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P.I.P 4

User Manual

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1 Functionality

The PIP-4 is a so called picture-in-picture processor. It is used to insert a video signal as a small window into a full frame display. The PIP-4 is designed to work with four independent channels. Each of these channels consists of an input for the different signal types YC and FBAS/BAS. The PIP-4 has a build in video crosspoint switch. By this, it is possible to freely select channels for the PIP window and the full frame. Another benefit is, that the PIP window and the full frame can have different signal types (FBAS/BAS, YC).

The configuration of the PIP-4 is completely done by a serial protocol using the RS232. The PIP-4 is designed to cascade up to 16 devices. Therefore, the RS232 input of the following PIP-4 must be connected with the RS232 output of the previous device. There are special commands to address one of these devices. The controlling computer (a PC for example) is always the authoritative part (the *master*). The master controls every connected PIP-4 (the *slaves*).

All of the settings could be saved to an EEPROM. At power up, the PIP-4 restores the saved setting. With this features, a *stand alone* operation is easily configured.

The PIP-4 has build in DIP switches. The first four switches are used to define a slave address. It is very important, that every PIP-4 inside the bus have an unique address! The switch DIP5 selects the baudrate of the built-in RS232 (off=2400bps, on=9600bps). As factory defaults, the PIP-4 uses 0 as address and a baudrate of 2400bps.

1.1 Structure of the PIP-4

The PIP-4 comes within a modern, small desktop case. The connectors of the power supply and the RS232 ports are placed on the front side. The connectors for all video signals (inputs and

outputs) are on the back side of the case. The four input channels are located on the left of the back plane. Each channel consist of an YC input (lower connector) and an FBAS input. Every channel, YC or FBAS , could be assigned to the full frame or the PIP window.

The four outputs could be found on the right half of the back plane. Each output have the same signals. They all could be connected to another video device. **Note:** the YC outputs are only active, if a input channel with a YC signal is selected as full frame.

1.2 Connecting the PIP-4

This chapter contains informations on how to wire the PIP-4. Note, that a user defined configuration forces it's own assignment of the channel inputs.

1.2.1 The control computer

The control computer is connected to the PIP-4 using the RS232. Since the PIP-4 is designed as a DTE, a so called 0-modem-cable must be used. This is necessary to connect two DTE devices.

The control computer uses a special command set to change the settings of the PIP-4. This requires a special program for the used control computer.

1.2.2 The video signals

If the PIP-4 is used in a user defined environment, it is important to read the specific documentation!

The PIP-4 supports 4 independent input channels. Each of them could be connected either to a YC source or to a FBAS/BAS source. Every channel could be assigned to the full frame or to the PIP window.

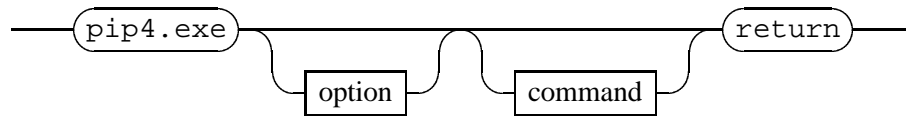
Note: it is not allowed to use the same input channel for both, PIP window and full frame, if they have different types (YC or FBAS).

The PIP-4 provides two outputs for FBAS an two for YC devices. The YC output are only available, if the full frame is connected to an YC source! Otherwise these outputs are inactive. The FBAS outputs are active without any restrictions.

1.2.3 The RS232 cable

For a DTE to DTE connection, a so called 0-modem-cable must be used. These cables have crossed RxD (pin 3) and TxD (pin 2) signals. There is no handshaking necessary. At least, the signal ground (pin 5) have to be connected. The cables are also used to cascade multiple PIP-4 devices.

synopsis



commands

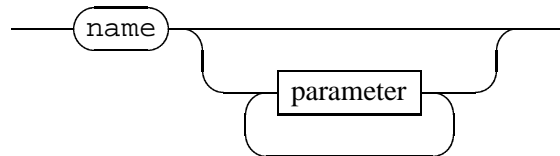


Figure 1: general commandline structure.

2 The PC-Software

The PIP-4 comes with a small MS-DOS commandline program. This simple program is a adaption of the serial protocol of the PIP-4. You can use `PIP4.EXE` to control all features of the connected PIP-4 devices.

2.1 The commandline

The program is designed to run on every MD-DOS PC. It is also possible to start if from within a *DOS box* of Windows 95. To install the program, you have to copy it to a directory of your choose.

If you are running Windows 95, it is not recommended to drag'n'drop a link to the desktop. This would call the program without any command.

Every call without any parameter forces the output of a short commandline description. Call `PIP4.EXE` with the parameter `help` to get an overview of the available commands.

Figure 1 shows the general structure of the commandline of the program. You can see, that the commandline is split into *options* and *commands*. The options are used to configure the program, while the commands are used to control the connected PIP-4 devices.

All options and commands are separated by whitespaces. If a command have it's own parameters, the program uses the *word* following the command.

2.2 The Options

com1..com4 select the serial port, to which the PIP-4 devices are connected. If this option isn't specified, COM1 is used as default.

Note: be aware that some computers have the serial mouse connected to this port!

2400bd, 9600bd configures the communication speed of the selected port. This selection must equal to the settings of the PIP-4! Without this option, the factory defaults of the PIP-4 are used.

help outputs a command summary to the screen. After this, the program quits running.

2.3 The Commands

The following overview describes all available commands of the program. The font `courier` is used to mark *keywords*. Word written in *italic* are placeholder for specific values which could be chosen by the user.

broadcast -

Activats the *broadcast mode*. In broadcast mode, all connected slaves are addressed. More detailed informations can be found at section 3.

slave *number*

This command is used to address a single slave. The parameter must be within 0 and 15.

xpos *number*

Defines the horizontal position of the pip window. The range of this value depends on the size of the PIP. Valid ranges for the horizontal position are: 1/9 PIP: 0..230 and 1/16 PIP: 0..255.

ypos *number*

Defines the vertical position of the pip window. The range of this value depends on the size of the pip. Valid ranges for the horizontal position are: 1/9 PIP: 0..185 and 1/16 PIP: 0..210.

size 1/9 | 1/16

This command is used to select the size of the pip window.

border off | thin | broad *color*

The command *border* configures the border of the pip windows. The border can be turned on and off. To turn it on, one of the parameters *thin* or *broad* must be used. The value of *color* specifies the color of the border. Valid selections are: black, magenta, green, white, red, yellow, orange and cyan.

show -

Activates a previously hidden pip window.

hide -

This command hides the pip window. This means, that the PIP window isn't keyed into the video signal.

freeze -

This command freeze the image of the pip window. The PIP shows the image at the time the command is transmitted.

live -

Switch back to a live video.

contrast *number*

Defines the contrast setting of the pip. The valid range of the parameter *number* is 0 to 15. A value of 0 is the lowest contrast possible. A value of 15 is the highest contrast possible.

frame *channel* *fbas* | *yc*

This command select a channel as full frame picture. The parameter *channel* specifies the the number of the channel. Note, that the this parameters counts from 0 to 3, whereas the labels of the connectors of the video signals starts with 1! The second parameter defines the type of the video signal.

Note: it is not allowed to use the same channel for both, PIP window and full frame, if they have different types.

pip *channel* *fbas* | *yc*

This command select a channel for the PIP window. For a descriptions of the parameters, look at the description of the command *frame*.

save -

This command saves all changes. At power up, the current state will be restored.

kill -

This command can be used to clear all saved setting. At power up, the PIP-4 uses the factory defaults.

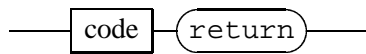
3 The serial protocol

The protocol described in this section defines the communication of the controlling PC and the PIP-4. If this informations are not necessary for your application, you can skip this section.

The serial protocol of the PIP-4 is based on normal ASCII characters. Every command starts with a single, case sensitive letter. There are up to two numeric parameters allowed. The parameters must be separated by a semicolon. Each command, terminated by a RETURN (0Dh), will be processed by the clients. Figure 2 shows the syntax graph of the general structure of the command sequence.

The PIP-4 devices are designed to work in a *master / slave* environment. The controlling computer is allways the *master*. All slaves are connected to one RS232 port. It is the job of the master to select the correct devices. Therefore the protocol implements *slave addresses*. Every

command



command

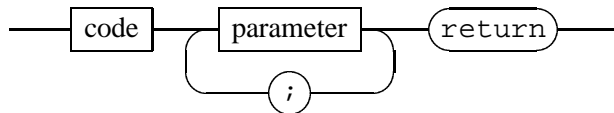


Figure 2: general structure of an command

addressed slave parse and execute the received commands. Further on, only a addressed slave is allowed to send data to the master.

In addition, a special *broadcast mode* is implemented, to make the setup of multiple devices much easier. In broadcast mode, each slave is addressed. The drawback is, that no slave is allowed to transmitt data! Because of this restriction, some commands are not available in this mode.

3.1 The command set

Table 1 describes every command of the serial protocol of the PIP-4. These informations are only needed for programmers.

Table 1: command overview

code	Parms	Description
I	/	An addressed PIP-4 returns some informations. These contains the name of the device and the revision code of the software, separated by a TAB character. Sample: "C01PIP<TAB>1.00" <i>This command ist not available in 'broadcast mode'.</i>
c	1	This command is used to address a slave. The parameter must be within 0 and 15. The imaginary address 255 is used to enter the broadcast mode. In broadcast mode, all slaves are address.
X	1	Defines the horizontal position of the PIP window. The range of this value depends on the size of the PIP. If the parameter is out of range, it will be clipped. Doing this, a value of 255 specifies the right margin for all pip sizes. Valid ranges for the horizontal position are: 1/9 PIP: 0..230 and 1/16 PIP: 0..255

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code	Parms	Description
Y	1	Defines the vertical position of the PIP window. The range of this value depends on the size of the PIP. If the parameter is out of range, it will be clipped. Doing this, a value of 255 specifies the lower margin for all pip sizes. Valid ranges for the horizontal position are: 1/9 PIP: 0..185 and 1/16 PIP: 0..210
W	2	The first parameter defines the width of the frame. Possible values are: 0=no frame, 1=thin, 2=broad The second parameter defines the color of the frame. The color codes 0 to 7 are assigned to the following colors: black, magenta, green, white, red, yellow, orange, cyan
P	1	Set the pip insertion visible (1) or invisible (0)
S	1	This command selects the size of the pip window. The size can be set to an 1/16 of the full frame by using the parameter 0. A Value of 1 switches to 1/9 of the original size.
F	1	Using this command, the image of the pip window could be frozen. Therefore, the parameter must be set to 1. To get a moving picture, the parameter must be 0.
C	1	Defines the contrast setting of the pip. The valid range of the parameter is 0 to 15.
f	2	This command select a channel as full frame picture. The first parameter specifies the channel. Note, that the this parameters counts from 0 to 3, whereas the labels of the connectors of the video signals starts with 1! The second parameter defines the type of the video signal. A 0 specifies a FBAS signal, while a 1 represents a YC signal. Note: it is not allowed to use the same channel for both, PIP window and full frame, if they have different types.
p	2	This command select a channel for the PIP window. The first parameter specifies the channel. Note, that the this parameters counts from 0 to 3, whereas the labels of the connectors of the video signals starts with 1! The second parameter defines the type of the video signal. A 0 specifies a FBAS signal, while a 1 represents a YC signal. Note: it is not allowed to use the same channel for both, PIP window and full frame, if they have different types.
#	1	With this command, it is possible to use b/w BAS signal as full frame signal. While doing this, the PIP-4 must know where to get the 'color information' (this means <i>burst</i> and <i>subcarrier</i>) from. If you enable the black and white mode, the color informations are taken from the PIP channel. Therefore, this channel must have a color signal. To enable the b/w mode, just set bit 0 of the parameter. To disable this mode, reset the bit.

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code	Parms	Description
k	/	This command can be used to clear all saved setting. At power up, the PIP-4 uses the factory defaults.
s	/	This command saves all changes. At power up, the current state will be restored.
*	/	<i>*internal*</i> restore to factory defaults. This command doesn't change the saved setting! To do so, just save the recalled state.
@	2	<i>*internal*</i> this command is used for direct register manipulation! Don't use this command, until you know what you do! The register number is given in the first parameter. The register is set to the value specified in the second parameter. <i>This command ist not available in 'broadcast mode'.</i>
?	1	<i>*internal*</i> this command requests the contents of the register, specified by the given parameter. <i>This command ist not available in 'broadcast mode'.</i>