DIO3265

Digital I/O Card

Software Manual (V3.0)

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Correction record

Manual Version	Record
1.0	First publish
2.0	revised to new manual style add new function DIO3265_set_default_password
3.0	disable the software key function with return value always true

Contents

1. How to install the software of DIO3265

1.1 Install the PCI driver

The PCI card is a plug and play card, once you add on a new card, the window system will detect while it is booting. Please follow the following steps to install your new card.

In WinXP/7 and up system you should: (take Win XP as example)

1. Make sure the power is off
2. Plug in the interface card
3. Power on
4. A hardware install wizard will appear and tell you it finds a new PCI card
5. Do not response to the wizard, just Install the file (..\DIO3265\Software\WinXP_7\ or if you download from website please execute the file DIO3265_Install.exe to get the file)
6. After installation, power off
7. Power on, it's ready to use

For more detail of step by step installation guide, please refer the file "installation.pdf " on the CD come with the product or register as a member of our user's club at:

http://automation.com.tw/

to download the complementary documents.

2. Where to find the file you need

WinXP/7 and up

The directory will be located at

.. \ JS Automation \DIO3265\API (header files and lib files for VB,VC,BCB,C#)

.. \ JS Automation \DIO3265\Driver (backup copy of DIO3265 drivers)

.. \ JS Automation \DIO3265\exe (demo program and source code)

The system driver is located at **..\system32\Drivers** and the DLL is located at **..\system**.

For your easy startup, the demo program with source code demonstrates the card functions and help file.

3. About the DIO3265 software

DIO3265 software includes a set of dynamic link library (DLL) and system driver that you can utilize to control the I/O card's ports and points separately.

Your DIO3265 software package includes setup driver, tutorial example and test program that help you how to setup and run appropriately, as well as an executable file which you can use to test each of the DIO3265 functions within Windows' operation system environment.

3.1 What you need to get started

To set up and use your DIO3265 software, you need the following:

- DIO3265 software
- DIO3265 hardware

  Main board

  Wiring board (Option)

3.2 Software programming choices

You have several options to choose from when you are programming DIO3265 software. You can use Borland C/C++, Microsoft Visual C/C++, Microsoft Visual Basic, or any other Windows-based compiler that can call into Windows dynamic link libraries (DLLs) for use with the DIO3265 software.

4. DIO3265 Language support

The DIO3265 software library is a DLL used with WinXP/7 and up. You can use these DLL with any Windows integrating development environment that can call Windows DLLs.

4.1 Building applications with the DIO3265 software library

The DIO3265 function reference topic contains general information about building DIO3265 applications, describes the nature of the DIO3265 files used in building DIO3265 applications, and explains the basics of making applications using the following tools:

Applications tools

- Microsoft Visual C/C++
- Borland C/C++
- Microsoft Visual C#
- Microsoft Visual Basic
- Microsoft VB.net

If you are not using one of the tools listed, consult your development tool reference manual for details on creating applications that call DLLs.

4.2 DIO3265 Windows libraries

The DIO3265 for Windows function library is a DLL called **DIO3265.dll**. Since a DLL is used, DIO3265 functions are not linked into the executable files of applications. Only the information about the DIO3265 functions in the DIO3265 import libraries is stored in the executable files.
Import libraries contain information about their DLL-exported functions. They indicate the presence and location of the DLL routines. Depending on the development tools you are using, you can make your compiler and linker aware of the DLL functions through import libraries or through function declarations.

Refer to **Table 1** to determine to which files you need to link and which to include in your development to use the DIO3265 functions in DIO3265.dll.

Header Files and Import Libraries for Different Development Environments		
Language	**Header File**	**Import Library**
Microsoft Visual C/C++	DIO3265.h	DIO3265VC.lib
Borland C/C++	DIO3265.h	DIO3265BC.lib
Microsoft Visual C#	DIO3265.cs	
Microsoft Visual Basic	DIO3265.bas	
Microsoft VB.net	DIO3265.vb	

Table 1

5. Basic concepts of digital I/O control

The digital I/O control is the most common type of PC based application. For example, on the main board, printer port is the TTL level digital I/O.

Types of I/O classified by isolation

If the system and I/O are not electrically connected, we call it is isolated. There are many kinds of isolation: by transformer, by photo-coupler, by magnetic coupler,… Any kind of device, they can brake the electrical connection without braking the signal is suitable for the purpose.

Currently, photo-coupler isolation is the most popular selection; isolation voltage up to 2000V or over is common. But the photo-coupler is limited by the response time, the high frequency type cost a lot. The new selection is magnetic coupler; it is designed to focus on high speed application.

The merit of isolation is to avoid the noise from outside world to enter the PC system, if the noise comes into PC system without elimination, the system maybe get "crazy" by the noise disturbance. Of course the isolation also limits the versatile of programming as input or output at the same pin as the TTL does. The inter-connection of add-on card and wiring board maybe extend to several meters without any problem.

The non-isolated type is generally the TTL level input/output. The ground and power source of the input/output port come from the system. Generally you can program as input or output at the same pin as you wish. **The connection of wiring board and the add-on board is limited to 50cm or shorter** (depends on the environmental noise condition).

Types of Output calssified by driver device

There are several devices used as output driver, the relay, transistor or MOS FET, SCR and SSR.

Relay is electric- mechanical device, its life time is about 1,000,000 times of switching. But on the other hand it has many selections such as high voltage or high current. It can also be used to switch DC load or AC load.

Transistor and MOS FET are basically semi-permanent devices. If you have selected the right ratings, it can work without switching life limit. But the transistor or MOS FET can only work in DC load condition.

The transistor or MOS FET also have another option is source or sink. For PMOS or PNP transistor is source type device, the load is one terminal connects to output and another connects to common ground, but NPN or NMOS is one terminal connects to output and the other connects to VCC+. **If you are concerned about hazard from high DC voltage while the load is floating, please choose the source type driver device.**

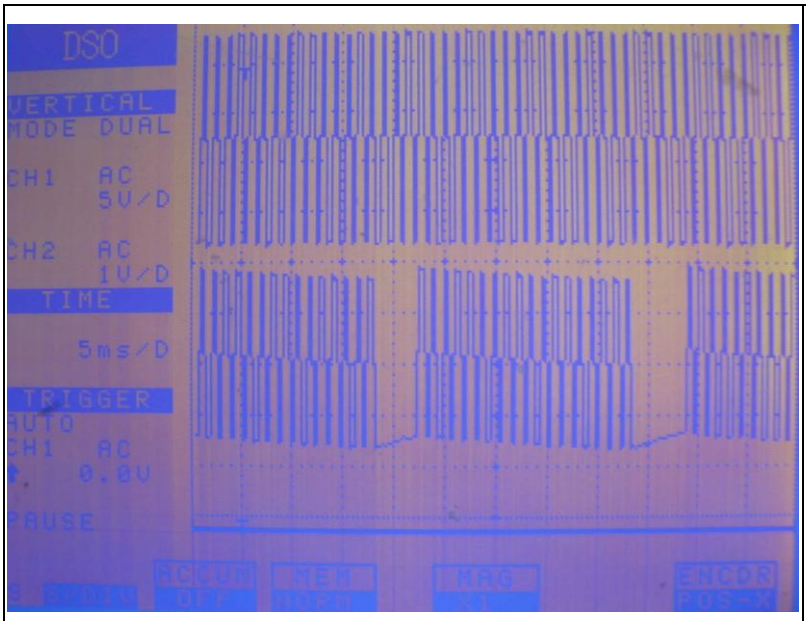
SCR (or triac) is seldom direct connect to digital output, but his relative SSR is the most often selection. In fact, SSR is a compact package of trigger circuit and triac. You can choose zero cross trigger (output command only turn on the output at power phase near zero to eliminate surge) or direct turn on type. SSR is working in AC load condition.

Input debounce

Debounce is the function to filter the input jitters. From the microscope view of a switch input, you will see the contact does not come to close or release to open clearly. In most cases, it will contact-release-contact-release… for many times then go to steady state (ON or OFF). If you do not have the debounce function, you will read the input at high state and then next read will get low state, this maybe an error data for your decision of contact input.

Debounce can be implemented by hardware or software. Analog hardware debounce circuit will have fixed time constant to filter out the significant input signal, if you want to change the response time, the only way is to change the circuit device.

If digital debounce is implemented, maybe several filter frequency you can choose. To choose the filter frequency, please keep the Nyquist–Shannon sampling theorem in mind: filter sample frequency must at least twice of the input frequency. The following sample is a bad selection of debounce filter, the input frequency is not as low as les than half of the sample frequency, the output will generate a beat frequency.

<table>
<tr><td> 
</td><td><- Input frequency at 835Hz

<- Output of digital filter,
Please note the beat frequency.</td></tr>
<tr><td colspan="2">Digital debounce circuit work at 1KHZ sample rate and observe the output of filter from 835Hz input</td></tr>
</table>

Software debounce will consume the CPU time a lot, we do not recommend to use except for you really know you want.

Input interrupt

You can scan the input by polling, but the CPU will spend a lot of time to do null task. Another way is use a timer to sample the input at adequate time (remind the Nyquist–Shannon sampling theorem, at least double of the input frequency). The third one is directly allows the input to generate interrupt to CPU. To use direct interrupt from input, the noise coupled from input must take special care not to mal-trigger the interrupt.

Read back of Output status

Some applications need to read back the output status, if the card does not provide output status read back, you can use a variable to store the status of output before you really command it output. Some cards provide the read back function but please note that **the read back status is come from the output register, not from the real physical output.**

6. Function format and language difference

6.1 Function format

Every DIO3265 function is consist of the following format:

Status = function_name (parameter 1, parameter 2, … parameter n);

Each function returns a value in the **Status** global variable that indicates the success or failure of the function. A returned **Status** equal to zero that indicates the function executed successfully. A non-zero status indicates failure that the function did not execute successfully because of an error, or executed with an error.

Note: **Status** is a 32-bit unsigned integer.

The first parameter to almost every DIO3265 function is the parameter **CardID** which is located the driver of DIO3265 board you want to use those given operation. The **CardID** is assigned by DIP/ROTARY SW. You can utilize multiple devices with different card CardID within one application; to do so, simply pass the appropriate **CardID** to each function.

Note: **CardID** is set by DIP/ROTARY SW (**0x0-0xF**)

6.2 Variable data types

Every function description has a parameter table that lists the data types for each parameter. The following sections describe the notation used in those parameter tables and throughout the manual for variable data types.

Primary Type Names					
Name	**Description**	**Range**	**C/C++**	**Visual BASIC**	**Pascal (Borland Delphi)**
u8	8-bit ASCII character	0 to 255	char	Not supported by BASIC. For functions that require character arrays, use string types instead.	Byte
I16	16-bit signed integer	-32,768 to 32,767	short	Integer (for example: deviceNum%)	SmallInt
U16	16-bit unsigned integer	0 to 65,535	unsigned short for 32-bit compilers	Not supported by BASIC. For functions that require unsigned integers, use the signed integer type instead. See the i16 description.	Word
I32	32-bit signed integer	-2,147,483,648 to 2,147,483,647	long	Long (for example: count&)	LongInt
U32	32-bit unsigned integer	0 to 4,294,967,295	unsigned long	Not supported by BASIC. For functions that require unsigned long integers, use the signed long integer type instead. See the i32 description.	Cardinal (in 32-bit operating systems). Refer to the i32 description.
F32	32-bit single-precision floating-point value	-3.402823E+38 to 3.402823E+38	float	Single (for example: num!)	Single
F64	64-bit double-precision floating-point value	-1.797683134862315E+308 to 1.797683134862315E+308	double	Double (for example: voltage Number)	Double

Table 2

6.3 Programming language considerations

Apart from the data type differences, there are a few language-dependent considerations you need to be aware of when you use the DIO3265 API. Read the following sections that apply to your programming language.

Note: Be sure to include the declaration functions of DIO3265 prototypes by including the appropriate DIO3265 header file in your source code. Refer to Building Applications with the DIO3265 Software Library for the header file appropriate to your compiler.

6.3.1 C/C++

For C or C++ programmers, parameters listed as Input/Output parameters or Output parameters are pass-by-reference parameters, which means a pointer points to the destination variable should be passed into the function. For example, the Read Port function has the following format:

Status = DIO3265_out_port_read **(u8 CardID, u8 port, u8*data);**

where **CardID** and **port** are input parameters, and **data** is an output parameter. Consider the following example:

```
u8 CardID, port;
u8 data,
u32 Status;
Status = DIO3265_out_port_read (CardID, port, &data);
```

6.3.2 Visual basic

The file DIO3265.bas contains definitions for constants required for obtaining DIO Card information and declared functions and variable as global variables. You should use these constants symbols in the *DIO3265*.bas, do not use the numerical values.

In Visual Basic, you can add the entire DIO3265.bas file into your project. Then you can use any of the constants defined in this file and call these constants in any module of your program. To add the DIO3265.bas file for your project in Visual Basic 4.0, go to the **File** menu and select the **Add File... option**. Select DIO3265.bas, which is browsed in the DIO3265 \ API directory. Then, select **Open** to add the file to the project.

To add the DIO3265.bas file to your project in Visual Basic 5.0 and 6.0, go to the **Project** menu and select **Add Module**. Click on the Existing tab page. **Select** DIO3265.bas, which is in the DIO3265 \ API directory. Then, select **Open** to add the file to the project.

6.3.3 Borland C++ builder

To use Borland C++ builder as development tool, you should generate a .lib file from the .dll file by implib.exe.

implib DIO3265BC.lib DIO3265.dll

Then add the **DIO3265BC.lib** to your project and add

#include "DIO3265.h" to main program.

Now you may use the dll functions in your program. For example, the Read Port function has the following format:

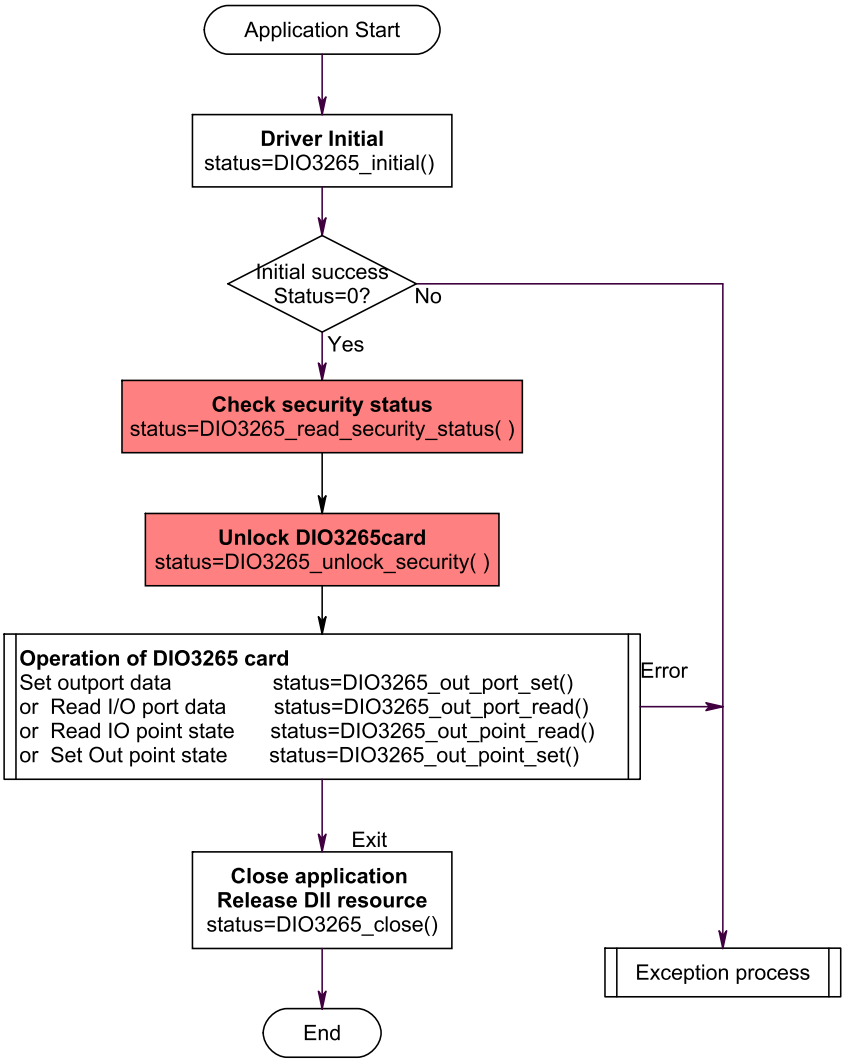
Status = DIO3265_out_port_read **(u8 CardID, u8 port, u8*data);**

where **CardID** and **port** are input parameters, and **data** is an output parameter. Consider the following example:

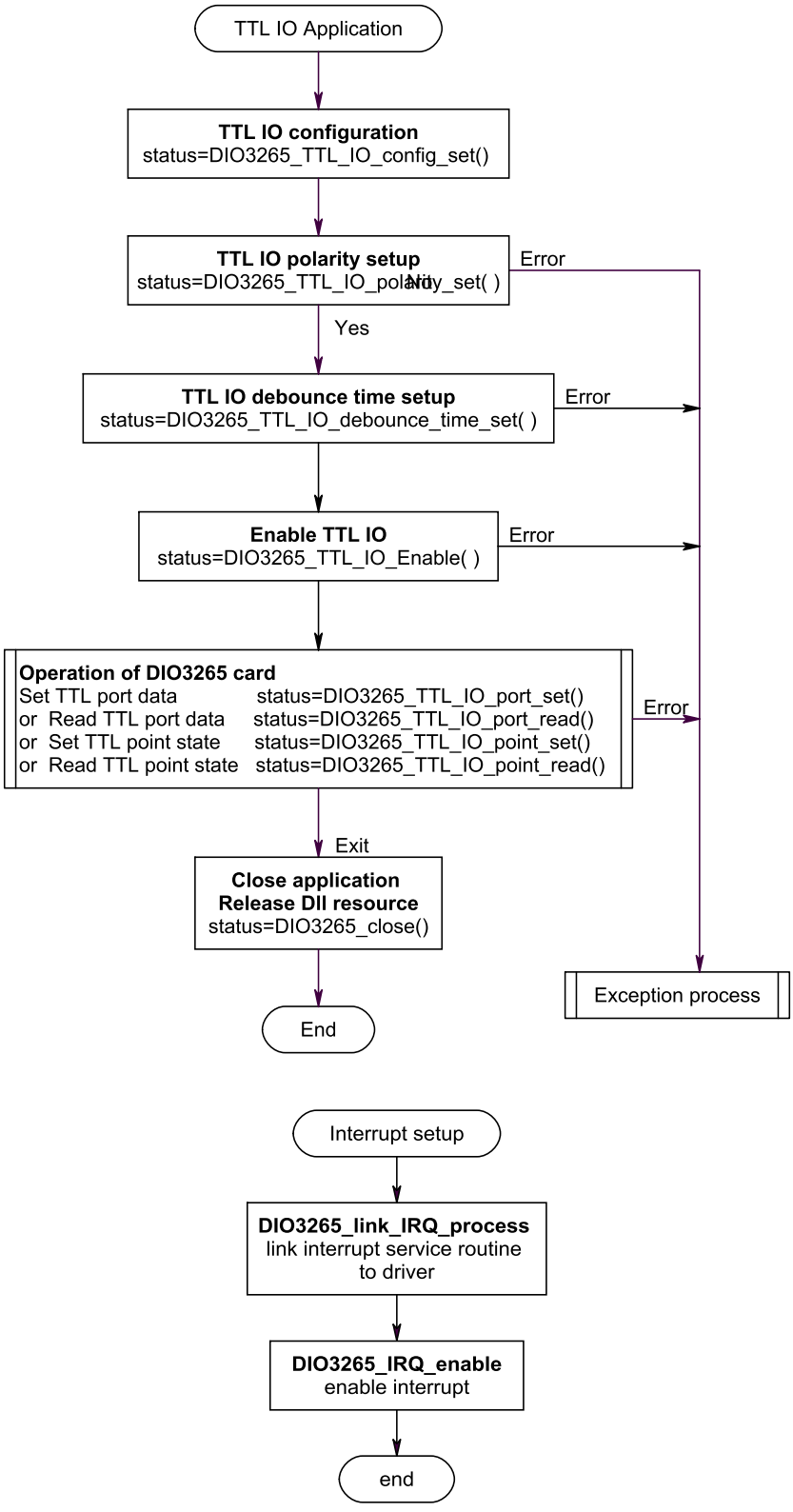
u8 CardID, port;
u8 data;
u32 Status;
Status = DIO3265_out_port_read (CardID, port, &data);

7. Flow chart of application implementation

7.1 DIO3265 Flow chart of application implementation



* If you do not use the password function, no need to unlock


TTL IO Application
TTL IO configuration
status=DIO3265_TTL_IO_config_set()
TTL IO polarity setup
status=DIO3265_TTL_IO_polarity_set( )
Error
Yes
TTL IO debounce time setup
status=DIO3265_TTL_IO_debounce_time_set( )
Error
Enable TTL IO
status=DIO3265_TTL_IO_Enable( )
Error
Operation of DIO3265 card
Set TTL port data status=DIO3265_TTL_IO_port_set()
or Read TTL port data status=DIO3265_TTL_IO_port_read()
or Set TTL point state status=DIO3265_TTL_IO_point_set()
or Read TTL point state status=DIO3265_TTL_IO_point_read()
Error
Exit
Close application
Release Dll resource
status=DIO3265_close()
End
Exception process
Interrupt setup
DIO3265_link_IRQ_process
link interrupt service routine
to driver
DIO3265_IRQ_enable
enable interrupt
end

8. Software overview and dll function

8.1 Initialization and close

You need to initialize system resource each time you run your application.

DIO3265_initial( ) will do.

Once you want to close your application, call

DIO3265_close( ) to release all the resource.

If you want to know the physical address assigned by OS. Use

DIO3265_info( ) to get the address .

- **DIO3265_initial**

  Format : u32 status =DIO3265_initial (void)

  Purpose: Initial the DIO3265 resource when start the Windows applications**.**

- **DIO3265_close**

  Format : u32 status = DIO3265_close (void);

  Purpose: Release the DIO3265 resource when close the Windows applications.

- **DIO3265_info**

  Format : u32 status = DIO3265_info(u8 CardID, u16 * address);

  Purpose: Read the physical I/O address assigned by O.S.

  Parameters:

  Input:

Name	Type	Description
CardID	u8	assigned by DIP/ROTARY SW

  Output:

Name	Type	Description
address	u16	physical I/O address assigned to DIO block by OS

8.2 Out port R/W

The DIO3265 card has only isolated output port and 2 byte programmable TTL I/O. We provide different functions for the two type of I/O.

The isolated output port can be set by:

DIO3265_out_port_set( ) and the output register can be read back by:

DIO3265_out_port_read( ).

If you just want to set one point or read one point, the function

DIO3265_out_point_set( ) and

DIO3265_out_point_read( ) will do.

To match with your application and keep the application software at logic conformity, the output polarity can be set and read back to verify by:

DIO3265_out_polarity_set( ) and read back by:

DIO3265_out_polarity_read( ).

- **DIO3265_out_port_set**

Format : u32 status = DIO3265_out_port_set (u8 CardID, u8 port, u8 data)

Purpose: Sets the output data.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1 … 7: port7
data	u8	bitmap of output values bit0: OUTn0 .... bit7: OUTn7 n is the port number

- **DIO3265_out_port_read**

Format : u32 status = DIO3265_out_port_read (u8 CardID , u8 port , u8 *data)

Purpose: Read the output data.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1 … 7: port7

Output:

Name	Type	Description
data	u8	bitmap of output values bit0: OUTn0 .... bit7: OUTn7 n is the port number

- **DIO3265_out_point_set**

Format : u32 status =DIO3265_out_point_set (u8 CardID, u8 port, u8 point, u8 state)

Purpose: Sets the bit data of output port.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1 … 7: port7
point	u8	point number 0~7 for bit0~bit7
state	u8	output state 0: inactive 1: active

- **DIO3265_out_point_read**

Format : u32 status =DIO3265_out_point_read (u8 CardID, u8 port, u8 point, u8 *state)

Purpose: Read the output port state.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1 … 7: port7
point	u8	point number of input 0~7 for bit0~bit7

Output:

Name	Type	Description
state	u8	output state 0: inactive 1: active

- **DIO3265_out_polarity_set**

Format : **u32 status =DIO3265_out_polarity_set (u8 CardID, u8 port, u8 polarity)**

Purpose: Sets the I/O polarity of port0~ port7

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1 … 7: port7
polarity	u8	polarity values b0: polarity of OUTn0 ... b7: polarity of OUTn7 bit data =0, normal polarity (default) bit data =1, invert polarity n is port number

- **DIO3265_out_polarity_read**

Format : **u32 status = DIO3265_out_polarity_read (u8 CardID, u8 port, u8 * polarity)**

Purpose: Read the I/O polarity of the port0~port7.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1 … 7: port7

Output:

Name	Type	Description
polarity	u8	polarity values b0: polarity of OUTn0 ... b7: polarity of OUTn7 bit data =0, normal polarity (default) bit data =1, invert polarity n is port number

8.3 TTL I/O Port R/W

DIO3265 has only isolated output ports but it also provides 2 TTL I/O ports which are more flexible for non-isolated application. The ports can be configured as input or output on port base. The port can be set at normal high or normal low voltage during power on by the on card jumper JP1 and JP2. (Refer Hardware manual, chapter 8 Hardware settings)

To configure the port as input or output by:

DIO3265_TTL_IO_config_set ( ) and read back the configuration by:

DIO3265_TTL_IO_config_read ( ).

To change the polarity as you need by:

DIO3265_TTL_IO_polarity_set( ) and read back to verify by:

DIO3265_TTL_IO_polarity_read( ).

After the configuration is complete, you can enable the port to function or disable it any time you want, the output of the disabled port will remain at high or low depends on the jumper setting. Use:

DIO3265_TTL_IO_Enable( ) to enable the port and

DIO3265_TTL_IO_Disable( ) to disable the port.

The TTL I/O port can use:

DIO3265_TTL_IO_port_set ( ) to output data and input data by:

DIO3265_TTL_IO_port_read( ).

For the point output, use:

DIO3265_TTL_IO_point_set ( ) and point input by:

DIO3265_TTL_IO_point_read ( ).

The DIO3265 card provides digital input debounce function. There are 4 range: 100Hz, 200Hz, 1KHz and no debounce to select for your application. At noisy environment to debounce the signal or to debounce the mechanical contact input, use:

DIO3265_TTL_IO_debounce_time_set ( ) to set the adequate time constant to drop out the noise and read back to check the setting by:

DIO3265_TTL_IO_debounce_time_read( ).

- **DIO3265_TTL_IO_config_set**

Format : **u32 status =DIO3265_TTL_IO_config_set (u8 CardID, u8 port, u8 configuration)**

Purpose: Sets port configuration.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1
configuration	u8	0: output port (default) 1: input port

- **DIO3265_TTL_IO_config_read**

Format : **u32 status =DIO3265_TTL_IO_config_read (u8 CardID, u8 port, u8 *configuration, u8 *TTL_IO_Status)**

Purpose: read port configuration, read TTL Enable status.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1

Output:

Name	Type	Description
configuration	u8	0: output port (default) 1: input port
TTL_IO_Status	u8	0: Disable 1: Enable

- **DIO3265_TTL_IO_polarity_set**

Format : **u32 status =DIO3265_TTL_IO_polarity_set (u8 CardID, u8 port, u8 polarity)**

Purpose: Sets the I/O polarity of port0~ port7

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1
polarity	u8	polarity values b0: polarity of IOn0 ... b7: polarity of IOn7 bit data =0, normal polarity (default) bit data =1, invert polarity n is port number

- **DIO3265_TTL_IO_polarity_read**

Format : **u32 status = DIO3265_TTL_IO_polarity_read (u8 CardID, u8 port, u8 * polarity)**

Purpose: Read the I/O polarity of the port0~port7.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1

Output:

Name	Type	Description
polarity	u8	polarity values b0: polarity of IOn0 ... b7: polarity of IOn7 bit data =0, normal polarity (default) bit data =1, invert polarity n is port number

- **DIO3265_TTL_IO_Enable**

Format : u32 status =DIO3265_TTL_IO_Enable (u8 CardID, u8 port)

Purpose: Enable TTL IO. Only enabled port can be in or out.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1

- **DIO3265_TTL_IO_Disable**

Format : u32 status =DIO3265_TTL_IO_Disable (u8 CardID, u8 port)

Purpose: Disable TTL IO. The output will be high or low depends on the JP1, JP2 setting.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1

- **DIO3265_TTL_IO_port_set**

Format : u32 status = DIO3265_TTL_IO_port_set (u8 CardID,u8 port, u8 data)

Purpose: Sets the output data.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1
data	u8	bitmap of output/input values b0: IOn0 ... b7: IOn7 n is port number

- **DIO3265_TTL_IO_port_read**

Format : u32 status = DIO3265_TTL_IO_port_read (u8 CardID , u8 port , u8 *data)

Purpose: Read the output data.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1

Output:

Name	Type	Description
data	u8	bitmap of output/input values b0: IOn0 ... b7: IOn7 n is port number

- **DIO3265_TTL_IO_point_set**

Format : u32 status =DIO3265_TTL_IO_point_set (u8 CardID, u8 port, u8 point, u8 state)

Purpose: Sets the bit data of output port.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1
point	u8	point number 0~7 for bit0~bit7
state	u8	point of output state 0: inactive 1: active

- **DIO3265_TTL_IO_point_read**

Format : u32 status =DIO3265_TTL_IO_point_read (u8 CardID, u8 port, u8 point, u8 *state)

Purpose: Read the output port state .

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1
point	u8	point number of input 0~7 for bit0~bit7

Output:

Name	Type	Description
state	u8	point of output state 0: inactive 1: active

- **DIO3265_TTL_IO_debounce_time_set**

Format : u32 status = DIO3265_TTL_IO_debounce_time_set (u8 CardID,u8 port ,u8 debounce_time)

Purpose: debounce time of the TTL I/O port signal

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1
debounce_time	u8	Debounce time selection: 0: no debounce 1: filter out duration less than 10ms (100Hz, default) 2: filter out duration less than 5ms (200Hz) 3: filter out duration less than 1ms (1KHZ)

Note: only valid for port configured as input

- **DIO3265_TTL_IO_debounce_time_read**

Format : u32 status = DIO3265_TTL_IO_debounce_time_read (u8 CardID,u8 port , u8 *debounce_time)

Purpose: To read back configuration of debounce mode

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
port	u8	port number 0: port0 1: port1

Output:

Name	Type	Description
debounce_time	u8	Debounce time selection: 0: no debounce 1: filter out duration less than 10ms (default) 2: filter out duration less than 5ms 3: filter out duration less than 1ms

8.4 Timer function

There is a build-in 32 bit timer run on 1us time base, you can set the timer constant by

DIO3265_timer_set( ) and

DIO3265_timer_start( ) to star its operation,

DIO3265_timer_stop( ) to stop operation.

For the timer related registers use:

DIO3265_timer_read( ) to read back registers.

- **DIO3265_timer_set**

Format : u32 status = DIO3265_timer_set (u8 CardID, u32 time_constant)

Purpose: set time constant.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by DIP/ROTARY SW
time_constant	u32	time_constant based on 1us time base

Note:

1. Time constant is based on 1us clock, period T= (time_constant +1) * 1us

2. If you also enable the timer interrupt, the period T must at least larger than the system interrupt response time else the system will be hanged by excess interrupts.

- **DIO3265_timer_read**

Format : u32 status= DIO3265_timer_read (u8 CardID, u8 index, u32 * data)

Purpose: Read back the setting of timer related registers

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by DIP/ROTARY SW
index	u8	0: Timer Start Status 1: Set Timer Data 2: Current Timer Data

Output:

Name	Type	Description
data	u32	Data read back

- **DIO3265_timer_start**

Format : **u32 status = DIO3265_timer_start (u8 CardID)**

Purpose: start timer function.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by DIP/ROTARY SW

- **DIO3265_timer_stop**

Format : **u32 status = DIO3265_timer_stop (u8 CardID)**

Purpose: stop timer function.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by DIP/ROTARY SW

8.5 Interrupt function

Sometimes you want your application to take care of the I/O while special event occurs; interrupt function is the right choice. DIO3265 provide timer event trigger input.

You must first link your service routine to the driver by

DIO3265_IRQ_process_link( ), load the timer and start it function (timer function can be execute after irq eanble).

Now all is ready, you can enable the interrupt by:

DIO3265_IRQ_enable( ) or disable by

DIO3265_IRQ_disable( ).

To read back the interrupt status (at interrupt service routine or polling routine) use

DIO3265_IRQ_read_status( ).

After reading the status register on card will be cleared.

- **DIO3265_IRQ_process_link**

Format : **u32 status = DIO3265_IRQ_process_link (u8 CardID,**
void (__stdcall *callbackAddr)(u8 CardID))

Purpose: Link irq service routine to driver

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW
callbackAddr	void	callback address of service routine

- **DIO3265_IRQ_enable**

Format : **u32 status = DIO3265_IRQ_enable (u8 CardID, HANDLE *phEvent)**

Purpose: Enable interrupt from timer

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW

Output:

Name	Type	Description
phEvent	HANDLE	event handle

- **DIO3265_IRQ_disable**

Format : **u32 status = DIO3265_IRQ_disable (u8 CardID)**

Purpose: Disable interrupt from timer

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW

- **DIO3265_IRQ_read_status**

Format : **u32 status = DIO3265_IRQ_read_status (u8 CardID, u8 *Event_Status)**

Purpose: To read back the interrupt status to identify the source

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by Rotary SW

Output:

Name	Type	Description
Event_Status	u8	Timer block: B0=1 means timer count up occurred. B0=0 means timer not count up.

Note:

1. Status read back will also clear the on board status register.

8.6 Software key function

From the dll version 3.0 and later, we remove the software key function owing to some customers complained about the card locked on some unknown occasion. We only remain the functions to comply with the existing programs but the returned value always true.

Since DIO3265 is a general purpose card, anyone who can buy from JS automation Corp. or her distributors. Your program is the fruit of your intelligence, un-authorized copy maybe prevent by the security function enabled.

You can use

DIO3265_set_password( ) to set password and start the security function.

DIO3265_change_password( ) to change it.

If you don't want to use security function after the password being setup,

DIO3265_clear_password( ) will reset to the virgin state.

Once the password is set, any function call of the dll's (except for the security functions) will be blocked until the

DIO3265_unlock_security( ) unlock the security.

You can also use

DIO3265_read_security_status( ) to check the current status of security.

On some special occasion, you do not set any password but the card locked by unknown accident, to unlock the unknown password to virgin state, use

DIO3265_set_default_password ( ) to clear all passwords.

- **DIO3265_set_password**

Format : **u32 status = DIO3265_set_password(u8 CardID,u16 password[5]);**

Purpose: To set password and if the password is not all "0", security function will be enabled.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by DIP/ROTARY SW
password[5]	u16	Password, 5 words

Note on password:

If the password is all "0", the security function is disabled.

- **DIO3265_change_password**

Format : **u32 status = DIO3265_change_password(u8 CardID, u16 Oldpassword[5], u16 password[5]);**

Purpose: To replace old password with new password.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by DIP/ROTARY SW
Oldpassword [5]	u16	The previous password
password[5]	u16	The new password to be set

- **DIO3265_clear_password**

Format : **u32 status = DIO3265_clear_password(u8 CardID,u16 password[5])**

Purpose: To clear password, to set password to all "0", i.e. disable security function.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by DIP/ROTARY SW
password[5]	u16	The password previous set

- **DIO3265_unlock_security**

Format : **u32 status = DIO3265_unlock_security(u8 CardID,u16 password[5])**

Purpose: To unlock security function and enable the further operation of this card

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by DIP/ROTARY SW
password[5]	u16	The password previous set

- **DIO3265_read_security_status**

Format : **u32 status = DIO3265_read_security_status(u8 CardID,u8 *lock_status, u8 *security_enable);**

Purpose: To read security status for checking if the card security function is unlocked.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by DIP/ROTARY SW

Output:

Name	Type	Description
lock_status	u8	0: security unlocked 1: locked 2: dead lock (must return to original maker to unlock)
security_enable	u8	0: security function disabled 1: security function enabled

Note on security status:

The security should be unlocked before using any other function of the card, and any attempt to unlock with the wrong passwords more than 10 times will cause the card at dead lock status. Any further operation even with the correct password will not unlock the card. The only way is to send back to the card distributor or the original maker to unlock to virgin state.

- **DIO3265_set_default_password**

Format : **u32 status = DIO3265_set_default_password (u8 CardID)**

Purpose: Clear all passwords.

Parameters:

Input:

Name	Type	Description
CardID	u8	assigned by DIP/ROTARY SW

9. Dll list

	Function Name	Description
1	DIO3265_initial( )	DIO3265 Initial
2	DIO3265_close( )	DIO3265 Close
3	DIO3265_info( )	get OS. Assigned address
4	DIO3265_out_port_set( )	Sets the output data.
5	DIO3265_out_port_read( )	Read the output data.
6	DIO3265_out_point_set( )	Sets the bit data of output port.
7	DIO3265_out_point_read( )	Read the output port state.
8	DIO3265_out_polarity_set( )	Sets the I/O polarity of port0~ port7
9	DIO3265_out_polarity_read( )	Read the I/O polarity of the port0~port7.
10	DIO3265_TTL_IO_config_set( )	Sets port configuration.
11	DIO3265_TTL_IO_config_read( )	read port configuration, read TTL Enable status.
12	DIO3265_TTL_IO_polarity_set( )	Sets the I/O polarity of port0~ port7.
13	DIO3265_TTL_IO_polarity_read( )	Read the I/O polarity of the port0~port7.
14	DIO3265_TTL_IO_Enable( )	Enable TTL IO.
15	DIO3265_TTL_IO_Disable( )	Disable TTL IO.
16	DIO3265_TTL_IO_port_set( )	Sets the output data.
17	DIO3265_TTL_IO_port_read( )	Read the output data.
18	DIO3265_TTL_IO_point_set( )	Sets the bit data of output port.
19	DIO3265_TTL_IO_point_read( )	Read the output port state.
20	DIO3265_TTL_IO_debounce_time_set( )	Set input port debounce time
21	DIO3265_TTL_IO_debounce_time_read( )	Read back input port debounce time
22	DIO3265_timer_set( )	Set timer constant
23	DIO3265_timer_read( )	Read back the setting of timer related registers
24	DIO3265_timer_start( )	Start timer operation
25	DIO3265_timer_stop( )	Stop timer operation
26	DIO3265_IRQ_process_link( )	Link irq service routine
27	DIO3265_IRQ_enable( )	Enable interrupt function
28	DIO3265_IRQ_disable( )	Disable interrupt function
29	DIO3265_IRQ_read_status( )	Read back the IRQ status
30	DIO3265_set_password( )	Set software key
31	DIO3265_change_password( )	Change software key
32	DIO3265_clear_password( )	Clear software key
33	DIO3265_unlock_security( )	Unlock software key
34	DIO3265_read_security_status( )	Read software key status
35	DIO3265_set_default_password( )	Clear all passwords

10. DIO3265 Error codes summary

Error Code	Symbolic Name	Description
0	DRV_NO_ERROR	No error.
1	DRV_READ_DATA_ERROR	Driver read data error
2	DRV_INIT_ERROR	Driver initial error
100	DEVICE_RW_ERROR	Device Read/Write error
101	DRV_NO_CARD	No DIO3265 card on the system.
102	DRV_DUPLICATE_ID	DIO3265 CardID duplicate error.
103	DRV_NOT_INSTALL	Driver not installed or bad installation
300	ID_ERROR	Function input parameter error. CardID setting error, CardID doesn't match the DIP SW setting
301	PORT_ERROR	Function input parameter error. Parameter out of range.
302	IN_POINT_ERROR	Function input parameter error. Parameter out of range.
303	OUT_POINT_ERROR	Function input parameter error. Parameter out of range.
306	DEBOUNCE_MODE_ERROR	Bad debounce time parameter
406	JSDIO_INDEX_ERROR	Bad index parameter