PCI-1202/1602/180x Software Manual

(for Windows 98/NT/2K/XP)

Warranty

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1. Introduction

PCI-1202/1602/180x Development Toolkit provides DLL (Dynamic Link Library) and simple DEMOs. Those DEMOs will show you how easy to use DLL to complete the I/O process without facing complex hardware.

This document introduces PCI-1202, PCI-1602, and PCI-180x series functions in the DLL. It is intended to be a companion to know functions, using the special functions (Continuous Capture, MagicScan...), programming, and error code information.

These DLL can perform a variety of data acquisition operation as follows:

1. Testing function
2. Plag & Play function
3. DIO function
4. DA function
5. AD funciton
6. MagicScan function
7. M_Function
8. Continuous Capture function
9. Batch Capture function

Section 1.1 : Functions categories and define.
Section 1.2 : Error code define.
Section 1.3 : The list of Configuration code that can control amplifier signal.
Section 1.4 : The list of thread priority setting.
(With the priority setting, you can get higher thread priority in the OS.)

1.1 Function Define

When you read the function manual, please notice the "KeyWORD" for variables.

KeyWORD	Set before call functions	Set after call functions and return value
[Input]	Yes	No
[Output]	No	Yes

The functions in the PCI-1202 DLL are divided into 9 categories. (The red WORD "P1202" of functions name could be replaced with "P1602" or "P180x" to use the functions which have the same purpose defined in P1602 or P180x DLL.)

Example:

P1202_ClearScan(Void)➔P1602_ClearScan(Void) or P180x_ClearScan(Void)

Category	Functions Define
Test	float P1202_FloatSub2(float fA, float fB);
	short P1202_ShortSub2(short nA, short nB);
	WORD P1202_GetDllVersion(Void);
	WORD P1202_GetDriverVersion(WORD *wVxdVersion);
Driver	WORD P1202_DriverInit(WORD *wTotalBoards);
	Void P1202_DriverClose(Void);
	WORD P1202_GetConfigAddressSpace(WORD wBoardNo, WORD *wAddrTimer,WORD *wAddrCtrl, WORD *wAddrDio, WORD *wAddrAdda);
	WORD P1202_ActiveBoard(WORD wBoardNo)
	WORD P1202_WhichBoardActive(Void);
Digital I/O	WORD P1202_Di(WORD *wDi);
	WORD P1202_Do(WORD wDo);
D/A	WORD P1202_Da(WORD wDaChannel, WORD wDaVal);
A/D	WORD P1202_SetChannelConfig(WORD wAdChannel, WORD wConfig);
	WORD P1202_AdPolling(float *fAdVal);
	WORD P1202_AdsPolling(float fAdVal[], WORD wNum);
	WORD P1202_AdsPacer(float fAdVal[], WORD wNum, WORD wSampleDiv);

Category	Functions Define
Magic	WORD P1202_ClearScan(Void);
	WORD P1202_StartScan(WORD wSampleRateDiv, DWORD dwNum, SHORT nPriority);
	WORD P1202_StartScanPostTrg(WORD wSampleRateDiv, DWORD dwNum, SHORT nPriority);
	WORD P1202_StartScanPreTrg(WORD wSampleRateDiv, DWORD dwNum, SHORT nPriority);
	WORD P1202_StartScanMiddleTrg(WORD wSampleRateDiv, DWORD dwNum, DWORD dwN2, SHORT nPriority);
	WORD P1202_StartScanPreTrgVerC(WORD wSampleRateDiv, DWORD dwNum, SHORT nPriority);
	WORD P1202_StartScanMiddleTrgVerC(WORD wSampleRateDiv, DWORD dwNum, DWORD dwN2,SHORT nPriority);
	Void P1202_ReadScanStatus(WORD *wStatus, DWORD *dwLowAlarm, DWORD *dwHighAlarm);
	WORD P1202_AddToScan(WORD wAdChannel, WORD wConfig, WORD wAverage, WORD wLowAlarm, WORD wHighAlarm, WORD wAlarmType);
	WORD P1202_SaveScan(WORD wAdChannel, WORD wBuf[]);
	Void P1202_WaitMagicScanFinish(WORD *wStatus, DWORD *dwLowAlarm, DWORD *dwHighAlarm);
	WORD P1202_StopMagicScan();
M_Function	WORD P1202_M_FUN_1(WORD wDaNumber, WORD wDaWave, float fDaAmplitude, WORD wAdSampleRateDiv, WORD wAdNumber, WORD wAdConfig, float fAdBuf[], float fLowAlarm, float HighAlarm);
	WORD P1202_M_FUN_2(WORD wDaNumber, WORD wDaWave, WORD wDaBuf[], WORD wAdSampleRateDiv, WORD wAdNumber, WORD wAdConfig, WORD wAdBuf[]);
	WORD P1202_M_FUN_3(WORD wDaNumber, WORD wDaWave, float fDaAmplitude, WORD wAdSampleRateDiv, WORD wAdNumber, WORD wChannelStatus[], WORD wAdConfig[], float fAdBuf[], float fLowAlarm, float fHighAlarm);
	WORD P1202_M_FUN_4(WORD wType, WORD wDaNumber, WORD wDaWave, float fDaAmplitude, WORD wAdSampleRateDiv, WORD wAdNumber, WORD wChannelStatus[], WORD wAdConfig[], float fAdBuf[], float fLowAlarm, float fHighAlarm);

Category	Functions Define
Continuous Capture	WORD P1202_Card0_StartScan(WORD wSampleRate, WORD wChannelStatus[], WORD wChannelConfig[],WORD wCount);
	WORD P1202_Card0_ReadStatus(WORD wBuf[], WORD wBuf2[], DWORD *dwP1, DWORD *dwP2, WORD *wStatus);
	Void P1202_Card0_Stop(Void);
	WORD P1202_Card1_StartScan(WORD wSampleRate, WORD wChannelStatus[],WORD wChannelConfig[],WORD wCount);
	WORD P1202_Card1_ReadStatus(WORD wBuf[], WORD wBuf2[], DWORD *dwP1, DWORD *dwP2,WORD *wStatus);
	Void P1202_Card1_Stop(Void);
	WORD P1202_FunA_Start(WORD wClock0Div, WORD wChannel0[], WORD wConfig0[], WORD Buffer0, DWORD dwMaxCount0, WORD wClock1Div, WORD wChannel1[], WORD wConfig1[], WORD *Buffer1, DWORD dwMaxCount1, SHORT nPriority);
Batch Capture	WORD P1202_FunA_ReadStatus(Void);
	WORD P1202_FunA_Stop(Void);
	WORD P1202_FunA_Get(DWORD *P0, DWORD *P1);
	WORD P1202_FunB_Start(WORD wClock0Div, WORD wChannel0[], WORD wConfig0[], WORD *Buffer0, DWORD dwMaxCount0, SHORT nPriority);
	WORD P1202_FunB_ReadStatus(Void);
	WORD P1202_FunB_Stop(Void);
	WORD P1202_FunB_Get(DWORD *P0);

1.2 Error Code Define

Error Code Define Table

Return Value	Define	Describe
0	NoError	No error.
1	DriverHandleError	Invalid VxD/SYS handle. **Note 1**
2	DriverCallError	Call VxD/SYS error. **Note 1**
3	AdControllerError	A/D controller error. May be hardware error, please contact agent.
4	M_FunExecError	M_Functions Error.
5	ConfigCodeError	A/D config error.
7	HighAlarm	fAdBuf[?]>fHighAlarm
8	LowAlarm	fAdBuf[?]< fLowAlarm
9	AdPollingTimeOut	AdPolling TimeOut.**Note1**
10	AlarmTypeError	Alarm type error.
11	FindBoardError	Found board error.
12	AdChannelError	Invalid A/D channel.
13	DaChannelError	Invalid D/A channel.(D/A channel must be 0 or 1)
14	InvalidateDelay	dwDelayUs > 8191.
15	DelayTimeOut	Delay TimeOut.
16	InvalidateData	Invalid data.
17	FifoOverflow	FIFO overflow.
18	TimeOut	TimeOut.
19	ExceedBoardNumber	Invalid board number. (First board number is 0)
20	NotFoundBoard	Can't detect board.**Note1**
22	FindTwoBoardError	Can't detect second board.
23	ThreadCreateError	Create thread error.
24	StopError	Stop error.
25	AllocateMemoryError	Allocate memory error.

Note 1: Please update driver and restart PC.

To get more information about the last release driver, please refer to http://www.icpdas.com/download/pci/index.htm

1.3 Configuration Code

PCI-1002L/1800L/1802L Configuration Code Table

Bipolar/Unipolar	Analog Input Signal Range	Gain	Settling Time	Configuration Code
Bipolar	+/- 5V	1	3 us	0x00
Bipolar	+/- 2.5V	2	3 us	0x01
Bipolar	+/- 1.25V	4	3 us	0x02
Bipolar	+/- 0.625V	8	3 us	0x03
Bipolar	+/- 10V	0.5	3 us	0x04
Bipolar	+/- 5V	1	3 us	0x05
Bipolar	+/- 2.5V	2	3 us	0x06
Bipolar	+/- 1.25V	4	3 us	0x07
Unipolar	0V ~ 10V	1	3 us	0x08
Unipolar	0V ~ 5V	2	3 us	0x09
Unipolar	0V ~ 2.5V	4	3 us	0x0A
Unipolar	0V ~ 1.25V	8	3 us	0x0B

PCI-1202H/1800H/1802H Configuration Code Table

Bipolar/Unipolar	Analog Input Signal Range	Gain	Settling Time	Configuration Code
Bipolar	+/- 5V	1	23 us	0x10
Bipolar	+/- 0.5V	10	28 us	0x11
Bipolar	+/- 0.05V	100	140 us	0x12
Bipolar	+/- 0.005V	1000	1300 us	0x13
Bipolar	+/- 10V	0.5	23 us	0x14
Bipolar	+/- 1V	5	28 us	0x15
Bipolar	+/- 0.1V	50	140 us	0x16
Bipolar	+/- 0.01V	500	1300 us	0x17
Unipolar	0V ~ 10V	1	23 us	0x18
Unipolar	0V ~ 1V	10	28 us	0x19
Unipolar	0V ~ 0.1V	100	140 us	0x1A
Unipolar	0V ~ 0.01V	1000	1300 us	0x1B

PCI-1602 Configuration Code Table

Bipolar/Unipolar	Analog Input Signal Range	Gain	Settling Time	Configuration Code
Bipolar	+/- 10V	1	3 us	0
Bipolar	+/- 5V	2	3 us	1
Bipolar	+/- 2.5V	4	3 us	2
Bipolar	+/- 1.25V	8	3 us	3

1.4 Priority

Thread's Priority Setting Table

Setting	Define
-2	THREAD_PRIORITY_LOWEST
-1	THREAD_PRIORITY_BELOW_NORMAL
0(Defual)	**THREAD_PRIORITY_NORMAL**
1	THREAD_PRIORITY_ABOVE_NORMAL
2	THREAD_PRIORITY_HIGHEST
15	THREAD_PRIORITY_TIME_CRITICAL
Others	THREAD_PRIORITY_NORMAL

2. Description of Functions

The following list divides functions in the PCI-1202 DLL into 9 categories.

- Testing function
- Plag&Play function
- DIO function
- DA function
- AD funciton
- MagicScan function
- M_Function
- Continuous Capture function
- Batch Capture function

In Section 1.1, the functions in each category are already listed in a table. This section will explain functions more detail about function, syntax, parameters, error code and the related DEMO.

2.1 The Testing Functions

2.1.0 P1202_FloatSub2

Calculate C=A-B in **float** format, **float=4 bytes floating point number.** This function is provided for testing DLL linkage.

- **Syntax :**

  float P1202_FloatSub2(float fA, float fB);
- **Parameters :**

  fA : [Input] 4 bytes floating point value

  fB : [Input] 4 bytes floating point value
- **Return :**

  Return = fA - fB
- **Demo :**

  DEMO1.C

2.1.1 P1202_ShortSub2

Calculate C=A-B in SHORT format, **SHORT=16 bits signed number.** This function is provided for testing DLL linkage.

- **Syntax :**

  short P1202_ShortSub2(Short nA, Short nB);
- **Parameters :**

  nA : [Input] 16 bits value

  nB : [Input] 16 bits value
- **Return :**

  Return = nA - nB
- **Demo :**

  DEMO1.C

2.1.2 P1202_GetDllVersion

Read the DLL version number of P1202.DLL.

- **Syntax :**

  WORD P1202_GetDllVersion(Void);

- **Parameter :**

  Void

- **Return :**

  Return = DLL version number

  Ex.: return = 0x200, the DLL version is 2.0.

- **Demo :**

  DEMO1.C

2.1.3 P1202_GetDriverVersion

This subroutine will read the driver version number of Nappci.VxD in Windows 95/98 or Napwnt.SYS in Windows NT.

- **Syntax :**

  WORD P1202_GetDriverVersion(WORD *wDriverVersion);

- **Parameter :**

  *wDriverVersion : [output] *wDriverVersion: address of **wDriverVersion**

  Ex: wDriverVersion=0x200, the driver version is 2.0

- **Return :**

  0 : No Error

  Others : Please refer to sec. 1.2

- **Demo :**

  DEMO1.C

2.2 The Driver Functions

2.2.0 P1202_DriverInit

Allocate resources needed from system and return the total board number in the system. This function must be called once before using the I/O functions.

- **Syntax :**

  WORD P1202_DriverInit(WORD *wTotalBoard);
- **Parameter :**

  *wTotalBoard :[Output] *wTotalBoard: address of **wTotalBoard**

  wTotalBoard=1 ➔ one PCI-1202 card in the system

  wTotalBoard=n ➔ n*PCI-1202 cards in the system
- **Return :**

  0 : No Error

  Others : Please refer to sec. 1.2.
- **Demo :**

  All demo programs.

2.2.1 P1202_DriverClose

This function will return the resources allocated from system. It must be called once at the end of program.

- **Syntax :**

  Void P1202_DriverClose(Void);
- **Parameter :**

  Void
- **Return :**

  Void
- **Demo :**

  All demo programs.

2.2.2 P1202_GetConfigAddressSpace

Get the I/O address of PCI-1202 board n. This function is for debug. It is not necessary to call this function in an application.

- **Syntax :**

WORD P1202_GetConfigAddressSpace(WORD wBoardNo, WORD *wAddrTimer,WORD *wAddrCtrl, WORD *wAddrDio, WORD *wAddrAdda);

- **Parameters :**

wBoardNo: [Input] PCI-1202 board number (Start from 0)
*wAddrTimer: [Output] Get 8254 Timer I/O address map
*wAddrCtrl: [Output] Get Controller I/O address map
*wAddrDio: [Output] Get Digital I/O Port I/O address map
*wAddrAdda: [Output] Get A/D and D/A I/O address map

* Please refer to “PCI-1202/1602/1800/1802 Hardware manual” Chapter 3 for more information,

- **Return :**

0 : No Error
Others : Please refer to sec. 1.2.

- **Demo :**

DEMO1.C

2.2.3 P1202_WhichBoardActive

Return the active board number.

- **Syntax:**

WORD P1202_WhichBoardActive(Void);

- **Parameter :**

Void

- **Return :**

Board number of the active board. (Start from 0)
First card => 0
Second card => 1

- **Demo :**

DEMO1.C

2.2.4 P1202_ActiveBoard

This function sets one of the PCI-1202 boards active.

*This function must be called once before the D/I/O, A/D, D/A functions

.

- **Syntax :**

WORD P1202_ActiveBoard(WORD wBoardNo);

- **Parameter :**

wBoardNo: [Input] board number **(Start from 0).**

- **Return :**

0 : No Error

Others : Please refer to sec. 1.2.

- **Demo :**

All DEMO programs.

- **Reference :**

The P1202_ActiveBoard(…) will take effect on all functions except the following:

P1202_FloatSub2
P1202_ShortSub2
P1202_GetDriverVersion
P1202_DriveInit
P1202_DriveClose
P1202_GetConfigAddressSpace
P1202_Card0_StartScan
P1202_Card0_ReadData
P1202_Card0_Stop
P1202_Card1_StartScan
P1202_Card1_ReadData
P1202_Card1_Stop

2.3 The DIO Functions

2.3.0 P1202_Di

This subroutine will read the 16 bits data from DI port.

*This function will refer to the current active PCI-1202. Use the P1202_ActiveBoard(….) to set the active board.

- **Syntax :**

  WORD P1202_Di(WORD *wDi);

- **Parameter :**

  *wDi : [Output] address of **wDi** which store the 16 bits DI data

- **Return :**

  0 : No Error

  Others : Please refer to sec. 1.2.

- **Demo :**

  DEMO1.C

2.3.1 P1202_Do

This subroutine will send the 16 bits data to DO port.

*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(….) to set the active board.

- **Syntax :**

  WORD P1202_Do(WORD wDo);

- **Parameter :**

  wDo : [Input] the 16 bits data sent to DO port

- **Return :**

  0 : No Error

  Others : Please refer to sec. 1.2.

- **Demo :**

  DEMO1.C

When CN1 connect with CN2：

P1202_Do(0x10) ;//Output 0x10

P1202_Di(*wDi) ;//*wDi=0x10 Input

2.4 The DA Functions

2.4.0 P1202_Da

This subroutine will send the 12 bits data to DA port.

*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(….) to set the active board.

- **Syntax :**

WORD P1202_Da(WORD wChannel, WORD wDaVal);

- **Parameters :**

wChannel : [Input] Analog output channel.

wChannel=0 (analog output Channel 0)

wChannel=1 (analog output Channel 1)

wDaVal : [Input] 12 bits data sent to DA port. 0=minimum and 4095=maximum. The DA output can be +/- 5V or +/- 10V depending on the setting of hardware JP1. The software can't detect the state of JP1. So the maximum wDaVal "4095" may be +5V or +10V

- **Return :**

0 : No Error

Others : Please refer to sec. 1.2.

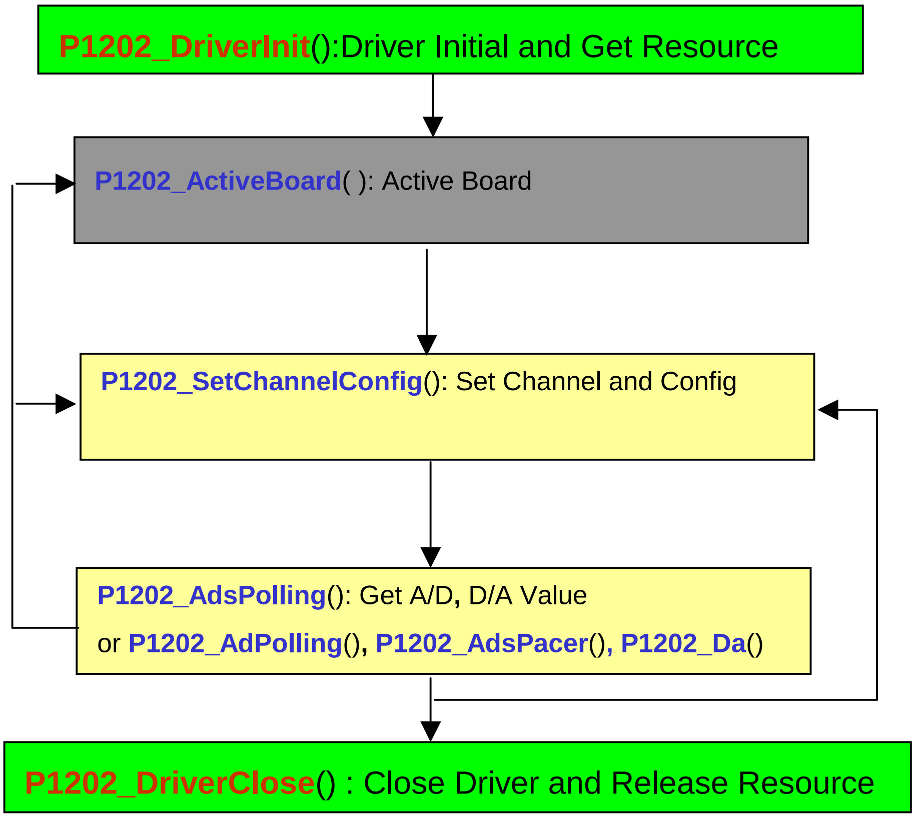
- **Demo :**

DEMO1.C

2.5 The AD Functions

2.5.0 Introduction

AD/DA Polling Function process


P1202_DriverInit():Driver Initial and Get Resource
P1202_ActiveBoard( ): Active Board
P1202_SetChannelConfig(): Set Channel and Config
P1202_AdsPolling(): Get A/D, D/A Value
or P1202_AdPolling(), P1202_AdsPacer(), P1202_Da()
P1202_DriverClose() : Close Driver and Release Resource

2.5.1 P1202_SetChannelConfig

This subroutine is used to set the AD channel configuration code. (Refer to section 1.3) It also sets the active AD channel for **P1202_AdPolling**, **P1202_AdsPolling** and **P1202_AdsPacer**.

*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(….) to set the active board.

- **Syntax :**

  WORD P1202_SetChannelConfig(WORD wChannel, WORD wConfig);
- **Parameters :**

  wChannel : [Input] AD channel number

  wConfig : [Input] Configuration code. Refer to "Section 1.3 Configuration Table"
- **Return :**

  0 : No Error

  Others : Please refer to section 1.2.
- **Demo :**

  DEMO1.C

2.5.2 P1202_AdPolling

This function will perform a single A/D conversion by software polling. The **P1202_SetChannelConfig** function is used to change the active channel and configuration code that the **P1202_AdPolling** function using.

*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(….) to set the active board.

- **Syntax :**

  WORD P1202_AdPolling(float *fAdVal);
- **Parameter :**

  *fAdVal :[Output] address of **fAdVal** which store the AD data, this data is automatically computed from hexadecimal to float based on the setting of **P1202_SetChannelConfig.**
- **Return :**

  0 : No Error

  Others : Please refer to section 1.2.
- **Demo :**

  DEMO1.C

2.5.3 P1202_AdsPolling

This subroutine will perform multiple AD conversions by polling. The **P1202_SetChannelConfig** subroutine can be used to change channel or configuration code and the **P1202_AdsPolling** will refer to that setting in later operation.

*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(….) to select the active board.

- **Syntax :**

WORD P1202_AdsPolling(float fAdVal[], WORD wNum);

- **Parameters :**

fAdVal[]:[Output] starting address of AD data buffer, these data will be automatically computed from hexadecimal to float based on the setting of **P1202_SetChannelConfig**

wNum:[Input] number of AD conversions will be performed

- **Return :**

0 : No Error

Others : Please refer to section 1.2.

- **Demo :**

DEMO1.C

2.5.4 P1202_AdsPacer

This subroutine will perform multiple AD conversions by pacer trigger. The **P1202_SetChannelConfig** subroutine can be used to change channel or configuration code and the **P1202_AdsPacer** will refer to that condition in later operation. The hardware pacer (8254 Timer) will generate trigger signals to AD converter periodically. So these AD data can be used to reconstruct the waveform of analog input. P1202_AdsPolling get ADs by pure software, so the AD conversion operation may be interrupted by system OS.

It is recommended to use *P1202_AdsPacer* if the input wave form reconstruction is needed.

*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(….) to select the active board.

- **Syntax :**

WORD P1202_AdsPacer(float fAdVal[], WORD wNum, WORD wSampleDiv);

- **Parameters :**

fAdVal[]:[Output] starting address of AD data buffer (16 bits), these data will be automatically computed based on the setting of **P1602_SetChannelConfig**

wNum : [Input] number of AD conversions will be performed

wSampleDiv: [Input] **AD sampling rate = 8M / wSampleDiv**

Example:

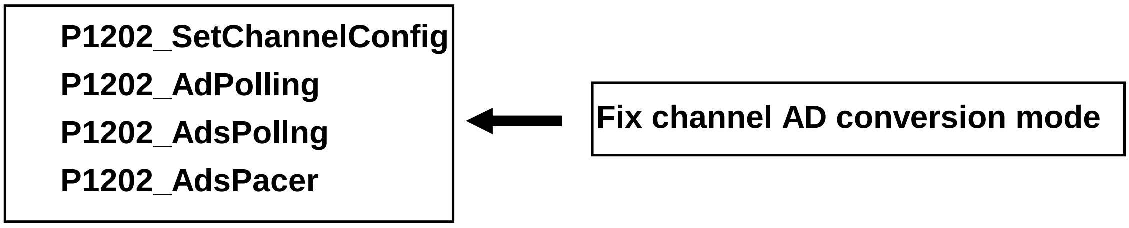
wSampleDiv = 80 → Sampling rate = 8M / 80 = 100K

- **Return :**

0 : No Error

Others : Please refer to section 1.2

- **Demo :** DEMO1.C



P1202_SetChannelConfig
P1202_AdPolling
P1202_AdsPollng
P1202_AdsPacer

Fix channel AD conversion mode

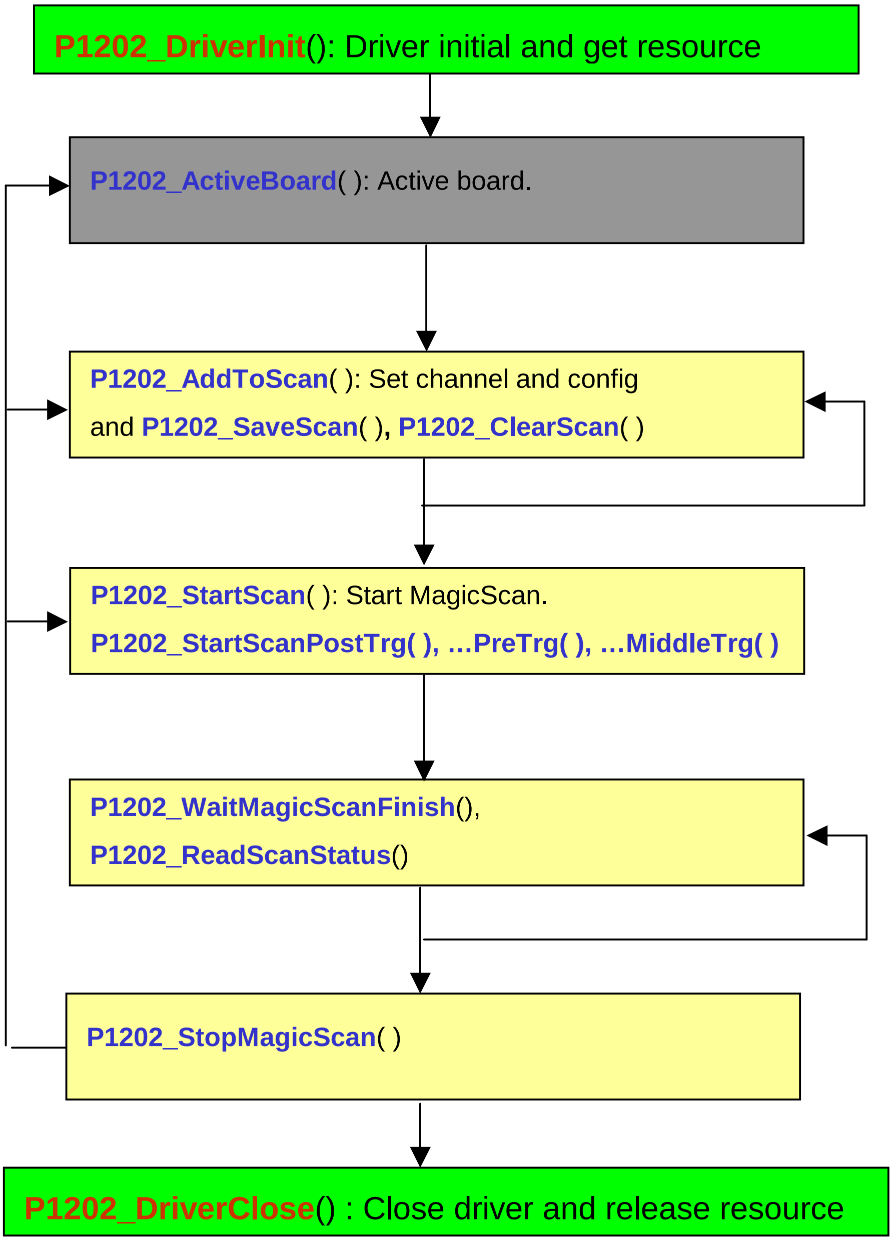
2.6 The MagicScan Functions

2.6.0 Introduction

MagicScan Process:

Step1. Set channel scan order and config.
Step2. Start MagicScan
Step3. Get MagicScan status
Step4. Get data

MagicScan Process Flow Diagram (PCI-1202) :



P1202_DriverInit(): Driver initial and get resource

P1202_ActiveBoard( ): Active board.

P1202_AddToScan( ): Set channel and config and P1202_SaveScan( ), P1202_ClearScan( )

P1202_StartScan( ): Start MagicScan.
P1202_StartScanPostTrg( ), ...PreTrg( ), ...MiddleTrg( )

P1202_WaitMagicScanFinish(),
P1202_ReadScanStatus()

P1202_StopMagicScan( )

P1202_DriverClose() : Close driver and release resource

2.6.1 P1202_ClearScan

This subroutine will initialize the MagicScan controller.

*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(….) to select the active board.

* Please refer to Note 1 in section 3.

- **Syntax :**

  WORD P1202_ClearScan();

- **Parameter :**

  Void

- **Return :**

  0 : No Error

  Others : Please refer to section 1.2.

- **Demo :**

  DEMO11.C

2.6.2 P1202_StartScan

This subroutine will start the MagicScan operation. This subroutine will return to the caller before the MagicScan operation finish.

* The user can use P1202_WaitMagicScanFinish(..) or P1202_ReadScanStatus(..) to check the status of MagicScan operation.
*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(..) to select the active board.

- **Syntax :**

  WORD P1202_StartScan(WORD wSampleRateDiv, WORD wNumCycles, SHORT nPriority);

- **Parameters :**

  wSampleRateDiv :[Input] AD sampling rate = 8M / wSampleRateDiv
  Ex: wSampleRateDiv = 80 → sampling rate = 8M / 80 = 100K
  wNumCycles :[Input] Number of MagicScan cycle to perform
  nPriority :[Input] Set Thread’s Priority. Please refer to section 1.4

- **Return :**

  0 : No Error
  Others : Please refer to section 1.2

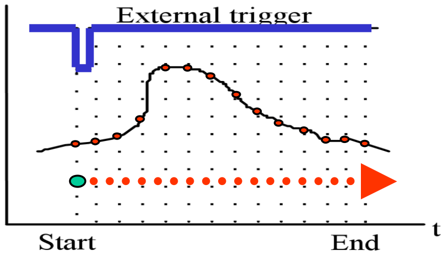
- **Demo :**

  DEMO11.C

2.6.3 P1202_StartScanPostTrg

To get a number of AD data from one or multi-channel after the external trigger arrives.

*The user can use P1202_ReadScanStatus() to check status and use P1202_StopMagicScan() to force the MagicScan to terminate.



* Please refer to Note 1 in the section 3

- ## Syntax :

WORD P1202_StartScanPostTrg(WORD wSampleRateDiv, WORD wNumCycles, SHORT nPriority);

- ## Parameters :

wSampleRateDiv :[Input] **AD sampling rate = 8M / wSampleRateDiv**

Ex: wSampleRateDiv = 80 ➔ sampling rate = 8M / 80 = 100K

wNumCycles :[Input] number of A/D data for each scan channel

Total data number = wNumCycles * number of scan channel

nPriority :[Input] Set thread's priority。Please refer to section 1.4

- ## Return :

0 : No Error

Others : Please refer to section 1.2.

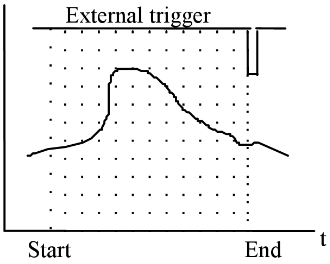
- ## Demo :

DEMO23.C

2.6.4 P1202_StartScanPreTrg

The Magic Controller keeps getting data after this function called. When the external trigger arrives, the Magic Controller will stop getting data and return the last wNumCycles data.

*The user can use P1202_ReadScanStatus() to check status and use P1202_StopMagicScan() to force MagicScan to terminate.



- **Syntax :**

WORD P1202_StartScanPreTrg(WORD wSampleRateDiv, WORD wNumCycles, SHORT nPriority);

- **Parameters :**

wSampleRateDiv :[Input] **AD sampling rate = 8M / wSampleRateDiv**

wSampleRateDiv = 80 ➔ sampling rate = 8M / 80 = 100K

wNumCycles :[Input] number of A/D data for each scan channel

Total data number = wNumCycles * number of scan channel

nPriority :[Input] Set thread’s priority。Please refer to section 1.4

- **Return :**

0 : No Error

Others : Please refer to section 1.2

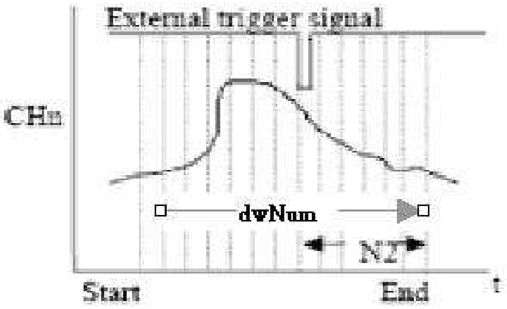
- **Demo :**

DEMO24.C

2.6.5 P1202_StartScanMiddleTrg

The Magic Controller keeps getting data. When the external trigger arrives, the Magic Controller still gets N2 data and return the last (wNum-N2) data that before external trigger and N2 data that after the trigger. So, the total AD data returned is wNum data per channel.

*The user can use P1202_ReadScanStatus() to check status and use P1202_StopMagicScan() to force MagicScan to terminate.



- **Syntax :**

WORD P1202_StartScanMiddleTrg(WORD wSampleRateDiv, WORD wNum, WORD wN2 , SHORT nPriority);

- **Parameters :**

wSampleRateDiv :[Input] **AD sampling rate = 8M / wSampleRateDiv**

wSampleRateDiv = 80➔sampling rate = 8M / 80 = 100K

wNum :[Input] Total data per channel

wN2 :[Input] Number of data after external trigger arrives(per channel)

nPriority :[Input] Set Thread’s Priority。Please refer to section 1.4

- **Return :**

0 : No Error

Others : Please refer to section 1.2.

- **Demo :**

DEMO25.C

2.6.6 P1202_ReadScanStatus

This subroutine will read the status of the MagicScan, Pre-trigger, Post-trigger and Mid-trigger operation. The status should be checked continually to make sure the scan is complete. If getting a status "0x80", the scan is complete and the data in buffer are ready.

*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(….) to select the active board.

- **Syntax :**

Void P1202_ReadScanStatus(WORD *wStatus, DWORD *dwLowAlarm, DWORD *dwHighAlarm);

- **Parameters :**

*wStatus :[Output] address of **wStatus** which store status

Table 2.8.6.1 wStatus Value Table

wStatus Value(HEX)	Status	Description
0x00	initial	MagicScan Initial Status (Idle)
0x01	start	MagicScan Running
0x02	time out1	MagicScan stage 1 controller TimeOut
0x04	time out2	MagicScan stage 2 controller TimeOut
0x08	overflow	MagicScan FIFO overflow※
0x80	OK	MagicScan Complete

※ Please refer to Note 2 in section 3

*dwLowAlarm :[Output] address of **wLowAlarm** which store the MagicScan alarm status

*dwHighAlarm :[Output] address of **wHighAlarm** which store the MagicScan alarm status

dwLowAlarm(bit 0~15)

Bit	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
channel	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

dwLowAlarm(bit 16~31)

Bit	1F	1E	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10
channel	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

dwLowAlarm 32 bits corresponding to 32 channels

Ch ? = 0 → no low alarm

Ch ? = 1 → low alarm on

Example:

dwLowAlarm=0 → all channels OK, no low alarm

dwLowAlarm=1 → channel_0 is low alarm, others are OK

dwLowAlarm=3 → channel_0 and channel_1 are low alarm, others are OK

dwHighAlarm(bit 0~15)

Bit	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
channel	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

dwHighAlarm(bit 16~31)

Bit	1F	1E	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10
channel	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

dwHighAlarm32 bits corresponding to 32 channels

Ch ? = 0 → no high alarm

Ch ? = 1 → high alarm on

Example:

dwHighAlarm=0 →all channels OK, no high alarm

dwHighAlarm=4 → high alarm of channel_2 is on, others are OK

dwHighAlarm=7 → high alarm of channel_0,1,2 are on, others are OK

- **Return :**

Void

- **Demo :**

DEMO11.C

2.6.7 P1202_AddToScan

This subroutine will add one channel into the **MagicScan circular queue**. The maximum channels could be added into MagicScan circular queue is 48. The scan sequence is the order of adding channel into scan queue.

Example:

P1202_AddToScan(1, 0, 1, 0, 0, 0);
P1202_AddToScan(1, 0, 1, 0, 0, 0);
P1202_AddToScan(0, 0, 1, 0, 0, 0);
Scan order is ch1 -> ch1 -> ch0 -> ch1 -> ch1 -> ch0 -> ch1-> …

*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(….) to select the active board.

- **Syntax :**

WORD P1202_AddToScan(WORD wAdChannel, WORD wConfig, WORD wAverage, WORD wLowAlarm, WORD wHighAlarm, WORD wAlarmType);

- **Patermeters :**

wAdChannel :[Input] AD channel number
wConfig :[Input] the configuration code. Refer to "Section 1.3 Configuration Table"
wAverage :[Input] the factor of digital average filter. Average wAverage data to one and the smallest value is 1

The factor of digital average filter :
When the wAverage is 5, it will average 5 data to 1. The sampling rate will become one fifth.

wLowAlarm :[Input] 12 bits low alarm data
wHighAlarm :[Input] 12 bits high alarm data
wAlarmType :[Input] Alarm type

Table 2.8.7.1 Alarm Type Define Table

AlarmType Value	Alarm Type	Comment
0	No alarm	Close
1	High alarm	Buff[?] > High alarm
2	Low alarm	Buff[?] < Low alarm
3	In alarm	Low < Buff[?] < High
4	Out alarm	Out range

Example:

P1202_AddToScan(0, 0, 1, 0, 0, 0)
wAdChannel =0→ Add channel 0 to scan.
wConfig = 0→Set AD range is 5V~ -5V
wAverage=1→No Average
wLowAlarm=0 →No LowAlarm
wHighAlarm=0 →No HighAlarm
wAlarmType=0→Close Alarm

- **Return :**

  0 : No Error

  Others : Please refer to section 1.2
- **Demo :** DEMO11.C

2.6.8 P1202_SaveScan

This subroutine specifies the starting address of AD data buffer for MagicScan, it should be set before MagicScan start.

- **Syntax :**

Void P1202_SaveScan(WORD wAdChannel, WORD wBuf[]);

- **Parameters :**

wAdChannel :[Input] Scan number in the scan queue.
(**Note**: not the A/D channel number.)

Example :

The first scan channel may be any channel. But the wAdChannel must be 0 in this subroutine, because the wAdChannel number is according to the scanning order.

wBuf :[Output] Starting address of AD data buffer for channel specified in wAdChannel

```
Example:

WORD   wV0[100000];       // AD ch:0 buffer
WORD   wV2[100000];       // AD ch:2 buffer

wRetVal=P1202_ClearScan();
      //****    For PCI-1202
wRetVal += P1202_AddToScan(0,0,1,0,0,0);      // add CH:0 to scan
wRetVal += P1202_SaveScan(0,wV0);
      //CH0 is the first join channel for scan, so the scanning order is 0.
      //Save the data of scanning channel that order is 0 to wV0[].

wRetVal += P1202_AddToScan(4,0,1,0,0,0);      // Join CH4 to the scan queue
wRetVal += P1202_SaveScan(1,wV2);
      //Note：The “1” means the scanning order is second, not physical channel.
      // CH4 is the second channel added into scan queue, so the scanning order is 1.
      // Save the data of scanning channel that order is 1 to wV2[].

wSampleRateDiv=80;          //      Sampling rate = 8M / 80 = 100k
P1202_StartScan(wSampleRateDiv,DATALENGTH,nPriority);    // Start scan
```

- **Return :**

0 : No Error

Others : Please refer to section 1.2

- **Demo :**.DEMO11.C

2.6.9 P1202_WaitMagicScanFinish

This subroutine will wait until the MagicScan operation is finished.

*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(….) to select the active board.

- **Syntax :**

Void P1202_WaitMagicScanFinish(WORD *wStatus, DWORD *dwLowAlarm, DWORD *dwHighAlarm);

- **Parameters :**

wStatus :[Output] address of **wStatus** which store the MagicScan status

Table 2.8.6.1 wStatus Status Table

wStatus Value(HEX)	Status	Describe
0x00	initial	MagicScan Initial Status(Idle)
0x01	start	MagicScan Running
0x02	time out1	MagicScan stage 1 controller TimeOur
0x04	time out2	MagicScan stage 2 controller TimeOut
0x08	overflow	MagicScan FIFO overflow※PS
0x80	OK	MagicScan Complete

*Note：Please refer to Note 2 in Section 3

*dwLowAlarm :[Output] address of **wLowAlarm** which store the MagicScan alarm status

*dwHighAlarm :[Output] address of **wHighAlarm** which store the MagicScan alarm status

dwLowAlarm(bit 0~15)

Bit	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
channel	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

dwLowAlarm(bit 16~31)

Bit	1F	1E	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10
channel	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

wLowAlarm 32 bits corresponding to 32 channels

Ch ? = 0 → No low alarm

Ch ? = 1 → Low alarm on

Example:
dwLowAlarm=0 → all channels OK, no low alarm
dwLowAlarm=1 → low alarm of channel_0 is on, others are OK
dwLowAlarm=3 → low alarm of channel_0 and channel_1 are on, others are OK

dwHighAlarm(bit 0~15)

Bit	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
channel	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

dwHighAlarm(bit 16~31)

Bit	1F	1E	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10
channel	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

dwHighAlarm 32 bits corresponding to 32 channels

Ch ? = 0 → No high alarm occurs

Ch ? = 1 → High alarm on

Example:
dwHighAlarm=0 → all channels OK, no high alarm
dwHighAlarm=4 → high alarm of channel_2 is on, others are OK
dwHighAlarm=7 → high alarm of channel_0,1,2 are on, others are OK

- **Return :**

  Void

- **Demo :**

  DEMO11.C

2.6.10 P1202_StopMagicScan

Stop MagicScan.

- **Syntax :**

  Void P1202_StopMagicScan(Void);
- **Parameter :**

  Void
- **Return :**

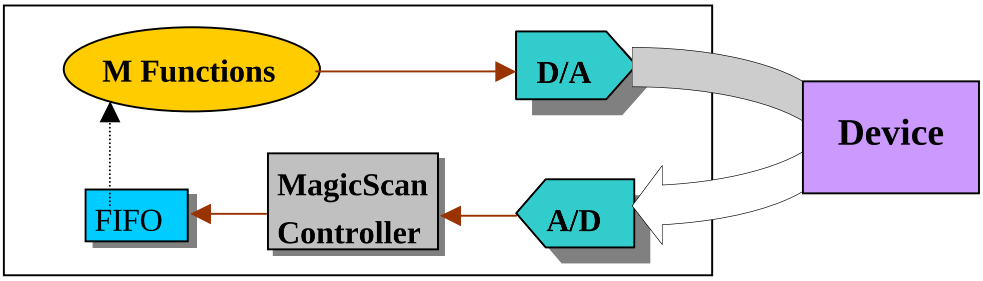
  Void
- **Demo :**

  DEMO14.C

2.7 The M_Functions

2.7.0 Introduction

M_Function Process Flow Chart：



*MagicScan Control：Please refer to Note 1 in the Section 3

Table 2.9.0.1 M_Function Feature Table

Function Name	D/A	A/D
M_FUN_1	Analog Output 0 Output sine wave	Analog Input 0 +10V ~ -10V
M_FUN_2	Analog Output 0 Output arbitrary wave form	Analog Input 0 +10V ~ -10V
M_FUN_3	Analog Output 0 Output sine wave	channel/gain programmable (32 channels max.)
M_FUN_4	Analog Output 0 Output square wave, semi-square-wave or sine wave	channel/gain programmable (32 channels max.)

2.7.1 P1202_M_FUN_1

This subroutine output sine wave from DA channel 0 according to the parameter wDaNumber and fDaAmplitude. By the wDaWave, the number of DA waveform to be output is programmable. **It can output sine wave from DA channel 0 and get data from AD Channel 0 at the same time.** Users also need to set sampling rate and data number of AD.

*Please refer to「PCI-1202/1602/1800/1802 Hardware manual」for more information.

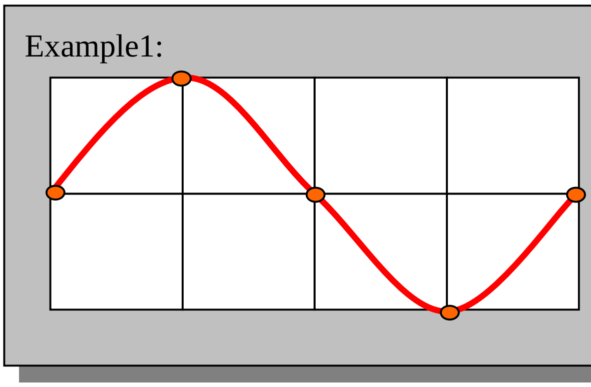
- **Syntax :**

WORD P1202_M_FUN_1(WORD wDaNumber, WORD wDaWave, float fDaAmplitude, WORD wAdSampleRateDiv, WORD wAdNumber, WORD wAdConfig, float fAdBuf[], float fLowAlarm, float fHighAlarm)

- **Parameters :**

wDaNumber: [Input] The element number of one sine wave. When the number increased, the wave will be more smoothly, but the speed of output a sine wave will be decreased.

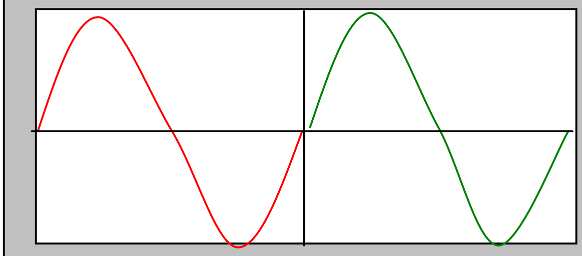
Example1:



This picture set wDaNumber 5, it will output a sine wave that make up by 5 of automatically generated DA value. And, the output speed depends upon computer performance.

wDaWave : [Input] Number of DA waveform to be output

Example2:



When wDaWave is 2, it will output the sine wave defined by wDANumber twice.

fDaAmplitude : [Input] Amplitude of DA output

*fDaAmplitude range is -10~10

NOTE : the hardware J1 must be set on +/-10V

wAdSampleRateDiv:
[Input] **AD sampling rate = 8000000 / wAdSampleRateDiv** samples/sec
wAdNumber: [Input] Number of AD data to be read

wAdConfig : [Input] A/D input range configuration code

Please refer to section 1.3

fAdBuf[] : [Output] the starting address of **fAdBuf** which store the A/D data

fLowAlarm : [Input] low alarm limit. **if fAdBuf[?]< fLowAlarm➔LowAlarm on**

fHighAlarm : [Input] high alarm limit. **if fAdBuf[?]>fHighAlarm➔HighAlarm on**

- **Return :**

  0 : No Error

  Others : Please refer to section 1.2

- **Demo :** DEMO5.C

2.7.2 P1202_M_FUN_2

The P1202_M_FUN_2 usage like P1202_M_FUN_1, but it will **not** compute the waveform image automatically. Users must set each DA value of the output wave form.

It can output the user defined waveform from DA channel 0 and get data from AD Channel 0 at the same time.

*Please refer to「PCI-1202/1602/1800/1802 Hardware manual」for more information.

- **Syntax :**

WORD P1202_M_FUN_2(WORD wDaNumber, WORD wDaWave, WORD wDaBuf[], WORD wAdSampleRateDiv, WORD wAdNumber, WORD wAdConfig, WORD wAdBuf[]);

- **Parameters :**

wDaNumber: [Input] number of D/A samples in one waveform

Please refer to Example 1 in the P1202_M_FUN_1

wDaWave : [Input] Number of DA waveform to be output

Please refer to Example 2 in the P1202_M_FUN_1

wDaBuf[] : [Output] The array stores the D/A waveform image
wAdSampleRateDiv:
[Input] AD sampling rate = 8000000 / wAdSampleRateDiv samples/sec
wAdNumber: [Input] Number of AD data to be read
wAdConfig : [Input] A/D input range configuration code

Please refer to section 1.3

wAdBuf[] : [Output] the starting address of fAdBuf which store the A/D data

- **Return :**

0 : No Error

Others : Please refer to section 1.2

- **Demo :**

DEMO7.C

2.7.3 P1202_M_FUN_3

This subroutine output sine wave from DA channel 0 according to the parameters wDaNumber and fDaAmplitude. By the wDaWave, the number of DA waveform output is programmable.

It can output sine wave from DA channel 0 and get data from channel scan at the same time. wAdNumber and wAdSampleRateDiv are used to set AD data number and sampling rate.

*Please refer to「PCI-1202/1602/1800/1802 Hardware manual」for more information.

- **Syntax :**

WORD P1202_M_FUN_3(WORD wDaNumber, WORD wDaWave, float fDaAmplitude, WORD wAdSampleRateDiv, WORD wAdNumber, WORD wChannelStatus[], WORD wAdConfig[], float fAdBuf[], float fLowAlarm, float fHighAlarm)

- **Parameters :**

wDaNumber: [Input] The element number of one sine wave. When the number increased, the wave will be more smoothly, but the speed of output a sine wave will be decreased

Please refer to Example 1 in the P1202_M_FUN_1

wDaWave : [Input] Number of DA waveform to be output

Please refer to Example 2 in the P1202_M_FUN_1

fDaAmplitude : [Input] Amplitude of DA output

fDaAmplitude value range = -10~10
NOTE : the hardware J1 must be set on +/-10V

wAdSampleRateDiv:
[Input] AD sampling rate = 8000000 / wAdSampleRateDiv samples/sec

wAdNumber: [Input] Number of AD data to be read
wAdChannel[]:[Input] 1 = scan channel(index) enable,
0 = scan channel (index) disable

Example3:

wAdChannel[0] = 1 →Set "scan channel 0" enable

wAdChannel[0]=0 →Set "scan channel 0" disable

wAdChannel[2]=1 →Set "scan channel 2" enable

wAdConfig[]:[Input]A/D input range configuration code

Please refer to section 1.3

fAdBuf[] : [Output] the starting address of fAdBuf which store the A/D data

fLowAlarm : [Input] low alarm limit. **if fAdBuf[?]< fLowAlarm→LowAlarm on**

fHighAlarm : [Input] high alarm limit. **if fAdBuf[?]>fHighAlarm→HighAlarm on**

- **Return :**

0 : No Error

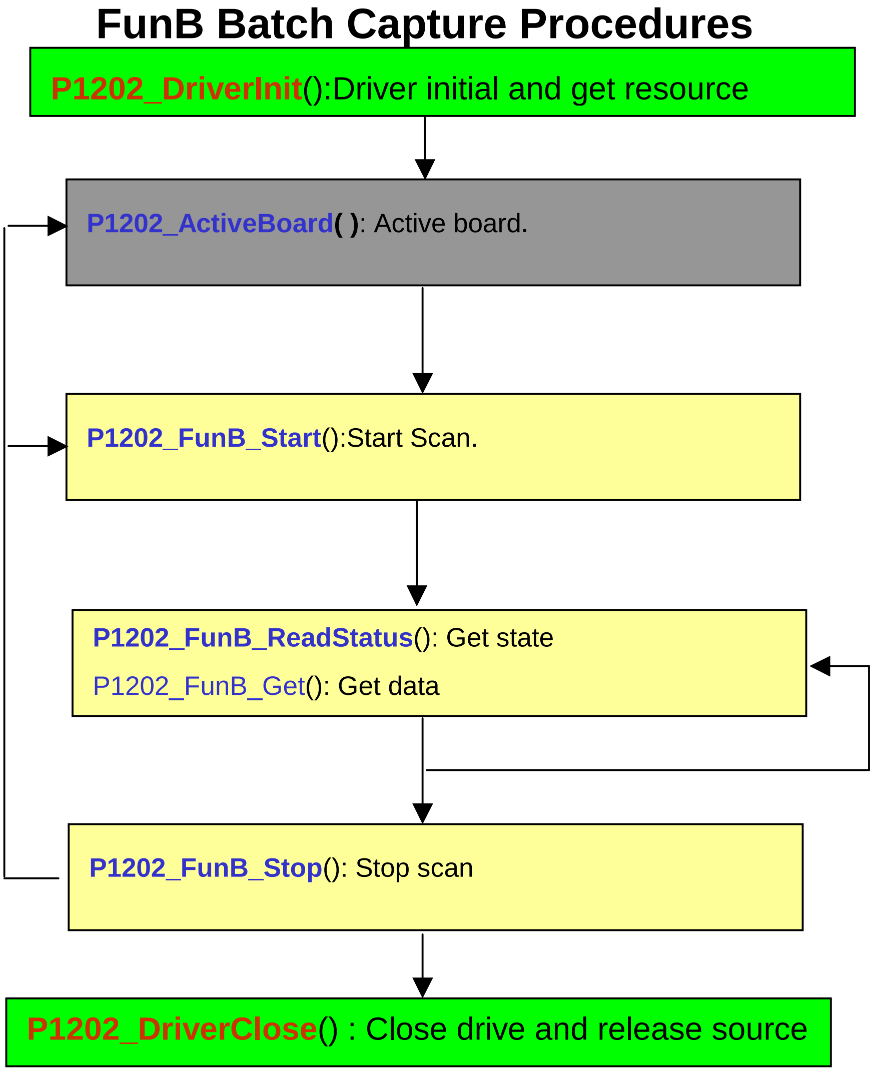
Others : Please refer to section 1.2.

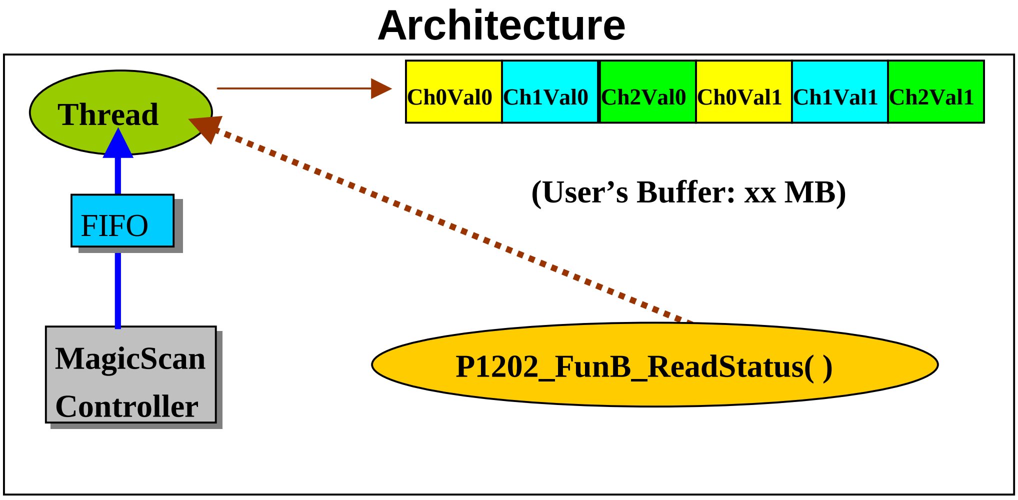
- **Demo :**

DEMO9.C

2.8 The Single Board Batch Capture

2.8.0 Introduction


FunB Batch Capture Procedures
P1202_DriverInit():Driver initial and get resource
P1202_ActiveBoard( ): Active board.
P1202_FunB_Start():Start Scan.
P1202_FunB_ReadStatus(): Get state
P1202_FunB_Get(): Get data
P1202_FunB_Stop(): Stop scan
P1202_DriverClose() : Close drive and release source



2.8.1 P1202_FunB_Start

This subroutine starts the batch capture and stores data into a specified memory. This function works on only one PCI-1202 board system.

*Please refer to section 2.9.0 for more information.

- **Syntax :**

WORD P1202_FunB_Start (WORD wClockDiv0, WORD wChannel0[], WORD wConfig0[], WORD *Buffer0, DWORD dwMaxCount0, SHORT nPriority);

- **Parameters :**

wClockDiv0:[Input] The AD sampling rate devisor .
The sampling rate is 8M / wClockDiv0

wChannel0[]:[Input] 0 = disable scan channel (index),
1 = enable scan channel (index)

Example1:

wChannel0[0] = 1 → set "scan channel 0" enable

wChannel0[0]=0 → set "scan channel 0" disable

wChannel0[2]=1 → set "scan channel 2" enable

wConfig0[]:[Input] Configuration code for each channel.
Refer to "Section 3.1 Configuration Table"

*Buffer0: [Output] Buffer to store the A/D data

dwMaxCount0: [Input] the data length to get in each getting data process. If the getting data thread gets "dwMaxCount0" data, the status that P1202_FunB_ReadStatus returned is 0, at this time users can copy data from Buffer0, then start the next getting process

nPriority :[Input] To set the thread's priority.*Please refer to section 1.4

- **Return :**

0 : No Error

Others : Please refer to section 1.2

- **Demo :**

DEMO21.C

2.8.2 P1202_FunB_ReadStatus

This function returns the status of Fun_B batch capture.

If the getting data thread gets “dwMaxCount0” data, the status is 0,
at this time users can copy data from Buffer0 to another memory, then
start the next getting process.

- **Syntax :**

  WORD P1202_FunB_ReadStatus(Void);

- **Parameter :**

  Void

- **Return :**

  0: data is ready
  1: data not ready

- **Demo :**

  DEMO21.C

2.8.3 P1202_FunB_Stop

This subroutine will stop the batch capture function.

- **Syntax :**

  WORD P1202_FunB_Stop(Void);
- **Parameter :**

  Void
- **Return :**

  0 : No Error

  Others : Please refer to section 1.2
- **Demo :** DEMO21.C

2.8.4 P1202_FunB_Get

This function will retrieve the number of A/D samples that have been acquired.

- **Syntax:**

  WORD P1202_FunB_Get(DWORD *P0);
- **Parameter :**

  *P0: [Output] how many A/D data has been acquired
- **Return :**

  0 : No Error

  Others : Please refer section 1.2
- **Demo :** DEMO21.C

2.9 Multi-board Batch Capture

(two boards operating simultaneously)

2.9.0 P1202_FunA_Start

When there are two boards installed on a PC, using this subroutine to start the batch capture from the two boards simultaneously and store data into memory.

*Please refer to section 2.9.0 for more information.

- **Syntax :**

WORD P1202_FunA_Start(WORD wClockDiv0, WORD wChannel0[],
WORD wConfig0[], WORD *Buffer0, DWORD dwMaxCount0,
WORD wClockDiv1, WORD wChannel1[],
WORD wConfig1[], WORD *Buffer1, DWORD dwMaxCount1
Short nPriority);

- **Parameters :**

WClockDiv0: [Input] AD sampling rate devisor for the first board.
The sampling rate is 8M / wClockDiv0
WChannel0[]:[Input] (0=no scan, 1=scan) For each channel of the first board

Example1:
wChannel0[0] = 1 →Scan Channel 0 for the first board
wChannel0[0] = 0 →No scan Channel 0 for the first board
wChannel0[2] = 1 →Scan Channel 2 for the first board

WConfig0[]:[Input] configuration code for each channel of the first board

Please refer to section 1.3

*Buffer0: [Output] Buffer to store the A/D data of the first board
dwMaxCount0:[Input] To specify the data length of the first board
wClockDiv1: [Input] The AD sampling rate devisor for the 2nd board
The sampling rate is 8M / wClockDiv1
WChannel1[]:[Input] (0=no scan, 1=scan) For each channel of the 2nd board

Example1:
wChannel1[0] = 1 → Scan Channel 0 for the 2nd board
wChannel1[0] = 0 → No scan Channel 0 for the 2nd board
wChannel1[2] = 1 → Scan Channel 2 for the 2nd board

WConfig1[]:Configuration code for each channel of the 2nd board

Please refer to section 1.3

*Buffer1: [Output] Buffer to store the A/D data of the 2nd board
DwMaxCount1: [Input] To specify the data length of the 2nd board
nPriority:[Input]To set the thread's priority. Please refer to section 1.4.

- **Return :**

  0 : No Error

  Others : Please refer to section 1.2
- **Demo Program :** DEMO20.C

2.9.1 P1202_FunA_ReadStatus

This subroutine will read the status of Fun_A batch capture.

- **Syntax :**

  WORD P1202_FunA_ReadStatus(Void);
- **Parameter :**

  Void
- **Return :**

  0: data is ready
  1: data not ready
- **Demo :** DEMO20.C

2.9.2 P1202_FunA_Stop

This subroutine will stop the batch capture function.

- **Syntax:**

  WORD P1202_FunA_Stop(Void);
- **Parameter :**

  Void
- **Return :**

  Void
- **Demo :**

  DEMO20.C

2.9.3 P1202_FunA_Get

This function will retrieve the number A/D samples acquired.

- **Syntax:**

  WORD P1202_FunA_Get(DWORD *P0, DWORD *P1);

- **Parameters :**

  *P0:[Output] how many A/D data has been acquired for the first board
  *P1:[Output] how many A/D data has been acquired for the 2nd board

- **Return :**

  0 : No Error

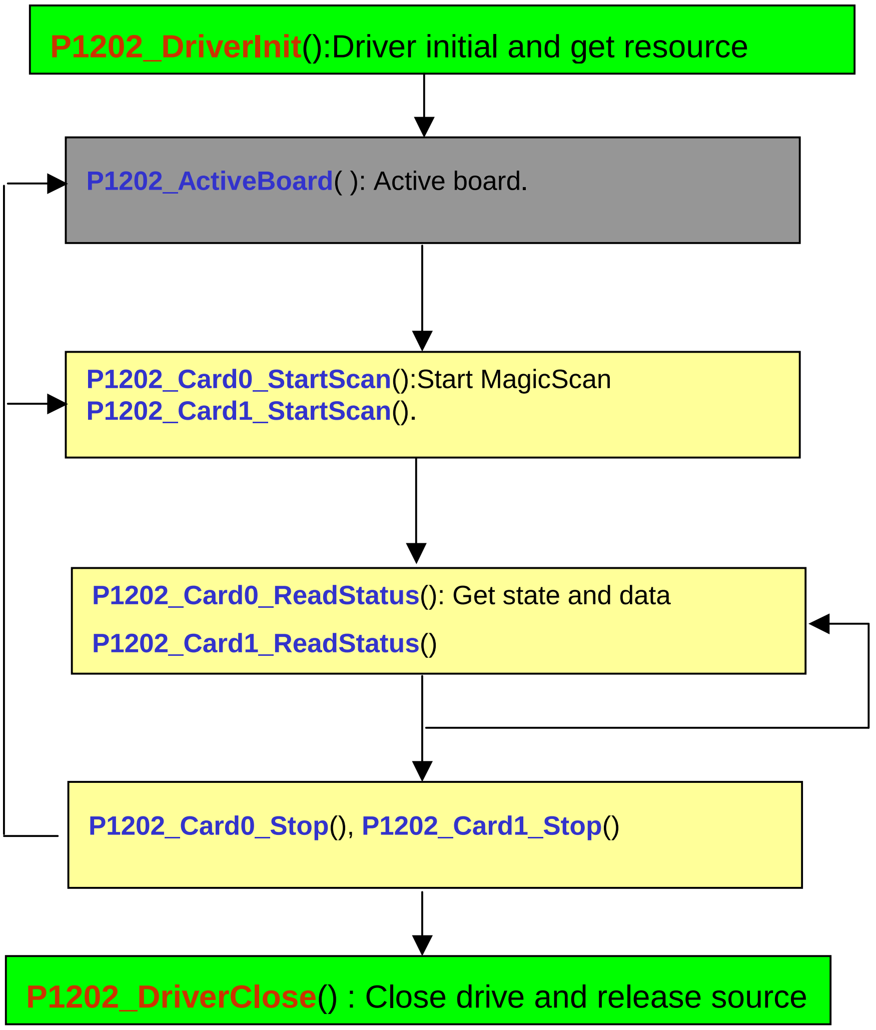
  Others : Please refer to section 1.2

- **Demo :** DEMO20.C

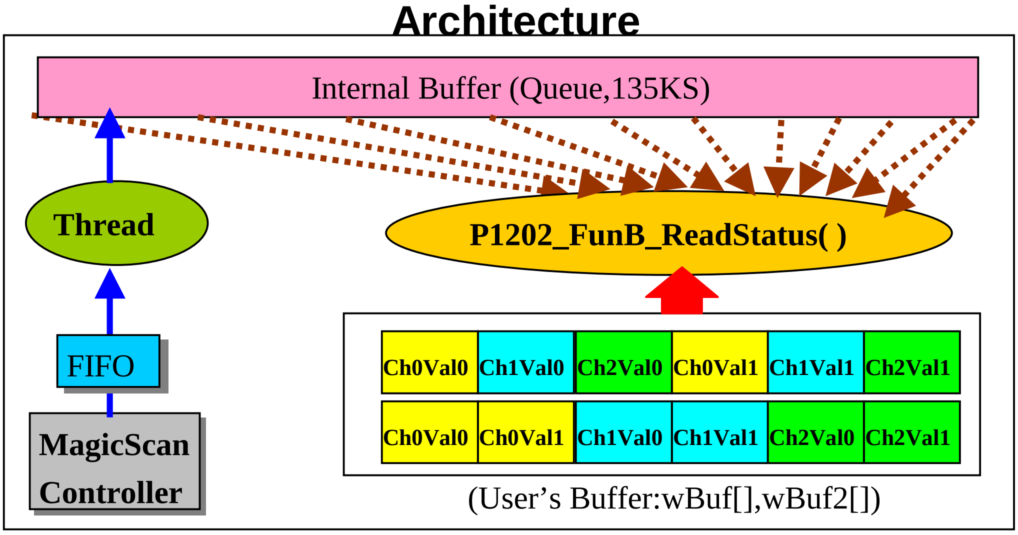
2.10 The Continuous Capture

2.10.0 Introduction

Continuous Capture Flow Diagram (PCI-1202) :


P1202_DriverInit():Driver initial and get resource
P1202_ActiveBoard( ): Active board.
P1202_Card0_StartScan():Start MagicScan
P1202_Card1_StartScan().
P1202_Card0_ReadStatus(): Get state and data
P1202_Card1_ReadStatus()
P1202_Card0_Stop(), P1202_Card1_Stop()
P1202_DriverClose() : Close drive and release source

Architecture



2.10.1 P1202_Card0_StartScan

This subroutine will start the channel scan and continuous capture function on the first board. It is recommended to get ADs for long time and low sampling rate. Otherwise, the chance of FIFO overflow could be increased. The sampling rate under 40KHz is recommended.

*Please refer to 「PCI-1202/1602/180x Hardware User Manual」 for more information.

- **Syntax :**

WORD P1202_Card0_StartScan(WORD wSampleRateDiv, WORD wChannelStatus[], WORD wChanelConfig[], WORD wCycles);

- **Parameters :**

wSampleRateDiv : [Input] **AD sampling rate = 8M / wSampleRatediv.**
Ex: wSampleRateDiv = 800, sampling rate = 8M / 800 =10K
wChannelStatus[] : [Input] (0=no scan, 1=scan) for each channel

Example1:

wChannelStatus **[0]** = 1 → Scan Channel **0**

wChannelStatus **[0]** = 0 → No scan Channel **0**

wChannelStatus **[2]** = 1 → Scan Channel **2**

wChannelConfig[] : [Input] configuration code for each channel

Example : wChannelConfig[1]=0, set the configuration of channel1 is 0
wCycles : [Input] number of A/D data for each scan channel

Total data number=wCycles * number of scan channel

- **Return :**

0 : No Error

Others : Please refer to section 1.2

- **Demo :** DEMO13.C

2.10.2 P1202_Card0_ReadStatus

This subroutine will read the status of the Continuous Capture on first board. It only checks the status of capture process without stops operation. When the data ready, the return value will be 0. Users can continue capturing data in a loop until stop the capturing process.

*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(….) to select the active board.

- **Syntax :**

P1202_Card0_ReadStatus(WORD wBuf[], WORD wBuf2[], DWORD *dwP1, DWORD *dwP2, WORD *wStatus);

- **Parameters :**

wBuf[]:[Output] store data by scan order(012…N012…N……012…N)

The data sequence in the wBuf[] is as follows :

Ch0Val0	Ch1Val0	Ch2Val0	Ch0Val1	Ch1Val1	Ch2Val1

wBuf2[] :[Output] in channel sequence order(00000…..11111……22222….NNNNN….)

The data sequence in the wBuf2[] is as follows :

Ch0Val0	Ch0Val1	Ch1Val0	Ch1Val1	Ch2Val0	Ch2Val1

*dwP1 :[Input/Output] reserved
*dwP2 :[Input/Output] reserved
*wStatus :[Output] 1=thread start, 2=TimeOut, 8=FIFO overflow, 0x80=thread finish, 5=buffer full

- **Return :**

0 : Ready
1 : No data
2 : FIFO overflow
3 : Thread time-out
4 : Buffer Full

- **Demo :** DEMO13.C

2.10.3 P1202_Card0_Stop

This subroutine will stop the continuous capture function on first board.

- **Syntax :**

  Void P1202_Card0_Stop(Void);
- **Parameter :**

  Void
- **Return :**

  0 : No Error

  Others : Please refer to section 1.2.
- **Demo :** DEMO13.C

2.10.4 P1202_Card1_StartScan

This subroutine will start the channel scan and continuous capture function on the second board. It is recommended using for long time and low sampling rate ADs. Otherwise, the chance of FIFO overflow could be increased. The sampling rate less than 40KHz is recommended.

*Please refer to 「PCI-1202/1602/180x Hardware User Manual」 for more information.

- **Syntax :**

WORD P1202_Card1_StartScan(WORD wSampleRateDiv, WORD wChannelStatus[], WORD wChanelConfig[], WORD wCount);

- **Parameters :**

wSampleRateDiv :[Input] **AD sampling rate = 8M / wSampleRateDiv.**
Ex: wSampleRate = 800 ➔ sampling rate = 8M / 800 = 10K

wChannelStatus[] :[Input] (0=no scan, 1=scan) for each channel

Example1:
wChannelStatus[0] = 1 → Scan Channel 0
wChannelStatus[0] = 0 → No scan Channel 0
wChannelStatus[2] = 1 → Scan Channel 2

wChannelConfig[] :[Input] configuration code for each channel
Ex: wChannelConfig[1] = 0 ← Set 0 as the configuration of channel1

wCycles:[Input] number of A/D data for each scan channel

Total data number=wCycles * number of scan channel

- **Return :**

0 : No Error

Others : Please refer to section 1.2.

- **Demo :** DEMO14.C

2.10.5 P1202_Card1_ReadStatus

This subroutine will read the status of the Continuous Capture on the second board. It only checks the status of continuous capture without stops the operation. When the data ready, the return value will be 0. Users can continue capturing data in a loop until stop the capturing process.

*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(….) to select the active board.

- **Syntax :**

P1202_Card1_ReadStatus(WORD wBuf[], WORD wBuf2[], DWORD *dwP1, DWORD *dwP2, WORD *wStatus);

- **Parameters :**

wBuf[] :[Output] store data by scan order (012…N012…N……012…N)

The data sequence in the wBuf[] is as follows :

Ch0Val0	Ch1Val0	Ch2Val0	Ch0Val1	Ch1Val1	Ch2Val1

wBuf2[] :[Output] store data by channel sequence
(00000…..11111……22222….NNNNN.)

The data sequence in the wBuf2[] is as follows :

Ch0Val0	Ch0Val1	Ch1Val0	Ch1Val1	Ch2Val0	Ch2Val1

*dwP1 :[Input/Output] reserved

*dwP2 :[Input/Output] reserved

*wStatus :[Output] 1 = thread start, 2 = TimeOut, 8 = FIFO overflow,
0x80 = thread finish, 5 = buffer full

Return :

0 : Ready
1 : No data
2 : FIFO overflow
3 : Thread time-out
4 : Buffer Full

- **Demo :** DEMO14.C

2.10.6 P1202_Card1_Stop

This subroutine will stop the continuous capture function of the 2nd board.

- **Syntax :**

  Void P1202_Card1_Stop(Void);

- **Parameter :**

  Void

- **Return :**

  Void

- **Demo :**

  DEMO14.C

2.11 The Other Functions

2.11.0 P1202_DelayUs

This is a **machine independent timer.** This function is used to delay a **settling time** or used as a **general purposed machine independent timer**.

*This function will refer to the current active PCI-1202 board. Use the P1202_ActiveBoard(….) to select the active board.

- **Syntax :**

WORD P1202_DelayUs(WORD wDelayUs);

- **Parameter :**

wDelayUs : number of us to delay, 8191 Max
wDelayUs=1 → delay 1 us
wDelayUs=1000 → delay 1000 us = 1 ms
wDelayUs=8191 → delay 8191 us = 8.191 ms (maximum delay)
wDelayUs=8192 → invalidate delay (will return error)

- **Return :**

0 : No Error

Others : Please refer to section 1.2

- **Demo :** DEMO1.C
- **Long Time Delay :**

```
 WORD DelayMs(WORD wDelayMs) // maximum delay=4294967.295 sec
{
WORD wDelay,wRetVal

wRetVal=0;
for   (wDelay=0; wDelay<wDelayMs; wDelay++)
      wRetVal+=P1202_DelayUs(1000);
return (wRetVal);
}
```

3. Appendix

※ Note1:

[MagicScan controller]

This is a mechanism of hardware channel scan. The scan channel sequence and config need be preset. When the scan start, the MagicScan Controller will switch channel and config according to the channel sequence automatically and get data into FIFO. At the same time, the driver will translate data in FIFO to the Buffer.

The only thing that user need to do is using function to get data from Buffer. The advantage of this mechanism is improving channel scan performance effectively.

※ Note2:

[FIFO Overflow]

When the FIFO full, the last data will cover the first data, it causes data lose and called “FIFO Overflow”.

To prevent FIFO Overflow, it is recommended to suspend another program like IE, anti-virus or select other card that have bigger FIFO like 8K series card.

4. DEMO

There are more than 20 demo programs provided as the following list:

- demo1: one board, D/I/O test, D/A test, A/D polling & pacer trigger test, general test
- demo2: two board, same as demo1
- demo3: one board, all 32 channels of A/D by software trigger(by polling)
- demo4: two board, same as demo3
- demo5: one board, M_function_1 demo
- demo6: two board, same as demo5
- demo7: one board, M_function_2 demo
- demo8: two board, same as demo7
- demo9: one board, M_function_3 demo
- demo10: two board, same as demo9
- demo11: one board, MagicScan demo
- demo12: two board, same as demo11
- demo13: one board, continuous capture demo
- demo14: two board, continuous capture demo (Windows 95/NT only)
- demo15: all installed board, D/I/O test for board number identification
- demo16: one board, performance evaluation demo
- demo17: one board, MagicScan demo, scan sequence: 4→3→5
- demo18: one board, MagicScan demo, scan 32 channel, show channel 0/1/15/16/17
- demo19: one board, A/D calibration.
- demo20: two board, P1202_FUNA, continuous capture demo
- demo21: single board, P1202_FUNB, continuous capture demo
- demo23: single board, post-trigger demo
- demo24: single board, pre-trigger demo
- demo25: single board, middle-trigger demo

Refer to the company floppy disk for details.