User's Guide

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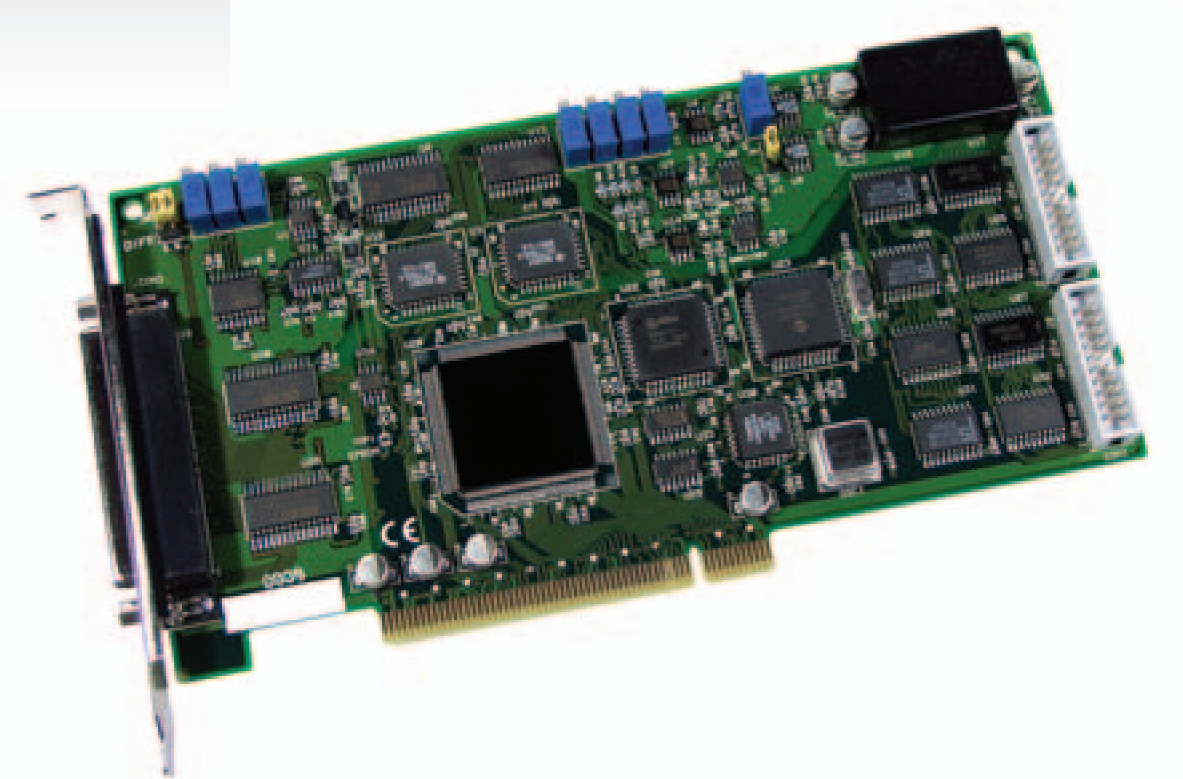

OME-PCI-1202/1602/1800/1802 BOARDS

DOS Software User's Manual

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WARNING: These products are not designed for use in, and should not be used for, patient-connected applications.

Table of Contents

1 . Introduction

The **OME-PCI-1202/1602/1800/1802 DOS driver** is a collection of library for DOS application. This library can be called by TC 2.x, BC 3.x and MSC 5.x. This library can perform a variety of data acquisition operations as follows:

- Get software version
- Initialization
- Digital Input/Output
- A/D conversion
- D/A conversion
- Demo

The driver source is given in the companion floppy disk. There are 19 demo programs given in the companion CD-ROM or floppy disk. The user can print out theses files for reference.

The hardware I/O control register & its function are given in the "OME-PCI-1202/1602/1800/1802 Hardware User's Manual". The user should refer to "OME-PCI-1202/1602/1800/1802 Hardware User's Manual" for more information.

- **12-bit DAC Resolution for OME-PCI-1202$_{(H/L)}$/1602/1602$_{F}$/1800$_{(H/L)}$/1802$_{(H/L)}$**

Data Input	Analog Output
MSB LSB	
1111 1111 1111	+Vref (2047/2048)
1000 0000 0001	+Vref (1/2048)
1000 0000 0000	0 Vlots
0111 1111 1111	-Vref (1/2048)
0000 0000 0000	-Vref (2048/2048)

Bipolar Output Code.

Vref is +5V or +10V selected by J1.

- **12-bit ADC Resolution for OME-PCI-1202$_{(H/L)}$/1800$_{(H/L)}$/1802$_{(H/L)}$**

Analog Input	Digital Output Binary Code	Hex Code
	MSB LSB	
+9.99512V	0111 1111 1111	7FF
0V	0000 0000 0000	000
-4.88m V	1111 1111 1111	FFF
-10V	1000 0000 0000	800

Input Voltages and Output Codes.

- **16-bit ADC Resolution for OME-PCI-1602/1602$_{F}$ Card**

Analog Input	Digital Output Binary Code	Hex Code
	MSB LSB	
+9.999695V	0111 1111 1111 1111	7FFF
0V	0000 0000 0000 0000	0000
-305uv	1111 1111 1111 1111	FFFF
-10V	1000 0000 0000 0000	8000

Input Voltages and Output Codes.

1.1 Software Installation

It is recommended to install the OME-PCI-1202/1602/1800/1802 DOS driver to your hard disk and backup the companion CD ROM. The contents of OME-PCI-1202/1602/1800/1802 DOS CD ROM are given as follows:

Refer to CD ROM readme.txt file.

1.1.1 Software content for OME-PCI-1202(H/L)

```
…\1202\TC>................................................For Turbo C 2.0 or later user
…\1202\BC>...............................................For Borland C++ 3.0 later user
…\1202\MSC>............................................For Microsoft C 5.1 later user

…1202\TC\DRIVER>P1202DR.H..............Header file
…\1202\TC\DRIVER>P1202TCL.C...........Driver source
…\1202\TC\DRIVER>IOPORT.C..............32-bit I/O port driver source

…\1202\TC\LIB>P1202.H............................Header file
…\1202\TC\LIB>P1202TCL.LIB................Large model library
…\1202\TC\LIB>P1202TCH.LIB...............Huge model library
…\1202\TC\LIB>IOPORTL.LIB................Large model library
…\1202\TC\LIB>IOPORTH.LIB................Huge model library

…\1202\TC\DEMO>P1202TCL.LIB..........Large model library
…\1202\TC\DEMO>IOPORTL.LIB...........Large model library
…\1202\TC\DEMO>P1202.H......................Header file
…\1202\TC\DEMO>DEMO1.C..................demo1 program source
…\1202\TC\DEMO>DEMO1.PRJ..............demo1 project file
…\1202\TC\DEMO>DEMO1.EXE.............demo1 execution
…\1202\TC\DEMO>DEMO2.C .................demo2 program source
                                              :
                                              :
```

:

…\1202\TC\DEMO>DEMO19.C.....................demo19 program source
…\1202\TC\DEMO>DEMO19.PRJ.................demo19 project file
…\1202\TC\DEMO>DEMO19.EXE................demo19 execution file

1.1.2 Software content for OME-PCI-1602/1602F

…\1602\TC>..For Turbo C 2.0 or later user
…\1602\BC>..For Borland C++ 3.0 later user
…\1602\MSC>...For Microsoft C 5.1 later user

...\1602\TC\DRIVER>P1602DR.H...........Header file
…\1602\TC\DRIVER>P160XTCL.C.......Driver source
…\1602\TC\DRIVER>IOPORT.C...........32-bit I/O port driver source

…\1602\TC\LIB>P1602.H.......................Header file
…\1602\TC\LIB>P1602TCL.LIB............Large model library
…\1602\TC\LIB>P1602TCH.LIB............Huge model library
…\1602\TC\LIB>IOPORTL.LIB.............Large model library
…\1602\TC\LIB>IOPORTH.LIB.............Huge model library

…\1602\TC\DEMO>P1602TCL.LIB.......Large model library
…\1602\TC\DEMO>IOPORTL.LIB........Large model library
…\1602\TC\DEMO>P1602.H..................Header file
…\1602\TC\DEMO>DEMO1.C...............demo1 program source
…\1602\TC\DEMO>DEMO1.PRJ...........demo1 project file
…\1602\TC\DEMO>DEMO1.EXE..........demo1 execution file

:

:

:

…\1602\TC\DEMO>DEMO19.C.............demo1 program source
…\1602\TC\DEMO>DEMO19.PRJ.........demo1 project file
…\1602\TC\DEMO>DEMO19.EXE........demo1 execution file

1.1.3 Software content for OME-PCI-1800(H/L)/1802(H/L)

```
…\180X\TC>..................................................For Turbo C 2.0 or later user
…\180X\BC>..................................................For Borland C++ 3.0 later user
…\180X\MSC>...............................................For Microsoft C 5.1 later user

…\180X\TC\DRIVER>P180XDR.H...............Header file
…\180X\TC\DRIVER>P180XTCL.C............Driver source
…\180X\TC\DRIVER>IOPORT.C.................32-bit I/O port driver source

…\180X\TC\LIB>P180X.H............................Header file
…\180X\TC\LIB>P180XTCL.LIB.................Large model library
…\180X\TC\LIB>P180XTCH.LIB................Huge model library
…\180X\TC\LIB>IOPORTL.LIB..................Large model library
…\180X\TC\LIB>IOPORTH.LIB..................Huge model library
…\180X\TC\DEMO>P180XTCL.LIB...........Large model library
…\180X\TC\DEMO>IOPORTL.LIB.............Large model library
…\180X\TC\DEMO>P180X.H......................Header file
…\180X\TC\DEMO>DEMO1.C...................demo1 program file
…\180X\TC\DEMO>DEMO1.PRJ..............demo1 project file
…\180X\TC\DEMO>DEMO1.EXE..............demo1 execution file
…\180X\TC\DEMO>DEMO2.C...................demo 2 program file
                                          :
                                          :
                                          :
…\180X \TC\DEMO>DEMO19.C................demo19 program source
…\180X\TC\DEMO>DEMO19.PRJ.............demo19 project file
…\180X\TC\DEMO>DEMO19.EXE............demo19 execution file
```

1.2 Compile & link using MSC

- The including file is **P1602.H**
- There are two OME-PCI-1602/1602F library files: **P1602MCH.LIB & P1602MCL.LIB**
- There are two 32-bit I/O library files: **IOPORTH.LIB & IOPORTL.LIB**
- Support MSC 5.1 & later compiler
- **LARGE** model compiler & link command: CL /AL demo?.c P1602MCL.LIB IOPORTL.lib
- **HUGE** model compiler & link command: CL /AH demo?.c P1602MCH.LIB IOPORTH.LIB

- **Note: The steps are the same for OME-PCI-1202(H/L)/1800(H/L)/1802(H/L) card.**

1.3 Compile & link using TC

- The including file is **P1602.H**
- There are two OME-PCI-1602/1602F library files: **P1602TCH.LIB & P1602TCL.LIB**
- There are two 32-bit I/O library files: **IOPORTH.LIB & IOPORTL.LIB**
- Support TC 2.x compiler
- Use the text editor to create a large model project file as follows:
  DEMO?.C
  P1602TCH.lib
  IOPORTH.lib
- Or use the text editor to create a huge model project file as follows:
  DEMO?.C
  P1602TCL.lib
  IOPORTL.lib
- Use TC integrated environment to **select the correct project file**
- Use TC integrated environment to **select the correct compiler model**
- **Press F9 to compile & link**

- **Note: The steps are the same for OME-PCI-1202(H/L)/1800(H/L)/1802(H/L) card.**

1.4 Compile & link using BC

- The including file is **P1602.H**
- There are two OME-PCI-1602/1602F library files: **P1602BCH.LIB & P1602BCL.LIB**
- There are two 32-bit I/O library files: **IOPORTH.LIB & IOPORTL.LIB**
- Support BC 3.x compiler
- Use BC integrated environment to create a large model project file as follows :
  DEMO?.C
  P1602BCL.LIB
  IOPORTL.LIB
- Or use BC integrated environment to create a huge model project file as follows :
  DEMO?.C
  P1602BCH.LIB
  IOPORTH.LIB
- Use BC integrated environment to **select the correct compiler model**
- **Press F9 to compile & link**

- **Note: The steps are the same for OME-PCI-1202(H/L)/1800(H/L)/1202(H/L) card.**

2 . C Language Library

The libraries are divided into several groups as follows:

- The test functions
- The M_Functions function
- The D/I/O functions
- The D/A function
- The A/D fixed-mode functions
- The A/D MagicScan mode functions
- The A/D continuous capture functions
- The Plug & Play functions
- The other functions

- **For OME-PCI-1202(H/L) Card**

The functions of fixed-channel mode are given as follows :

1. P1202_SetChannelConfig
2. P1202_AdPoling
3. P1202_AdsPolling
4. P1202_AdsPacer

Data in float format

The functions of MagicScan mode are given as follows:

1. P1202_ClearScan
2. P1202_StartScan
3. P1202_AddToScan
4. P1202_SaveScan
5. P1202_ReadMagicScanResult

Data in 12 bits HEX format

The functions of M_Functions are given as follows:

1. P1202_M_FUN_1
2. P1202_M_FUN_2
3. P1202_M_FUN_3

The functions of continuous capture are given as follows:

1. P1202_Card0_StartScan
2. P1202_Card0_ReadData
3. P1202_Card0_Stop

- **For OME-PCI-1602/1602F Card**

The functions of fixed-channel mode are given as follows:

5. P1602_SetChannelConfig
6. P1602_AdPoling
7. P1602_AdsPolling
8. P1602_AdsPacer

Data in float format

The functions of MagicScan mode are given as follows:

6. P1602_ClearScan
7. P1602_StartScan
8. P1602_AddToScan
9. P1602_SaveScan
10. P1602_ReadMagicScanResult

Data in 16 bits HEX format

The functions of M_Functions are given as follows:

4. P1602_M_FUN_1
5. P1602_M_FUN_2
6. P1602_M_FUN_3

The functions of continuous capture are given as follows:

4. P1602_Card0_StartScan
5. P1602_Card0_ReadData
6. P1602_Card0_Stop

- **For OME-PCI-1800(H/L)/1802(H/L) Card**

The functions of fixed-channel mode are given as follows:

9. P180X_SetChannelConfig
10. P180X_AdPoling
11. P180X_AdsPolling
12. P180X_AdsPacer

Data in float format

The functions of MagicScan mode are given as follows:

11. P180X_ClearScan
12. P180X_StartScan
13. P180X_AddToScan
14. P180X_SaveScan
15. P180X_ReadMagicScanResult

Data in 12 bits HEX format

The functions of M_Functions are given as follows:

7. P180X_M_FUN_1
8. P180X_M_FUN_2
9. P180X_M_FUN_3

The functions of continuous capture are given as follows:

7. P180X_Card0_StartScan
8. P180X_Card0_ReadData
9. P180X_Card0_Stop

2.1 The Configuration Code Table

2.1.1 OME-PCI-1602/1602F Configuration Code Table

Bipolar/Unipolar	Input Signal Range	Gain	Settling Time	Configuration Code
Bipolar	+/- 10V	1	3 us	0
Bipolar	+/- 5.0V	2	3 us	1
Bipolar	+/- 2.5V	4	3 us	2
Bipolar	+/- 1.25V	8	3 us	3

2.1.2 OME-PCI-1202L/1800L/1802L Configuration Code Table

Bipolar/Unipolar	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

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

Bipolar/Unipolar	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

2.2 OME-PCI-1202/1602/1800/1802 Header File

2.2.1 P1202.H for OME-PCI-1202(H/L) Card

```
#include  <stdio.h>
#include  <stdlib.h>
#include  <dos.h>
#include  <conio.h>
#include  <math.h>
#include  <graphics.h>

#define   WORD                 unsigned int
#define   DWORD                unsigned long
#define   UCHAR                unsigned char

#define NoError                          0
#define DriverHandleError                1
#define DriverCallError                  2
#define AdControllerError                3
#define M_FunExecError                   4
#define ConfigCodeError                  5
#define FrequencyComputeError            6
#define HighAlarm                        7
#define LowAlarm                         8
#define AdPollingTimeOut                 9
#define AlarmTypeError                  10
#define FindBoardError                  11
#define AdChannelError                  12
#define DaChannelError                  13
#define InvalidateDelay                14
#define DelayTimeOut                    15
#define InvalidateData                  16
#define FifoOverflow                    17
#define TimeOut                         18
#define ExceedBoardNumber                19
#define NotFoundBoard                    20
```

```
#define OpenError                        21

#define  MAX_BOARD_NUMBER       16

float P1202_FloatSub2(float fA, float fB);
short P1202_ShortSub2(short nA, short nB);

WORD P1202_DriverInit(WORD *wBoards);
WORD P1202_DriverClose(void);
WORD P1202_GetDriverVersion(WORD *wDriverVersion);

WORD P1202_GetConfigAddressSpace(WORD wBoardNo, WORD *wAddrTimer,         WORD
        *wAddrCtrl, WORD *wAddrDio, WORD *wAddrAdda);
WORD P1202_DelayUs(WORD wDelayUs);

WORD P1202_ActiveBoard( WORD wBoardNo );
WORD P1202_WhichBoardActive(void);
WORD P1202_Di(WORD *wDi);
WORD P1202_Do(WORD wDo);
WORD P1202_Da(WORD wDaChannel, WORD wDaVal);

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 wSample);

WORD P1202_M_FUN_1(WORD wDaFrequency, WORD wDaWave, float dfDaAmplitude, WORD
        wAdClock, WORD wAdNumber, WORD wAdConfig, float fAdBuf[], float fLowAlarm, float
        fHighAlarm);

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

WORD P1202_M_FUN_3(WORD wDaFrequency, WORD wDaWave, float fDaAmplitude, WORD
        wAdClock, WORD wAdNumber, WORD wChannelStatus[], WORD wAdConfig[], float fAdBuf[],
        float fLowAlarm, float fHighAlarm);
```

```
WORD P1202_Card0_StartScan(WORD wSampleRate, WORD wChannelStatus[], WORD
      wChannelConfig[], WORD wCount);
WORD P1202_Card0_ReadData(void);
void  P1202_Card0_Stop(void);

WORD P1202_ClearScan(void);
WORD P1202_StartScan(WORD wSampleRate, WORD wNum);
WORD P1202_AddToScan(WORD wAdChannel, WORD wAdConfig, WORD wAverage, WORD
      wLowAlarm, WORD wHighAlarm, WORD wAlarmType);
WORD P1202_SaveScan(WORD wAdChannel, WORD wBuf[]);
WORD P1202_ReadMagicScanResult(DWORD *dwHiAlarm, DWORD dwLoAlarm);
```

```
/***
wBuf0[] -> the scaned data is stored as
           1,0,1,0,1,0,1,0…   order
wBuf1[] -> the scaned data is stored as
           0,0,0,0,.....,0,1,1,1,1,.....,1 order
           ^^^^^^^^^^^^^^^ ^^^^^^^^^^^^^^^
           |<-DATACOUNT->| |<-DATACOUNT->|
             ch:0 data         ch:1 data
***/

extern WORD    wBuf0[],wBuf1[];
```

2.2.2 P1602.H for OME-PCI-1602/1602F Card

```
#include  <stdio.h>
#include  <stdlib.h>
#include  <dos.h>
#include  <conio.h>
#include  <math.h>
#include  <graphics.h>


#define   WORD              unsigned int
#define   DWORD             unsigned long
#define   UCHAR             unsigned char

#define NoError                     0
#define DriverHandleError           1
#define DriverCallError             2
#define AdControllerError           3
#define M_FunExecError              4
#define ConfigCodeError             5
#define FrequencyComputeError       6
#define HighAlarm                   7
#define LowAlarm                    8
#define AdPollingTimeOut            9
#define AlarmTypeError              10
#define FindBoardError              11
#define AdChannelError              12
#define DaChannelError              13
#define InvalidateDelay             14
#define DelayTimeOut                15
#define InvalidateData              16
#define FifoOverflow                17
#define TimeOut                     18
#define ExceedBoardNumber           19
#define NotFoundBoard               20
#define OpenError                   21
```

```
#define  MAX_BOARD_NUMBER   16

float P1602_FloatSub2(float fA, float fB);
short P1602_ShortSub2(short nA, short nB);

WORD P1602_DriverInit(WORD *wBoards);
WORD P1602_DriverClose(void);
WORD P1602_GetDriverVersion(WORD *wDriverVersion);



WORD P1602_GetConfigAddressSpace(WORD wBoardNo, WORD *wAddrTimer,
            WORD *wAddrCtrl, WORD *wAddrDio, WORD *wAddrAdda);
WORD P1602_DelayUs(WORD wDelayUs);
WORD P1602_ActiveBoard( WORD wBoardNo );
WORD P1602_WhichBoardActive(void);
WORD P1602_Di(WORD *wDi);
WORD P1602_Do(WORD wDo);
WORD P1602_Da(WORD wDaChannel, WORD wDaVal);

WORD P1602_SetChannelConfig(WORD wAdChannel, WORD wConfig);
WORD P1602_AdPolling(float *fAdVal);
WORD P1602_AdsPolling(float fAdVal[], WORD wNum);
WORD P1602_AdsPacer(float fAdVal[], WORD wNum, WORD wSample);

WORD P1602_M_FUN_1(WORD wDaFrequency, WORD wDaWave, float dfDaAmplitude,
           WORD wAdClock, WORD wAdNumber, WORD wAdConfig, float fAdBuf[], float
            fLowAlarm, float fHighAlarm);

WORD P1602_M_FUN_2(WORD wDaNumber, WORD wDaWave, WORD wDaBuf[],
           WORD wAdClock, WORD wAdNumber, WORD wAdConfig, WORD wAdBuf[]);

WORD P1602_M_FUN_3(WORD wDaFrequency, WORD wDaWave, float fDaAmplitude,
           WORD wAdClock, WORD wAdNumber, WORD wChannelStatus[],
           WORD wAdConfig[], float fAdBuf[], float fLowAlarm, float fHighAlarm);
WORD P1602_Card0_StartScan(WORD wSampleRate, WORD wChannelStatus[],
        WORD wChannelConfig[], WORD wCount);
WORD P1602_Card0_ReadData(void);
  void  P1602_Card0_Stop(void);

WORD P1602_ClearScan(void);
WORD P1602_StartScan(WORD wSampleRate, WORD wNum);
WORD P1602_AddToScan(WORD wAdChannel, WORD wAdConfig, WORD wAverage,
        WORD wLowAlarm, WORD wHighAlarm, WORD wAlarmType);
WORD P1602_SaveScan(WORD wAdChannel, WORD wBuf[]);
WORD P1602_ReadMagicScanResult(DWORD *dwHiAlarm, DWORD dwLoAlarm);
```

```
/***
wBuf0[] -> the scaned data is stored as
           1,0,1,0,1,0,1,0…   order
wBuf1[] -> the scaned data is stored as
           0,0,0,0,.....,0,1,1,1,1,.....,1 order
           ^^^^^^^^^^^^^^^ ^^^^^^^^^^^^^^^
           |<-DATACOUNT->| |<-DATACOUNT->|
             ch:0 data         ch:1 data
***/

extern WORD    wBuf0[],wBuf1[];
```

2.2.3 P180X.H for OME-PCI-1800(H/L)/1802(H/L) Card

```
#include  <stdio.h>
#include  <stdlib.h>
#include  <dos.h>
#include  <conio.h>
#include  <math.h>
#include  <graphics.h>

#define   WORD              unsigned int
#define   DWORD             unsigned long
#define   UCHAR             unsigned char

#define NoError                      0
#define DriverHandleError            1
#define DriverCallError              2
#define AdControllerError            3
#define M_FunExecError               4
#define ConfigCodeError              5
#define FrequencyComputeError        6
#define HighAlarm                    7
#define LowAlarm                     8
#define AdPollingTimeOut             9
#define AlarmTypeError              10
#define FindBoardError              11
#define AdChannelError              12
#define DaChannelError              13
#define InvalidateDelay             14
#define DelayTimeOut                15
#define InvalidateData              16
#define FifoOverflow                17
#define TimeOut                     18
#define ExceedBoardNumber           19
#define NotFoundBoard               20
#define OpenError                   21

#define  MAX_BOARD_NUMBER   16
```

```
float P180X_FloatSub2(float fA, float fB);
short P180X_ShortSub2(short nA, short nB);

WORD P180X_DriverInit(WORD *wBoards);
WORD P180X_DriverClose(void);
WORD P180X_GetDriverVersion(WORD *wDriverVersion);

WORD P180X_GetConfigAddressSpace(WORD wBoardNo, WORD *wAddrTimer, WORD
      *wAddrCtrl, WORD *wAddrDio, WORD *wAddrAdda);
WORD P180X_DelayUs(WORD wDelayUs);

WORD P180X_ActiveBoard( WORD wBoardNo );
WORD P180X_WhichBoardActive(void);
WORD P180X_Di(WORD *wDi);
WORD P180X_Do(WORD wDo);
WORD P180X_Da(WORD wDaChannel, WORD wDaVal);

WORD P180X_SetChannelConfig(WORD wAdChannel, WORD wConfig);
WORD P180X_AdPolling(float *fAdVal);
WORD P180X_AdsPolling(float fAdVal[], WORD wNum);
WORD P180X_AdsPacer(float fAdVal[], WORD wNum, WORD wSample);

WORD P180X_M_FUN_1(WORD wDaFrequency, WORD wDaWave, float dfDaAmplitude, WORD
       wAdClock, WORD wAdNumber, WORD wAdConfig, float fAdBuf[], float fLowAlarm, float
       fHighAlarm);

WORD P180X_M_FUN_2(WORD wDaNumber, WORD wDaWave, WORD wDaBuf[], WORD
       wAdClock, WORD wAdNumber, WORD wAdConfig, WORD wAdBuf[]);

WORD P180X_M_FUN_3(WORD wDaFrequency, WORD wDaWave, float fDaAmplitude, WORD
       wAdClock, WORD wAdNumber, WORD wChannelStatus[], WORD wAdConfig[], float fAdBuf[],
       float fLowAlarm, float fHighAlarm);



WORD P180X_Card0_StartScan(WORD wSampleRate, WORD wChannelStatus[],
          WORD   wChannelConfig[], WORD wCount);
WORD P180X_Card0_ReadData(void);
   void   P1802_Card0_Stop(void);

WORD P180X_ClearScan(void);
WORD P180X_StartScan(WORD wSampleRate, WORD wNum);
WORD P180X_AddToScan(WORD wAdChannel, WORD wAdConfig, WORD wAverage,
           WORD wLowAlarm, WORD wHighAlarm, WORD wAlarmType);
WORD P180X_SaveScan(WORD wAdChannel, WORD wBuf[]);
WORD P180X_ReadMagicScanResult(DWORD *dwHiAlarm, DWORD dwLoAlarm);

/***
wBuf0[] -> the scaned data is stored as
           1,0,1,0,1,0,1,0…   order
wBuf1[] -> the scaned data is stored as
           0,0,0,0,.....,0,1,1,1,1,.....,1 order
           ^^^^^^^^^^^^^^^ ^^^^^^^^^^^^^^^
           |<-DATACOUNT->| |<-DATACOUNT->|
             ch:0 data         ch:1 data
***/

extern WORD    wBuf0[],wBuf1[];
```

2.3 The Testing Functions

2.3.1 P1202_FloatSub2
P1602_FloatSub2
P180X_FloatSub2

- **Description:**

  Compute C=A-B in **float** format, **float=4 bytes floating point number.** This function is provided to test library linkage. **If this subroutine return the correct value, the other subroutine will work properly also.**

- **Syntax:**

  float P1202_FloatSub2(float fA, float fB); *for OME-PCI-1202(H/L) Card.*
  float P1602_FloatSub2(float fA, float fB); *for OME-PCI-1602/1602F Card.*
  float P180X_FloatSub2(float fA, float fB); *for OME-PCI-1800(H/L)/1802(H/L) Card.*

- **Input Parameter :**

  fA : 4 bytes floating point value
  fB : 4 bytes floating point value

- **Return Value :** return=fA-fB
- **Demo Program : DEMO1.C**

2.3.2 P1202_ShortSub2
P1602_ShortSub2
P180X_ShortSub2

- **Description :**

  Compute C=A-B in SHORT format, **SHORT=16 bits signed number.** This function is provided to test library linkage. **If this subroutine return the correct value, the other subroutine will work properly also.**

- **Syntax :**

short P1202_ShortSub2(Short nA, Short nB);   *for OME-PCI-1202(H/L) Card.*

short P1602_ShortSub2(Short nA, Short nB);   *for OME-PCI-1602/1602F Card.*

short P180X_ShortSub2(Short nA, Short nB);   *for OME-PCI-1800(H/L)/1802H(H/L) Card.*

- **Input Parameter :**

nA : 16 bits value

nB : 16 bits value

- **Return Value :** return=nA-Nb
- **Demo Program : DEMO1.C**

2.3.3 P1602_GetDriverVersion P180X_GetDriverVersion P1602_GetDriverVersion

- **Description :**

This subroutine will read the software version number.

- **Syntax :**

WORD P1202_GetDriverVersion(WORD *wDriverVersion);

for OME-PCI-1202(H/L) Card.

WORD P1602_GetDriverVersion(WORK *wDriverVersion);

for OME-PCI-1602/1602F Card.

WORD P180X_GetDriverVersion(WORD *wDriverVersion);

for OME-PCI-1800(H/L)/1802(H/L) Card.

- **Input Parameter :** *wDriverVersion : address of **wDriverVersion**

wDriverVersion=0x200 → Version 2.0

- **Return Value :**

NoError : OK.

- **Demo Program : DEMO1.C**

2.4 The M_Functions

2.4.1 P1602_M_FUN_1
P1602_M_FUN_1
P180X_M_FUN_1

- **Description :**

The P1602_M_FUN_1 will compute the wave form image automatically. (Refer to "PCI-1202/1602/1800/1802 Hardware Manual" chapter-5 for details) (input=AD channel_0, output=DA channel_0). This function will refer to the current active OME-PCI-1602/1602F board. Use the P1602_ActiveBoard(….) to select the active board.

- **Syntax :**

WORD P1202_M_FUN_1(WORD wDaFrequency, WORD wDaWave,
float fDaAmplitude, WORD wAdClock, WORD wAdNumber,
WORD wAdConfig, float fAdBuf[], float fLowAlarm, float fHighAlarm);
for OME-PCI-1202(H/L) Card.
WORD P1602_M_FUN_1(WORD wDaFrequency, WORD wDaWave,
float fDaAmplitude, WORD wAdClock, WORD wAdNumber,
WORD wAdConfig, float fAdBuf[], float fLowAlarm, float fHighAlarm);
for OME-PCI-1602/1602F Card.

WORD P180X_M_FUN_1(WORD wDaFrequency, WORD wDaWave,
float fDaAmplitude, WORD wAdClock, WORD wAdNumber,
WORD wAdConfig, float fAdBuf[], float fLowAlarm, float fHighAlarm);
for OME-PCI-1800(H/L)/1802(H/L) Card.

- ## Input Parameter :

wDaFrequency : **DA output frequency = 1.8M/wDaFrequency (pentium 120)**
wDaWave : Number of DA wave form to be output
fDaAmplitude : Amplitude of DA output. NOTE : the hardware J1 must select +/-10V
wAdClock : **AD sampling clock = 8000000/wAdClock** samples/sec
wAdNumber: Number of AD data to be read.
wAdConfig : **A/D input range configuration code.**
fAdBuf[] : the starting address of **fAdBuf** which store the A/D data.
fLowAlarm : low alarm limit. if **fAdBuf[?]< fLowAlarm** → LowAlarm.
fHighAlarm : high alarm limit. if **fAdBuf[?]>fHighAlarm** → HighAlarm.

- ## Return Value :

0 : OK.
ExceedBoardNumber: invalidate board number.
FindBoardError: no OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board
AdControllerError : embedded controller handshake error .
ConfigCodeError : **wAdConfig** configuration code error.
HighAlarm : **fAdBuf[?]>fHighAlarm.**
LowAlarm : **fAdBuf[?]< fLowAlarm.**

- ## Demo Program : DEMO5.C

2.4.2 P1202_M_FUN_2
P1602_M_FUN_2
P180X_M_FUN_2

- **Description :**

The P1602_M_FUN_2 will **not** compute the wave form image automatically.
(Refer to "PCI-1202/1602/1800/1802 Hardware Manual" chapter-5 for details)
(input=AD channel_0,output=DA channel_0) This function will refer to the current active OME-PCI-1602/1602F board. Use the P1602_ActiveBoard(…) to select the active board.

- **Syntax :**

```
WORD   P1202_M_FUN_2(WORD wDaFrequency, WORD wDaWave,
       WORD wDaBuf[], WORD wAdClock, WORD wAdNumber
       WORD wAdConfig, WORD wAdBuf[]);
```
for OME-PCI-1202(H/L) Card.

```
WORD   P1602_M_FUN_2(WORD wDaFrequency, WORD wDaWave,
       WORD wDaBuf[], WORD wAdClock, WORD wAdNumber
       WORD wAdConfig, WORD wAdBuf[]);
```
for OME-PCI-1602/1602F Card.

```
WORD   P180X_M_FUN_2(WORD wDaFrequency, WORD wDaWave,
       WORD wDaBuf[], WORD wAdClock, WORD wAdNumber
       WORD wAdConfig, WORD wAdBuf[]);
```
for OME-PCI-1800(H/L)/1802(H/L) Card.

- **Input Parameter :**

wDaFrequency : **DA output frequency = 1.8M/wDaFrequency(pentium 120)**
wDaWave : Number of DA wave form to be output.
wDaBuf[] : The array store the D/A wave form image.
wAdClock : **AD sampling clock = 8000000/wAdClock** samples/sec.
wAdNumber: Number of AD data to be read.
wAdConfig : **A/D input range configuration code.**
wAdBuf[] : the starting address of **fAdBuf** which store the A/D data.

- **Return Value :**

  0 : OK.
  ExceedBoardNumber: invalidate board number.
  FindBoardError: no OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board
  AdControllererror: embedded controller handshake error .

- **Demo Program : DEMO7.C**

The DA output wave form generator is a **machine dependent** function
The DA output frequency = **1.8M/wDaFrequency** is machine dependent.

The testing results are given as follows:

DA output frequency = 1.8M/wDaFrequency for pentium 120
DA output frequency = 2.0M/wDaFrequency for pentium 133

The user must test this value before using M_FUN_1 and M_FUN_2.

2.4.3 P1202_M_FUN_3
P1602_M_FUN_3
P180X_M_FUN_3

- **Description :**

The P1602_M_FUN_3 will compute the wave form image automatically. (Refer to "PCI-1202/1602/1800/1802 Hardware Manual" chapter-5 for details) (input=programable channels,output=DA channel_0) This function will refer to the current active OME-PCI-1602/1602F board. Use the P1602_ActiveBoard(…) to select the active board.

- **Syntax :**

```
WORD   P1602_M_FUN_3( WORD wDaFrequency, WORD wDaWave,
       float fDaAmplitude, WORD wAdClock, WORD wAdNumber,
       WORD wChannelStatus[], WORD wAdConfig[], float fAdBuf[],
       float fLowAlarm, float fHighAlarm)
```

for OME-PCI-1202(H/L) Card.

```
WORD   P1602_M_FUN_3( WORD wDaFrequency, WORD wDaWave,
       float fDaAmplitude, WORD wAdClock, WORD wAdNumber,
       WORD wChannelStatus[], WORD wAdConfig[], float fAdBuf[],
       float fLowAlarm, float fHighAlarm)
```

for OME-PCI-1602/1602F Card

```
WORD   P1602_M_FUN_3( WORD wDaFrequency, WORD wDaWave,
       float fDaAmplitude, WORD wAdClock, WORD wAdNumber,
       WORD wChannelStatus[], WORD wAdConfig[], float fAdBuf[],
       float fLowAlarm, float fHighAlarm)
```

for OME-PCI-1800(H/L)/1802(H/L) Card

- **Input Parameter :**

wDaFrequency : **DA output frequency = 1.8M/wDaFrequency (pentium 120)**
wDaWave : Number of DA wave form to be output
fDaAmplitude : Amplitude of DA output. NOTE : the hardware J1 must select +/-10V
wAdClock : **AD sampling clock = 8000000/wAdClock** samples/sec
wAdNumber: Number of AD data to be read
wAdChannel[]: status (1=scan, 0=no scan) code of all 32 channels
wAdConfig[]: configuration code of all 32 channels
fAdBuf[] : the starting address of **fAdBuf** which store the A/D data
fLowAlarm : low alarm limit. if **fAdBuf[?]< fLowAlarm** → LowAlarm
fHighAlarm : high alarm limit. if **fAdBuf[?]>fHighAlarm** → HighAlarm

- **Return Value :**

0 : OK
ExceedBoardNumber: invalidate board number
FindBoardError: no OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board
AdControllerError : embedded controller handshake error
HighAlarm : **fAdBuf[?]>fHighAlarm**
LowAlarm : **fAdBuf[?]< fLowAlarm**

- **Demo Program : DEMO9.C**

DA output frequency = 1.8M/wDaFrequency for pentium 120
DA output frequency = 2.0M/wDaFrequency for pentium 133

The user must test this value before using M_FUN_1 and M_FUN_2.

2.5 The DIO Functions

2.5.1 P1202_Di / P1602_Di / P180X_Di

- **Description :**

  This function will read the 16 bits D/I data from the current active board. Use P1602_ActiveBoard(…) to select the active board.
- **Syntax :**

  WORD P1202_Di(WORD *wDi); *for OME-PCI-1202(H/L) Card*

  WORD P1602_Di(WORD *wDi); *for OME-PCI-1602/1602F Card*

  WORD P180X_Di(WORD *wDi); *for OME-PCI-1800(H/L)/1802(H/L) Card*
- **Input Parameter :**

  *wDi : address of **wDi** which store the 16 bits D/I data
- **Return Value :**

  NoError : OK

  ExceedBoardNumber: invalidate board number

  FindBoardError : cannot find the OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board
- **Demo Program : DEMO1.C**

2.5.2 P1202_Do / P1602_Do / P180X_Do

- **Description :** This function will send the 16 bits D/O data to the current active board. Use P1602_ActiveBoard(…) to select the active boards.
- **Syntax :** WORD P1602_Do(WORD wDo);
- **Input Parameter :**

  wDo : the 16 bits data sent to DO port
- **Return Value :**

  NoError : OK

  ExceedBoardNumber: invalidate board number

  FindBoardError : cannot find the OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board
- **Demo Program : DEMO1.C**

2.6 The DA Functions

2.6.1 P1202_Da / P1602_Da / P180X_Da

- **Description :**

This function will send the 12 bits D/A data to the current active board. Use P1602_ActiveBoard(…) to select the active boards.

- **Syntax :**

WORD P1202_Da(WORD wChannel, WORD wDaVal);
for OME-PCI-1202(H/L) Card
WORD P1602_Da(WORD wChannel, WORD wDaVal);
for OME-PCI-1602/1602F Card
WORD P180X_Da(WORD wChannel, WORD wDaVal);
for OME-PCI-1800(H/L)/1802(H/L) Card

- **Input Parameter :**

wChannel : 0 for channel_0 DA, 1 for channel_1 DA

wDaVal : 12 bits data sent to DA port. 0=minimum and 4095=maximum. The DA output can be +/- 5V or +/- 10V setting by hardware JP1. The software can't detect the state of JP1. So 4095 maybe +5V or +10V (depend on JP1).

- **Return Value :**

NoError : OK

ExceedBoardNumber: invalidate board number

FindBoardError : cannot find the OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board

DaChannelError : channel number must be 0 or 1

- **Demo Program : DEMO1.C**

2.7 The AD Fixed-mode Functions

2.7.1 P1202_SetChannelConfig
P1602_SetChannelConfig
P180X_SetChannelConfig

- **Description :**

This subroutine will set the AD channel & its configuration code. This subroutine will set the active AD channel for P1602_AdPolling, P1602_AdsPolling and P1602_AdsPacer. This function will refer to the current active OME-PCI-1602/1602F board. Use the P1602_ActiveBoard(….) to select the active board.

- **Syntax :**

WORD P1202_SetChannelConfig(WORD wChannel, WORD wConfig);
for OME-PCI-1202(H/L) Card, Maximun 16 Channels.

WORD P1602_SetChannelConfig(WORD wChannel, WORD wConfig);
for OME-PCI-1602/1602F Card, Maximum 32 Channels.

WORD P180X_SetChannelConfig(WORD wChannel, WORD wConfig);
for OME-PCI-1800(H/L)/1802(H/L) Card.
Maximum 16 Channels for OME-PCI-1800(H/L) Card.
Maximum 32 Channels for OME-PCI-1802(H/L) Card.

- **Input Parameter :**

wChannel : AD channel number
wConfig : Configuration code. Refer to "PCI-1202/1602/1800/1802 Hardware Manual" for details.

- **Return Value :**

NoError : OK
ExceedBoardNumber: invalidate board number
FindBoardError : cannot find the OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board
AdControllerError : MagicScan controller hardware handshake error

- **Demo Program : DEMO1.C**

2.7.2 P1202_AdPolling
P1602_AdPolling
P180X_AdPolling

- **Description :**

This subroutine will perform one AD conversion by polling. The P1602_SetChannelConfig subroutine can be used to change channel or configuration code and the P1602_AdPolling will refer to that condition in later operation. This function will refer to the current active OME-PCI-1602/1602F board. Use the P1602_ActiveBoard(….) to select the active board.

- **Syntax :**

WORD P1202_AdPolling(float *fAdVal); *for OME-PCI-1202(H/L) Card*
WORD P1602_AdPolling(float *fAdVal); *for OME-PCI-1602/1602F Card*
WORD P180X_AdPolling(float *fAdVal); *for OME-PCI-1800(H/L)/1802(H/L) Card*

- **Input Parameter :**

*fAdVal : address of **fAdVal** which store the AD data, this data is automatically computed based on the setting of **P1602_SetChannelConfig**.

- **Return Value :**

NoError : OK

ExceedBoardNumber: invalidate board number

FindBoardError : cannot find the OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board

AdPollingTimeOut : hardware timeout error

- **Demo Program : DEMO1.C**

2.7.3 P1202_AdsPolling
P1602_AdsPolling
P180X_AdsPolling

- **Description :**

This subroutine will perform multiple AD conversions by polling.
The **P1602_SetChannelConfig** subroutine can be used to change channel or configuration code and the **P1602_AdsPolling** will refer to that condition in later operation. This function will refer to the current active OME-PCI-1602/1602F board. Use the P1602_ActiveBoard(….) to select the active board.

- **Syntax :**

WORD P1202_AdsPolling(float fAdVal[], WORD wNum);
for OME-PCI-1202(H/L) Card

WORD P1602_AdsPolling(float fAdVal[], WORD wNum);
for OME-PCI-1602/1602F Card

WORD P180X_AdsPolling(float fAdVal[], WORD wNum);
for OME-PCI-1800(H/L)/1802(H/L) Card

- **Input Parameter :**

fAdVal[]: starting address of AD data buffer, these data will be automatically computed based on the setting of **P1602_SetChannelConfig**.
wNum: number of AD conversions will be performed.

- **Return Value :**

NoError: OK
ExceedBoardNumber: invalidate board number
FindBoardError: cannot find the OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board
AdPollingTimeOut: hardware timeout error

- **Demo Program : DEMO1.C**

2.7.4 P1202_AdsPacer
P1602_AdsPacer
P180X_AdsPacer

- **Description :**

This subroutine will perform multiple AD conversions by pacer trigger. The **P1602_SetChannelConfig** subroutine can be used to change channel or configuration code and the **P1602_AdsPacer** will refer to that condition in later operation. The hardware pacer will generate trigger signal to AD converter periodically. So these AD data can be used to reconstruct the wave form of analog input. The **P1602_AdsPolling** is controlled by software polling , so the AD conversion operation will be interrupted by system OS. **It is recommended to use *P1602_AdsPacer* if the input wave form reconstruction is needed.** This function will refer to the current active OME-PCI-1602/1602F board. Use the P1602_ActiveBoard(….) to select the active board.

- **Syntax :**

WORD P1202_AdsPacer(float fAdVal[], WORD wNum, WORD wSample);
for OME-PCI-1202(H/L) Card

WORD P1602_AdsPacer(float fAdVal[], WORD wNum, WORD wSample);
for OME-PCI-1602F Card

WORD P180X_AdsPacer(float fAdVal[], WORD wNum, WORD wSample);
for OME-PCI-1800(H/L)/1802(H/L) Card

- **Input Parameter :**

fAdVal[] : starting address of AD data buffer, these data will be automatically computed based on the setting of **P1602_SetChannelConfig**.

wNum : number of AD conversions will be performed.

wSample : **AD sampling rate = 8M/wSample**

For OME-PCI-1202 Card

wSample=73 → Sampling rate=8M/73=110K → **Maximum for OME-PCI-1202 Card**
wSample=80 → Sampling rate=8M/80=100K

For OME-PCI-1602F/1602 Card

wSample=40 → Sampling rate=8M/40=200K → **Maximum for OME-PCI-1602F Card**
wSample=80 → Sampling rate=8M/80=100K → **Maximum for OME-PCI-1602 Card**

For OME-PCI-1800/1802 Card

wSample=24 → Sampling rate=8M/24=333K → **Maximum**
wSample=80 → Sampling rate=8M/80=100K

● Return Value :

NoError : OK

ExceedBoardNumber: invalidate board number

FindBoardError : cannot find the OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board

AdPollingTimeOut : hardware timeout error

● Demo Program : DEMO1.C

P1602_SetChannelConfig
P1602_AdPolling
P1602_AdsPollng
P1602_AdsPacer

← **Fix channel AD conversion mode**

2.8 The MagicScan Functions

2.8.1 P1202_ClearScan
P1602_ClearScan
P180X_ClearScan

- **Description :**

  This subroutine will initialize the MagicScan controller to the Initial state. This function will refer to the current active OME-PCI-1602/1602F board. Use the P1602_ActiveBoard(….) to select the active board.

- **Syntax :** WORD P1202_ClearScan(); *for OME-PCI-1202(H/L) Card*

  WORD P1602_ClearScan(); *for OME-PCI-1602/1602F Card*

  WORD P180X_ClearScan(); *for OME-PCI-1800(H/L)/1802(H/L) Card*

- **Input Parameter :** void
- **Return Value :**

  NoError : OK

  ExceedBoardNumber: invalidate board number

  FindBoardError : cannot find the OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board

- **Demo Program : DEMO11.C**

2.8.2 P1602_StartScan
P1602_StartScan
P1602_StartScan

- **Description :**

This subroutine will start the MagicScan operation. This function will refer to the current active OME-PCI-1602/1602F board. Use the P1602_ActiveBoard(….) to select the active board.

- **Syntax :**

WORD P1202_StartScan(WORD wSampleRate, WORD wNum);
for OME-PCI-1202(H/L) Card
WORD P1602_StartScan(WORD wSampleRate, WORD wNum);
for OME-PCI-1602/1602F Card
WORD P180X_StartScan(WORD wSampleRate, WORD wNum);
for OME-PCI-1800(H/L)/1802(H/L) Card

- **Input Parameter :**

wSampleRate : **AD sampling rate = 8M/wSampleRate**

For OME-PCI-1202 Card

wSampleRate=73 → Sampling rate=8M/73=110K → **Maximum**
wSampleRate=80 → Sampling rate=8M/80=100K

For OME-PCI-1602F/1602 Card

wSampleRate=40 → Sampling rate=8M/40=200K → **Maximum for OME-PCI-1602FCard**
wSampleRate=80 → Sampling rate=8M/80=100K → **Maximum for OME-PCI-1602 Card**

For OME-PCI-1800/1802 Card

wSampleRate=24 → Sampling rate=8M/24=333K → **Maximum**
wSampleRate=80 → Sampling rate=8M/80=100K

wNum : Number of **MagicScan cycle** to perform

- **Return Value :**

NoError : OK

ExceedBoardNumber: invalidate board number

FindBoardError : cannot find the OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board

AdControllerError : MagicScan controller hardware handshake error

- **Demo Program : DEMO11.C**

2.8.3 P1202_ReadMagicScanResult
P1602_ReadMagicScanResult
P180X_ReadMagicScanResult

- **Description :**

  This subroutine will read the alarm result of the MagicScan operation. This function will refer to the current active OME-PCI-1602/1602F board. Use the P1602_ActiveBoard(….) to select the active board.

- **Syntax :**

  void P1202_ReadMagicScanResult(DWORD *dwHighAlarm, DWORD dwLowAlarm);
  for OME-PCI-1202(H/L) Card
  void P1602_ReadMagicScanResult(DWORD *dwHighAlarm, DWORD *dwLowAlarm);
  for OME-PCI-1602/602F Card
  void P180X_ReadMagicScanResult(DWORD *dwHighAlarm, DWORD *dwLowAlarm);
  for OME-PCI-1800(H/L)/1802(H/L) Card

- **Input Parameter :**

  *dwLowAlarm: address of **dwLowAlarm** which store the MagicScan alarm status
  (bit_0 → channel_0, bit_31 → channel_31, 0=no alarm, 1=low alarm)
  *dwHighAlarm: address of **dwHighAlarm** which store the MagicScan alarm tatus
  (bit_0 → channel_0, bit_31 → channel_31, 0=no alarm, 1=high alarm)

- **Return Value** : void
- **Demo Program : DEMO11.C**

dwLowAlarm	→ 32 bits corresponding to 32 channels
	→ 0 = no low alarm
	→ 1 = is low alarm
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	→ 32 bits corresponding to 32 channels
	→ 0 = no high alarm
	→ 1 = is high alarm
dwHighAlarm=0	→ all channels OK, no high alarm
dwHighAlarm=1	→ channel_0 is high alarm, others are OK
dwHighAlarm=3	→ channel_0 and channel_1 are high alarm, others are OK

2.8.4 P1202_AddToScan
P1602_AddToScan
P180X_AddToScan

- **Description :**

This subroutine will add one channel to the **MagicScan circular queue**. This function will refer to the current active OME-PCI-1602/1602F board.Use the P1602_ActiveBoard(…) to select the active board.

- **Syntax :**

void P1202_AddToScan(WORD wAdChannel, WORD wConfig, WORD wAverage, WORD wLowAlarm, WORD wHighAlarm, WORD wAlarmType);
for OME-PCI-1202(H/L) Card

void P1602_AddToScan(WORD wAdChannel, WORD wConfig, WORD wAverage, WORD wLowAlarm, WORD wHighAlarm, WORD wAlarmType);
for OME-PCI-1602/1602F Card

void P180X_AddToScan(WORD wAdChannel, WORD wConfig, WORD wAverage, WORD wLowAlarm, WORD wHighAlarm, WORD wAlarmType);
for OME-PCI-1800(H/L)/1802(H/L) Card

- **Input Parameter :**

wAdChannel : AD channel number
wConfig : the configuration code
wAverage : the factor of digital average filter
wLowAlarm : 16 bits low alarm data
wHighAlarm : 16 bits high alarm data
wAlarmType : 0=no alarm, 1=high alarm, 2=low alarm, 3=in-alarm, 4=out-alarm

- **Return Value** : void

NoError : Ok
ExceedBoardNumber: invalidate board number
FindBoardError : cannot find the OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board
AdChannelError : invalidate AD channel
AlarmTypeError : only 0/1/2/3/4 are validate
AdControllerError : MagicScan controller hardware handshake error

- **Demo Program : DEMO11.C**

2.8.5 P1202_SaveScan P1602_SaveScan P180X_SaveScan

- **Description :**

This subroutine will specify the starting address of AD data buffer for MagicScan. This function will refer to the current active OME-PCI-1602/1602F board. Use the P1602_ActiveBoard(…) to select the active board.

- **Syntax :**

void P1202_SaveScan(WORD wAdChannel, WORD wBuf[]);
for OME-PCI-1202(H/L) Card
void P1602_SaveScan(WORD wAdChannel, WORD wBuf[]);
for OME-PCI-1602/1602F Card
void P180X_SaveScan(WORD wAdChannel, WORD wBuf[]);
for OME-PCI-1800(H/L)/1802(H/L) Card

- **Input Parameter :**

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

wBuf : starting address of AD data buffer for channel specified in **wAdChannel**

- **Return Value :**

NoError : Ok
ExceedBoardNumber: invalidate board number
FindBoardError : cannot find the OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board
AdChannelError : invalidate AD channel

- **Demo Program :.DEMO11.C**

2.9 The Plug & Play Functions

2.9.1 P1202_DriverInit
P1602_DriverInit
P180X_DriverInit

- **Description :**

This function will detect all the OME-PCI-1602/1602F boards installed in the system. This function must be called once before the other functions are called.

- **Syntax :**

WORD P1202_DriverInit(WORD *wTotalBoard); *for OME-PCI-1202(H/L) Card*
WORD P1602_DriverInit(WORD *wTotalBoard); *for OME-PCI-1602/1602F Card*
WORD P180X_DriverInit(WORD *wTotalBoard); *for OME-PCI-1800(H/L)/1802(H/L) Card*

- **Input Parameter :**

*wTotalBoard: address of **wTotalBoard**
wTotalBoard=1 → one OME-PCI-1602/1602F card in the system
wTotalBoard=n → n*PCI-1602/1602F cards in the system

- **Return Value :**

NoError : OK
NoFoundBoard: detect no OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) Card

- **Demo Program : All DEMO programs**

2.9.2 P1202_DriverClose
P1602_DriverClose
P180X_DriverClose

- **Description :**
  Return all resources to system. This function must be called once before program is terminated.

- **Syntax :**
  WORD P1202_DriverClose(void); *for OME-PCI-1202(H/L) Card*
  WORD P1602_DriverClose(void); *for OME-PCI-1602/1602F Card*
  WORD P180X_DriverClose(void); *for OME-PCI-1800(H/L)/1802(H/L) Card*

- **Input Parameter :** void

- **Return Value :** NoError

- **Demo Program : All DEMO programs**

2.9.3 P1202_GetConfigAddressSpace P1602_GetConfigAddressSpace P180X_GetConfigAddressSpace

- **Description :**

Get the I/O address of OME-PCI-1602/1602F board n. This function is for debug. It is not necessary to call this function.

- **Syntax :**

WORD P1202_GetConfigAddressSpace(WORD wBoardNo, WORD *wAddrTimer,WORD *wAddrCtrl, WORD *wAddrDio, WORD *wAddrAdda);
for OME-PCI-1202(H/L) Card

WORD P1602_GetConfigAddressSpace(WORD wBoardNo, WORD *wAddrTimer,WORD *wAddrCtrl, WORD *wAddrDio, WORD *wAddrAdda);
for OME-PCI-1602/1602F Card

WORD P180X_GetConfigAddressSpace(WORD wBoardNo, WORD *wAddrTimer,WORD *wAddrCtrl, WORD *wAddrDio, WORD *wAddrAdda);
for OME-PCI-1800(H/L)/1802(H/L) Card

- **Input Parameter :**

wBoardNo: OME-PCI-1602/1602F board number
wAddrTimer, wAddrCtrl, wAddrDio, wAddrAdda: refer to
"PCI-1202/1602/1800/1802 Hardware manual" Chapter-3 for details.

- **Return Value :**

NoError : OK
FindBoardError: handshake check error
ExceedBoardError: wBoardNo is invalidate

- **Demo Program : ALL DEMO programs**

2.9.4 P1202_WhichBoardActive
P1602_WhichBoardActive
P180X_WhichBoardActive

- **Description:**

  Return the board number of the active board.

- **Syntax:**

  WORD P1202_WhichBoardActive(void); *for OME-PCI-1202(H/L) Card*

  WORD P1602_WhichBoardActive(void); *for OME-PCI-1602/1602F Card*

  WORD P180X_WhichBoardActive(void); *for OME-PCI-1800(H/L)/1802(H/L) Card*

- **Input Parameter:** void

- **Return Value:** board number of the active board.

- **Demo Program: DEMO1.C**

2.9.5 P1602_ActiveBoard
P1602_ActiveBoard
P180X_ActiveBoard

- **Description:**

This function will active one of the OME-PCI-1602/1602F boards installed in the system. This function must call once before the D/I/O, A/D, D/A functions are called.

- **Syntax:**

WORD P1202_ActiveBoard(WORD wBoardNo); *for OME-PCI-1202(H/L) Card*
WORD P1602_ActiveBoard(WORD wBoardNo); *for OME-PCI-1602/1602F Card*
WORD P180X_ActiveBoard(WORD wBoardNo); *for OME-PCI-1800(H/L)/1802(H/L) Card*

- **Input Parameter:**

wBoardNo: board number

- **Return Value :**

NoError : OK
ExceedBoardError: wBoardNo is invalidate

- **Demo Program : All DEMO program.**

The P1602_ActiveBoard(…) will take effect on all functions except the following:

1. P1602_FloatSub2
2. P1602_ShortSub2
3. P1602_GetDriverVersion
4. P1602_DriveInit
5. P1602_DriveClose
6. P1602_GetConfigAddressSpace
7. P1602_Card0_StartScan
8. P1602_Card0_ReadData
9. P1602_Card0_Stop

2.10 The Continuous Capture Functions

2.10.1 P1202_Card0_StartScan
P1602_Card0_StartScan
P180X_Card0_StartScan

- **Description:**

  This subroutine will start the continuous capture function. Refer to "PCI-1202/1602/1800/1802 Hardware User Manual chapter-6 for details"

- **Syntax :** WORD P1602_Card0_StartScan(WORD wSampleRate, WORD wChannelStatus[], WORD wChanelConfig[], WORD wCount);

- **Input Parameter :**

  wSampleRate : **AD sampling rate = 8M/wSampleRate:**

  For OME-PCI-1202 Card:

  wSampleRate=73 → Sampling rate=8M/73=110K→**Maximum**
  wSampleRate=80 → Sampling rate=8M/80=100K

  For OME-PCI-1602F/1602 Card:

  wSampleRate=40 →Sampling rate=8M/40=200K→**Maximum for OME-PCI-1602F Card**
  wSampleRate=80 →Sampling rate=8M/80=100K→**Maximum for OME-PCI-1602 Card**

  For OME-PCI-1800/1802 Card:

  wSampleRate=24 →Sampling rate=8M/24=333K→**Maximum**
  wSampleRate=80 →Sampling rate=8M/80=100K

  wChannelStatus[]: (0=no scan, 1=scan) for each channel
  wChannelConfig[]: configuration code for each channel
  wCount: number of A/D data for each scan channel

- **Return Value :**

  NoError : OK
  FindBoardError : cannot find the OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board
  AdControllerError : MagicScan controller hardware handshake error

- **Demo Program : DEMO13.C**

2.10.2 P1202_Card0_ReadData
P1602_Card0_ReadData
P180X_Card0_ReadData

- **Description :**

  This subroutine will read the data of continuous capture function.
- **Syntax :**

  WORD P1202_Card0_ReadData(void); *for OME-PCI-1202(H/L) Card*

  WORD P1602_Card0_ReadData(void); *for OME-PCI-1602/1602F Card*

  WORD P180X_Card0_ReadData(void); *for OME-PCI-1800(H/L)/1802(H/L) Card*
- **Input Parameter :**void
- **Return Value :**

  NoError: data is ready

  TimeOut: data not ready

  FifoOverflow: FIFO overflow
- **Demo Program : DEMO13.C**

2.10.3 P1202_Card0_Stop
P1602_Card0_Stop
P180X_Card0_Stop

- **Description :**

  This subroutine will stop the continuous capture function.
- **Syntax :**

  void P1202_Card0_Stop(void); *for OME-PCI-1202(H/L) Card*

  void P1602_Card0_Stop(void); *for OME-PCI-1602/1602F Card*

  void P180X_Card0_Stop(void); *for OME-PCI-1800(H/L)/1802(H/L) Card*
- **Input Parameter :** void
- **Return Value :** void
- **Demo Program : DEMO13.C**

2.11 The Other Functions

2.11.1 P1202_DelayUs P1602_DelayUs P180X_DelayUs

- **Description :**

  This is a **machine independent timer.** This function can be used to delay the **settling time** or used as a **general purposed machine independent timer**. This function will refer to the current active OME-PCI-1602/1602F board. Use the 1602_ActiveBoard(….) to select the active board.

- **Syntax :**

  void P1202_DelayUs(WORD wDelayUs); *for OME-PCI-1202(H/L) Card*
  void P1602_DelayUs(WORD wDelayUs); *for OME-PCI-1602/1602F Card*
  void P180X_DelayUs(WORD wDelayUs); *for OME-PCI-1800(H/L)/1802(H/L) Card*

- **Input 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 Value :**

  NoError : OK
  ExceedBoardNumber: invalidate board number
  FindBoardError :cannot find the OME-PCI-1202(H/L)/1602/1602F/1800(H/L)/1802(H/L) board
  InvalidateDelay : **wDelayUs** > 8191

- **Demo Program : DEMO1.C**

- ## Long Time Delay :

```
WORD DelayMs(WORD dwDelayMs) // maximum delay=4294967.295 sec
   {
    WORD dwDelay,dwRetVal

   dwRetVal=0;
      for  ( dwDelay=0; dwDelay<dwDelayMs; dwDelay++ )
           dwRetVal += P1602_DelayUs( 1000 );
      return( dwRetVal );
   }
```

3 Demo Programs

There are about 19 demo program given as follows:

- 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, perform 32 channels of A/D conversion by software trigger(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 95/98/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.

Refer to the CD ROM for details.

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