User’s Guide

OME-PCI-1202
PCI Data Acquisition Board
Windows Software Manual
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WARNING: These products are not designed for use in, and should not be used for, patient-connected applications.
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1.0 Introduction

1.1 Software Installation

Insert the CD ROM included with your OME-PCI-1202 board and the following installation screen should auto-start.

Follow the instructions on the screen to complete the software installation. The software is designed to support the entire OME family of data acquisition hardware, so during the installation, you will be asked to specify your particular hardware (OME-PCI-1202 board in this case). During the installation process, you will also be prompted to enter the operating system you will be using.

After installation the following folders will be created on your computer.
Demo Folder
Contains all demonstration programs including their source code. Examples are provided for Visual C++, Borland C++, Visual Basic and Delphi.

Please note: The VC++ demos are developed with VC++ 4.0. After setting up the environment, use NMAKE.EXE to compile and link the demo code. For example, C:\P1202\DEMO\VC\nmake /f demo1.mak

Driver Folder
Contains software drivers, include files and definition files for programming languages.

Manual Folder
Contains hardware user manuals, software user manuals and technical notes.

Diag Folder
Contains card diagnostic programs

Inf Folder
Contains tech notes and .INF file for the plug and play installation (only available for operating systems that support plug and play).
1.2 Plug & Play Installation for Windows

The 1202.inf file provides all the information needed to complete the Plug & Play installation. **After the installation, Windows will reserve the resources and update the registry.** The Plug & Play information is shown in Fig 1 (Windows 2000 device manager). Figure 2 shows the resources reserved. If the user runs “c:\WINNT\regedit.exe”, the registry information of the OME-PCI-1202H/L can be found under “HKEY_LOCAL_MACHINE\System\CurrentControlSet001\Services\P1202” as in Fig 3. The Fig 4 shows the registry items in detail.

![Device Manager]

Fig 1. The Plug & Play information
Fig 2. The allocated resources for this OME-PCI-1202.

Fig 3. Registry Path and Keys
Fig 4. Registry Item Detail
1.3 Using With Visual C++

All the demo programs have been developed and tested using Windows 95/NT and Visual C++ 4.0 compiler. The key points are given as below:
1. Make sure the PATH includes the Visual C++ compiler
2. Execute the \MSDEV\BIN\VCVARS32.BAT to setup the environment. The VCVARS32.BAT is provided in Visual C++.
3. The source program must include “P1202.H”
4. Copy the P1202.LIB, import library, to the same directory as the source program.
5. Copy the P1202.DLL, to the same directory as the source program
6. Edit the source program (e.g. DEMO1.C)
7. Edit the NMAKE file (e.g. DEMO1.MAK)
8. NMAKE /f DEMO1.MAK
9. Execute DEMO1.EXE

NOTE: The **P1202.lib** is used at linking time and the **P1202.DLL** is at run time.

1.4 Using With MFC

The key points for using MFC are given as below:

1. Use MFC wizard to create source code
2. The source program must include “P1202.H”
3. Copy the P1202.LIB, import library, to the same directory as the source program
4. Copy the P1202.DLL, to the same directory as the source program
5. Select **Build/Settings/Link** and key “P1202.lib” in the **object/library modules** field

NOTE: The **P1202.lib** is used at linking time and the **P1202.DLL** is used at run time.
1.5 Using With BC++

The drivers were created with Visual C++ 4.0. The P1202.H and P1202.lib are also directly compatible with Visual C/C++. You cannot use these files with BC++. The following modifications are required:

```c
#include <conio.h>
#include <windows.h>
HINSTANCE hDLLLib;

// Step 1: declare a function pointer

float CALLBACK (*FloatSub2)(float fA, float fB);

main()
{
    // Step 2: load dll
    hDLLLib=LoadLibrary("P1202.dll");
    if (hDLLLib)
    {
        // Step 3: get the function address
        FloatSub2=(FARPROC)GetProcAddress(hDLLLib,"P1202_FloatSub2");
        if (FloatSub2)
        {
            // Step 4: call function
            printf("1.2-3.4=%f",FloatSub2(1.2,3.4);
        }
        else printf("get P1202_FloatSub2 function address error");
        // Step 5: free library
        FreeLibrary(hDLLLib);
    }
    else printf("load P1202.dll error");
    getch();
}
```

By incorporating these modifications and the P1202.DLL, the user can use BC++ to call the driver.
1.6 Using With Visual Basic

```
\DEMO\VB\P1202.DLL  → DLLs
\DEMO\VB\DEMO1.FRM  → Form file
\DEMO\VB\P1202.BAS  → Module file
\DEMO\VB\DEMO1.VBP  → Project file
```

NOTE: 1. Tested under Windows 95/NT and VB 4.0 (32 bits)

- The Demo1 Result:
• The P1202.BAS

    Attribute VB_Name = "Module1"
    Option Explicit
    Global Const NoError = 0
    Global Const DriverHandleError = 1
    Global Const DriverCallError = 2
    Global Const AdControllerError = 3
    Global Const M_FunExecError = 4
    Global Const ConfigCodeError = 5
    Global Const FrequencyComputeError = 6
    Global Const HighAlarm = 7
    Global Const LowAlarm = 8
    Global Const AdPollingTimeOut = 9
    Global Const AlarmType Error = 10
    Global Const FindBoardError = 11
    Global Const AdChannelError = 12
    Global Const DaChannelError = 13
    Global Const InvalidateDelay = 14
    Global Const DelayTimeOut = 15
    Global Const InvalidateData = 16
    Global Const FifoOverflow = 17
    Global Const TimeOut = 18
    Global Const ExceedBoardNumber = 19
    Global Const NotFoundBoard = 20
    Global Const OpenError = 21
    Global Const FindTwoBoardError = 22
    Global Const ThreadCreateError = 23
    Global Const StopError = 24
    Global Const AllocateMemoryError = 25

    Declare Function P1202_DriverInit Lib "P1202.dll" (wTotalBoards As Integer) As Integer
    Declare Sub P1202_DriverClose Lib "P1202.dll" ()

    Declare Function P1202_GetDriverVersion Lib "P1202.dll" (wVxdVersion As Integer) As Integer

    Declare Function P1202_GetConfigAddressSpace Lib "P1202.dll" (ByVal wBoardNo As Integer, _
        wAddrTimer As Integer, wAddrCtrl As Integer, wAddrDio As Integer, _
        wAddrAdda As Integer) As Integer

    Declare Function P1202_ActiveBoard Lib "P1202.dll" (ByVal wBoardNo As Integer) As Integer
    Declare Function P1202_WhichBoardActive Lib "P1202.dll" () As Integer

    Declare Function P1202_M_FUN_1 Lib "P1202.dll" (ByVal wDaFrequency As Integer, _
        ByVal wDaWave As Integer, ByVal fDaAmplitude As Single, _
        ByVal wAdClock As Integer, ByVal wAdNumber As Integer, _
        ByVal wAdConfig As Integer, ByVal fAdBuf As Single, ByVal fLowAlarm As Single, _
        ByVal fHighAlarm As Single) As Integer

    Declare Function P1202_M_FUN_2 Lib "P1202.dll" (ByVal wDaNumber As Integer, _
Declare Function P1202_M_FUN_3 Lib "P1202.dll" (ByVal wDaFrequency As Integer, _
    ByVal wDaWave As Integer, ByVal fDaAmplitude As Single, _
    ByVal wAdClock As Integer, ByVal wAdNumber As Integer, _
    ByVal wAdConfig As Integer, ByVal wAdBuf As Integer) As Integer

Declare Function P1202_M_FUN_4 Lib "P1202.dll" (ByVal wType As Integer,  _
    ByVal wDaFrequency As Integer,  _
    ByVal wDaWave As Integer, ByVal fDaAmplitude As Single, _
    ByVal wAdClock As Integer, ByVal wAdNumber As Integer, _
    ByVal wAdConfig As Integer, ByVal wAdBuf As Single, _
    ByVal fLowAlarm As Single, ByVal fHighAlarm As Single) As Integer

Declare Function P1202_Di Lib "P1202.dll" (wDi As Integer) As Integer
Declare Function P1202_Do Lib "P1202.dll" (ByVal wDo As Integer) As Integer

Declare Function P1202_Da Lib "P1202.dll" (ByVal wDaChannel As Integer, _
    ByVal wDaVal As Integer)  As Integer
Declare Function P1202_SetChannelConfig Lib "P1202.dll" (ByVal wAdChannel As Integer,  _
    ByVal wConfig As Integer) As Integer
Declare Function P1202_AdPolling Lib "P1202.dll" (ByVal wAdChannel As Integer, _
    ByVal fAdBuf As Single) As Integer
Declare Function P1202_AdsPolling Lib "P1202.dll" (ByVal wAdChannel As Integer, _
    ByVal wNum As Integer)  As Integer
Declare Function P1202_AdsPacer Lib "P1202.dll" (ByVal wAdChannel As Integer, _
    ByVal fAdBuf As Single, ByVal wNum As Integer) _
    ByVal wSample As Integer) As Integer
Declare Function P1202_ClearScan Lib "P1202.dll" () As Integer
Declare Function P1202_StartScan Lib "P1202.dll" (ByVal wSampleRate As Integer, _
    ByVal dwNum As Long, ByVal nPriority As Integer) As Integer
Declare Sub P1202_ReadScanStatus Lib "P1202.dll" (wStatus As Integer, dwLowAlarm As Long, _
    dwHighAlarm As Long)
Declare Function P1202_AddToScan Lib "P1202.dll" (ByVal wAdChannel As Integer, _
    ByVal wConfig As Integer, ByVal wAverage As Integer, ByVal wLowAlarm As Integer, _
    ByVal wHighAlarm As Integer, ByVal wAlarmType As Integer) As Integer
Declare Function P1202_SaveScan Lib "P1202.dll" (ByVal wOridinalOrder As Integer, _
    ByVal wBuf As Integer)  As Integer
Declare Sub P1202_WaitMagicScanFinish Lib "P1202.dll" (wStatus As Integer, _
    ByVal wLowAlarm As Integer, _
    ByVal wHighAlarm As Integer)
Declare Function P1202_StopMagicScan Lib "P1202.dll" () As Integer

Declare Function P1202_DelayUs Lib "P1202.dll" (ByVal wDelayUs As Integer) As Integer

'------------------------ FunA series ----------------------------

Declare Function P1202_FunB_Start Lib "P1202.dll" (ByVal wClockDiv As Integer, _
    wChannel As Integer, wConfig As Integer, Buffer As Integer, _
    ByVal dwMaxCount As Long, ByVal nPriority As Integer) As Integer
Declare Function P1202_FunB_ReadStatus Lib "P1202.dll" () As Integer
Declare Function P1202_FunB_Stop Lib "P1202.dll" () As Integer
Declare Function P1202_FunB_Get Lib "P1202.dll" (P0 As Long) As Integer
Declare Function P1202_Card0_StartScan Lib "P1202.dll" (ByVal wSampleRate As Integer,  
     wChannelStatus As Integer, wChannelConfig As Integer, ByVal wCount As Integer) As 
     Integer
Declare Function P1202_Card0_ReadStatus Lib "P1202.dll" (wBuf As Integer, wBuf2 As Integer,  
     dwP1 As Long, dwP2 As Long, wStatus As Integer) As Integer
Declare Sub P1202_Card0_Stop Lib "P1202.dll" ()

Declare Function P1202_Card1_StartScan Lib "P1202.dll" (ByVal wSampleRate As Integer,  
     wChannelStatus As Integer, wChannelConfig As Integer,  
     ByVal wCount As Integer) As Integer
Declare Function P1202_Card1_ReadStatus Lib "P1202.dll" (wBuf As Integer, wBuf2 As Integer,  
     dwP1 As Long, dwP2 As Long, wStatus As Integer) As Integer
Declare Sub P1202_Card1_Stop Lib "P1202.dll" ()

Declare Function GetTickCount Lib "kernel32" () As Long
Declare Sub Sleep Lib "kernel32" (ByVal dwMilliseconds As Long)

Global AdBuf(10000) As Single
Global Channel(32) As Integer
Global ConfigCode(32) As Integer
Global Buf(10000) As Integer
Global Buf1(10000) As Integer
Global Buf2(10000) As Integer
Global Card0Buf0(10000) As Integer
Global Card0Buf1(10000) As Integer
Global Card1Buf0(10000) As Integer
Global Card1Buf1(10000) As Integer
Global AdNumber As Integer
Global CR
Global LF
Public Sub ShowWave()
    Dim a(1000), yc, xc, xl, yt As Single
    Dim ii As Integer
    Dim tmpstr$ = "" 
    Picture1.Cls
    yc = Picture1.ScaleTop + Picture1.ScaleHeight / 2
    xl = Picture1.ScaleLeft
    xs = Picture1.ScaleWidth / AdNumber
    ys = Picture1.ScaleHeight / 10
    Picture1.Line (xl, yc)-(xl + Picture1.ScaleWidth, yc), QBColor(4)
    Picture1.PSet (X1, yc - ys * AdBuf(0))
    For ii = 1 To AdNumber - 1
        Picture1.Line -(xl + (xs * ii), yc - (ys * AdBuf(ii)))
        Next ii
End Sub

Private Sub DA0Text_Change()
    DA0Text.Text = UCase(DA0Text.Text)
End Sub

Private Sub DA0Text_KeyPress(KeyAscii As Integer)
    If KeyAscii = 13 Then
        Call StartCMD_Click
    End If
End Sub

Private Sub DA1Text_Change()
    DA1Text.Text = UCase(DA1Text.Text)
End Sub

Private Sub DA1Text_KeyPress(KeyAscii As Integer)
    If KeyAscii = 13 Then
        Call StartCMD_Click
    End If
End Sub

Private Sub DoText_Change()
    DoText.Text = UCase(DoText.Text)
End Sub

Private Sub DoText_KeyPress(KeyAscii As Integer)
    If KeyAscii = 13 Then
        Call StartCMD_Click
    End If
End Sub

Private Sub ExitCMD_Click()
    Unload Me
End Sub

Private Sub Form_Load()
    Dim TotalBoards As Integer

Dim RetValue As Integer

CR = Chr$(13)
LF = Chr$(10)
RetValue = P1202_DriverInit(TotalBoards)
If RetValue <> 0 Then
    ret = MsgBox("The Return Error Code = " + Str$(RetValue) + CR + LF + _
"The 180X Card Not Found !", 0, "P1202 Return Error Code !")
    Exit Sub
End If
End Sub

Private Sub Form_Unload(Cancel As Integer)
Call P1202_DriverClose
End Sub

Private Sub StartCMD_Click()
Dim V0 As Single
Dim Didata As Integer
Dim dadata As Integer
Dim RetValue, ret, cc, Dodata As Integer
AdNumber = 100
RetValue = P1202_ActiveBoard(0)
If RetValue <> 0 Then
    ret = MsgBox("The Return Error Code = " + Str$(RetValue), 0, "P1202 Return Error Code !")
    Exit Sub
End If
Dodata = Val("&H" + DoText.Text)
RetValue = P1202_Do(Dodata)
If RetValue <> 0 Then
    ret = MsgBox("The Return Error Code = " + Str$(RetValue), 0, "P1202 Return Error Code !")
    Exit Sub
End If
RetValue = P1202_Di(Didata)
If RetValue <> 0 Then
    ret = MsgBox("The Return Error Code = " + Str$(RetValue), 0, "P1202 Return Error Code !")
    Exit Sub
End If
DiText.Text = Hex(Didata)
dadata = Val("&h" + DA0Text.Text)
RetValue = P1202_Da(0, dadata)
dadata = Val("&h" + DA1Text.Text)
RetValue = P1202_Da(1, dadata)
If RetValue <> 0 Then
    ret = MsgBox("The Return Error Code = " + Str$(RetValue), 0, "P1202 Return Error Code !")
    Exit Sub
End If
RetValue = P1202_SetChannelConfig(0, 0) ' // +/- 5V range
RetValue = RetValue + P1202_DelayUs(23) ' // delay 23 us settling time
RetValue = RetValue + P1202_AdPolling(V0)
If RetValue <> 0 Then
    ret = MsgBox("The Return Error Code = " + Str$(RetValue), 0, "P1202 Return Error Code !")
    Exit Sub
End If
End If
CH0Text.Text = Format(V0, "#0.000")

RetVal = P1202_SetChannelConfig(1, 0) ' // +/- 5V range
RetVal = RetValue + P1202_DelayUs(23) ' // delay 3 us settling time
RetVal = RetValue + P1202_AdPolling(V0)
If RetValue <> 0 Then
  ret = MsgBox("The Return Error Code = " + Str$(RetValue), 0, "P1202 Return Error Code !")
  Exit Sub
End If
CH1Text.Text = Format(V0, "#0.000")
RetVal = P1202_SetChannelConfig(0, 0) ' Ch:0, +/- 5V range
RetVal = RetValue + P1202_DelayUs(23) ' // delay 3 us settling time
RetVal = RetValue + P1202_AdPolling(AdBuf(0), AdNumber)

Call ShowWave
End Sub
1.7 Using With Delphi

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1202.PAS</td>
<td>unit file</td>
</tr>
<tr>
<td>P1202.DLL</td>
<td>DLLs</td>
</tr>
<tr>
<td>UNIT1.PAS</td>
<td>demo source file</td>
</tr>
<tr>
<td>UNIT1.DFM</td>
<td>form file</td>
</tr>
<tr>
<td>PROJECT1.DPR</td>
<td>project file</td>
</tr>
</tbody>
</table>

NOTE:  
1. tested under Windows 95/NT and Delphi 2.0 (32 bits)  
2. The P1202.PAS is designed for demo purposes and the P1202.PAS now only supports “P1202_ShortSub2(A,B)”. The user can modify this file to support all driver functions.

```pascal
unit P1202;
interface
function P1202_ShortSub2(a: smallint; b: smallint): smallint; StdCall;
implementation
function P1202_ShortSub2; external 'P1202.DLL' name 'P1202_ShortSub2';
end.
```

```pascal
procedure TForm1.Button1Click(Sender: TObject);
var
  a,b,c : smallint;
begin
  a := StrToInt(Edit1.text);
  b := StrToInt(Edit2.text);
  c := P1202_ShortSub2(a,b);
  Edit3.text := IntToStr(c);
end;
end.
```

P1202.PAS

UNIT1.PAS (partial)
1.8 Using With LabVIEW

LabVIEW is an industrial graphical programming language developed by National Instruments.

<table>
<thead>
<tr>
<th>DLL</th>
<th>DEMO1.VI</th>
<th>MFUN1.VI</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1202.Dll</td>
<td>Demo VI</td>
<td>Driver VI</td>
</tr>
</tbody>
</table>

NOTE:

1. Tested under **Windows 95/NT and LabVIEW 4.0**
2. The demo1.VI will call MFUN1.VI to perform M_Functions. The M_Functions can send an arbitrary waveform to the D/A output and perform A/D input at the same time. If D/A channel_0 is connected to A/D channel_0, M_Functions can measure the D/A output back. The output response is shown in Fig 8 and the connection diagram for demo1.VI is given in Fig. 9.

Fig 8. The Output of DEMO1.VI (call M_FUN_1)
Fig 9. The Connection Diagram of DEMO1.VI (call MFUN1.VI)

Fig 10. The Connecting Diagram of MFUN1.VI (call DLL M_FUN_1)
A common demo program is used for all p1202.dll demonstrations. The demo program will accept **wDaFreq** and **wAdClk**

```c
#include <windows.h>
#include <stdlib.h>
#include <stdio.h>
#include <conio.h>
#include "P1202.H"

/**************************************************************************/
/*  DEMO1 program for one P1202 card in the PC system.  */
/*  Please set the resolution of your monitor to at least 1024x768.*
/**************************************************************************/
/*  First Card: P1202 function call demo. */
/*  For the proper operation the P1202, the following functions */
/*  must be used. */
/*  P1202 DriverInit();   <-- initial the driver */
/*  P1202 DriverClose();  <-- close the driver */
/**************************************************************************/
short nDMA=-1, nIRQ=-1; // not used
WORD wBase=0x220,wAdBuf[510],wFlag=0,wAddrCtrl;
int iLine;
DWORD dwDaNum=90,dwAdClk=24;
WORD wTotalBoard,wInitialCode;

void READ_CMD(char *);
short ASCII_TO_HEX(char);
void TEST_CMD(HWND, int, int, int, int);
LRESULT CALLBACK WndProc(HWND, UINT, WPARAM, LPARAM);
void SHOW_WAVE(HWND hwnd);

/**************************************************************************/
int WINAPI WinMain (HINSTANCE hInstance, HINSTANCE hPrevInstance, PSTR szCmdLine, int iCmdShow)
{
    static char szAppName[] = "P1202 Demo1";
    HWND hwnd ;
    MSG msg ;
    WNDCLASSEX wndclass ;
    wndclass.cbSize     = sizeof(wndclass);
    wndclass.style     = CS_HREDRAW|CS_VREDRAW;
    wndclass.lpfnWndProc = WndProc;
    wndclass.cbClsExtra    = 0;
    wndclass.cbWndExtra    = 0;
    wndclass.hInstance     = hInstance;
    wndclass.hIcon     = LoadIcon(NULL, IDI_APPLICATION);
    wndclass.hCursor     = LoadCursor(NULL, IDC_ARROW);
    wndclass.hbrBackground = (HBRUSH)GetStockObject(WHITE_BRUSH);
    wndclass.lpszMenuName = NULL;
    wndclass.lpszClassName = szAppName;
    wndclass.hIconSm     = LoadIcon(NULL, IDI_APPLICATION);
    
    hwnd = CreateWindow(szAppName, "P1202 Demo1", 0, 0, CW_USEDEFAULT, CW_USEDEFAULT, NULL, NULL, hInstance, &wndclass);
    if(hwnd != NULL) {
        RegisterHotKey(hwnd, 1, MAKELONG(FW_KEY, 0), FW_KEY);
        msg = PeekMessage(0, NULL, 0, 0, PM_REMOVE);
        if(msg == 0) msg = 0x80000000;
        MessageBox(hwnd, "Select Card.", "P1202 Demo1", 0);
    }
    msg = 0;
    return 0;
}
```
RegisterClassEx(&wndclass);
hwnd=CreateWindow(szAppName,"P1202 Demo1 Program",
                  WS_OVERLAPPEDWINDOW,
                  CW_USEDEFAULT, CW_USEDEFAULT,
                  CW_USEDEFAULT, CW_USEDEFAULT,
                  NULL, NULL, hInstance, NULL);
ShowWindow(hwnd,SW_SHOWMAXIMIZED);
UpdateWindow(hwnd);

while (GetMessage(&msg, NULL, 0, 0))
{
    TranslateMessage(&msg);
    DispatchMessage(&msg);
    return msg.wParam;
}

/* ---------------------------------------------------------------- */
LRESULT CALLBACK WndProc(HWND hwnd, UINT iMsg, WPARAM wParam, LPARAM lParam)
{
    static int  cxChar, cyChar, cxClient, cyClient,cxBuffer;
    static int  cyBuffer, xCaret, yCaret;
    static char  cBuf[80];
    HDC hdc;
    TEXTMETRIC   tm;
    PAINTSTRUCT  ps;
    int i;

    switch (iMsg)
    {
        case WM_CREATE :  // window initial
            /* NOTICE: call P1202_DriverInit() to initialize the driver. */
            // Initialize the device driver, and return the board number in the PC
            wInitialCode=P1202_DriverInit(&wTotalBoard);
            if( wInitialCode!=NoError )
            {
                MessageBox(hwnd,"No P1202 card in this system !!!",
                            "P1202 Card Error",MB_OK);
            }
            hdc=GetDC(hwnd);
            SelectObject(hdc,GetStockObject(SYSTEM_FIXED_FONT));
            GetTextMetrics(hdc, &tm);
            cxChar=tm.tmAveCharWidth;
            cyChar=tm.tmHeight;
            ReleaseDC(hwnd, hdc);
            return 0;
        case WM_SIZE :
            cxClient=LOWORD(lParam);  // window size in pixels
            cyClient=HIWORD(lParam);
            cxBuffer=max(1,cxClient/cxChar); // window size in characters
            cyBuffer=max(1,cyClient/cyChar);
            return 0;
        case WM_SETFOCUS :
            CreateCaret(hwnd, NULL, cxChar, cyChar);
SetCaretPos(xCaret * cxChar, yCaret * cyChar);
ShowCaret(hwnd);
return 0;
case WM_KILLFOCUS :
HideCaret(hwnd);
DestroyCaret();
return 0;
case WM_CHAR :  // user press KEYBOARD
for (i = 0 ; i < (int) LOWORD(lParam) ; i++)
{
    switch (wParam)
    {
    case '\b' :  // backspace pressed
        if (xCaret > 0)
        {
            xCaret--;
            cBuf[xCaret]=' ';            
            HideCaret(hwnd);
            hdc=GetDC(hwnd);
            SelectObject(hdc,GetStockObject(SYSTEM_FIXED_FONT));
            TextOut(hdc, xCaret * cxChar, yCaret * cyChar,cBuf+xCaret,1);
            ShowCaret(hwnd);
            ReleaseDC(hwnd, hdc);
        }
        break;
    case '\r' :  // carriage return pressed
        if (wFlag==1)
        {
            InvalidateRect(hwnd, NULL, TRUE);
            wFlag=0;
            break;
        }
        wFlag=1;
        cBuf[xCaret]=0;
        if (xCaret!=0) {xCaret=0; yCaret++;}
        READ_CMD(cBuf);
        TEST_CMD(hwnd,xCaret, cxChar, yCaret,cyChar);
        xCaret=0; yCaret+=iLine;
        if (yCaret >= cyBuffer) InvalidateRect(hwnd, NULL, TRUE);
        break;
    case '\x1B' :  // escape pressed
        InvalidateRect (hwnd, NULL, TRUE) ;
        xCaret=yCaret=0;
        break;
    default :  // other KEY pressed
        cBuf[xCaret]=(char) wParam;
        HideCaret(hwnd);
        hdc=GetDC (hwnd);
        SelectObject(hdc,GetStockObject(SYSTEM_FIXED_FONT));
        TextOut(hdc,xCaret*cxChar,yCaret*cyChar,cBuf+xCaret,1);
        ShowCaret(hwnd);
        ReleaseDC(hwnd, hdc);
        xCaret++;
        break;
    }
    SetCaretPos(xCaret*cxChar, yCaret*cyChar);
    return 0;
case WM_PAINT :  // clr and show HELP
InvalidateRect(hwnd, NULL, TRUE);
hdc=BeginPaint(hwnd, &ps);
SelectObject(hdc,GetStockObject(SYSTEM_FIXED_FONT));

sprintf(cBuf,"Press any key to continue");
TextOut(hdc,0,0,cBuf,strlen(cBuf));
xCaret = 0 ; yCaret=1;
SetCaretPos(0,yCaret*cyChar);

EndPaint(hwnd, &ps);
return 0;

case WM_DESTROY :

/**************************************************************/
/* NOTICE: call P1202_DriverClose() to close the driver.  */
/**************************************************************/
P1202_DriverClose();   // close the driver
PostQuitMessage(0);
return 0 ;
}
return DefWindowProc(hwnd, iMsg, wParam, lParam);

/* ------------------------------------------------------------------- 
- */
/* [0][1][2][3][4]=wII, [6][7][8][9]=dwAdClk */
void READ_CMD(char szCmd[])
{
    DWORD nT1,nT2,nT3,nT4,nT5;
    if(szCmd[0]==0) return;   // only press [Enter]
    nT1=ASCII_TO_HEX(szCmd[0]);    // HEX format
    nT2=ASCII_TO_HEX(szCmd[1]);
    nT3=ASCII_TO_HEX(szCmd[2]);
    nT4=ASCII_TO_HEX(szCmd[3]);
    nT5=ASCII_TO_HEX(szCmd[4]);
    dwDaNum=nT1*10000+nT2*1000+nT3*100+nT4*10+nT5;
    nT1=ASCII_TO_HEX(szCmd[6]);    // HEX format
    nT2=ASCII_TO_HEX(szCmd[7]);
    nT3=ASCII_TO_HEX(szCmd[8]);
    nT4=ASCII_TO_HEX(szCmd[9]);
    dwAdClk=(DWORD)(nT1*10000+nT2*100+nT3*10+nT4);
}

short ASCII_TO_HEX(char cChar)
{
    if(cChar<='9') return(cChar-'0');
    else if (cChar<='F') return(cChar-'A'+10);
    else return(cChar-'a'+10);
}
/* -------------------------------------------------------------------------------- */

void TEST_CMD(HWND hwnd, int x, int dx, int y, int dy)
The READ_COM only accepts **fix format** command. The command format is given as below:

The steps to compile and link the demo program are described in Sec. 1.3. All demo programs share a similar interface. The separate testing functions are placed in “**TEST_CMD(....) { ........}**”. So only **TEST_CMD** is listed in the user manual.
2. Description of Functions

These DLL functions are divided into the following groups:

- 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 batch capture functions
- The Plug & Play functions
- Other functions

Fixed-Channel Mode Functions

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

MagicScan Functions

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

M_functions

1. P1202_M_FUN_1
2. P1202_M_FUN_2
3. P1202_M_FUN_3
**A/D Batch Capture Functions** (Save data to memory with two boards simultaneously)

1. P180X_FunA_Start
2. P180X_FunA_ReadStatus
3. P180X_FunA_Stop
4. P180X_FunA_Get

**A/D Batch Capture Functions** (Save data to memory with a single board)

1. P180X_FunB_Start
2. P180X_FunB_ReadStatus
3. P180X_FunB_Stop
4. P180X_FunB_Get

**Continuous Capture Functions**

1. P180X_Card0_StartScan
2. P180X_Card0_ReadStatus
3. P180X_Card0_StopScan
4. P180X_Card1_StartScan
5. P180X_Card1_ReadStatus
6. P180X_Card1_StopScan

Group-0: for card_0 continuous capture function  
Group-1: for card_1 continuous capture function
## 2.1 The Configuration Code Table

### OME-PCI-1202L Configuration Code Table

<table>
<thead>
<tr>
<th>Bipolar/Unipolar</th>
<th>Input Signal Range</th>
<th>Gain</th>
<th>Settling Time</th>
<th>Configuration Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bipolar</td>
<td>+/- 5V</td>
<td>1</td>
<td>3 µs</td>
<td>0x00</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 2.5V</td>
<td>2</td>
<td>3 µs</td>
<td>0x01</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 1.25V</td>
<td>4</td>
<td>3 µs</td>
<td>0x02</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 0.625V</td>
<td>8</td>
<td>3 µs</td>
<td>0x03</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 10V</td>
<td>0.5</td>
<td>3 µs</td>
<td>0x04</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 5V</td>
<td>1</td>
<td>3 µs</td>
<td>0x05</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 2.5V</td>
<td>2</td>
<td>3 µs</td>
<td>0x06</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 1.25V</td>
<td>4</td>
<td>3 µs</td>
<td>0x07</td>
</tr>
<tr>
<td>Unipolar</td>
<td>0V to 10V</td>
<td>1</td>
<td>3 µs</td>
<td>0x08</td>
</tr>
<tr>
<td>Unipolar</td>
<td>0V to 5V</td>
<td>2</td>
<td>3 µs</td>
<td>0x09</td>
</tr>
<tr>
<td>Unipolar</td>
<td>0V to 2.5V</td>
<td>4</td>
<td>3 µs</td>
<td>0x0A</td>
</tr>
<tr>
<td>Unipolar</td>
<td>0V to 1.25V</td>
<td>8</td>
<td>3 µs</td>
<td>0x0B</td>
</tr>
</tbody>
</table>

### OME-PCI-1202H Configuration Code Table

<table>
<thead>
<tr>
<th>Bipolar/Unipolar</th>
<th>Input Signal Range</th>
<th>Gain</th>
<th>Settling Time</th>
<th>Configuration Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bipolar</td>
<td>+/- 5V</td>
<td>1</td>
<td>23 µs</td>
<td>0x10</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 0.5V</td>
<td>10</td>
<td>28 µs</td>
<td>0x11</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 0.05V</td>
<td>100</td>
<td>140 µs</td>
<td>0x12</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 0.005V</td>
<td>1000</td>
<td>1300 µs</td>
<td>0x13</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 10V</td>
<td>0.5</td>
<td>23 µs</td>
<td>0x14</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 1V</td>
<td>5</td>
<td>28 µs</td>
<td>0x15</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 0.1V</td>
<td>50</td>
<td>140 µs</td>
<td>0x16</td>
</tr>
<tr>
<td>Bipolar</td>
<td>+/- 0.01V</td>
<td>500</td>
<td>1300 µs</td>
<td>0x17</td>
</tr>
<tr>
<td>Unipolar</td>
<td>0V to 10V</td>
<td>1</td>
<td>23 µs</td>
<td>0x18</td>
</tr>
<tr>
<td>Unipolar</td>
<td>0V to 1V</td>
<td>10</td>
<td>28 µs</td>
<td>0x19</td>
</tr>
<tr>
<td>Unipolar</td>
<td>0V to 0.1V</td>
<td>100</td>
<td>140 µs</td>
<td>0x1A</td>
</tr>
<tr>
<td>Unipolar</td>
<td>0V to 0.01V</td>
<td>1000</td>
<td>1300 µs</td>
<td>0x1B</td>
</tr>
</tbody>
</table>
#define EXPORTS extern "C" __declspec (dllimport) // Usage for Allpication
// #define EXPORTS // Usage for DLL

//----------priority setting constant----------------------------------
//
// THREAD_PRIORITY_LOWEST
// THREAD_PRIORITY_BELOW_NORMAL
// THREAD_PRIORITY_NORMAL
// THREAD_PRIORITY_ABOVE_NORMAL
// THREAD_PRIORITY_HIGHEST
//
//----------priority setting constant----------------------------------

// return code
#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 DaChannelError        12
#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 FindTwoBoardError        22
#define ThreadCreateError      23
#define StopError             24
#define AllocateMemoryError    25

EXPORTS float  CALLBACK P1202_FloatSub2(float fA, float fB);
EXPORTS short  CALLBACK P1202_ShortSub2(short nA, short nB);
EXPORTS WORD   CALLBACK P1202_GetDllVersion(void);
EXPORTS WORD   CALLBACK P1202_DriverInit(WORD *wTotalBoards);
EXPORTS void   CALLBACK P1202_DriverClose(void);
EXPORTS WORD   CALLBACK P1202_GetDriverVersion(WORD *wVxdVersion);
EXPORTS WORD   CALLBACK P1202_GetConfigAddressSpace(WORD wBoardNo,
    WORD *wAddrTimer,WORD *wAddrCtrl, WORD *wAddrDio, WORD *wAddrAdda);
EXPORTS WORD   CALLBACK P1202_ActiveBoard( WORD wBoardNo );
EXPORTS WORD  CALLBACK P1202_WhichBoardActive(void);

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

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

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

EXPORTS WORD  CALLBACK P1202_M_FUN_4(WORD wType, WORD wDaFrequency, WORD
  wDaWave,
  float fDaAmplitude, WORD wAdClock, WORD wAdNumber,
  WORD wChannelStatus[], WORD wAdConfig[],
  float fAdBuf[], float fLowAlarm, float fHighAlarm);

EXPORTS WORD  CALLBACK P1202_Di(WORD *wDi);
EXPORTS WORD  CALLBACK P1202_Do(WORD wDo);
EXPORTS WORD  CALLBACK P1202_Da(WORD wDaChannel, WORD wDaVal);
EXPORTS WORD  CALLBACK P1202_SetChannelConfig(WORD wAdChannel,
  WORD wConfig);

EXPORTS WORD  CALLBACK P1202_AdPolling(float *fAdVal);
EXPORTS WORD  CALLBACK P1202_AdsPolling(float fAdVal[], WORD wNum);
EXPORTS WORD  CALLBACK P1202_AdsPacer(float fAdVal[], WORD wNum,
  WORD wSample);

EXPORTS WORD  CALLBACK P1202_ClearScan(void);
EXPORTS WORD  CALLBACK P1202_StartScan(WORD wSampleRateDiv, DWORD dwNum,
  SHORT nPriority);
EXPORTS void  CALLBACK P1202_ReadScanStatus(WORD *wStatus,
  DWORD *dwLowAlarm, DWORD *dwHighAlarm);

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

EXPORTS WORD  CALLBACK P1202_SaveScan(WORD wAdChannel, WORD wBuf[]);
EXPORTS void  CALLBACK P1202_WaitMagicScanFinish(WORD *wStatus,
  DWORD *dwLowAlarm, DWORD *dwHighAlarm);

EXPORTS WORD  CALLBACK P1202_StopMagicScan();

EXPORTS WORD  CALLBACK P1202_DelayUs(WORD wDelayUs);
EXPORTS WORD  CALLBACK P1202_Card0_StartScan(WORD wSampleRate, WORD
  wChannelStatus[],
  WORD wChannelConfig[],WORD wCount);

EXPORTS WORD  CALLBACK P1202_Card0_ReadStatus(WORD wAdChannel, WORD wBuf[],
  DWORD *dwP1, DWORD *dwP2,
  WORD *wStatus);

EXPORTS void  CALLBACK P1202_Card0_Stop(void);
EXPORTS WORD  CALLBACK P1202_Card1_StartScan(WORD wSampleRate,
WORD wChannelStatus[],WORD wChannelConfig[],WORD wCount);
EXPORTS WORD  CALLBACK P1202_Card1_ReadStatus(WORD wBuf[], WORD wBuf2[],
DWORD *dwP1, DWORD *dwP2,WORD *wStatus);
EXPORTS void  CALLBACK P1202_Card1_Stop(void);

EXPORTS WORD  CALLBACK 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);
EXPORTS WORD  CALLBACK P1202_FunA_ReadStatus(void);
EXPORTS WORD  CALLBACK P1202_FunA_Stop(void);
EXPORTS WORD  CALLBACK P1202_FunA_Get(DWORD *P0, DWORD *P1);

EXPORTS WORD  CALLBACK P1202_FunB_Start(WORD wClock0Div, WORD wChannel0[],
WORD wConfig0[], WORD *Buffer0, DWORD dwMaxCount0, SHORT nPriority);
EXPORTS WORD  CALLBACK P1202_FunB_ReadStatus(void);
EXPORTS WORD  CALLBACK P1202_FunB_Stop(void);
EXPORTS WORD  CALLBACK P1202_FunB_Get(DWORD *P0);

EXPORTS WORD  CALLBACK P1202_StartScanPostTrg(WORD wSampleRateDiv,
DWORD dwNum, SHORT nPriority);
EXPORTS WORD  CALLBACK P1202_StartScanPreTrg(WORD wSampleRateDiv,
DWORD dwNum, SHORT nPriority);
EXPORTS WORD  CALLBACK P1202_StartScanMiddleTrg(WORD wSampleRateDiv,
DWORD dwN1, DWORD dwN2, SHORT nPriority);
EXPORTS WORD  CALLBACK P1202_StartScanPreTrgVerC(WORD wSampleRateDiv,
DWORD dwNum, SHORT nPriority);
EXPORTS WORD  CALLBACK P1202_StartScanMiddleTrgVerC(WORD wSampleRateDiv,
DWORD dwN1, DWORD dwN2, SHORT nPriority);
2.3 The Test Functions

2.3.1 P1202_FloatSub2

- **Description:**
  Calculates $C=A-B$ in **float** format, **float=4 bytes floating point number**. This function is provided to test the DLL linkage.
- **Syntax:** `float P1202_FloatSub2(float fA, float fB);
- **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

- **Description:**
  Calculates $C=A-B$ in **SHORT** format, **SHORT=16 bits signed number**. This function is provided to test the DLL linkage.
- **Syntax:** `short P1202_ShortSub2(Short nA, Short nB);
- **Input Parameter:**
  - `nA` : 16 bits value
  - `nB` : 16 bits value
- **Return Value:** `return=nA-nB`
- **Demo Program:** DEMO1.C
2.3.3  P1202_GetDllVersion

- **Description**: Read the DLL version number of the **P1202.DLL**.

- **Syntax**: `WORD P1202_GetDllVersion(void);`

- **Input Parameter**: void

- **Return Value**: `return=0x200 → Version 2.0`

- **Demo Program**: DEMO1.C

2.3.4  P1202_GetDriverVersion

- **Description**: This function will read the version of the software driver.

- **Syntax**: `WORD P1202_GetDriverVersion(WORD *wDriverVersion);`

- **Input Parameter**: `[output]` `*wDriverVersion : address of wDriverVersion`
  `wDriverVersion=0x200 → Version 2.0`

- **Return Value**: `NoError : OK`
  `DriverHandleError : the NAPPCI.VxD open error for Windows 95`
  `the NAPPCI.SYS open error for Windows NT`
  `DriverCallError : call NAPPCI.VxD return error`
  `call NAPPCI.SYS return error`

- **Demo Program**: DEMO1.C
2.4 The M_Functions

2.4.1 P1202_M_FUN_1

- **Description:**
  The P1202_M_FUN_1 will calculate the waveform image automatically. (Refer to “PCI-1202 Hardware Manual” chapter-5 for details) (input=AD channel_0, output=DA channel_0)

- **Syntax:**
  ```
  WORD P1202_M_FUN_1(WORD wDaFrequency, WORD wDaWave, float fDaAmplitude, WORD wAdClock, WORD wAdNumber, WORD wAdConfig, float fAdBuf[], float fLowAlarm, float fHighAlarm)
  ```

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

- **Return Value:**
  - **NoError**: OK
  - **DriverHandleError**: Invalidate VxD/SYS handle
  - **DriverCallError**: VxD/SYS function call error
  - **ExceedBoardNumber**: invalid board number
  - **FindBoardError**: no OME-PCI-1202 board
  - **AdControllerError**: embedded controller handshake error
  - **M_FunExecError**: M_Functions return code error
  - **ConfigCodeError**: `wAdConfig` configuration code error
  - **HighAlarm**: `fAdBuf[?] > fHighAlarm`
  - **LowAlarm**: `fAdBuf[?] < fLowAlarm`

- **Demo Program**: DEMO5.C
2.4.2  P1202_M_FUN_2

- **Description:**
  The P1202_M_FUN_2 will **not** calculate the waveform image automatically. (Refer to “OME-PCI-1202 Hardware Manual” chapter-5 for details) (input=AD channel_0, output=DA channel_0)

- **Syntax:**
  ```
  WORD P1202_M_FUN_2(WORD wDaNumber, WORD wDaWave, WORD wDaBuf[],
  WORD wAdClock, WORD wAdNumberOf, WORD wAdConfig, WORD wAdBuf[]);
  ```

- **Input Parameter:**
  - wDaNumber: number of D/A samples in one waveform
  - wDaWave: number of D/A waveforms to output
  - wDaBuf[]: The array which will store the D/A waveform image
  - wAdClock: **AD sample clock = \(\frac{8000000}{wAdClock}\) samples/sec**
  - wAdNumberOf: Number of A/D data points to be read
  - wAdConfig: **A/D input range configuration code.**
  - wAdBuf[]: the starting address of fAdBuf which will contain the A/D data

- **Return Value:**
  - NoError : OK
  - DriverHandleError : Invalid VxD/SYS handle
  - DriverCallError : VxD/SYS function call error
  - ExceedBoardNumberOf: invalidate board number
  - FindBoardError: no OME-PCI-1202 board
  - AdControllerError : embedded controller handshake error
  - M_FunExecError : M_Functions return code error
  - ConfigCodeError : wAdConfig configuration code error

- **Demo Program:** DEMO7.C
  The D/A output waveform generator is a **machine dependent** function. The DA output frequency = **1.8M/wDaNumber** is machine dependent (depends on users computer). Below are some tested benchmarks:

<table>
<thead>
<tr>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D/A output frequency = 1.8M/dwDaNumber for pentium 120</td>
</tr>
<tr>
<td>D/A output frequency = 2.0M/dwDaNumber for pentium 133</td>
</tr>
<tr>
<td>The user must test this value before using M_FUN_1, M_FUN_2 and M_FUN_3.</td>
</tr>
</tbody>
</table>
2.4.3 P1202_M_FUN_3

- **Description:**
  The P1202_M_FUN_3 will calculate the waveform image automatically. (Refer to “OME-PCI-1202 Hardware Manual” chapter-5 for details) (input=programable channels, output=DA channel_0) This function will refer to the current active OME-PCI-1202 board. Use the P1202_ActiveBoard(....) to select the active board. Refer to Sec. 2.4.2 for more information.

- **Syntax:**
  ```
  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)
  ```

- **Input Parameter:**
  
  - **wDaFrequency:** D/A output frequency = 1.8M/wDaFrequency (pentium 120)
  
  - **wDaWave:** Number of D/A waveform to be output

  - **fDaAmplitude:** Amplitude of D/A output. NOTE: the hardware J1 must select +/-10V

  - **wAdClock:** A/D sample rate = 8000000/wAdClock samples/sec

  - **wAdNumber:** Number of A/D data points to be read

  - **wAdChannel[]:** 1=scan, 0=no scan

  - **wAdConfig[]:** 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:**
  
  - NoError : OK

  - DriverHandleError : Invalid VxD/SYS handle

  - DriverCallError : VxD/SYS function call error

  - ExceedBoardNumber : invalidate board number

  - FindBoardError : no OME-PCI-1202 board

  - AdControllerError : embedded controller handshake error

  - M_FunExecError : M_Functions return code error

  - ConfigCodeError : wAdConfig configuration code error

- **Demo Program:** DEMO9.C
2.5 The DIO Functions

2.5.1 P1202_Di

- **Description:** This function will read the 16 bit data from digital input (DI) port. This function will refer to the current active OME-PCI-1202. Use the P1202_ActiveBoard(....) to select the active board.

- **Syntax:** WORD P1202_Di(WORD *wDi);

- **Input Parameter:**
  * *wDi* [output] : address of *wDi* which contains the 16 bit DI data

- **Return Value:**
  - NoError : OK
  - FindBoardError : cannot find the OME-PCI-1202 board
  - ExceedBoardNumber: invalid board number

- **Demo Program :** DEMO1.C

2.5.2 P1202_Do

- **Description:** This function will send the 16 bit data to the digital output (DO) port. This function refers to the current active OME-PCI-1202 board. Use the P1202_ActiveBoard(....) to select the active board.

- **Syntax:** WORD P1202_Do(WORD wDo);

- **Input Parameter:**
  * wDo : the 16 bit data sent to the DO port

- **Return Value:**
  - NoError : OK
  - ExceedBoardNumber: invalid board number
  - FindBoardError : cannot find the OME-PCI-1202 board

- **Demo Program :** DEMO1.C
2.6 The DA Functions

2.6.1 P1202_Da

**Description**: This function will send 12 bit data to the analog output (D/A) port. This function will refer to the current active OME-PCI-1202 board. Use the P1202_ActiveBoard(……) to select the active board.

- **Syntax**: WORD P1202_Da(WORD wChannel, WORD wDaVal);
- **Input Parameter**:
  - wChannel : 0 for channel_0 DA, 1 for channel_1 D/A
  - wDaVal : 12 bit data sent to DA port. 0=minimum and 4095=maximum. The D/A output can be set to +/- 5V or +/- 10V setting by hardware JP1. The software cannot detect the state of JP1, so 4095 may be equal to +5V or +10V (depending on the position of JP1).
- **Return Value**:
  - NoError : OK
  - FindBoardError : cannot find the OME-PCI-1202 board
  - ExceedBoardNumber: invalid board number
  - DaChannelError : channel number must be 0 or 1
- **Demo Program**: DEMO1.C
# 2.7 The A/D Fixed-mode Functions

## 2.7.1 P1202_SetChannelConfig

- **Description**: This function will set the A/D channel’s configuration code. This function will set the active A/D channel for P1202_AdPolling, P1202_AdsPolling and P1202_AdsPacer. This function will refer to the current active OME-PCI-1202 board. Use the P1202_ActiveBoard(…) to select the active board.

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

- **Input Parameter**:
  - wChannel : A/D channel number
  - wConfig : Configuration code. Refer to the “PCI-1202 Hardware Manual” for details.

- **Return Value**:
  - NoError : OK
  - ExceedBoardNumber: invalid board number
  - FindBoardError : cannot find the OME-PCI-1202 board
  - AdControllerError : MagicScan controller hardware handshake error

- **Demo Program**: DEMO1.C

## 2.7.2 P1202_AdPolling

- **Description**: This function will perform A/D conversions on a single channel by software polling. The P1202_SetChannelConfig function can be used to change channel or configuration code and the P1202_AdPolling will refer to that condition in later operation. This function will refer to the current active OME-PCI-1202 board. Use the P1202_ActiveBoard(…) to select the active board.

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

- **Input Parameter**:
  - *fAdVal : address of fAdVal which contains the A/D data. The data is converted to volts based on the setting of P1202_SetChannelConfig.

- **Return Value**:
  - NoError : OK
  - ExceedBoardNumber: invalidate board number
  - FindBoardError : cannot find the OME-PCI-1202 board
  - AdPollingTimeOut : hardware timeout error

- **Demo Program**: DEMO1.C
2.7.3 P1202_AdsPolling

- **Description**: This function performs multiple A/D conversions on a single channel by polling. The `P1202_AdsPolling` function is controlled by software polling so the A/D conversion process could be disturbed by operating system interrupts. Since the hardware pacer is used to control the A/D process with the `P1202_AdsPacer` function, it is a better choice if a waveform must be precisely reconstructed. The `P1202_SetChannelConfig` function can be used to change channel or configuration code. This function will refer to the current active OME-PCI-1202 board. Use the `P1202_ActiveBoard(....)` to select the active board.

- **Syntax**: `WORD P1202_AdsPolling(float fAdVal[], WORD wNum);`

- **Input Parameter**:
  - `fAdVal[]`: starting address of the A/D data buffer, the data will be converted to volts based on the setting of `P1202_SetChannelConfig`.
  - `wNum`: number of A/D conversions to be performed.

- **Return Value**:
  - `NoError`: OK
  - `ExceedBoardNumber`: invalid board number
  - `FindBoardError`: cannot find the OME-PCI-1202 board
  - `AdPollingTimeOut`: hardware timeout error

- **Demo Program**: `DEMO1.C`
2.7.4  P1202_AdsPacer

- **Description:** This function will perform multiple A/D conversions by pacer trigger. The **P1202_SetChannelConfig** function can be used to change the channel or configuration code. The hardware pacer will generate a periodic A/D trigger signal. So the AD data can be used to reconstruct the waveform of the analog input. The **P1202_AdsPolling** function is controlled by software polling so the A/D conversion process could be disturbed by operating system interrupts. Since the hardware pacer is used to control the A/D process in the **P1202_AdsPacer function**, it is a better choice if a waveform must be precisely reconstructed. This function will refer to the current active OME-PCI-1202 board. Use the **P1202_ActiveBoard(....)** to select the active board.

- **Syntax:** `WORD P1202_AdsPacer(float fAdVal[], WORD wNum, WORD wSample);`

- **Input Parameter:**
  - `fAdVal[]`: starting address of the A/D data buffer, the data will be automatically calculate based on the setting of the **P1202_SetChannelConfig** function.
  - `wNum`: number of A/D conversions to be performed.
  - `wSample`: **AD sample rate = 8M/wSample.**
    - for example: `wSample=80  \rightarrow  \text{sample rate}=8M/80=100K`

- **Return Value:**
  - NoError: OK
  - ExceedBoardNumber: invalid board number
  - FindBoardError: cannot find the OME-PCI-1202 board
  - AdPollingTimeOut: hardware timeout error

- **Demo Program:** DEMO1.C

<table>
<thead>
<tr>
<th>P1202_SetChannelConfig</th>
<th>Fix channel AD conversion mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1202_AdsPolling</td>
<td></td>
</tr>
<tr>
<td>P1202_AdsPacer</td>
<td></td>
</tr>
</tbody>
</table>
2.8 The MagicScan Functions

2.8.1 P1202_ClearScan

- **Description**: This function will set the MagicScan controller to its initial state. This function will refer to the current active OME-PCI-1202 board. Use the P1202_ActiveBoard(....) function to select the active board.

- **Syntax**: WORD P1202_ClearScan();
- **Input Parameter**: void
- **Return Value**:
  - NoError : OK
  - ExceedBoardNumber: invalid board number
  - FindBoardError : cannot find the OME-PCI-1202 board
  - AdControllerError : MagicScan controller hardware handshake error

- **Demo Program**: DEMO11.C
2.8.2 P1202_StartScan

- **Description**: This function will start the MagicScan operation. The function will return to the caller before the MagicScan process is finished. The user can use `P1202_WaitMagicScanFinish(...)` or `P1202_ReadScanStatus(...)` to check the state of MagicScan operation. This function will refer to the current active OME-PCI-1202 board. Use the `P1202_ActiveBoard(....)` to select the active board.
- **Syntax**: `WORD P1202_StartScan(WORD wSampleRate, WORD wNum);

- **Input Parameter**:
  - `wSampleRate`: AD sample rate = 8M/wSampleRate.
    - `wSampleRate=80` → sample rate = 8M/80 = 100K
  - `wNum`: Number of MagicScan cycles to perform

- **Return Value**:
  - `NoError`: OK
  - `ExceedBoardNumber`: invalid board number
  - `FindBoardError`: cannot find the OME-PCI-1202 board
  - `AdControllerError`: MagicScan controller hardware handshake error

- **Demo Program**: `DEMO11.C`
2.8.3  P1202_ReadScanStatus

- **Description**: This function will read the status of the MagicScan operation. This function will refer to the current active OME-PCI-1202 board. Use the P1202_ActiveBoard(….) to select the active board.

- **Syntax**: void P1202_ReadScanStatus(WORD *wStatus, WORD *wLowAlarm, WORD *wHighAlarm);

- **Input Parameter**: [output]
  *wStatus : address of wStatus which contains the MagicScan status
  *wLowAlarm : address of wLowAlarm which contains the MagicScan alarm status
  *wHighAlarm : address of wHighAlarm which contains the MagicScan alarm status

- **Return Value**: void

- **Demo Program**: DEMO11.C

<table>
<thead>
<tr>
<th>wStatus</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x00</td>
<td>MagicScan initial condition (idle state)</td>
</tr>
<tr>
<td>0x01</td>
<td>MagicScan start operation</td>
</tr>
<tr>
<td>0x02</td>
<td>MagicScan stage 1 controller timeout</td>
</tr>
<tr>
<td>0x04</td>
<td>MagicScan stage 2 controller timeout</td>
</tr>
<tr>
<td>0x08</td>
<td>MagicScan FIFO overflow</td>
</tr>
<tr>
<td>0x80</td>
<td>MagicScan function OK</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>wLowAlarm</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>32 bits corresponding to 32 channels</td>
</tr>
<tr>
<td></td>
<td>0 = no low alarm</td>
</tr>
<tr>
<td></td>
<td>1 = is low alarm</td>
</tr>
<tr>
<td>0</td>
<td>all channels OK, no low alarm</td>
</tr>
<tr>
<td>1</td>
<td>channel_0 is in low alarm, others are OK</td>
</tr>
<tr>
<td>3</td>
<td>channel_0 and channel_1 are in low alarm, others are OK</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>wHighAlarm</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>32 bits corresponding to 32 channels</td>
</tr>
<tr>
<td></td>
<td>0 = no high alarm</td>
</tr>
<tr>
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</tr>
<tr>
<td>3</td>
<td>channel_0 and channel_1 are in high alarm, others are OK</td>
</tr>
</tbody>
</table>
2.8.4  P1202_AddToScan

- **Description:** This function will add one channel to the MagicScan circular queue. This function will refer to the current active OME-PCI-1202 board. Use the P1202_ActiveBoard(....) to select the active board.

- **Syntax:**
  ```c
  word P1202_AddToScan(WORD wAdChannel, WORD wConfig, WORD wAverage, WORD wLowAlarm, WORD wHighAlarm, WORD wAlarmType);
  ```

- **Input Parameter:**
  - `wAdChannel`: A/D channel number
  - `wConfig`: the configuration code
  - `wAverage`: the factor for the digital average filter
  - `wLowAlarm`: 12 bit low alarm value
  - `wHighAlarm`: 12 bit high alarm value
  - `wAlarmType`: 0=no alarm, 1=high alarm, 2=low alarm, 3=in-alarm, 4=out-alarm

- **Return Value:**
  - NoError: Ok
  - ExceedBoardNumber: invalid board number
  - FindBoardError: cannot find the OME-PCI-1202 board
  - AdChannelError: invalid AD channel
  - AlarmTypeError: only 0/1/2/3/4 are valid
  - AdControllerError: MagicScan controller hardware handshake error

- **Demo Program:** DEMO11.C
2.8.5 P1202_SaveScan

- **Description**: This function will specify the starting address of the A/D data buffer for MagicScan.
- **Syntax**: `void P1202_SaveScan(WORD wAdChannel, WORD wBuf[]);`
- **Input Parameter**:
  - `wAdChannel`: Scan number in the scan queue.
    (Note: not the A/D channel number.)
  - `wBuf`: starting address of the A/D data buffer for the channel specified in `wAdChannel`
- **Return Value**:
  - `NoError`: Ok
  - `ExceedBoardNumber`: invalid board number
  - `FindBoardError`: cannot find the OME-PCI-1202 board
  - `AdChannelError`: invalid A/D channel
- **Demo Program** : `DEMO11.C`
- **Code Fragment**

```c
WORD   wV0[100000];   // AD ch:0 buffer
WORD   wV2[100000];   // AD ch:2 buffer
:
:
  wRetVal=P1202_ClearScan();
  //****    For OME-PCI-1202L
  wRetVal += P1202_AddToScan(0,0,1,0,0,0); // CH:0 to scan
  wRetVal += P1202_SaveScan(0,wV0);
  wRetVal += P1202_AddToScan(2,0,1,0,0,0); // CH:2 to scan
  wRetVal += P1202_SaveScan(1,wV2);   // Notice: 1 not 2
    // Notice: This is a ordinal number in
    // Scan Queue not a channel number.
  wSampleRateDiv=80;       // sample rate=8M/wSampleRateDiv
  P1202_StartScan(wSampleRateDiv,DATALENGTH,nPriority);
```
2.8.6 P1202_WaitMagicScanFinish

- **Description**: This function will delay until the MagicScan operation is finished. This function will refer to the current active OME-PCI-1202 board. Use the P1202_ActiveBoard(…) to select the active board.
- **Syntax**: void P1202_WaitMagicScanFinish(WORD *wStatus, WORD *wLowAlarm, WORD *wHighAlarm);
- **Input Parameter**: [output]
  *wStatus : address of wStatus which store the MagicScan status
  *wLowAlarm : address of wLowAlarm which store the MagicScan alarm status
  *dwHighAlarm : address of wHighAlarm which store the MagicScan alarm status
- **Return Value**: void
- **Demo Program**: DEMO11.C

<table>
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</tr>
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</tbody>
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<td>channel_0 and channel_1 are in high alarm, others are OK</td>
</tr>
</tbody>
</table>
2.9 The Pulg&Play Functions

2.9.1 P1202_DriverInit

- **Description:** This function will detect all of the OME-PCI-1202 boards installed in the system. This function must be called once before the other functions are called.

- **Syntax:** `WORD P1202_DriverInit(WORD *wTotalBoard);`

- **Input Parameter:** [output] `*wTotalBoard: address of wTotalBoard`
  
  - `wTotalBoard=1` ➔ one OME-PCI-1202 card in the system
  - `wTotalBoard=n` ➔ `n*OME-PCI-1202 cards in the system`

- **Return Value:**
  
  - `NoError : OK`
  - `NoFoundBoard: can not detect any OME-PCI-1202`
  - `FindBoardError: handshake check error`
  - `DriverHandleError : the NAPPCI.VxD .open error for Windows 95`
    
    - the NAPPCI.SYS .open error for Windows NT
  - `DriverCallError : call NAPPCI.VxD return error`
    
    - call NAPPCI.SYS return error

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

2.9.2 P1202_DriverClose

- **Description:** Returns all system resources. This function should be called before the program is terminated.

- **Syntax:** `void P1202_DriverClose(void);`

- **Input Parameter:** `void`

- **Return Value:** `void`

- **Demo Program:** All DEMO programs.
2.9.3 P1202_GetConfigAddressSpace

- **Description**: Gets the I/O address of OME-PCI-1202 board n. This function is for debugging purposes only. It is not necessary to call this function.
- **Syntax**: WORD P1202_GetConfigAddressSpace(WORD wBoardNo, WORD *wAddrTimer, WORD *wAddrCtrl, WORD *wAddrDio, WORD *wAddrAdda);
- **Input Parameter**:
  - wBoardNo: OME-PCI-1202 board number
  - [output] wAddrTimer, wAddrCtrl, wAddrDio, wAddrAdda: refer to the “OME-PCI-1202 Hardware manual” for additional details.
- **Return Value**:
  - NoError: OK
  - FindBoardError: handshake check error
  - ExceedBoardError: wBoardNo is invalid
- **Demo Program**: DEMO1.C

2.9.4 P1202_WhichBoardActive

- **Description**: Returns the board number for the active board.
- **Syntax**: WORD P1202_WhichBoardActive(void);
- **Input Parameter**: void
- **Return Value**: board number of the active board.
- **Demo Program**: DEMO1.C
2.9.5  P1202_ActiveBoard

- **Description:** This function will make one of the OME-PCI-1202 boards the active board. (strange) This function must be called before the D/I/O, A/D, D/A functions are used.

- **Syntax:** `WORD P1202_ActiveBoard(WORD wBoardNo);`

- **Input Parameter:**
  
  `wBoardNo`: board number

- **Return Value :**
  
  - NoError : OK
  - ExceedBoardError: wBoardNo is invalid

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

  The P1202_ActiveBoard(…) will take effect on all functions except the following:
  
  1. P1202_FloatSub2
  2. P1202_ShortSub2
  3. P1202_GetDriverVersion
  4. P1202_DriveInit
  5. P1202_DriveClose
  6. P1202_GetConfigAddressSpace
  7. P1202_Card0_StartScan
  8. P1202_Card0_ReadData
  9. P1202_Card0_Stop
  10. P1202_Card1_StartScan
  11. P1202_Card1_ReadData
  12. P1202_Card1_Stop
2.10 Multi-board Batch Capture Functions
(Two boards operating simultaneously)

2.10.1 P1202_FunA_Start

- **Description:** This function will start the batch capture process for two boards operating simultaneously.

- **Syntax:**

  ```c
  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);
  ```

- **Input Parameter:**

  - `wClockDiv0`: the A/D sample rate divisor for the first board.
    the sample rate is 8M/wClockDiv0.
  - `wChannel0[]`: (0=no scan, 1=scan) for each channel of the first board
  - `wConfig0[]`: configuration code for each channel of the first board
  - `*Buffer0`: buffer to store the A/D data for the first board
  - `dwMaxCount0`: sample count for the first board
  - `wClockDiv1`: the A/D sample rate divisor for the second board.
    the sample rate is 8M/wClockDiv1.
  - `wChannel1[]`: (0=no scan, 1=scan) for each channel of the second board
  - `wConfig1[]`: configuration code for each channel of the second board
  - `*Buffer1`: buffer to store the A/D data of the second board
  - `dwMaxCount1`: sample count for the second board
nPriority: A/D thread priority. The value of nPriority ranges from:
-2: THREAD_PRIORITY_LOWEST
-1: THREAD_PRIORITY_BELOW_NORMAL
0: THREAD_PRIORITY_NORMAL
1: THREAD_PRIORITY_ABOVE_NORMAL
2: THREAD_PRIORITY_HIGHEST
Other: THREAD_PRIORITY_NORMAL

● Return Value:
  NoError : OK
  FindTwoBoardError : cannot find two OME-PCI-1202 boards

● Demo Program : DEMO20.C
2.10.2   P1202_FunA_ReadStatus

- **Description**: This function will read the status of the batch capture process.

- **Syntax**:
  
  ```c
  WORD P1202_FunA_ReadStatus( void );
  ```

- **Input Parameter**:
  
  ```c
  void;
  ```

- **Return Value**:
  
  - 0: data is ready
  - 1: data not ready

- **Demo Program**: DEMO20.C
2.10.3  **P1202_FunA_Stop**

- **Description:** This function will stop the batch capture function.

- **Syntax:**
  
  ```c
  word P1202_FunA_Stop(void);
  ```

- **Input Parameter:**
  
  ```c
  void
  ```

- **Return Value :**
  
  ```c
  NoError : OK
  StopError : Stop Error
  ```

- **Demo Program :** DEMO20.C

2.10.4  **P1202_FunA_Get**

- **Description:** This function will retrieve the number A/D samples acquired.

- **Syntax:**
  
  ```c
  word P1202_FunA_Get(DWORD *P0, DWORD *P1);
  ```

- **Input Parameter:**
  
  ```c
  *P0: [output] the number of A/D samples that have been acquired for the first board.
  *P1: [output] the number of A/D samples that have been acquired for the second board.
  ```

- **Return Value :**
  
  ```c
  NoError : OK
  ```

- **Demo Program :** DEMO20.C
2.11 Single Board Batch Capture

2.11.1 P1202_FunB_Start

- **Description**: This function will start the batch capture process.

- **Syntax**:
  ```c
  WORD P1202_FunB_Start(WORD wClockDiv0, WORD wChannel0[],
                         WORD wConfig0[], WORD *Buffer0, DWORD dwMaxCount0,
                         SHORT nPriority);
  ```

- **Input Parameter**:
  - `wClockDiv0`: the A/D sample rate divisor for the board. The sample rate is 8M/wClockDiv0.
  - `wChannel0[]`: (0=no scan, 1=scan) for each channel of the board
  - `wConfig0[]`: configuration code for each channel of the board
  - `*Buffer0`: buffer to store the A/D data for the board
  - `dwMaxCount0`: number of data points
  - `nPriority`: Thread priority. The value of nPriority ranges from:
    - -2: THREAD_PRIORITY_LOWEST
    - -1: THREAD_PRIORITY_BELOW_NORMAL
    - 0: THREAD_PRIORITY_NORMAL
    - 1: THREAD_PRIORITY_ABOVE_NORMAL
    - 2: THREAD_PRIORITY_HIGHEST
    - Other: THREAD_PRIORITY_NORMAL

- **Return Value**:
  - NoError : OK
  - FindBoardError : cannot find the OME-PCI-1202 board
  - AdControllerError : MagicScan controller hardware handshake error

- **Demo Program**: DEMO21.C
2.11.2 P1202_FunB_ReadStatus

- **Description**: This function provides the status of the batch capture process.

- **Syntax**:
  
  ```c
  WORD P1202_FunB_ReadStatus( void );
  ```

- **Input Parameter**:
  
  ```c
  void;
  ```

- **Return Value**:
  
  0: data is ready
  1: data not ready

- **Demo Program**: DEMO21.C
2.11.3  P1202_FunB_Stop

- **Description:** This function will stop the batch capture process.

- **Syntax:**
  
  word P1202_FunB_Stop(void);

- **Input Parameter:**
  
  void

- **Return Value :**
  
  NoError  : OK
  StopError : Stop Error

- **Demo Program :** DEMO21.C

2.11.4  P1202_FunB_Get

- **Description:** This function will retrieve the number A/D samples acquired.

- **Syntax:**
  
  word P1202_FunB_Get(DWORD *P0);

- **Input Parameter:**
  
  *P0: [output] the number of A/D data points that have been acquired.

- **Return Value :**
  
  NoError  : OK

- **Demo Program :** DEMO21.C
2.12 The Continuous Capture Functions

2.12.1 P1202_Card0_StartScan

- **Description**: This function will start the continuous capture function for card 0. The continuous capture functions are best suited for low speed, long duration collection. Although computer dependent, sample rates should be kept under 40kHz. Refer to the OME-PCI-1202 Hardware User Manual, for additional details on this function.

- **Syntax**: WORD P1202_Card0_StartScan(WORD wSampleRate, WORD wChannelStatus[], WORD wChannelConfig[], WORD wCount);

- **Input Parameter**:
  - wSampleRate: AD sample rate = 8M/wSampleRate.
    - wSampleRate=800 → sample rate=8M/800=10KHz
  - 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 board
  - AdControllerError : MagicScan controller hardware handshake error

- **Demo Program**: DEMO13.C
2.12.2 P1202_Card0_ReadStatus

- **Description:** This function will read the data collected by the continuous capture function.
- **Syntax:** `P1202_Card0_ReadStatus(WORD wBuf[], WORD wBuf2[], DWORD *dwP1, DWORD *dwP2, WORD *wStatus);
- **Input Parameter:** [output]
  - `wBuf[]`: in scan sequence order(012…N012…N……012…N)
  - `wBuf2[]`: in channel sequence order(00000…..11111……22222….NNNNN….)
  - `dwP1`: reserved
  - `dwP2`: reserved
  - `wStatus`: 1=thread start, 2=TimeOut, 8=FIFO overflow, 0x80=thread finish
- **Return Value:**
  - 0: data is ready
  - 1: data not ready
- **Demo Program:** DEMO13.C

2.12.3 P1202_Card0_Stop

- **Description:** This function will stop the continuous capture function.
- **Syntax:** `void P1202_Card0_Stop(void);
- **Input Parameter:** void
- **Return Value:** void
- **Demo Program:** DEMO13.C
2.12.4 P1202_Card1_StartScan

- **Description:** This function will start the continuous capture function for card 1. The continuous capture functions are best suited for low speed, long duration collection. Although computer dependent, sample rates should generally be kept under 40kHz. Refer to the OME-PCI-1202 Hardware User Manual, for additional details on this function.

- **Syntax:** WORD P1202_Card1_StartScan(WORD wSampleRate, WORD wChannelStatus[], WORD wChannelConfig[], WORD wCount);

- **Input Parameter:**
  - wSampleRate: **AD sample rate = 8M/wSampleRate.**
    - wSampleRate=80 → sample rate=8M/800=10KHz
  - 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 board
  - AdControllerError : MagicScan controller hardware handshake error

- **Demo Program : DEMO14.C**
2.12.5  P1202_Card1_ReadStatus

- **Description:** This function will read the data collected by the continuous capture function.
- **Syntax:**

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

- **Input Parameter: [output]**
  - `wBuf[]`: in scan sequence order(012…N012…N……012…N)
  - `wBuf2[]`: in channel sequence order(00000…..11111……22222….NNNNN….)
  - `dwP1`: reserved
  - `dwP2`: reserved
  - `wStatus`: 1=thread start, 2=TimeOut, 8=FIFO overflow, 0x80=thread finish

- **Return Value:**
  - 0: data is ready
  - 1: data not ready

- **Demo Program: DEMO14.C**

2.12.6  P1202_Card1_Stop

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

  ```c
  void P1202_Card1_Stop(void);
  ```

- **Input Parameter: void**
- **Return Value: void**
- **Demo Program: DEMO14.C**
2.13 Other Functions

2.13.1 P1202_DelayUs

- **Description:** This is a machine independent timer. This function can be used to generate the settling time delay or as a general purpose machine independent timer. This function will refer to the current active OME-PCI-1202 board. Use the P1202_ActiveBoard(...) to select the active board.

- **Syntax:** word P1202_DelayUs(WORD wDelayUs);

- **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 → invalid delay (will return error)

- **Return Value:**
  - NoError : OK
  - ExceedBoardNumber: invalid board number
  - FindBoardError : cannot find the OME-PCI-1202 board
  - InvalidDelay : dwDelayUs > 8191

- **Demo Program:** DEMO1.C

- **Long Time Delay:**

```c
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. Demo Program

The following demonstration programs are provided on the included CD:

- demo1: one board, D/I/O test, D/A test, A/D polling & pacer trigger test, general test
- demo2: two boards, same as demo1
- demo3: one board, all 32 channels of A/D by software trigger (by polling)
- demo4: two boards, same as demo3
- demo5: one board, M_function_1 demo
- demo6: two boards, same as demo5
- demo7: one board, M_function_2 demo
- demo8: two boards, same as demo7
- demo9: one board, M_function_3 demo
- demo10: two boards, same as demo9
- demo11: one board, MagicScan demo
- demo12: two boards, same as demo11
- demo13: one board, continuous capture demo
- demo14: two boards, continuous capture demo (Windows only)
- demo15: all installed boards, 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 boards, P180X_FUNA, batch capture demo
- demo21: single board, P180X_FUNB, batch capture demo
- demo23: single board, post-trigger demo
- demo24: single board, pre-trigger demo
- demo25: single board, middle-trigger demo
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