User's Guide

OME-PCI-1202

PCI Data Acquisition Board
Windows Software Manual

omega.com®
OMEGA®

OMEGAnet® Online Service www.omega.com	Internet e-mail info@omega.com

Servicing North America:

USA: ISO 9001 Certified
One Omega Drive, P.O. Box 4047
Stamford CT 06907-0047
TEL: (203) 359-1660 FAX: (203) 359-7700
e-mail: info@omega.com

Canada:
976 Bergar
Laval (Quebec) H7L 5A1, Canada
TEL: (514) 856-6928 FAX: (514) 856-6886
e-mail: info@omega.ca

For immediate technical or application assistance:

USA and Canada: Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA®
Customer Service: 1-800-622-2378 / 1-800-622-BEST®
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN®
TELEX: 996404 EASYLINK: 62968934 CABLE: OMEGA

Mexico: En Español: (001) 203-359-7803 e-mail: espanol@omega.com
FAX: (001) 203-359-7807 info@omega.com.mx

Servicing Europe:

Benelux:
Postbus 8034, 1180 LA Amstelveen, The Netherlands
TEL: +31 (0)20 3472121 FAX: +31 (0)20 6434643
Toll Free in Benelux: 0800 0993344
e-mail: sales@omegaeng.nl

Czech Republic:
Frystatska 184, 733 01 Karviná, Czech Republic
TEL: +420 (0)59 6311899 FAX: +420 (0)59 6311114
Toll Free: 0800-1-66342 e-mail: info@omegashop.cz

France:
11, rue Jacques Cartier, 78280 Guyancourt, France
TEL: +33 (0)1 61 37 29 00 FAX: +33 (0)1 30 57 54 27
Toll Free in France: 0800 466 342
e-mail: sales@omega.fr

Germany/Austria:
Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
TEL: +49 (0)7056 9398-0 FAX: +49 (0)7056 9398-29
Toll Free in Germany: 0800 639 7678
e-mail: info@omega.de

United Kingdom: ISO 9002 Certified
One Omega Drive, River Bend Technology Centre
Northbank, Irlam, Manchester
M44 5BD United Kingdom
TEL: +44 (0)161 777 6611 FAX: +44 (0)161 777 6622
Toll Free in United Kingdom: 0800-488-488
e-mail: sales@omega.co.uk

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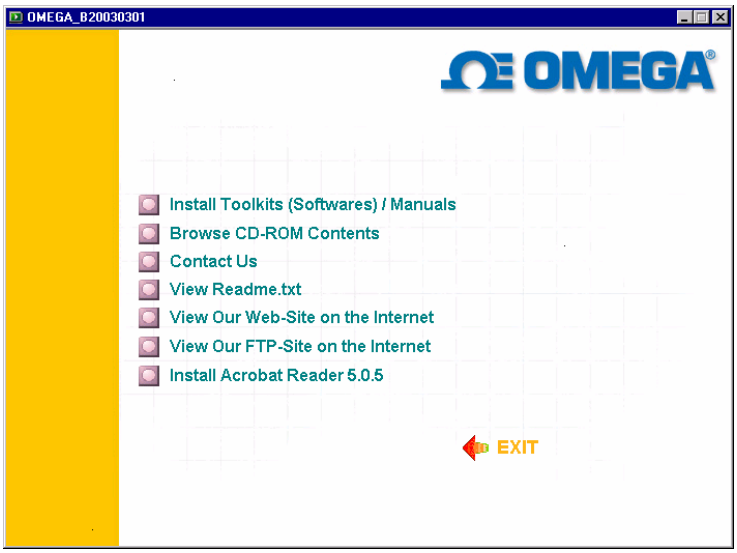
1.0 Introduction

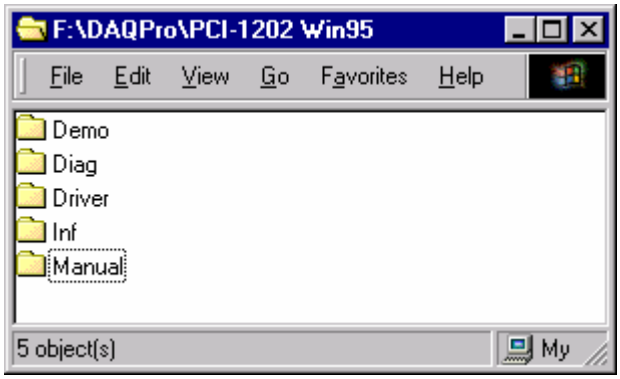
1.1 Software Installation

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.

Fig 1. The Plug & Play information

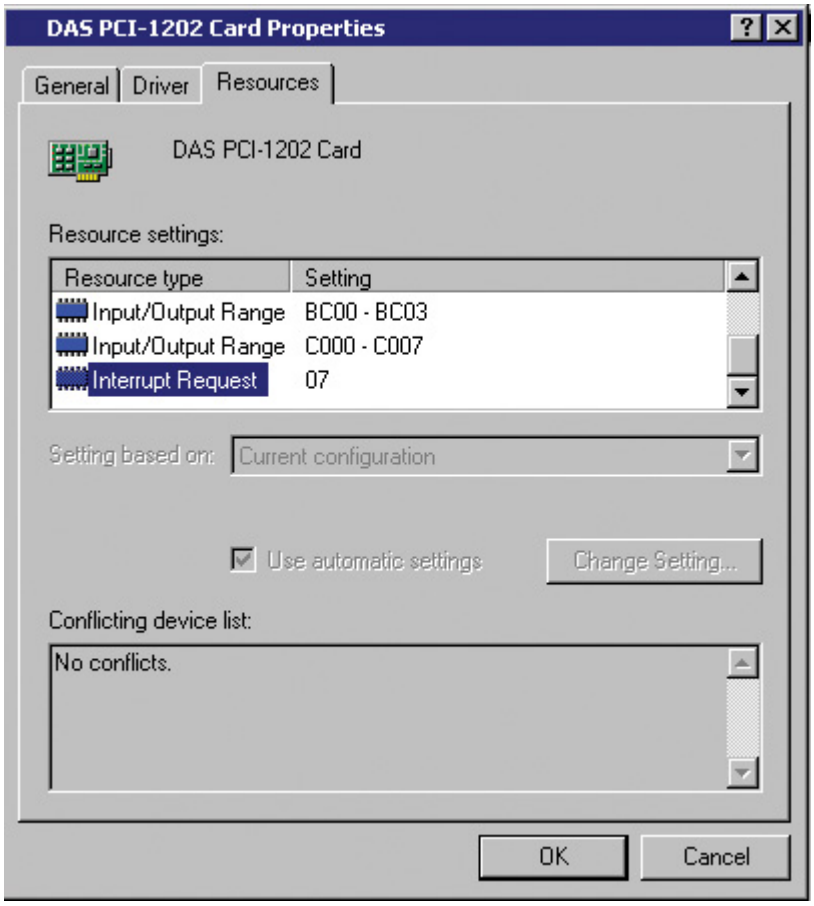


Fig 2. The allocated resources for this OME-PCI-1202.

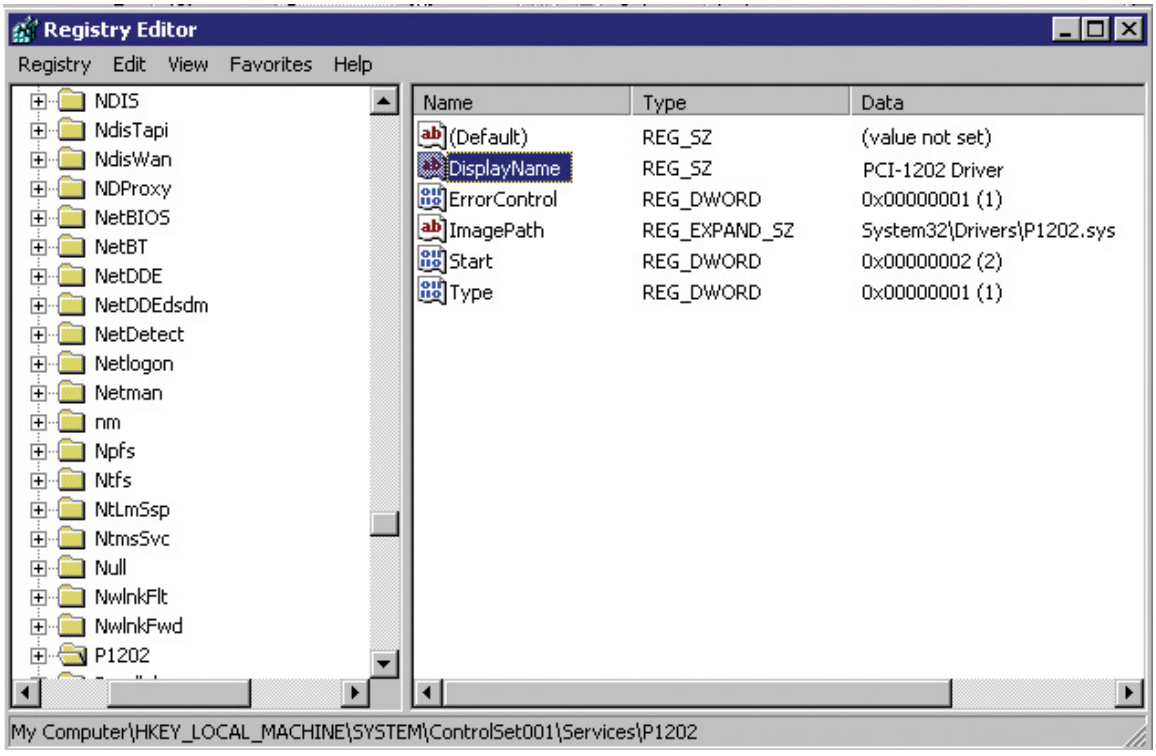


Fig 3. Registry Path and Keys

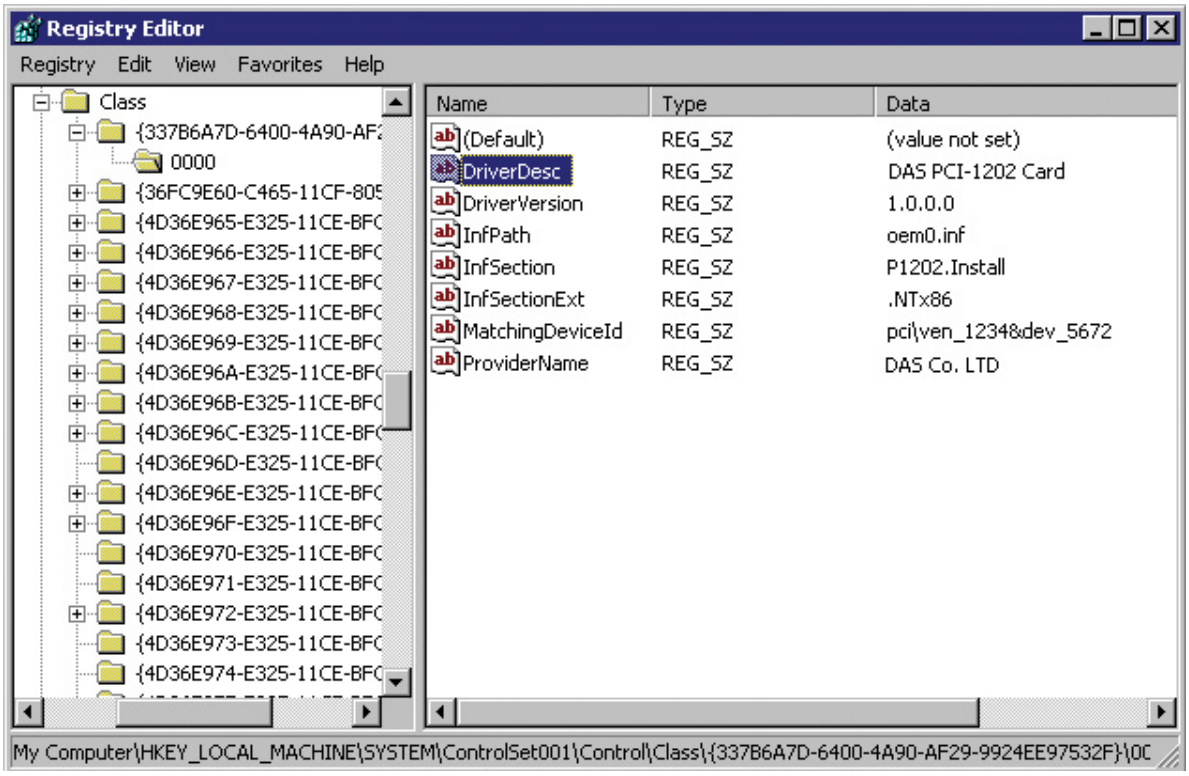


Fig 4. Registry Item Detail

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:

```
#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(hDLLib);
    }
else printf("load P1202.dll error");
getch();
}
```

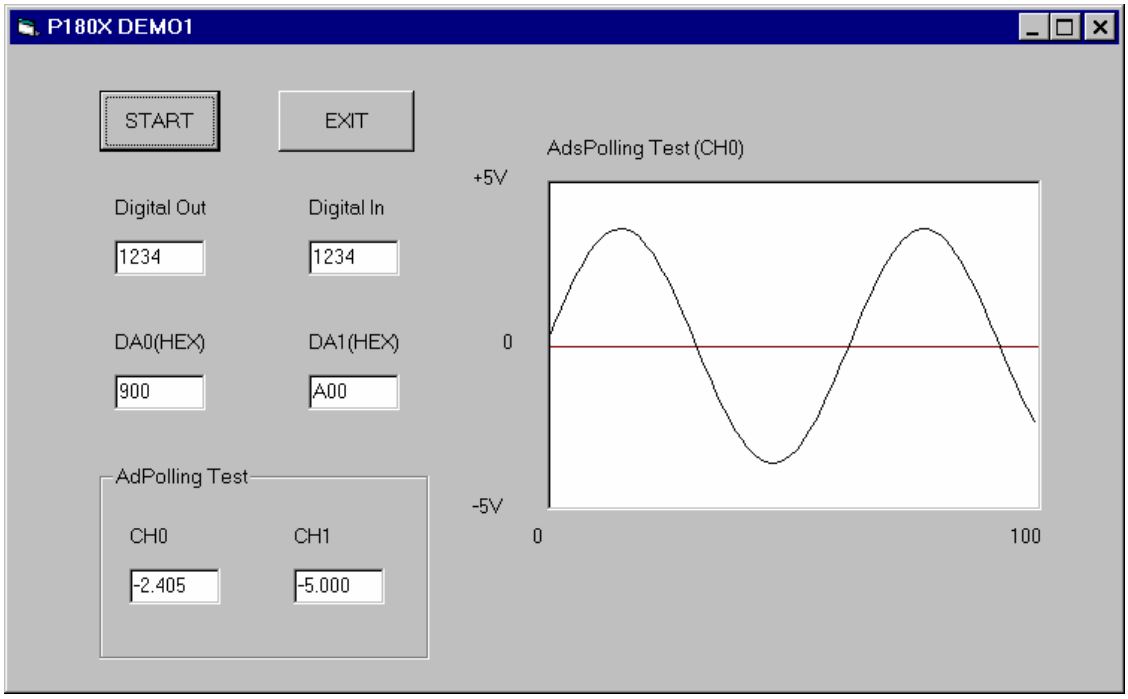
By incorporating these modifications and the P1202.DLL, the user can use BC++ to call the driver.

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 AlarmTypeError = 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, 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, _
```

```
            ByVal wDaWave As Integer, wDaBuf As Integer, ByVal wAdClock As Integer, _
            ByVal wAdNumber As Integer, ByVal wAdConfig As Integer, _
            wAdBuf As Integer) 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, _
            wChannelStatus As Integer, wAdConfig As Integer, fAdBuf As Single, _
            ByVal fLowAlarm As Single, ByVal fHighAlarm As Single) 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, _
           wChannelStatus As Integer, wAdConfig As Integer, fAdBuf 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" (fAdVal As Single) As Integer
Declare Function P1202_AdsPolling Lib "P1202.dll" (fAdVal As Single, ByVal wNum As Integer)  _
            As Integer
Declare Function P1202_AdsPacer Lib "P1202.dll" (fAdVal 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,  _
            wBuf As Integer)  As Integer
Declare Sub P1202_WaitMagicScanFinish Lib "P1202.dll" (wStatus As Integer,  _
            wLowAlarm As Integer, _ 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 ----------------------------


'----------------------- FunB 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
```

DEMO1.FRM

```
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$(RetValue) + CR + LF + "The 180X Card Not
           Found !", 0, "P1202 Return Error Code !")
           Exit Sub
        End If
        Dodata = Val("&H" + DoText.Text)
        RetValue = P1202_Do(Dodata)
        If RetValue <> 0 Then
           ret = MsgBox("The Return Error Code = " + Str$(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
        CH0Text.Text = Format(V0, "#0.000")

        RetValue = P1202_SetChannelConfig(1, 0) ' // +/- 5V range
        RetValue = RetValue + P1202_DelayUs(23) '       // delay 3 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
        CH1Text.Text = Format(V0, "#0.000")
        RetValue = P1202_SetChannelConfig(0, 0) ' Ch:0, +/- 5V range
        RetValue = RetValue + P1202_DelayUs(23) '       // delay 3 us settling time
        RetValue = RetValue + P1202_AdsPolling(AdBuf(0), AdNumber) '

        Call ShowWave
End Sub
```

1.7 Using With Delphi

P1202.PAS	**→ unit file**
P1202.DLL	**→ DLLs**
UNIT1.PAS	**→ demo source file**
UNIT1.DFM	**→ form file**
PROJECT1.DPR	**→ project file**

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.

P1202.PAS

```
unit P1202;
interface
function P1202_ShortSub2(a: smallint; b: smallint): smallint;  StdCall;
implementation
function P1802_ShortSub2; external 'P1202.DLL' name 'P1202_ShortSub2';
end.
```

UNIT1.PAS
(partial)

```
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.
```

1.8 Using With LabVIEW

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

P1202.Dll	**→ DLL**
DEMO1.VI	**→ Demo VI**
MFUN1.VI	**→ Driver VI**

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.

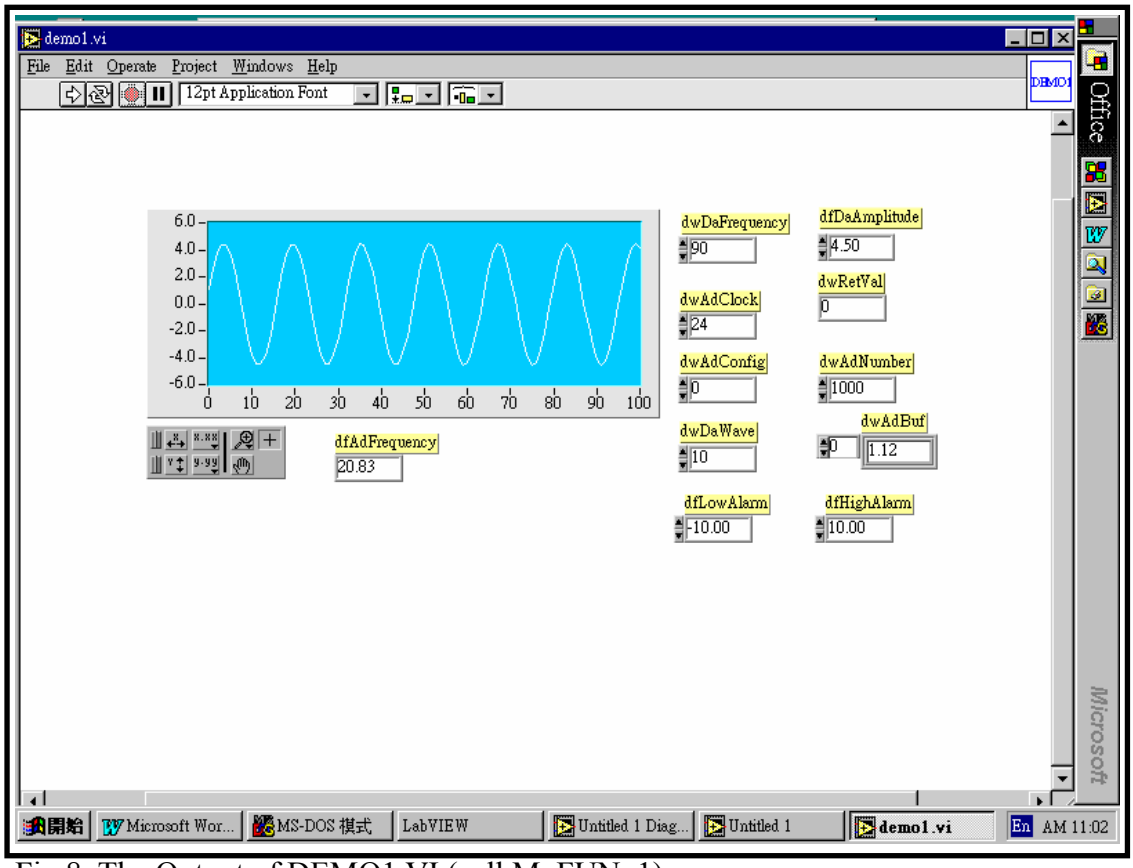


Fig 8. The Output of DEMO1.VI (call M_FUN_1)

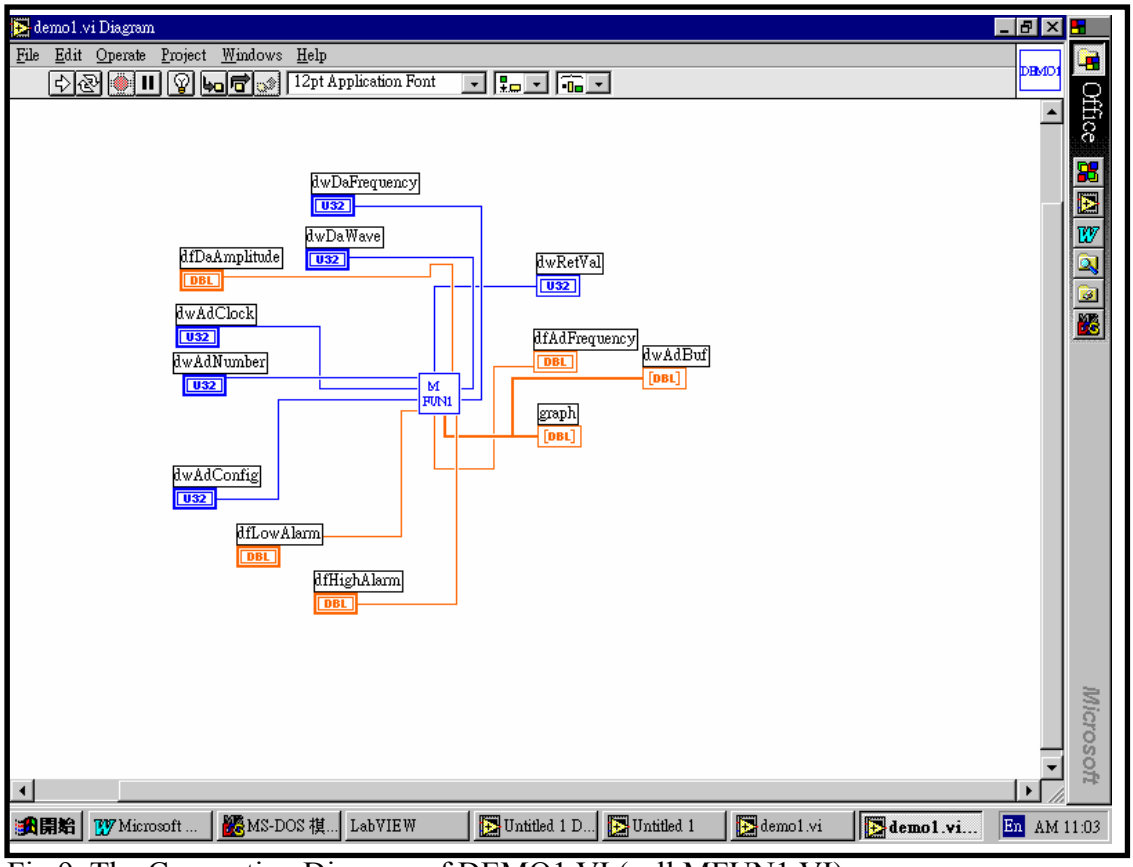


Fig 9. The Connection Diagram of DEMO1.VI (call MFUN1.VI)

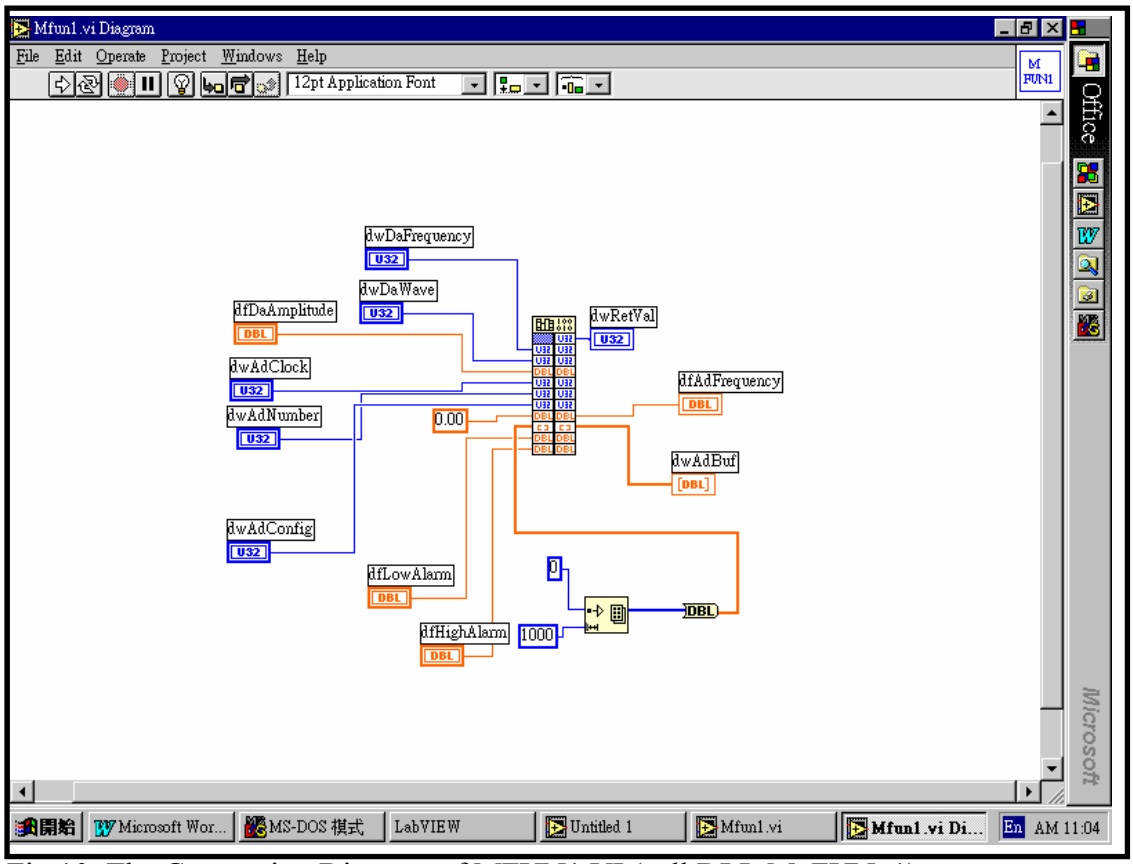


Fig 10. The Connecting Diagram of MFUN1.VI (call DLL M_FUN_1)

1.9 Demo Program

A common demo program is used for all p1202.dll demonstrations. The demo program will accept **wDaFreq** and **wAdClk**

```
#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);
```

```
     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*1000+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);
}
/* ------------------------------------------------------------------ */
```

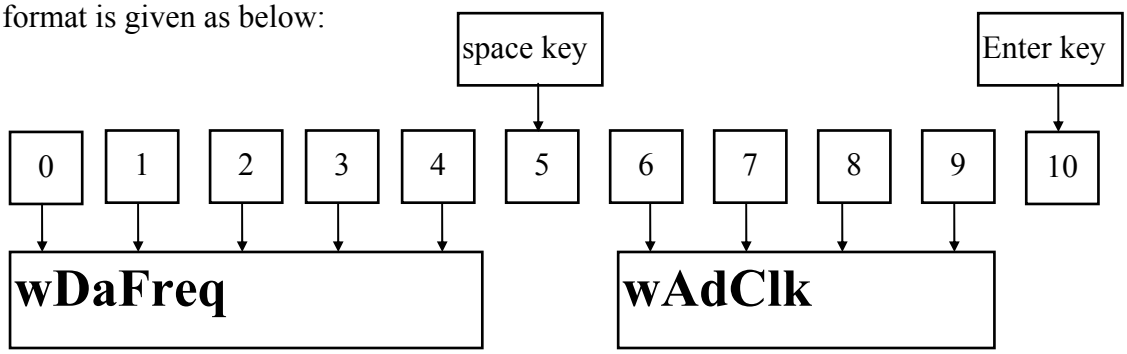
void TEST_CMD(HWND hwnd, int x, int dx, int y, int dy)

{

Separate testing function is placed here

}

The READ_COM only accepts **fix format** command. The command format is given as below:



- if [0] = [Enter key] → accept current setting of **wDaFreq** and **wAdClk**

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

data in float format

MagicScan Functions

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

data in 12 bits HEX format

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

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

OME-PCI-1202H Configuration Code Table

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

2.2 P1202.H

```
#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 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 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 wBuf[], WORD wBuf2[],
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 wAdNumber, WORD wAdConfig, WORD wAdBuf[]);

- **Input Parameter :**

wDaNumber: number of D/A samples in one wave form

wDaWave : number of D/A waveforms to output

wDaBuf[] : The array which will store the D/A wave form image

wAdClock : **AD sample clock = 8000000/wAdClock** samples/sec

wAdNumber: 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

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 : 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:

D/A output frequency = 1.8M/dwDaNumber for pentium 120

D/A output frequency = 2.0M/dwDaNumber for pentium 133

The user must test this value before using M_FUN_1, M_FUN_2 and M_FUN_3.

2.4.3 P1202_M_FUN_3

- **Description :**

The P1202_M_FUN_3 will calculate the wave form 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 wave form 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
HighAlarm : **fAdBuf[?]>fHighAlarm**
LowAlarm : **fAdBuf[?]< fLowAlarm**

- **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 → sample rate=8M/80=100K

- **Return Value :**

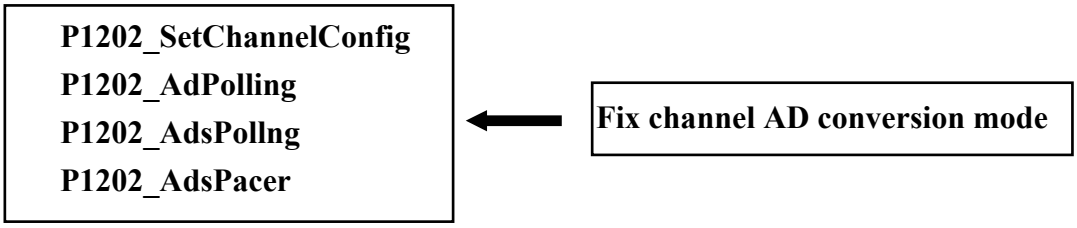
  NoError : OK

  ExceedBoardNumber: invalid board number

  FindBoardError : cannot find the OME-PCI-1202 board

  AdPollingTimeOut : hardware timeout error

- **Demo Program : DEMO1.C**



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**

wStatus	**= 0x00**	**→ MagicScan initial condition (idle state)**
	= 0x01	**→ MagicScan start operation**
	= 0x02	**→ MagicScan stage 1 controller timeout**
	= 0x04	**→ MagicScan stage 2 controller timeout**
	= 0x08	**→ MagicScan FIFO overflow**
	= 0x80	**→ MagicScan function OK**

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

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

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 :** 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**

```
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**

wStatus	**= 0x00**	**→ MagicScan initial condition (idle state)**
	= 0x01	**→ MagicScan operation started**
	= 0x02	**→ MagicScan stage 1 controller timeout**
	= 0x04	**→ MagicScan stage 2 controller timeout**
	= 0x08	**→ MagicScan FIFO overflow**
	= 0x80	**→ MagicScan function OK**

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

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

2.9 The Pulg&Play Functions

2.9.1 P1202_DriverInit

- **Description:** This function will detect all of theOME-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 :**

```
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 :**

  WORD P1202_FunA_ReadStatus(void);

- **Input Parameter :**

  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:**
  word P1202_FunA_Stop(void);
- **Input Parameter:**
  void
- **Return Value :**
  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:**
  word P1202_FunA_Get(DWORD *P0, DWORD *P1);
- **Input Parameter:**
  *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 :**
  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 :**

```
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 :**
  WORD P1202_FunB_ReadStatus(void);

- **Input Parameter :**
  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 wChanelConfig[], 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 wChanelConfig[], 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 theOME-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:** 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:** 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 activeOME-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 theOME-PCI-1202 board

  InvalidDelay : **dwDelayUs** > 8191

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

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

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

3. 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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