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AVT-921 - DLL VERSION 1.0

The AVT-921 Dynamic Link Library (DLL) version 1.0 allows the software developer access to the AVT-921 hardware from a Visual Basic program. The 16-bit DLL runs under Windows 3.1x and has been tested with Visual Basic (VB) 3.0.

The remaining sections of this supplement cover the topics listed below.

- The section titled Installation describes the details of installing the AVT-921 DLL.
- Basic Functions lists the routines necessary to gain access to the AVT-921 hardware.
- Convenience Functions lists the extra functions that permit the developer to modify the behavior of the AVT-921 hardware.
- The final section, Sample Visual Basic Program, describes a sample VB program that makes use of the AVT-921 DLL.

Besides the sections described above, this document provides a table of the DLL routines available to the VB programmer.

Installation

The AVT-921 DLL distribution disk contains the following files:

- AVT-921.DLL - This is the AVT-921 DLL
- GLOBAL.BAS - This VB file contains routines for the sample program.
- NETMON.EXE - This file is the VB sample program in EXE format.
- NETMON.FRM - The form for the VB sample program resides in this file.
- NETMON.MAK - This represents the make file for the VB sample program.
- README.TXT - This read me file contains the text of the Installation section of the AVT-921 DLL version 1.0 (Manual Supplement #2).
- SUPP2.DOC - MS-Word version 6.0 file of this document.

To install the AVT-921 DLL, the developer copies the AVT-921.DLL file from the installation disk to the desired directory on the host computer. The remaining files can be copied to any development directory since they mostly deal with the sample VB program.

Basic Functions

The following subsections describe the basic functions of the AVT-921 DLL. These functions establish a connection to the AVT-921, detach from the AVT-921 hardware, and read and write bytes to or from the hardware.

AVT921CONNECT

AVT921CONNECT establishes a connection to the AVT-921 hardware. The following VB declare statement shows the parameters and return value for this function.

Declare Function AVT921CONNECT Lib "AVT-921.DLL" (ByVal SegmentAddress As Integer) As Integer

AVT921CONNECT requires the 16-bit segment address configured on the AVT-921 hardware prior to installation. (Please refer to the AVT-921 Users Manual to determine how to define this segment and how to install the AVT-921.) The developer specifies this value in the variable SegmentAddress. Note that the DLL does not validate this address. The developer must assume the responsibility for specifying the correct segment address for the installed AVT-921 board.

The AVT921CONNECT function returns a valid Selector on successfully connecting to the hardware. The developer uses this Selector to invoke all the other DLL functions described in this supplement. If the connect request fails, the function returns a 0 Selector value.

AVT921DETACH

AVT921DETACH detaches from the connection established by the successful AVT921CONNECT call. The developer makes the call to AVT921DETACH when the application no longer wishes to communicate with the AVT-921 hardware. The detach frees system resources allocated by AVT921CONNECT thus avoiding memory leaks.

The following VB declare statement shows the parameter and return value for AVT921DETACH.

Declare Function AVT921DETACH Lib "AVT-921.DLL" (ByVal Selector As Integer) As Integer

The detach function requires as its parameter the Selector supplied by the AVT921CONNECT function. If the detach completes successfully, AVT921DETACH returns a 1; otherwise it returns a 0.

AVT921READBYTE

The AVT921READBYTE function reads a byte from the AVT-921 device. As explained in the AVT-921 Users Manual, the AVT-921 employs FIFO's for getting data into and out of the device. This function reads any available byte from the output FIFO.

The following declare statement shows the parameters and return value for AVT921READBYTE.

Declare Function AVT921READBYTE Lib "AVT-921.DLL" (ByVal Selector As Integer, Byte As Integer) As Integer

The first parameter represents the Selector supplied by the AVT921CONNECT function. The second parameter, Byte, points to an integer location to store the byte read from the AVT-921. Note that even though Byte points to an integer, the actual data read from the device remains a

byte. The upper byte of the integer always remains a 0. (For example, if the AVT921READBYTE obtains a &HFF from the AVT-921, the Byte variable contains a &H00FF.)

If a byte has been successfully read from the device, AVT921READBYTE returns a 1. If a byte has not been successfully read, the AVT921READBYTE returns a 0. Note that a 0 return does not signify an error but indicates an empty output FIFO.

AVT921WRITEBYTE

The AVT921WRITEBYTE function writes a byte to the AVT-921 device. As explained in the previous subsection, the AVT-921 employs a FIFO for sending data to the device. This function writes the supplied byte to this FIFO.

The following declare statement shows the parameters and return value for AVT921WRITEBYTE.

Declare Function AVT921WRITEBYTE Lib "AVT-921.DLL" (ByVal Selector As Integer, ByVal Byte As Integer) As Integer

The first parameter represents the Selector supplied by the AVT921CONNECT function. The second parameter, Byte, contains the byte to write to the AVT-921. Even though Byte has an integer declaration, the AVT921WRITEBYTE function only writes the lower byte to the device.

If the byte has been successfully written to the device, AVT921WRITEBYTE returns a 1. If the byte has not been successfully written, the function returns a 0. The write request only fails when the hardware marks the input FIFO to the AVT-921 as full.

Convenience Functions

The following subsections describe the convenience functions of the AVT-921 DLL. These functions perform specific activities for the caller that cannot be done by writing data to the input or output FIFO's.

AVT921FLUSHINPUT

The AVT921FLUSHINPUT function clears all data from the AVT-921 input FIFO. (The input FIFO refers to the input to the AVT-921.) By clearing the input FIFO, the developer ensures that subsequent reads of the FIFO by the AVT-921 contains only the newest data for processing.

The following declare statement shows the parameter for the AVT921FLUSHINPUT subroutine.

Declare Sub AVT921FLUSHINPUT Lib "AVT-921.DLL" (ByVal Selector As Integer)

The parameter for AVT921FLUSHINPUT represents the Selector returned by the AVT921CONNECT function.

AVT921FLUSHOUTPUT

The AVT921FLUSHOUTPUT function clears all data from the AVT-921 output FIFO. (The output FIFO refers to the output from the AVT-921.) By clearing the output FIFO, the developer ensures that subsequent writes to the FIFO by the AVT-921 contains the latest data.

The following declare statement shows the parameter for the AVT921FLUSHOUTPUT subroutine.

```
Declare Sub AVT921FLUSHOUTPUT Lib "AVT-921.DLL" (ByVal Selector As Integer)
```

The parameter for AVT921FLUSHOUTPUT represents the Selector returned by the AVT921CONNECT function.

AVT921HALT

The AVT921HALT subroutine halts the operation of the AVT-921. The device cannot interact with the J1850 bus while halted.

The following declare statement shows the parameter for the AVT921HALT subroutine.

```
Declare Sub AVT921HALT Lib "AVT-921.DLL" (ByVal Selector As Integer)
```

The parameter for AVT921HALT represents the Selector returned by the AVT921CONNECT function.

AVT921PWMMODE

As noted in the AVT-921 Users Manual, the AVT-921 hardware can operate in either VPW or PWM mode. The AVT921PWMMODE subroutine forces the device to operate in PWM mode.

The following declare statement shows the parameter for the AVT921PWMMODE subroutine.

```
Declare Sub AVT921PWMMODE Lib "AVT-921.DLL" (ByVal Selector As Integer)
```

The parameter for AVT921PWMMODE represents the Selector returned by the AVT921CONNECT function.

AVT921START

The AVT921START subroutine starts the operation of the AVT-921. When started, the AVT-921 can interact with the J1850 bus.

The following declare statement shows the parameter for the AVT921START subroutine.

```
Declare Sub AVT921START Lib "AVT-921.DLL" (ByVal Selector As Integer)
```

The parameter for AVT921START represents the Selector returned by the AVT921CONNECT function.

AVT921VPWMODE

As noted in the AVT-921 Users Manual, the AVT-921 hardware can operate in either VPW or PWM mode. The AVT921VPWMODE subroutine forces the device to operate in VPW mode.

The following declare statement shows the parameter for the AVT921VPWMODE subroutine.

```
Declare Sub AVT921VPWMODE Lib "AVT-921.DLL" (ByVal Selector As Integer)
```

The parameter for AVT921VPWMODE represents the Selector returned by the AVT921CONNECT function.

Sample Visual Basic Program

The AVT-921 DLL distribution disk includes a VB application that uses the “AVT-921.DLL” file to interact with the AVT-921 hardware. The application, a network monitor, reports all the J1850 traffic observed by the AVT-921 hardware. Developers are encouraged to use the sample to help develop their applications. The rest of this section points out portions of the code of interest to the VB developer. The sample provided use all the exported routines in the “AVT-921.DLL”.

Declarations

Since the VB application uses “AVT-921.DLL”, the routines required for this DLL must be declared. This declaration occurs in the “Netmon.FRM” code under “Object: (general)” and “Proc: (declarations)”. The following code segments show the required declarations. (Ignore line wrapping. The actual VB application has these entries on one line.)

```
Declare Function AVT921CONNECT Lib "AVT-921.DLL" (ByVal SegmentAddress As Integer) As Integer
```

```
Declare Function AVT921DETACH Lib "AVT-921.DLL" (ByVal Selector As Integer) As Integer
```

```
Declare Sub AVT921FLUSHINPUT Lib "AVT-921.DLL" (ByVal Selector As Integer)
```

```
Declare Sub AVT921FLUSHOUTPUT Lib "AVT-921.DLL" (ByVal Selector As Integer)
```

```
Declare Sub AVT921HALT Lib "AVT-921.DLL" (ByVal Selector As Integer)
```

```
Declare Sub AVT921PWMMODE Lib "AVT-921.DLL" (ByVal Selector As Integer)
```

```
Declare Function AVT921READBYTE Lib "AVT-921.DLL" (ByVal Selector As Integer, Byte As Integer) As Integer
```

```
Declare Sub AVT921START Lib "AVT-921.DLL" (ByVal Selector As Integer)
```

```
Declare Sub AVT921VPWMODE Lib "AVT-921.DLL" (ByVal Selector As Integer)
```

```
Declare Function AVT921WRITEBYTE Lib "AVT-921.DLL" (ByVal Selector As Integer, ByVal Byte As Integer) As Integer
```

Connect

The connect button’s responsibility consists of connecting the VB application to the AVT-921 hardware. The code segment shows how this occurs. Note that if the connection is successful the software clears the input and output buffers, sets the mode of operation, and starts the device. This software is located in the “Netmon.FRM” code under “Object: ConnectButton” and “Proc: Click”.

```

' Request that the DLL connects to the AVT-921 at the requested address.

Screen.MousePointer = HourGlassPointer      ' show we are active
Selector = AVT921CONNECT(SegmentAddress)    ' try and connect to the avt-921
Screen.MousePointer = DefaultPointer        ' return to the default pointer

' If an error is returned from the connect request then notify
' the operator; otherwise, set up for processing.

If (Selector = 0) Then
    MsgBox "Unable to connect to the AVT-921.", 0, "Connect Error"
Else
    Call FormState                          ' set the form to reflect new activity
    Call AVT921FLUSHINPUT(Selector)         ' clear the input and output fifo's
    Call AVT921FLUSHOUTPUT(Selector)

    If (VPWmodeButton.Value = True) Then    ' if vpw mode selected
        Call AVT921VPWMODE(Selector)
    Else                                    ' else assume pwm mode
        Call AVT921PWMMODE(Selector)
    End If

    NetTimer(1).Enabled = True              ' enable the timer for reading input
    Call AVT921START(Selector)              ' start the device
End If

```

Detach

The code to detach from the AVT-921 hardware exists in “Netmon.FRM” under “Object: DetachButton” and “Proc: Click”. The code segment shows that the application first halts the AVT-921 in order to stop the hardware’s interaction with the J1850 bus. The detach occurs in the call to AVT921DETACH using the Selector obtained from the AVT921CONNECT function.

```

' Process if we have a valid selector.

If (Selector <> 0) Then

    ' First disable the timer responsible for reading data.
    NetTimer(1).Enabled = False

    ' Next discontinue processing.
    Call AVT921HALT(Selector)              ' stop the avt-921

    ' Detach from the avt-921 device.
    Status = AVT921DETACH(Selector)

```

Data Reporting

The actual reporting of data occurs in the timer routine. The code for this routine exists in “Netmon.FRM” under “Object: NetTimer()” and “Proc: Timer”. The code segment shows the reading of the header byte of a AVT-921 message. If the read completes successfully, the software obtains the number of bytes in the message from the header. The timer routine uses this number to process the remainder of the message. The developer should refer to the code or the AVT-921 Users Manual to learn more about message format and processing.

```
' If the timer is for the net monitor then read  
' the data from the avt-921.
```

```
Status = AVT921READBYTE(Selector, Byte)
```

```
' If the status is true then we have read a byte. We assume that this is a  
' header byte so we use it to calculate the length of the rest of the message.
```

```
If (Status <> 0) Then
```

Miscellaneous

The final sample in this supplement shows the code associated with the “Request Version” button. This code, located in “Netmon.FRM” under “Object: VersionButton” and “Proc: Click”, illustrates the writing of a message to the AVT-921.

```
' Write the firmware request to the avt-921
```

```
Byte = &HB0          ' request firmware value  
Status = AVT921WRITEBYTE(Selector, Byte)
```

```
' if error then read the response.
```

```
If (Status = 0) Then
```

```
    MsgBox "Error requesting firmware version", MB_OK, "Write Error"  
End If
```

AVT-921 DLL FUNCTIONS

Call to the AVT-921 DLL Function	Description
Declare Function AVT921CONNECT Lib "AVT-921.DLL" (ByVal SegmentAddress As Integer) As Integer	AVT921CONNECT connects the VB application to the AVT-921 hardware. The developer uses the returned Selector to access all other DLL routines. A return of 0 indicates that the connect failed.
Declare Function AVT921DETACH Lib "AVT-921.DLL" (ByVal Selector As Integer) As Integer	AVT921DETACH detaches the VB application from the AVT-921 hardware. A return of 1 indicates a successful detach; otherwise the function returns a 0.
Declare Sub AVT921FLUSHINPUT Lib "AVT-921.DLL" (ByVal Selector As Integer)	AVT921FLUSHINPUT clears the AVT-921's input FIFO.
Declare Sub AVT921FLUSHOUTPUT Lib "AVT-921.DLL" (ByVal Selector As Integer)	AVT921FLUSHOUTPUT clears the AVT-921's output FIFO.
Declare Sub AVT921HALT Lib "AVT-921.DLL" (ByVal Selector As Integer)	AVT921HALT forces the AVT-921 into a halt state. This prevents the processor from interacting with the J1850 bus.
Declare Sub AVT921PWMMODE Lib "AVT-921.DLL" (ByVal Selector As Integer)	AVT921PWMMODE puts the AVT-921 hardware into the PWM operational mode.
Declare Function AVT921READBYTE Lib "AVT-921.DLL" (ByVal Selector As Integer, Byte As Integer) As Integer	AVT921READBYTE reads a byte from the AVT-921 hardware. This byte is stored at the address specified in the second argument. If the read was successful, the function returns a 1; otherwise the function returns a 0.
Declare Sub AVT921START Lib "AVT-921.DLL" (ByVal Selector As Integer)	AVT921START starts the AVT-921 hardware. Once started, the hardware can interact with the J1850 bus.
Declare Sub AVT921VPWMODE Lib "AVT-921.DLL" (ByVal Selector As Integer)	AVT921VPWMODE puts the AVT-921 into the VPW operational mode.
Declare Function AVT921WRITEBYTE Lib "AVT-921.DLL" (ByVal Selector As Integer, ByVal Byte As Integer) As Integer	AVT921WRITEBYTE writes the byte supplied in the second parameter to the AVT-921. Even though the byte is passed as an integer, the routine only writes the lower byte to the hardware.