User's Manual
Event Manager Version 1.0
BETA Release
December 16, 1994

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Introduction:

The Event Manager package is a control package designed to step through a specified list of events, in order, with a resolution of one second and multiple events per second period. It supports a variety of events including serial data output, local and network DDE messages, playing wave files, (.avi) video files, displaying or hiding pictures, starting and stopping Audio CD tracks, digital outputs, digital input wait events and launching executable files. In addition, it supports an assortment of DDE commands allowing it to be completely controlled remotely and thus used as a DDE driver. This program was originally designed for use in a major manufacturer's test facilities. Users are encouraged to leave a message on CompuServe for me. I am a one man company with a full time job, so please consider that when you are waiting for an answer. I will do everything within my abilities to answer all questions. My CompuServe I.D. is 71612,3074. If you prefer you can write to me at the following address:

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Hardware Requirements:

Computer:

Any computer that will run Windows well will run this program. It is highly recommended that the target PC be a 486DX 33 or better to run network applications.

Network:

Although there is no requirement for network capabilities, to use Net DDE, Microsoft's Windows for WorkGroups upgrade will be required. The WFW Net DDE Manager is required to set up Net DDE transactions. If WFW is not installed, Net DDE is not available to the user. It is strongly suggested that an Etherlink III/16 adapter such as
3-COM model #3C509 be used due to it's support of high level interrupts. To better understand DDE and NetDDE, the VB Knowledge Base can be downloaded from the Microsoft Download Service and in addition there are articles on Windows for Workgroups that will help users understand and use Network DDE.

MultiMedia Requirements:

To play wave files, the PC must contain a Sound board such as the Creative Labs Sound Blaster. The MCI tool supplied with Visual Basic and used here does not support the PC Speaker Driver. Audio and Video Drivers can be downloaded from the Microsoft Download Services bulletin board at 206-936-6735. The file required is a self extracting (.exe) named "WV1019.EXE" and it is Micosoft's Video for Windows Runtime. It will update the media player and load drivers to play ".avi" files. It is highly recommended that user's download this file and update their systems prior to using the video capabilities of this program.

Digital Input and Output:

Any Optomux compatible digital I/O subsystem will work, when properly configured, to support the program's Digital I/O features. Appropriate modules must be used to suit the individual application. For those of you who are unfamiliar with digital I/O or Optomux, I will try to briefly explain. Digital I/O is simply on/off control of external devices via single point control outputs/inputs. Optomux is a serial communications based command/response protocol developed by Opto 22 Corporation and is now a standard in the controls industry. Further information can be obtained from either Opto 22 or Grayhill who both sell hardware that is Optomux compatible. This program was tested with Grayhill's MicroDAC controller. The block diagram of hardware interconnections specifies the exact components used to test this program. As a safety note, it is wise to know appropriate safety procedures for dealing with digital I/O, especially when using 120 vac voltage levels. If you are not familiar with wiring and interconnection of electronic devices, please contact a professional electrical or electronic installer.

Getting Started:

Since it is assumed that you downloaded the software, installation requires that you use an unpack utility to uncompress the files to a location of your choice. After unpacking the files, copy the VBX and DLL files to the **Windows/System** directory, and install the icons for the program(s) into the Program manager as follows:

Select File from the File Manager. Then choose New. When the New Program Object dialog box appears, select Program Item and OK. The Program Item Properties dialog box will then appear. At the Description line, type "Event Manager". At the Command line, type "C:\ EVENT\EVENT.EXE", then choose OK. The Event Manager icon will now appear in your Program Manager selections. Auxiliary programs can be started from the Tools menu. You can install their icons if desired in the same manner as for the Event Manager.

Features of the Event Manager:

Before you develop an application, it is advisable to understand the basic concepts and features of the system. There are 12 different event types that can be programmed.

List of Events:

Trigger Event - this is a programmable event of which there can only be one and it must be the first event. It is always created automatically with a new Sequencer file with a default trigger of "User Select". For users who obtain the digital I/O, one of four digital inputs can be used to trigger the sequence of events.

Digital Output - supports both turning on/off up to 21 bits of I/O either singly or in groups.

Digital Input Wait - supports 4 digital inputs, 3 if a digital trigger is used. The Sequencer will be put into Pause mode until the digital input is received and will then Resume.

Alarm - will sound an alarm on the PC.

Sound File - plays WAVE or MIDI files using a sound capable PC. (The PC Speaker driver is not supported.)

AVI Files - plays (.avi) files on any PC that has the required driver. Files can be played either in a small window or full screen.

Image Files - bitmap files can be displayed or hidden.

Audio CD - a single track or all tracks can be played and stopped by command.

Serial File - plays a pre-generated file of binary data to a serial port of up to 255 characters long. Serial input data is ignored. The primary purpose of this event is to write messages to Scoreboards, download setpoints to PID controllers, control VCR's, tape players, etc... A Serial File Builder tool is included to assist the user in developing binary files without programming.

Executable - is intended to start up executable files on the local or networked PC. The full path of the executable with parameters can be programmed into the grid for this event. Starting executables on remote PC's can be accomplished by using Net DDE features of Windows for WorkGroups and the WFW toolkit.

DDE Messages - DDE, including Net DDE functions can be programmed as an event and is one of the most powerful features of the Event Manager System. With DDE, you can control local or remote networked applications that support DDE, start up programs on remote PC 's, allow other programs to remotely program the Event Driver's I/O, or control it's overall operation.

Macro Files - These are logical groups of events that are saved with the (.dlm) extension and have no trigger event. They can be used to simplify a sequence layout and limit the number of lines required. This speeds screen updates and makes the sequence more readable. The Macro files can be developed with either the Event Manager or the Macro Editor tool. Frequent use of Macro files is highly recommended.

Event Grid:

The Event Grid is a spreadsheet like interface with preset column names and widths. The grid entries are not editable on the grid. The grid is divided into 6 columns named as follows:

Time - contains the event's scheduled time in 24 hour format, independent of any settings in the Control Panel, and is referenced to the Trigger, which can be either time "00:00:00" or for a real time trigger, a value representing some time between "00:00:00" and "23:59:59".

Identifier - contains an alphanumeric label for each event identifying it's function.

State - contains a alphanumeric modifier for a given function Identifier which further describes it's specific function such as ON or OFF for a digital event.

Value - This contains a numerical representation of the value of a given event's output such as O1H for a digital output event with an Identifier label of DO01.

Comments - Users can put comments here to describe a function more specifically. An example might be to comment on a digital point DO01 with an ON state as meaning that VCR #1 will be put in Play Mode.

Command Parameters - contains file names and command line parameters for serial files, sound files, executables and link data for DDE Messages.

File Menu:

 **New** - will create a new file, clear all the event buffers, and then put up a form requesting that the user accept a default trigger for the first event or allow you to select one of several choices. The shortcut key is Ctrl + N.

 **Open** - will load a selected file of event data into memory and display it on a grid. The configuration file will also be loaded to support serial port parameters, I/O settings, etc... The Shortcut key is Ctrl + O.

 **Save** - puts the current event information on disk and creates an additional configuration file with a (.ini) extension . If a file was flagged as new and has never been saved, then it will query the user for the file name and store it with a (.tlm) extension. Default setup parameters will be loaded. The shortcut key is Ctrl + S.

Save As - requests the user for a file name and then stores the file into the selected directory. The shortcut key is Ctrl + A.

 **Print** - all data will be printed on the grids in the selected area. The shortcut key is Ctrl + P.

Printer Setup - a small form will be shown to allow the user to set the printer into landscape or portrait mode. Landscape mode works best with grid printouts because of the width. The shortcut key is Ctrl + T.

Exit - will unload all forms, release and unload "io.dll" (a custom C program allowing direct port I/O in VB), and return to Windows. If a file was not saved and has changes then the user will be given the option to save. The shortcut key is Ctrl + X.

Edit Menu:

 **Copy** - will copy all grid data in the selected area. The shortcut key is Ctrl + C. The data is copied to the Clipboard and can be inserted into the Macro Editor for simultaneous editing of

Macro (.dlm) and Runtime (.tlm) files.

 **Cut** - will simultaneously copy the lines to the Clipboard and delete the selected grid items. Cut lines are recoverable with the Undo Edit menu item. The shortcut key is Shift + Del. Only one Undo level is supported.

 **Paste** - will insert all copied lines just above the selected grid item. All other items will be moved down. The pasted lines can be removed with the Undo Edit menu item. The shortcut key is Shift + Ins.

Insert Break - will put a blank line at the selected location. This is to allow runtime breakpoints, multiple sequences per file, testing and remote DDE control. The shortcut key is Ctrl + Ins.

Delete - this allows a user to delete lines. The data is not copied to the Clipboard. All lines that are selected will be saved for the Undo Edit menu item. The shortcut key is Del.

Undo Edit - Copy, Cut, Paste, and Delete operations can be undone immediately after execution by selecting this menu item or be pressing Ctrl U. Only one level of Undo is supported.

Adjust Times - gives user the ability to adjust the times of pasted lines following a known good time setting. When lines are pasted, selecting the line below where the lines were pasted and pressing Ctrl + F1 or selecting Adjust Times on the menu will add the previous item's time to all the starting time of all events thereafter until an empty line is encountered. When a line is edited by double clicking on a grid item, the start time is saved. When the user returns to the grid, the difference in time on the edited line (+ or -) will be calculated. Then if the user selects the line following the edited line and selects Adjust Times or presses Ctrl + F1, the difference will be added to all lines from the selected line to the first empty line. This is useful when the user wants to avoid resetting all times on a simple copy and paste operation.

Undo Times - A previous time adjustment can be removed by selecting this menu item or pressing key Ctrl + F2. This works until the next Event Selection is started.

Find Macro Length - shows the beginning and ending times of a Macro event. Selecting a grid item containing a Macro, then pressing Ctrl + L or selecting this menu item will load the macro into the copy array and display the times. This is useful for knowing where to start the next grid item in time order.

Events Menu:

 **Step** - allows the user to step through each event one at a time to test a scheme before run time. The F1 key will begin Step mode.

 **Full Run** - begins the automated sequencing of events from the trigger. Following receipt of the programmed trigger event, events are executed in the order that they are found on the

grid. The F2 key will begin Full Run mode. With the Source data item #1
(first line number) poked into the link, DDE command [**RUN**] duplicates this menu item.

 **Partial Run** - begins run execution at the selected line. Click on the line to start and then press F3 or select this menu item. With any non-zero source item poked into the link (as a starting line number), the DDE command [**RUN**] duplicates this menu item.

Responses - brings the Event Response Form to the screen and places it under the Main Form to observe system and external responses to the sequenced events. Items such as DDE responses, alarms, error messages, etc.. appear here. The F4 key will execute this menu item.

Setup Menu:

Serial Ports - allows the user to set the serial port parameters for COM1 - COM4. The serial parameters are saved in the (.ini) file with each application.

Tools Menu:

Serial File Editor - this is a built in tool that creates user defined binary files that are later used by Serial File events to send the binary file data to a specified serial port. The F5 key can be used to start the Serial File Editor.

Sound Recorder- this simply shells out to the Windows built in Sound Recorder application. If it is already running but obscured from view by other overlapping windows, a new instance (copy) will not be started, but the existing one will be brought to the front. The F6 key can be used to start the Sound Recorder.

DDE Controller - connects a DDE link to the Event Manager and allows remote manipulation of the Event Manager. From it, the user can poke data items on the link, send commands, and watch data sourced from the Event Manager change. The DDE Controller can be started with key F7.

Macro Editor - The Macro Editor allows the user to create Macro files simultaneously with an Event Manager file. This is useful when it is undesirable to unload the Event file to correct or update a Macro file. The Macro Editor can also edit Runtime (.tlm) files . The Macro Editor can be started with the F8 key.

Info Menu:

About Event Manager - clicking this will display a copyright message and allow the user to select information about Registration.

ReadMe - this will open the file "EVREAD.WRI" in the Windows "Write" editor to show important information about the program, including coming updates, bug fixes, etc ..

Run Time Tool Bar:

The Run Time Tool Bar allows VCR like control over the sequences.

 This button will set the Event Manager into STEP mode. A sequence can then be played manually for testing.

 This button toggles the appearance of a text box into which you may enter the number of times you want a particular sequence to execute. This button is only usable in Run Mode.

 During Step mode, this button will advance the selected item to the next grid entry.

 When a grid item other than the trigger line (line #1) is selected, this button will start the Partial Run Mode at the selected item. If the trigger line is selected, then Run Time will await the trigger event.

 If this button is clicked while the Event Manager is in Run Mode, either Partial or Full Run, then the sequence of events will be paused. Elapsed Time will continue to be counted. When the Pause button is clicked again, the Event Manager will Resume and the Elapsed Time will be reset to where it was Paused.

 In either Run Mode, clicking this button will place a Dialog Box on the screen requesting the user to confirm the Stop command. The user then has the option to continue the sequence or abort it. If Stop is clicked during Step Mode then the Event Manager will be taken out of Step Mode.

Program Settings:

Serial Setup:

Setting up the serial ports is fairly intuitive but requires some notes of caution. This program is only designed to operate up to 19,200 baud. This is sufficient for most applications I could foresee using the Event Manager to accomplish. Also, the Windows Control Panel must be set to the desired interrupt and base address settings to match any installed boards for Com3 and Com4. It is virtually impossible for me to test this function thoroughly due to the wide variety of serial I/O boards available. Any difficulties reported will be resolved as they arise. If enough folks think that better Com Port support is needed, I will most likely select the Digiboard 4 Port

Buffered Serial board to add ports and increase baud rates.

Entering and Editing Events:

Trigger Event:

The Trigger Event allows the user to trigger the sequence of events three possible ways.

1. User makes a selection from the screen by clicking on Yes from within the dialog box.

2. One of the four possible digital inputs is selected to start the sequence when it transitions from an off state to an on state.

3. The trigger can be set to begin on a specific time of day. To set the trigger option, double click on the first row of the grid and the Trigger Form will be displayed. Click on the selected Trigger Type option. If User Selection is chosen, "Screen Button" will show in the Trigger Selection box. If Real Time is chosen, you must enter the real time value at which to start in the box labeled "Enter Time Zero". If Digital Trigger is chosen you must either take the default selection in the Trigger Selection box or choose one of the other three possibilities. After making your selection, and/or entering the requested information, click on OK to return to the Main Form.

Digital Output Event:

The Digital Output event is programmed on the Edit Form. With the Main Form displayed, double click on any empty grid column except on the Trigger line. The Edit Form will be displayed with the time set to "00:00:00". On the Edit Form, in the Event Selections box, choose the Digital Output option. The choice of digital points will be displayed to the right of Event Selections. If you intend to turn on one digital point, then click on the Bit On option in the Digital State box. If you intend to turn off one bit, then choose Bit Off in the Event State box. This is the value that will be sent to the I/O driver and corresponds directly to a module point on the I/O rack. Modify the Event Start Time needed and enter appropriate comments. The Command Parameters box is unused with digital outputs. When you have finished making your selections click on OK to return to the Main Form.

Digital Input (Wait) Event:

The Digital Input event is programmed on the Edit Form. With the Main Form displayed, double click on any empty grid column except on the Trigger line. The Edit Form will be displayed with the time set to "00:00:00". On the Edit Form, in the Event Selections box, choose the Digital Input (Wait) option. The choice of digital points will be displayed to the right of Event Selections. The Command Parameters box is unused with digital inputs. When you have finished making your selections, edit the Event Start Time as required and click on OK to return to the Main Form.

Sound File Event:

The Sound File event is programmed on the Edit Form. With the Main Form displayed, double click on any empty grid column except on the Trigger line. The Edit Form will be displayed with the time set to "00:00:00". On the Edit Form, in the Event Selections box, choose

the Sound File option. A dialog box will be displayed requesting the name of the sound file. All file names with the extension (.wav) will be located and displayed. The Sound Event also supports MIDI files. To select a MIDI file, click on the "List Files of Type" box to select (.mid) files. Browse through the directories until you find the appropriate file. To select the file, click on the file name and then click OK or simply double click on the file name. When you are returned to the Edit Form, edit the Event Start Time as required, add any Comments and then click on OK to accept the entries

Serial File:

The Serial File event is programmed on the Edit Form. With the Main Form displayed, double click on any empty grid column except on the Trigger line. The Edit Form will be displayed with the time set to the same time as the last event. On the Edit Form, in the Event Selections box, choose the Serial File option. A dialog box will be displayed requesting the name of the serial file. All file names with the extension (.ser) will be located and displayed. Browse through the directories until you find the appropriate file. To select the file, click on the file name and then click OK or simply double click on the file name. When you are returned to the Edit Form, edit the Event Start Time as required, add any Comments and then click on OK to accept the entries.

Executable:

The Executable File event is programmed on the Edit Form. With the Main Form displayed, double click on any empty grid column except on the Trigger line. The Edit Form will be displayed with the time set to the same time as the last event. On the Edit Form, in the Event Selections box, choose the Executable option. A dialog box will be displayed requesting the name of the executable file. All file names with the extension (.exe) will be located and displayed. Browse through the directories until you find the appropriate file. To select the file, click on the file name and then click OK or simply double click on the file name. When you are returned to the Edit Form, edit the Event Start Time as required and add any Comments. Click on OK to accept the entries.

CD Audio:

The CD event is programmed on the Edit Form. With the Main Form displayed, double click on any empty grid column except on the Trigger line. The Edit Form will be displayed with the time set to 00:00:00. On the Edit Form, in the Event Selections box, choose the CD Audio option. The CD event has two enterable values. The normal value text box is re-labeled "Start Track" and a new value box is added on the form which is labeled "Stop Track". To set the starting track number, either hand enter a number within the range of tracks or use the up and down arrows to raise or lower the existing value until the appropriate track number is displayed. Do the same for the last track you want to hear by entering a track number in the "Stop Track" text box. To stop a track from playing which may be from a previous CD event, click on STOP in the Event State box. The "Start Track" and "Stop Track" values to will set automatically to zero. After selecting the tracks to play, edit the Event Start Time as required and add any Comments. Click on OK to accept the entries.

Image Files:

The Image event is programmed on the Edit Form. With the Main Form displayed,

double click on any empty grid column except on the Trigger line. The Edit Form will be displayed with the time set to 00:00:00. On the Edit Form, in the Event Selections box, choose the Image File option. A dialog box will be displayed requesting the name of the (.bmp) file. Browse through the directories until you find the appropriate file. To select the file, click on the file name and then click OK or simply double click on the file name. When you are returned to the Edit Form, edit the Event Start Time as required, choose the appropriate option to Show or Hide the image file and any Comments. Click on OK to accept the entries.

AVI Files:

The AVI event is programmed on the Edit Form. With the Main Form displayed, double click on any empty grid column except on the Trigger line. The Edit Form will be displayed with the time set to 00:00:00. On the Edit Form, in the Event Selections box, choose the AVI File option. A dialog box will be displayed requesting the name of the (.avi) file. Browse through the directories until you find the appropriate file. To select the file, click on the file name and then click OK or simply double click on the file name. When you are returned to the Edit Form, edit the Event Start Time as required, choose either the Full Screen or Window option and add any Comments. Click on OK to accept the entries.

DDE Messages:

The DDE Message event is programmed on the Edit Form. With the Main Form displayed, double click on any empty grid column except on the Trigger line. The Edit Form will be displayed with the time set to 00:00:00. On the Edit Form, in the Event Selections box, choose the DDE Message option. In the Event Modifier box, a series of choices will be displayed showing direction of data flow and Source/Destination information. Select the appropriate DDE type selection, either Event --> Source,
Event <--Destination, Command --> Remote, or Poke --> Remote. If Source is chosen, then enter the information in the Command Parameters box as data to update a Remote Destination. There is no particular format required for this data. If Destination is chosen, enter the name of the Source (remote) application in the Command Parameters box followed by a | character . Immediately following the | character, enter the topic of the DDE conversation recognized by the Source application, followed by a ! character. Follow this immediately with the Link Item, (a text box, or spreadsheet cell, etc. ...) recognized by the remote application. The final format, for example should be RemoteAppName|RemoteTopic!RemoteLinkItem. Using the up and down arrows, enter the channel # in the box labeled DDE Channel #. When your selections have been made, click OK to accept them and return to the Edit Form. On the Edit Form, add any Comments, edit the Event Start Time if necessary and click OK to accept them return to the Main Form.

About DDE:

Sending and receiving DDE Messages is the most complex part of the Event Manager program. It is the one feature that makes the Sequencer extensible and thus allows the user to remotely program other applications, allow others to manipulate it, start programs on other machines across the network, etc...

The Event Manager has the following DDE capabilities:

Supports 1 Source box to which multiple apps can link. This box is in a special VB form

that is set up to act as a source (server). When a user elects to update the source link, all destinations that are connected to it will be updated. This would be the Source option selection. The Source link also accepts commands from the destination applications that are linked to it. A list of those commands will be presented later in this section.

Supports up to 6 (0 - 5)Destination channels that can be used to link to DDE applications on the local PC or on networked PCs.

Supports 4 DDE Message types - **Source, Destination** , **Command** , and **Poke**.
A Source DDE Message simply allows a user to update the Event Manager's source link. This allows all connected destination apps to receive updated information from the source (Event Manager). There are some automatic Source events that occur when the destination applications send commands to the Event Manager. These will be detailed later in this section.

A Destination DDE Message connects one of 6 channels (0 - 5) to remote applications, treating them as sources and setting itself internally to receive data from them on a notification basis. The user can Poke data to the source, then send a Command , and receive confirmation of the Message and it's status back from the destination apps. This of course assumes that the destination app is cooperating in the process and is written specifically to work with the Event Manager. Visual Basic source code is provided to registered users detailing how this is done and giving example programs to develop applications for this or any other DDE capable program. A great deal of information on DDE and Net DDE is available on the Microsoft Developer's CD series. The Microsoft Download service offers the VB Knowledge Base which goes into detail on DDE and Network DDE.

A Poke DDE Message sends data to the source application, the nature of which is entirely dependent on what the source will accept. It is used primarily with custom apps to allow bi-directional controls and handshaking

A Command DDE Message allows the user to send commands to remote applications. Many applications can accept commands and are to some extent remotely controllable.

Event Manager Commands:

The following list of commands are accepted by the Event Manager:

[TIME] - updates the source link with the Elapsed Time. This command will be rejected if the Event Manager is not in Run mode.

[STATUS] - updates the link with the status of the Event Manager, this is a text description of the mode.

[PAUSE] - places the Event Manager into Pause mode. The equivalent to selecting the Pause button on the Main Form. This command is rejected if the system is not in Run mode.

[RESUME] - Resume the Event Manager. The equivalent to selecting the Resume button on the Main Form. This command is rejected if Event Manager is not in Run mode.

[ALARM] - Causes the Alarm output to activate.

[MESSAGE] - Puts a message into the Event Response Form. The Message must be poked into the Source link.

[DIGITALON] - This command turns on one or more digital outputs. It expects to have the ascii/hex representation of the 24 bit digital word poked into the source box prior to receiving the command. The hex digits must be formatted with a leading zero as in the example, "08000" for digital output number 16.

[DIGITALOFF] - This command turns off one or more digital outputs. It expects to have the Ascii/Hex representation of the 24 bit digital word poked into the source box prior to receiving the command. The hex digits must be formatted with a leading zero as in the example, "08000" for digital output number 16.

[DIGITALREAD] - This command returns the value of the digital inputs. It places an Ascii/Hex representation of the 4 input points into the source box. The return data will be formatted without a lead zero as in the example, "F", with only the lower 4 bits being meaningful. The upper four bits will be forced low.

[RUN] - This command allows the user to start a sequence running from any selected point on the grid. The starting line number must be poked into the source box prior to sending the command.

[STOP] - If the Sequencer is either RUNNING or STEPPING this command will stop the sequencing . The file will remain loaded. This command requires no poked data.

[EXIT] - If the user wants to unload the file and exit the application, this command will unload the program from memory and exit to Windows. This command requires no poked data..

[FILELOAD] - This will load a specified file .TLM file. The file name must be poked into the link first.

[AVIF] -This command allows a user to play an AVI file (Fullscreen) on a machine with the appropriate drivers. A file name is required to be poked in first.

[AVIW] -This command allows a user to play an AVI file (in a Window)on a machine with the appropriate drivers. A file name is required to be poked in first.

[SOUND] - This command allows a user to play a SOUND file, either (.wav) or (.mid) type, on a machine with the appropriate sound driver. A file name is required to be poked into the link.

[MINIMIZE] - This command minimizes the Event Manager window. No poked data is required.

[MAXIMIZE] - This command maximizes the Event Manager window. No poked data is required.

[NORMAL] - This command returns a minimized or maximized window to the normal window state. No poked data is required.

[CD] - This command plays a specified track or range of tracks on a preloaded Audio CD. The starting and stopping track number must be poked in first.

DDE Controller:

The DDE Controller is an ancillary program designed originally to test the DDE functions within the main program. As such, it is not as robustly implemented as a typical commercial program. Registered users will receive the source code as an aid in understanding how to write VB interfaces to DDE capable applications. The DDE Controller allows the user to send DDE data and commands to the Event Manager. It runs as an independent (.exe) file under Windows and can be started by pressing "F7" or selecting the "DDE Controller" option under "Tools" on the Main Menu. Remember that the Event Manager window must have the focus to use the “F7” key. (It will fool you).

Connecting to the Event Manager:

To begin using the DDE Controller to issue commands, it will be necessary to connect to the Event Manager by opening a DDE channel. To do this, click the Connect button on the DDE Controller. A channel or link to the Event Manager will be opened. There will be no response to a successful connection, however a failure to have the Event Manager running will generate an error message to the screen. Any attempt to poke data or send commands without opening a channel will also cause an error and a message will be sent to the screen.

Sending Commands:

Many of the supported DDE commands expect data to be placed on the link before the command can successfully execute. For example, a legal file name with a (.wav) or (.mid) extension must be on the link prior to issuing the "SOUND" command. An error will be generated on the link if this is not true. Data is placed on the link with the Poke button, after the required information has been typed into the Source to "EVENT " text box. File names can be placed into the text box by clicking on the File button. This will allow the user to enter in a file selection dialog box. When the selection has been made and OK is chosen on the dialog box, the file name is placed into the Source to "EVENT" text box. To get the file name to the Event Manager input link, click the Poke button. After the file name has been poked to the Event Manager, the command can be issued by clicking on the appropriate command in the Command List list box, and then clicking on the Command button. An example might be to select a file name for a wave file from your sound files directory, followed by choosing the "SOUND" command, then clicking Command to play the file.

After working with the DDE Controller, it should become obvious that the Event Manager is easily controllable remotely. With the source code for connecting to it, VB programmers should be able to use the Event Manager as a driver only. Remote programs can use all of it's digital I/O and multimedia capabilities by sending commands over a DDE channel.

The source code provided to registered users can be used as a template for development of a variety of applications.

DDE Controller Command Formats: (data requirements to POKE on the link)

ALARM	no data required
AVIF	drive:\directory\file.avi (example) c:\event\windsrf1.avi
AVIW	drive:\directory\file.avi (example) c:\event\windsrf1.avi
CD	starting track, ending track (example) 1,2
DIGITALOFF	digital value, (example) 01FF
DIGITALON	digital value, (example) 08
DIGITALREAD	no data required
EXIT	no data required
FILELOAD	drive:\directory\file.tlm (example) c:\event\images.tlm (system must not be in RUNNING mode)
IMAGE	drive:\directory\file.bmp (example) c:\event\claudia.bmp
MAXIMIZE	no data required
MESSAGE	any text data you want to send
MINIMIZE	no data required
NORMAL	no data required
PAUSE	no data required (system must be in RUNNING mode)
RESUME	no data required (system must be in RUNNING mode)
RUN	number of grid line to start (example) 24 (system must not be in RUNNING mode)
SERIAL	drive:\directory\file.ser,port (example) c:\event\test.ser,2
SOUND	drive:\directory\file.wav (or file.mid) (example) c:\event\adams.wav
STATUS	no data required
STOP	no data required (system must be in RUNNING mode)
TIME	no data required

Serial File Editor:

The Serial File Editor is a built-in tool that is used for generating binary files. This tool is meant to be used to make files for output to serial ports to control devices which typically require RS-232, RS-422 or RS-485 data in either ascii, binary or mixed formats.

Creating a Binary File:

Load the Serial Editor by choosing the "Serial File Editor" menu option under the Main Menu item "Tools" or press "F5". In the Text Box labeled "Serial File Message", you now have two choices for input. The editor accepts input as an ascii string when it sees a "$" as the first and last character. An example would be "$Event Manager$". Numbers from 0-255 can be entered individually by typing #(0-255). A typical example would be a carriage return entered as #(13).Only decimal format is accepted. At this time, hexadecimal and other number formats are not supported. Ascii character lines and numbers can follow each other directly as in "$Event Manager$#(13)". When the Convert button is pressed, the resultant printed output will be "Event

Manager 13". The added space after the ascii line will not be in the binary file itself. In addition, the first character in the file will be the count of characters in the file. This is to tell VB how many characters to read in binary mode. When the file is sent out the selected serial port, the first character will **not** be sent. If for some reason the character "$" must be sent out within an ascii string, it will be necessary to split the ascii string into two parts and insert the "$" character as a number. This is because the "$" is the terminating character and the ascii string conversion will stop when it finds the second "$" character.

The following example illustrates the solution to this problem. Given the ascii string "Big Bucks$", the conversion of "$Big Bucks$$" would result in "Big Bucks". The correct method is to insert the "$" character as a number such as "$Big Bucks$#(36)", which would produce "Big Bucks 36" . Although this looks different than the original ascii string input, it produces the binary equivalent in the file.

To save the file for use as a serial event, choose the command "Save As" after converting the input and verifying the results. A dialog box will appear requesting a file name for the file. By default, the file extension is ".ser" but it can be renamed as required. Enter the appropriate name and press OK.

Macro Editor:

The Macro Editor is simply a scaled down version of the Event Manager using only it's editing features. The purpose of the Macro Editor is to allow users to continue running an application in the Event Manager while testing and updating macro files on the Macro Editor. The Clipboard is used to copy data back and forth from the Event Manager to the Macro Editor and vice versa. The Macro Editor is most useful when the Event Manager is programmed primarily with macro files. It is highly recommended for both program readability and efficient program development using the Macro Editor that users make the most of macro files in their applications. Since using the Macro Editor is not significantly different than using the Event Manager, it will not be necessary to discourse heavily on it's use. There are several differences worthy of note. The Macro Editor's standard file extension is (.dlm). Macro files are loaded dynamically during the run time to save space and screen update time. It was done for very similar reasons as DLL files in Windows. The Macro Editor can load either (.dlm) or (.tlm) files. If (.tlm) files (the Event Manager default extension) are loaded, the trigger event will be stripped off as it does not apply to macro files. Macro files cannot be run time tested in the Macro Editor and must be edited and saved in the Macro Editor and then tested with the Event Manager.

System Defaults:

Due to the fact that prior to any user input, some type of default choices had to be made by the program, there is a "default.ini" file that is loaded each time a new Event Sequence file is created. The defaults are as follows:

Serial Ports:

The program defaults for COM1 - COM4 are set to 9600 Baud, 8 data, 1 stop, and no parity, however no port values are actually changed until the runtime when a port is about to be used and then only the port in use will be changed. This is (hopefully) to avoid accidentally resetting parameters that other programs have set. It is intentional in this design to be as fully

cooperative with other programs as possible.

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