

VP-8LVCT

User's Manual

First Edition

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Table of Contents

Chapter 1: Overview	3
1.1 Basic Functions	3
1.2 Features	4
1.3 Applications	5
Chapter 2: Hardware Installation	6
2.1 Board Features	6
2.2 Setting the Board Number	7
2.3 Setting the JP1 Speaker Out Jumper	8
2.4 Installing the Board	9
2.5 Telephone Connections	10
2.6 Multiple VP-8LVCT Board Connection Using H.100 bus	11
Chapter 3: Installing the TAPI Driver	12
3.1 Getting Started	12
3.2 Welcome Window	14
3.3 Selecting a Directory	15
3.4 Selecting the Setup Type	16
3.5 Selecting a Program Folder	17
3.6 File Copying	18
3.7 Setting the Board Type	19
3.8 Adding TAPI Service Provider	20
3.9 Restarting the Computer	21
Chapter 4: TAPI Diagnosis	22
4.1 Finding the Phone Dialer Directly	23
4.2 Using the Find Function	24
4.3 Phone Dialer Diagnosis	26
4.4 Line Detector Diagnosis	29
4.5 Call Progress Monitor Settings	30
4.6 Tone Tests	35
Appendix A: Technical Specifications	38

1.1 Basic Functions

The VP-8LVCT is a DSP-based voice processing board with analog telephone line interfaces. Each board employs eight voice processing lines. Up to 16 boards can be installed in the same PC to build a 64-line system. The basic functions of the VP-8LVCT board include:

- Telephone Interface
- Telephone Dialer
- Telephone Lines Seizure
- Ring Detector
- DTMF Detector
- Voice Record and Play Back
- Voice Compression and Decompression
- Call Progress Analysis
- Caller ID Indication
- Digital Data Switching (via H.100 bus)

1.2 Features

A VP-8LVCT board contains the following main components:

- **Telephone line interface:**

The VP-8LVCT board can interface directly with 8 analog phone lines. The caller ID can be derived through this telephone line interface both in FSK and DTMF signal types.

- **PCI slave interface:**

The VP-8LVCT board is designed to reside in a single PCI bus slot. Each board contains a 5-volt PCI bus interface compliant with PCI specification version 2.1. The PCI interface is a 33 MHz, 32-bit target device.

- **Analog-to-digital and digital-to-analog conversion:**

The board employs programmable subscriber line interface chip to convert the analog to and from the digital signal in A-law or u-law voice coding.

- **DSP processing unit:**

Each board has a high-performance digital signal processor (DSP) that provides resources for 8 lines of call processing and programmable voice processing. It supports one or more tasks including voice recording/playback, DTMF detection/generation, automatic gain control and call progress analysis.

- **Dual port memory:**

A 256 KB dual port memory in each board allows it to be accessed by the PC master and the DSP simultaneously. The memory is designed as a bridge between the PC system and voice processing board, which reduces interruptions to the PC system.

- **H.100 bus connectivity:**

The VP-8LVCT board fully supports the H.100 bus specification. The H.100 bus allows boards to share data and signaling information with other boards on the same H.100 bus. For example, you can connect two or more VP-8LVCT boards for applications that perform data switching. You can also use H.100 compatible products from other manufacturers with the VP-8LVCT board. The H.100 bus interface supports 32 streams at 8 MHz each, which provides 128 timeslots each for a total of 4096 timeslots.

- **DSP firmware:**

This is a downloadable binary file that can be loaded by the device driver. It's easy to upgrade without any hardware modification.

- **Device driver:**

The device driver is fully compliant with Microsoft NT / 2000 kernel driver architecture and the voice processing is compliant to the sound card device driver.

- **API library:**

The API library provides both native API and TAPI architecture.

- **Tool programs:**

These utility programs simplify online signal definition and testing.

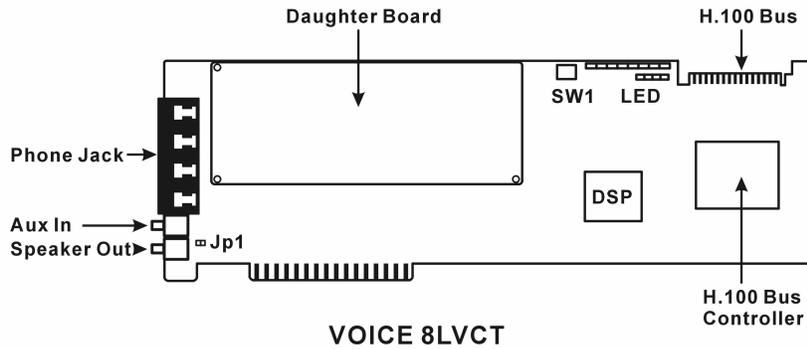
1.3 Applications

The following are all applications that are compatible with the VP-8LVCT board:

- Interactive Voice Response (IVR)
- Automatic Call Distribution (ACD)
- Unified Messaging System (UMS)
- TAPI Compliant Applications
- VoIP Applications

Chapter 2 Hardware Installation

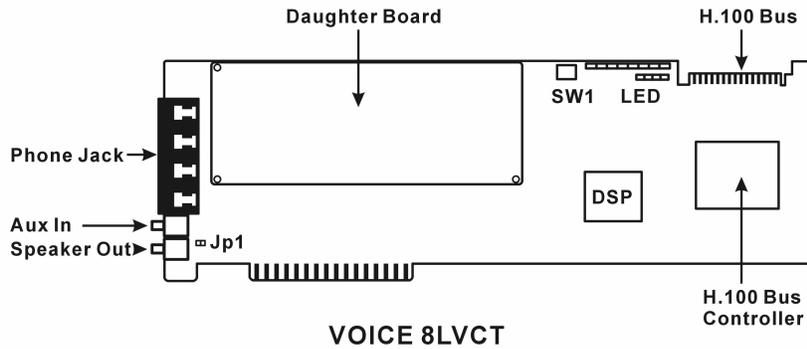
2.1 Board Features



Installing the VP-8LVCT board has three main points of interest:

- The setting of the board number using the SW1 rotary switch.
- The setting of the JP1 Speaker Out Jumper to either the open or closed position.
- Insertion of the board into one of the PCI bus slots in your PC.

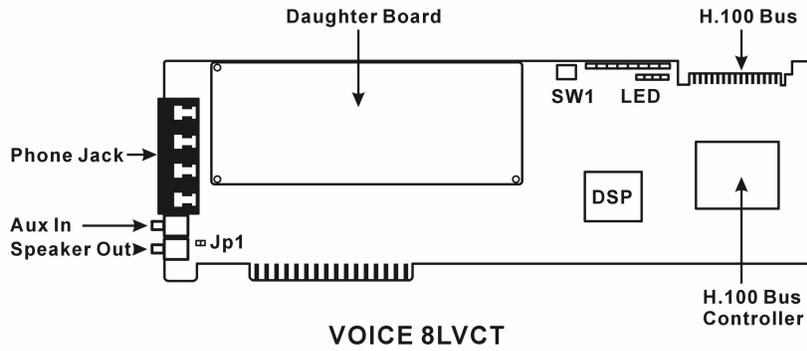
2.2 Setting the Board Number



The **SW1 Rotary Switch** (circled in the picture above) is the device that allows you to assign the VP-8LVCT board a number.

- "0" is the default setting, and should be the number for the first board.
- If needed, succeeding board numbers should correspond with succeeding boards. For example:
 - "1" should represent the 2nd board
 - "2" should represent the 3rd board, and so on.
- The letters A - F on the rotary switch represent the board numbers 10 - 15, respectively.
- To set the SW1 rotary switch to a desired board number, simply insert a screwdriver into the switch and turn clockwise. The arrow on the switch acts as an indicator showing which number the board is set to.

2.3 Setting the JP1 Speaker Out Jumper



- The JP1 Speaker Out Jumper default setting is in the closed position, which is required if the board is being connected to a stereo speaker (i.e. a speaker with more than one channel).
- If the board is being connected to a mono-speaker (i.e. a speaker with only one channel), then the Speaker Out Jumper should be set to the open position.

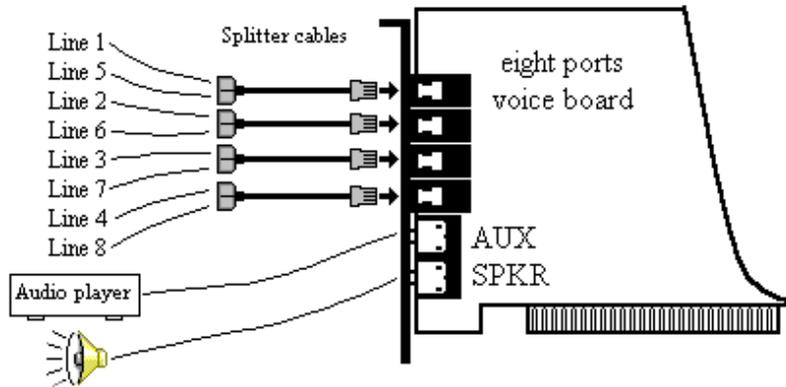
2.4 Installing the Board

- The VP-8LVCT board needs a plug-and-play (i.e. no jumper, no switch needed) PCI bus expansion slot.
NOTE: normal PCs will have 3 to 5 PCI slots. More specialized or industrial computers will have more.

- Industrial PCs may hold up to 16 cards.
- It is recommended that you use a PC that is 586 or better:
- Shut down the PC and disconnect the power supply.
- Open the cover for the main unit.
- Find an empty PCI slot and insert the voice card there.

2.5 Telephone Connections

1. The VP-8LVCT board connection to the telephone network and audio devices:

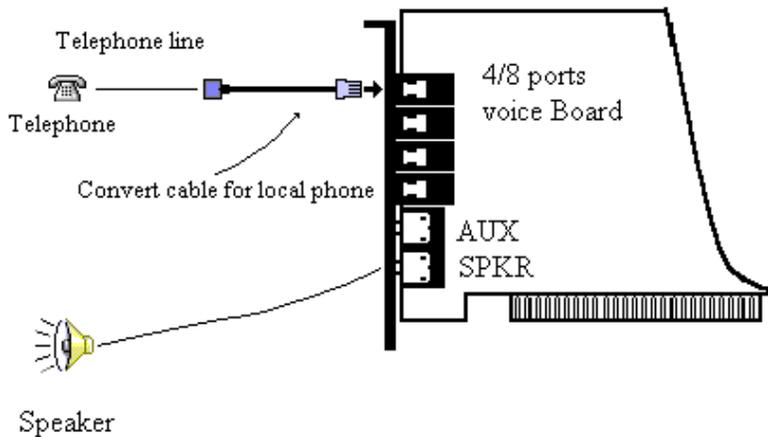


Splitter cables: These cables are used to connect to two telephone lines from a voice board phone jack.

AUX: This is the input connector used to record audio from any audio player (CD, cassette, etc.).

SPKR: This is the output connector used to connect to speakers, either mono or stereo.

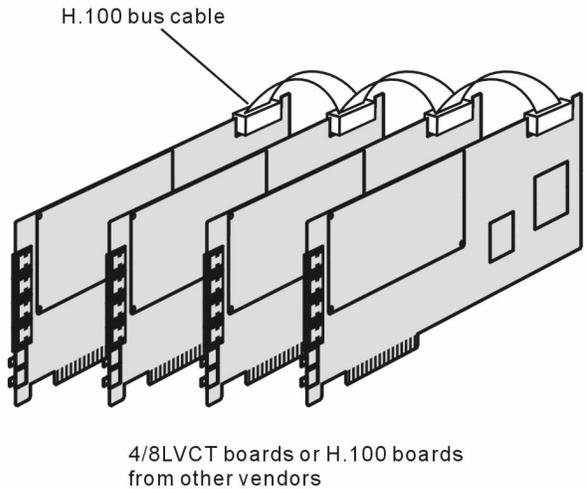
2. Special local phone connection, used specifically for recording purposes:



A telephone or handset can be connected to the first phone jack (RJ-14) through an adaptor cord. This connection makes it possible to record voice by telephone locally instead of calling via a PBX.

2.6 Multiple VP-8LVCT Board Connection Using H.100 bus

- Multiple VP-8LVCT boards, or a single VP-8LVCT board used in conjunction with other H.100 bus boards from other vendors, can both transfer data to and from each other via an H.100 bus cable.
- The following diagram shows the connection of an H.100 bus cable:

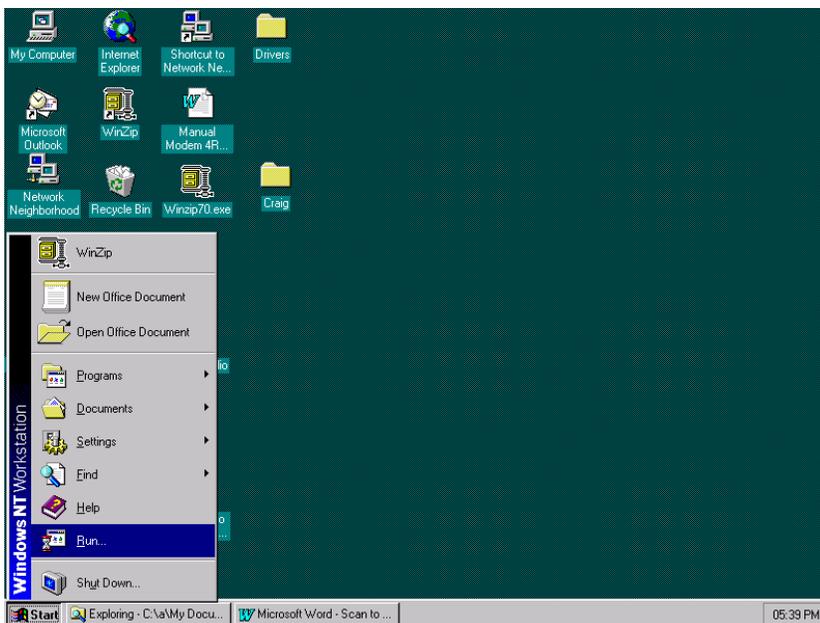


Chapter 3

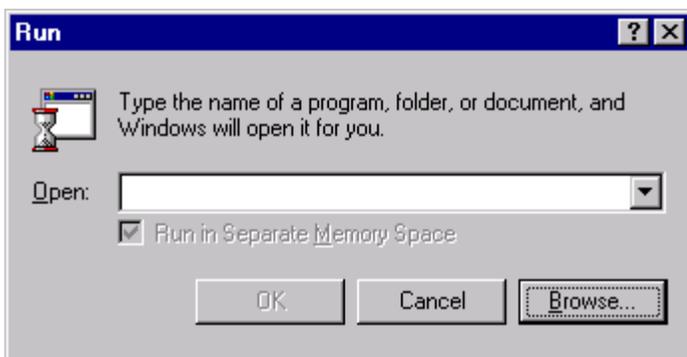
Installing the TAPI Driver

3.1 Getting Started

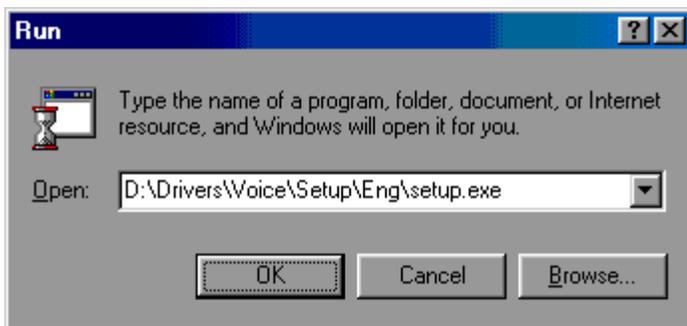
- First, insert the installation CD-ROM into the CD-ROM drive.
- Next, from your desktop click on the  button in the bottom left-hand corner of your desktop screen. Then click on the **Run** command.
- Your desktop screen should look like the image on the next page just before you start the **Run** command:



- When the **Run** window appears, it should look like this:



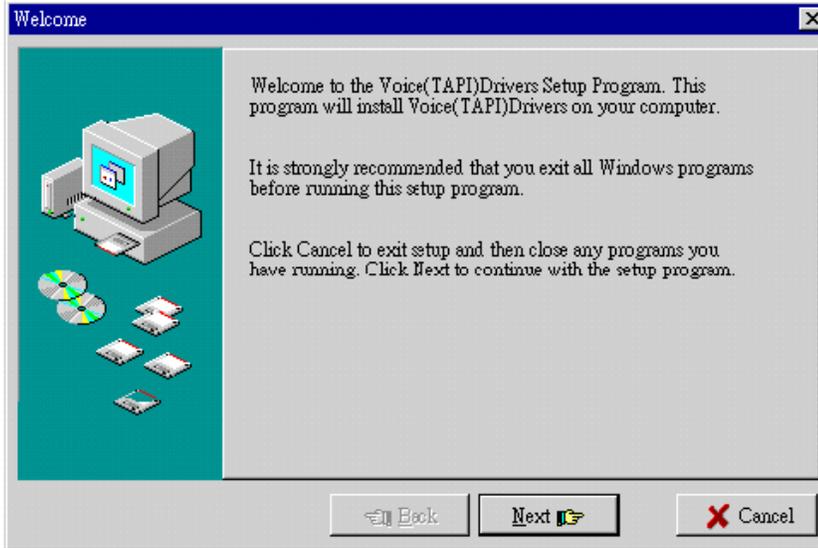
- To find the execution command that installs the TAPI Driver, you need to go to the  button located in the bottom right-hand corner of the window.
- Once the **Browse** drop box appears, you need to find your CD-ROM drive.
(NOTE: In this example, it's the "D:" drive but different computers may vary. To find out where your CD-ROM drive is, please consult your computer owner's manual.)
- Once you get to the CD-ROM drive, you need to go through the following file path:
 - Drivers
 - Voice
 - Setup
 - Eng (for English), or Twn (for traditional Chinese), or Chn (for simplified Chinese).
 - setup.exe
- Once you get to **setup.exe**, click on it once.
- After that, the entire file path should appear in the **Open** field of the **Run** window.
- Your **Run** window should then look like this:



- Once you have the file path like the one in the example above, click on the  button and the TAPI Driver Setup Program will begin.

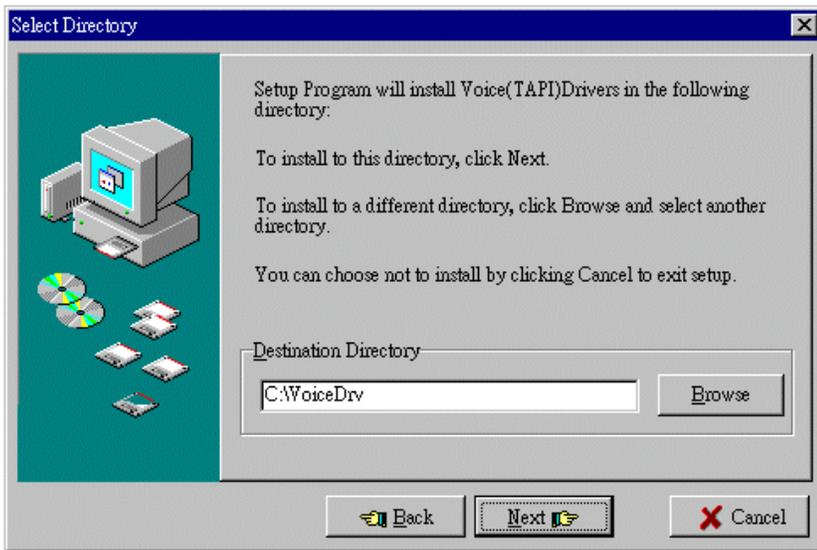
3.2 Welcome Window

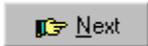
- After executing the Run command, the first window to appear will be the Welcome window.
- The image below illustrates what the Welcome window will look like.



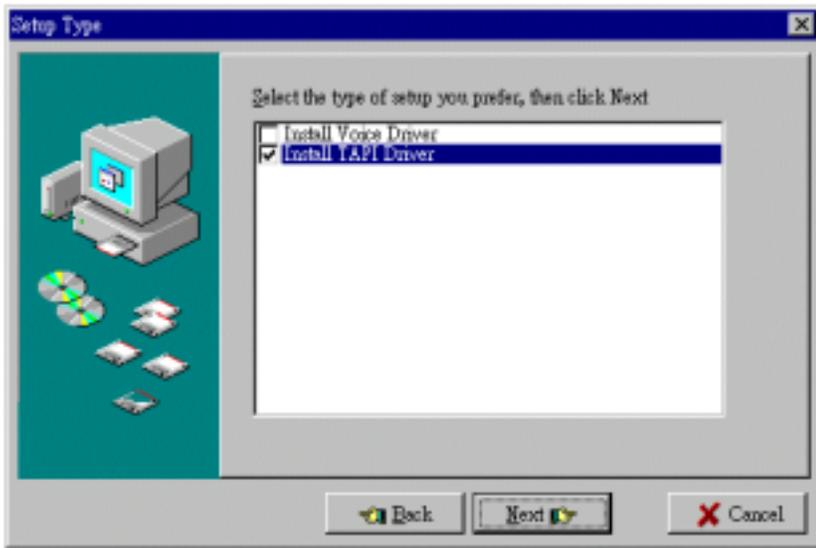
- Simply read the instructions, and click on the  button.

3.3 Selecting a Directory



- The next step is to select a directory. Here, in the **Destination Directory** field, the default directory has been set as "**C:\VoiceDrv**".
- If this is the directory you want to be installed, then just click on the  button.
- If you would like to select another directory, type it in or click on the **Browse** button to find it. After you have selected it, click on the  button to continue.

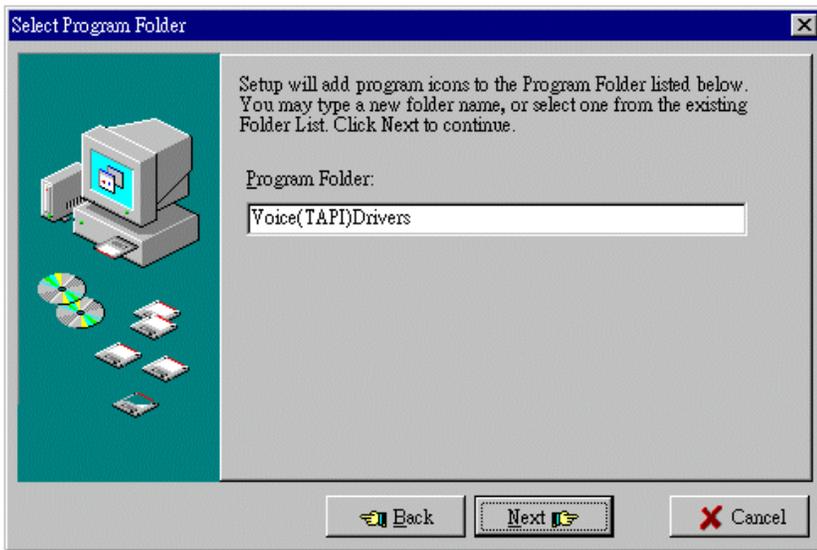
3.4 Selecting the Setup Type



- Next, the Setup Type window will appear. Here, you need to choose the TAPI Driver as your setup.
- In the selection field, move down to the second option, "**Install TAPI Driver**", select it, and then click on the  button.

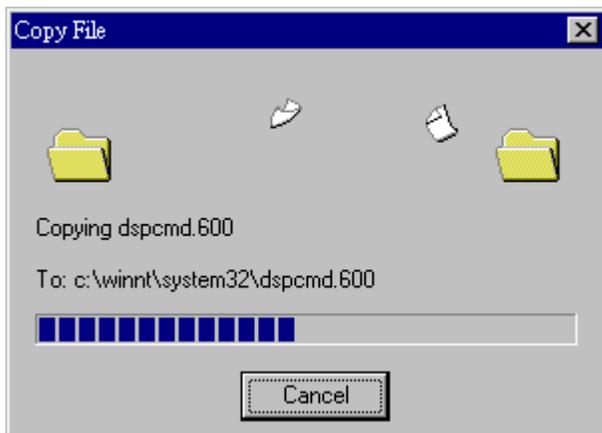
NOTE: Make sure **NOT** to select the first option, "**Install Voice Driver**".

3.5 Selecting a Program Folder



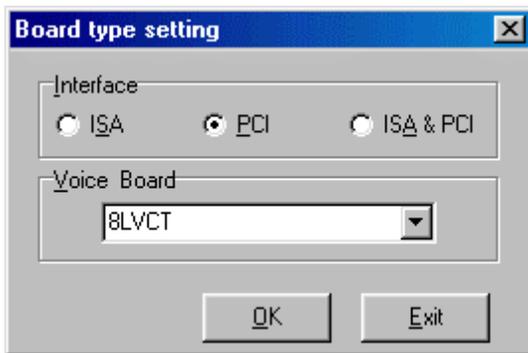
- Now, a Program Folder must be selected. In the **Program Folder** field, “**Voice (TAPI) Drivers**” has been set as the default Program Folder.
- If the default Program Folder is the one you want, then click on the  button.
- If you would like to select another Program Folder, you may type it in or choose one from the existing folder list. When you are finished, click on the  button to continue.

3.6 File Copying



- Now all related files will be copied from the CD-ROM to your computer.

3.7 Setting the Board Type



- After all of the files have been copied, the board type must be set.
- In the **Interface** set of options, choose **PCI**.
- In the **Voice Board** field, "**8LVCT/4LVCT**" should appear as soon as you choose PCI as your Interface.
- When these two settings have been finished, move down to the **OK** button and click.
- After this, the actual installation of the VP-8LVCT will begin.

3.8 Adding TAPI Service Provider

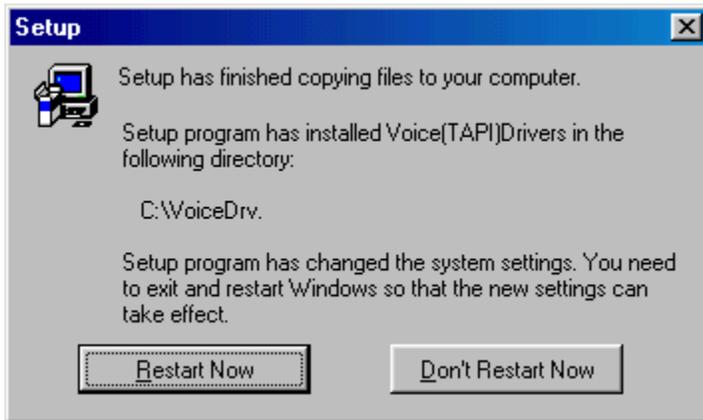
- After the TAPI Driver has been installed, the Adding Service Provider will display the following message:



- This window, as you can see, simply tells you that the TAPI Driver installation is complete. From here, click on the  button to move onto the final window.

3.9 Restarting the Computer

- After the VP-8LVCT installation is finished, the Setup window will appear.
- Here, you will be instructed to exit and restart Windows so the new settings may take effect.
- The following image illustrates what the Setup window will look like:



- To restart your computer, simply click on the  button.
- Once the computer has finished restarting, the installation process will be complete.

Chapter 1

TAPI Diagnosis

Once the VP-8LVCT has been installed, we strongly recommend that a quick diagnosis be made to make sure everything is up and running.

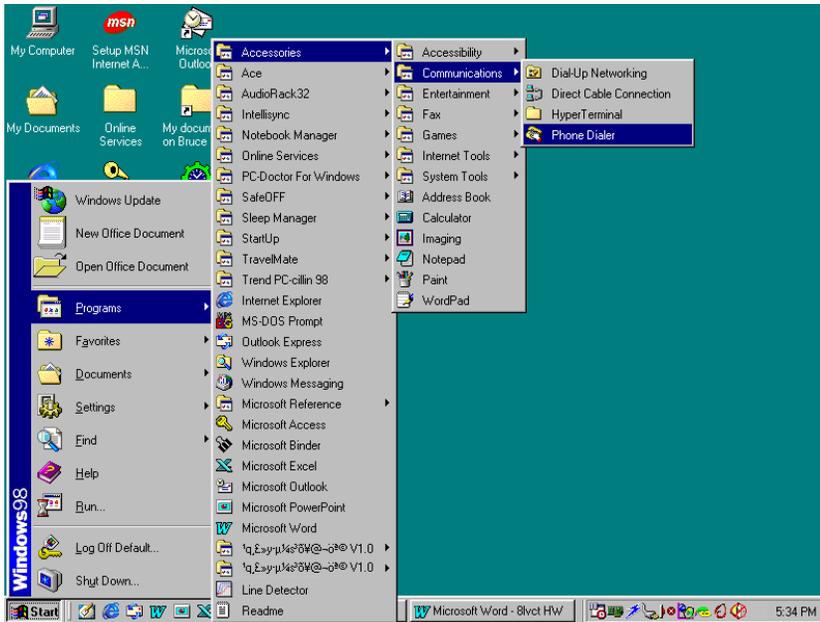
A diagnosis is a simple but important way to ensure that the VP-8LVCT has been properly installed and is in working order. There are two ways to do perform a diagnosis:

- Using the **Phone Dialer** window.
- Using the **Line Detector** window.

NOTE: It is NOT necessary to run BOTH tests. These are simply two different ways to perform the same task. They are equally effective, thus neither one is better than the other. Both are listed simply for your convenience. You may choose which method is more suitable for you.

4.1 Finding the Phone Dialer Directly

One way to access the Phone Dialer window is to start from your desktop screen. Simply go to:
Start-> Programs-> Accessories-> Communications -> Phone Dialer (as shown below)

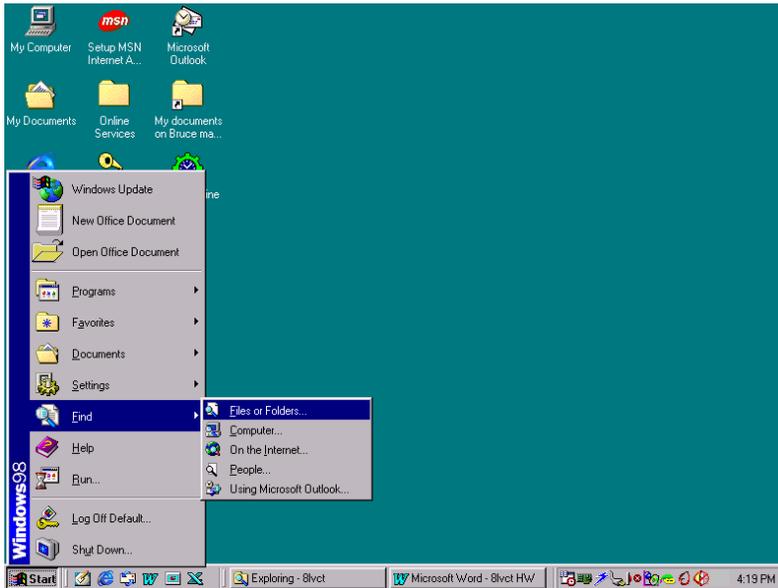


- After finding the **Phone Dialer** icon, simply click on it once and the following window will appear:

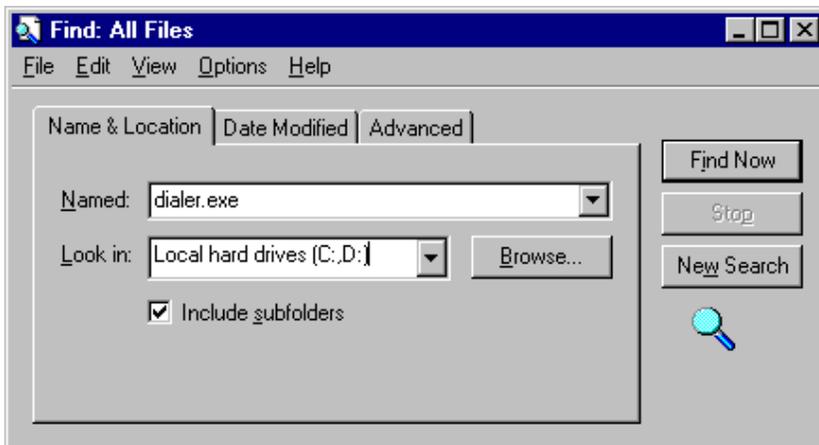


4.2 Using the Find Function

- Using the **Find** function is the second way to get to the Phone Dialer.
- From your desktop screen, go to: **Start -> Find -> Files or Folders**.
- The following image illustrates how your screen should look at this point:

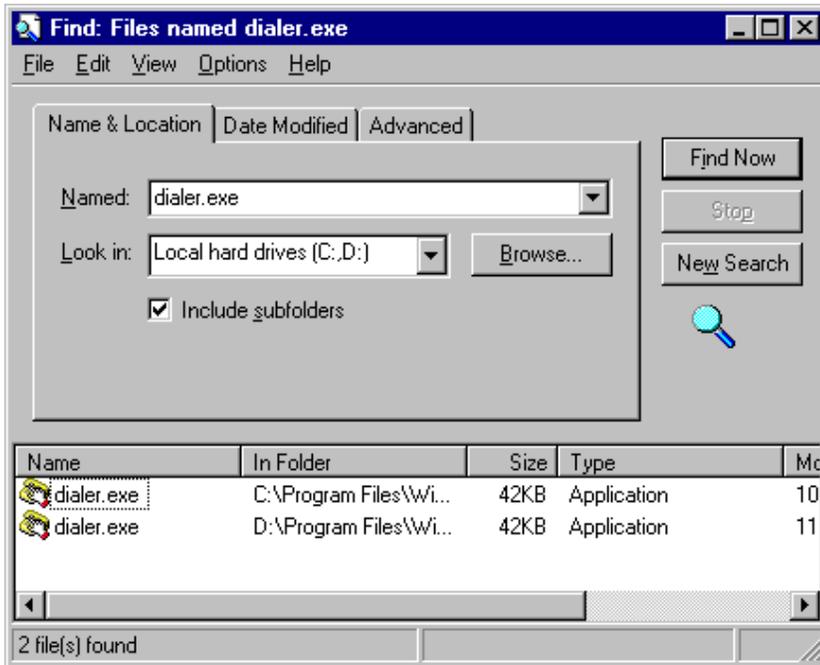


- When you find the **Files or Folders** icon, simply click on it once.
- Now, this window should appear:



- When the window appears, the cursor will already be in the **Named** field and type in "**dialer.exe**".
- Next, move down to the **Look in** field and click on the drop box. Choose your hard drive.

- If you have two hard drives, like in the previous example, move down to the **Local Hard Drives** option, which covers both the **C:** and **D:** drives, and click on it.
- Click on the **Find Now** button. The results of the search will be listed at the bottom of the window, as in the image below:



- When the search is finished, at least one **Phone Dialer** or **Dialer** program should appear in the search results field.

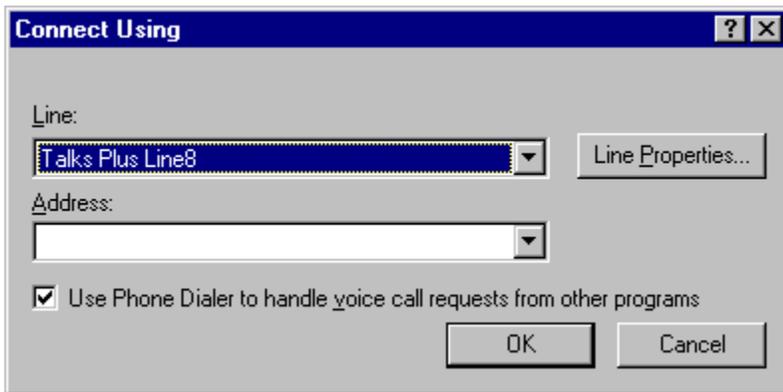
NOTE: In the previous image, note that two Phone Dialers appear, one from each hard drive. They are exactly the same, so if this happens, you may choose either one.

- Click on one of the Phone Dialer icons once, and the Phone Dialer window will then appear.

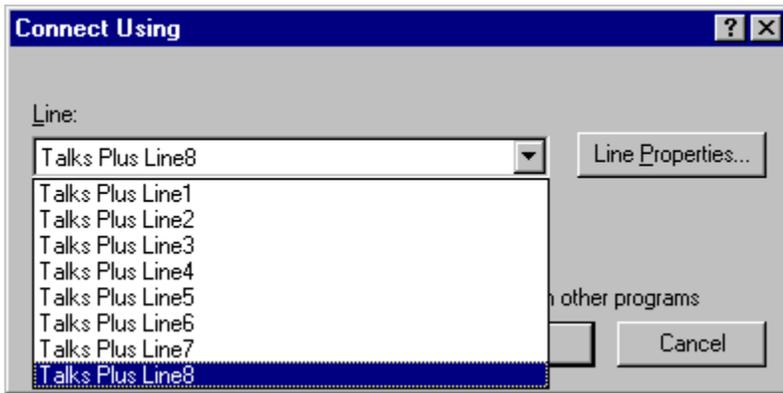
4.3 Phone Dialer Diagnosis



- The first step in Phone Dialer diagnosis is to connect the dialer with a channel, or telephone line.
- To do this, go to the **Tools** menu located at the top of the window. When the drop-box appears, move down to the **Connect Using** option and click on it:



- In the **Line** section at the top, click on the drop-box to choose which channel you would like the Phone Dialer to be connected to:



- After choosing the line you would like to use for your diagnosis, click on the **OK** button.

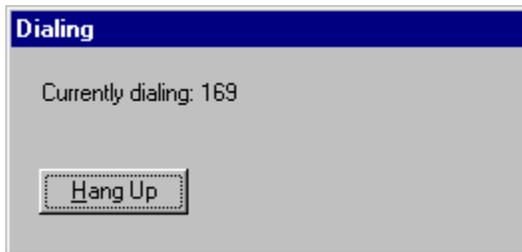
NOTE: If you are not sure which channel is connected to which telephone line, please refer to **Section 2.5 Telephone Connections** of this manual.

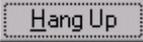


- The Phone Dialer is now ready to test the VP-8LVCT.
- In the **Number to dial** field, enter in the telephone number of the telephone line that you just selected.

NOTE: In the previous example, an extension number has been entered. If you choose a channel that is connected to an extension number within your PBX, then you should dial that extension number. If you choose a channel that is connected to a regular phone line, then you should dial the corresponding phone number.

- After entering the extension number or telephone number, click on the  button.
- Now, the **Dialing** window will appear:



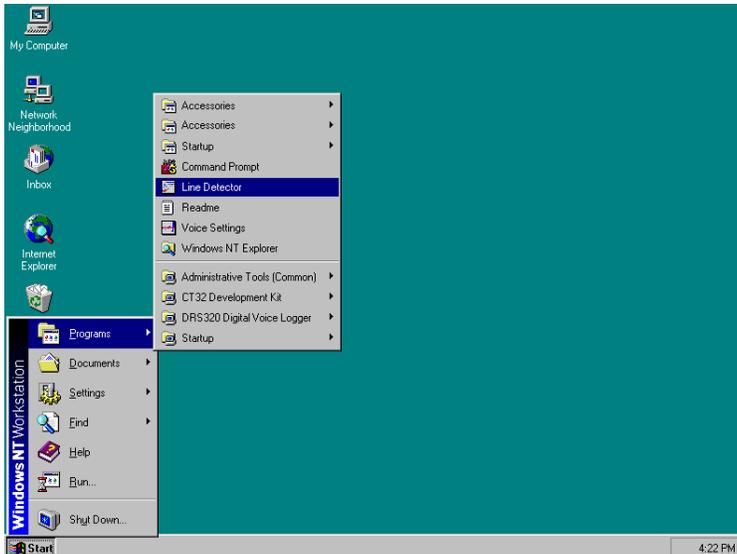
- The phone to which you dialed should now start ringing. This means that the VP-8LVCT is up and running.
- The diagnosis is now complete. To exit, press the  button.
- It is recommended that you test all lines connected to the VP-8LVCT. In order to test the other lines, simply return to the **Connect Using** window, select another line you want to test, and repeat the rest of the procedure until all channels have been tested.

4.4 Line Detector Diagnosis

- To get to the Line Detector window from your desktop, follow the path: **Start -> Programs -> Line Detector**.
- When you find the Line Detector icon, simply click on it to open it.

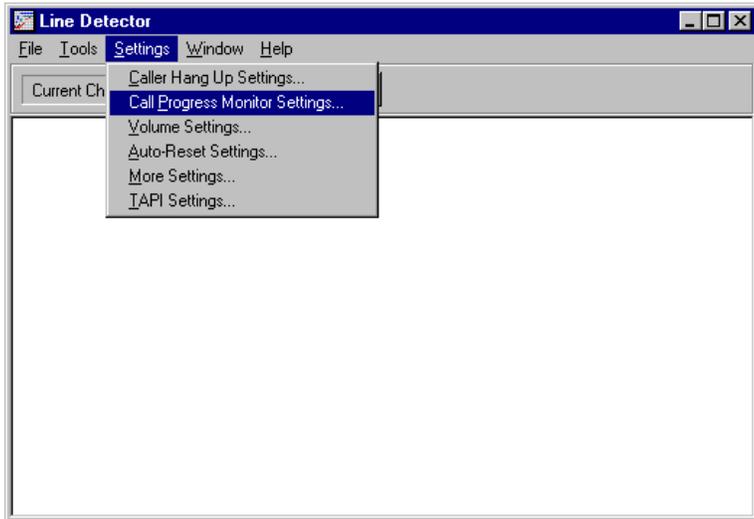
NOTE: You may also use the **Find** function to locate the Line Detector window. It is the same procedure as for the Phone Dialer. Please refer to **Section 4.2 Using the Find Function** for more details.

- The following image is what your desktop might look like when you find the Line Detector:

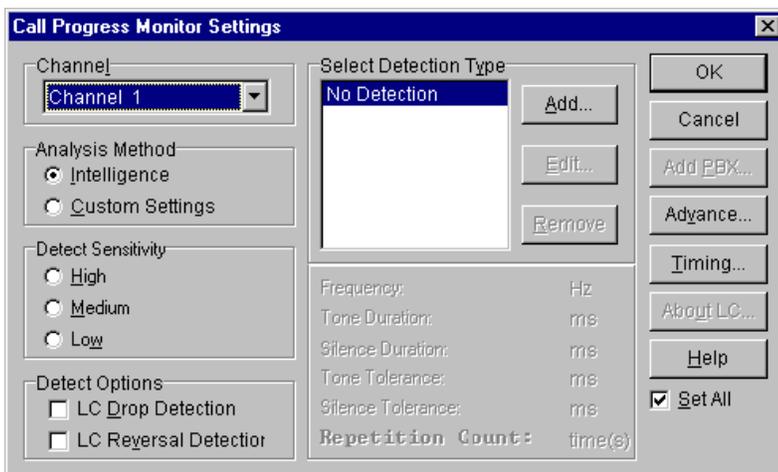


4.5 Call Progress Monitor Settings

- In the **Line Detector** window, go to the **Settings** menu on the menu bar.
- When the drop box appears, move down to the **Call Progress Monitor Settings** option and click on it.
- Here is where to find the Call Progress Monitor Settings window:



- Now, the following window should appear:

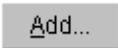


- First, go to the **Channel** section in the upper-left corner of the window (circled in the previous image), and select which channel you want to test. If you're not sure which channel is connected to which line, please refer to **Section 2.5 Telephone Connections** of this manual.
- Next, you need to go to the **Analysis Method** section, located just below the Channel section (also circled in the previous image). Here you have two choices - **Intelligence** and **Custom Settings**:

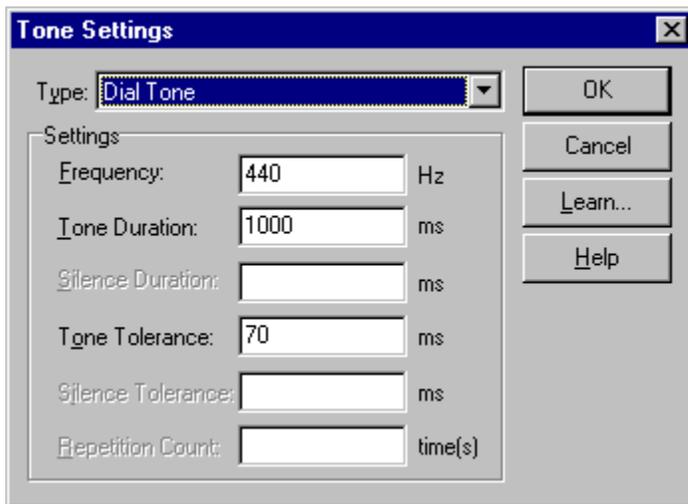
- **INTELLIGENCE:**

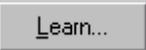
This is the fastest method. It will automatically configure the Call Progress Monitor. After choosing Intelligence, go back to the  button on the right and click on it. You will then be finished and you can move on to **Section 4.6 Tone Test**.

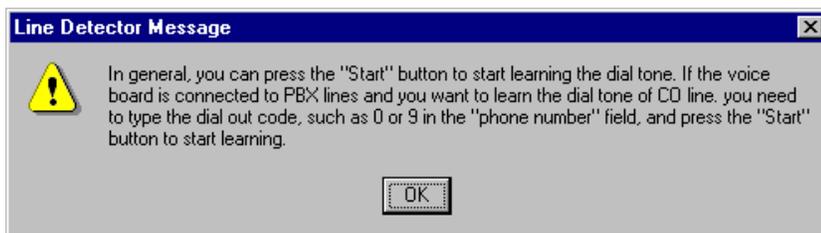
- **CUSTOM SETTINGS:**

If, however, you choose Intelligence and the Tone Test fails (because of an irregular tone waveform, for example), you then need to return to this window and choose Custom Settings. After choosing Custom Settings, move over to the **Select Detection Type** section and click on the  button.

- The **Tone Settings** window will then appear:



- Here, go to the  button and click on it.



- When the **Line Detector Message** window appears, read the message and click on the  button.

- The **Input Calling Phone** window will now appear:



- In the **Phone Number** field, make sure you enter the number that is connected to the channel you selected in the **Channel** section of the **Call Progress Monitor Settings** window.
- Next, move down below the Phone Number field to the **Dial Out Options** section. There, the **Number of tone cadence to test** field is defaulted at **5 rings**. This represents the number of times the phone will ring to allow the VP-8LVCT board to learn the tone configurations. If you would like to change this number, simply move to the field and change the number. Below that field, are two options: **Blind Dialing** and **Pulse Dialing**.

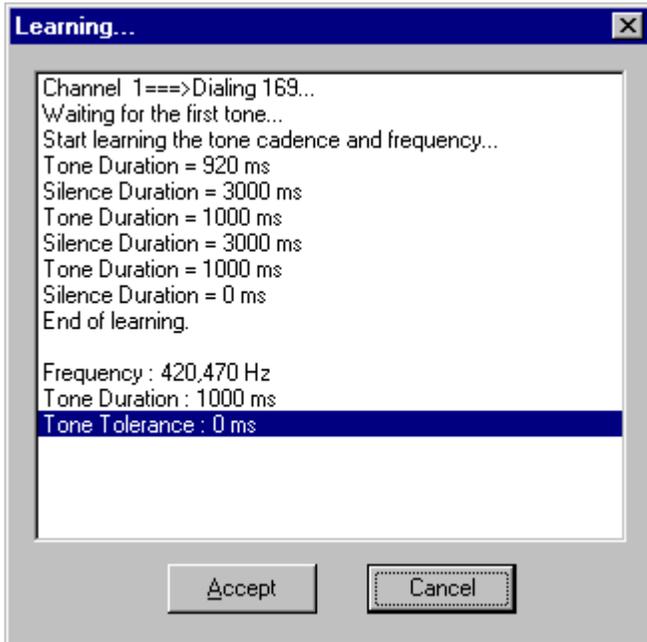
- **Blind Dialing** means that the VP-8LVCT will dial the number you entered immediately, without waiting for a dial tone.

- **Pulse Dialing** means that the VP-8LVCT will wait for a dial tone first, and then dial the number you entered.

NOTE: These two options are not very important. Blind dialing is the default because it is slightly faster, and thus is the recommended option in most cases.

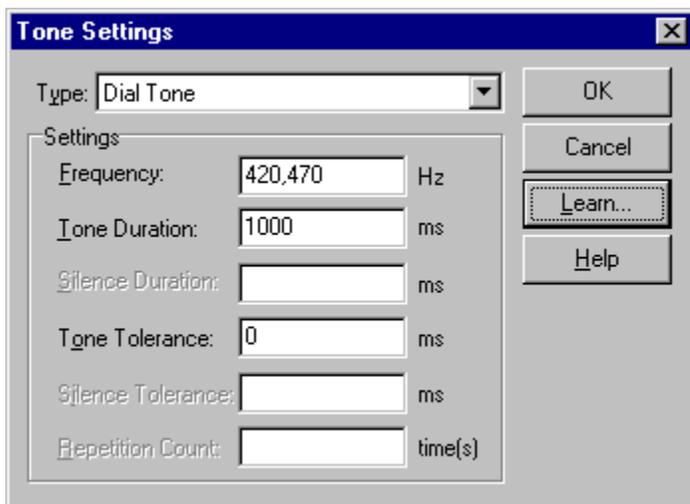
- Once you have configured everything, click on the  button.

- Now the **Learning** window will appear, and the phone number or extension number you entered in earlier will begin to be dialed:



- The telephone to which you have dialed should now start ringing. As it's ringing, the VP-8LVCT is learning the PBX configurations being displayed in the Learning window (i.e. the tone cadence and frequency).
- After the telephone has rung five times (or whatever you set the number of rings to), the VP-8LVCT has finished learning the PBX configurations and are ready to accept them.
- To accept the configurations, click on the  button.
- Accepting the tone cadence and frequency will automatically close the Learning window.

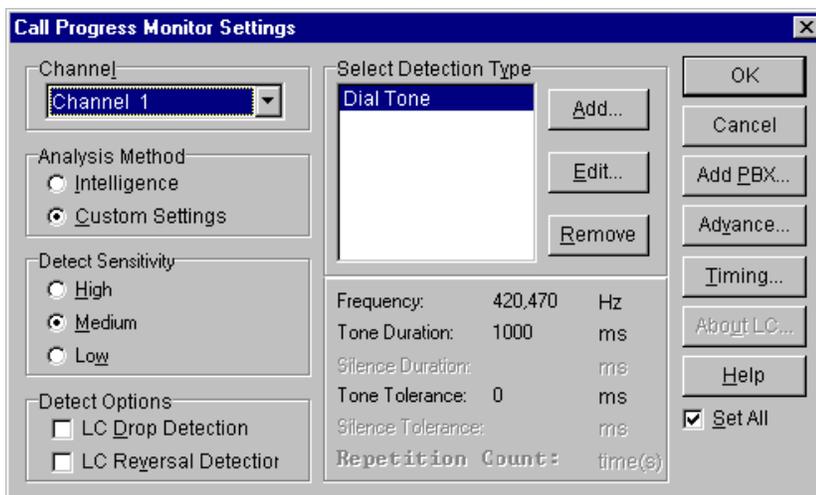
- Now, the Tone Settings window will re-appear:



- In the Tone Settings window, the new Frequency, Tone Duration, and Tone Tolerance configurations will automatically be recorded in the Settings section.

- Double-check to make sure the configurations are correct, then click **OK** to exit this window.

- Next, the Call Progress Monitor Settings window will re-appear:

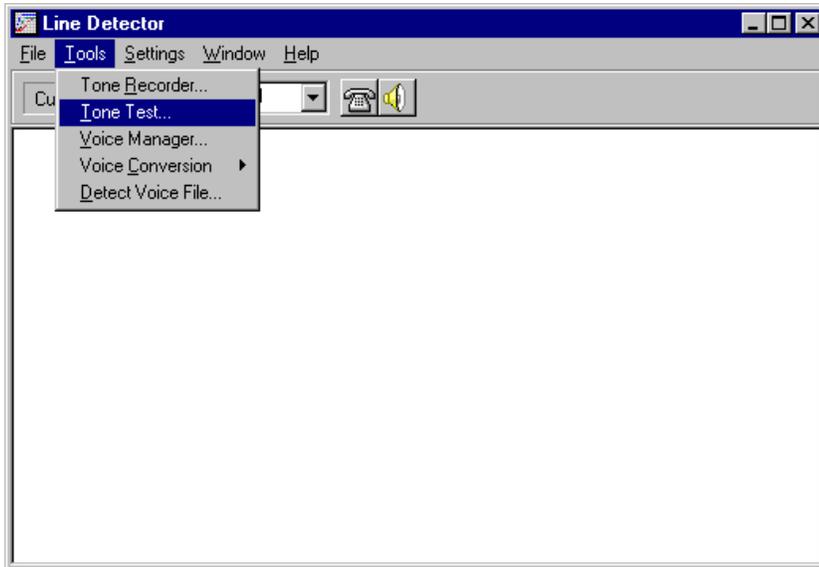


- Click on the **OK** button.

- The Custom Settings for this channel have now been learned, and this part of the diagnosis is complete. It is time to move on to the Tone Tests.

4.6 Tone Tests

- The next place to go to in the Line Detector window is the **Tone Test**, located in the **Tools** menu on the menu bar at the top of the window:

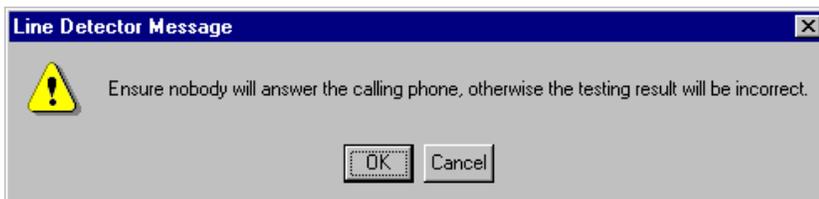


- When the drop box appears, go down to the **Tone Test** option and click on it.
- In the Tone Test window, there are four types of tests to be conducted listed in the **Testing Types** section:
 1. **No Answer**
 2. **Line Connect**
 3. **Line Busy**
 4. **Caller Hang Up**

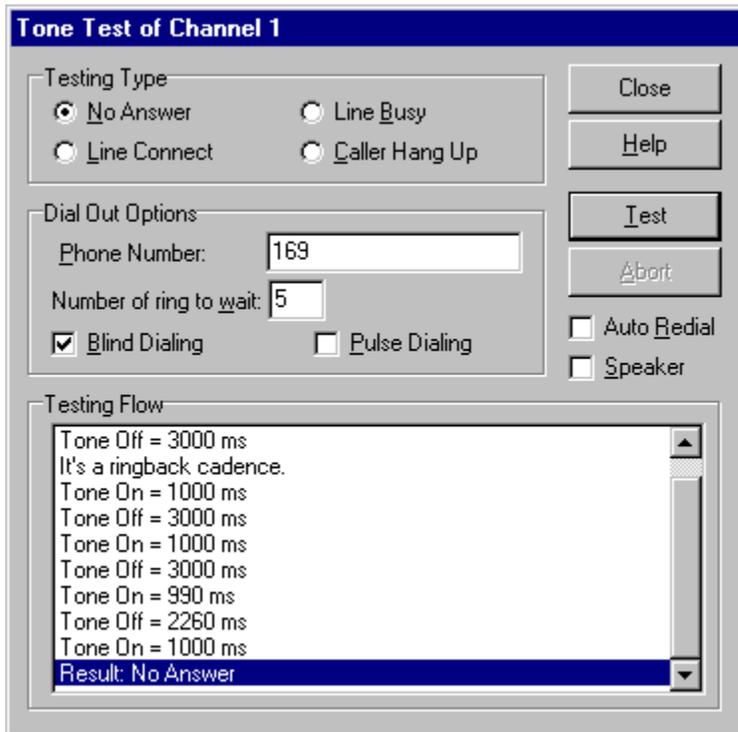
NOTE: It is strongly recommended that all four tones be tested.

1. NO ANSWER:

- Go to the No Answer option in the Testing Type section and click on it.
- In the **Dial Out Options** section, enter a phone number or extension number in the **Phone Number** field.
- Next, click on the button and the following window will appear:



- Simply read the instructions, which tell you to make sure NOT to answer the phone to which you are dialing, and then click on the  button. The No Answer cadence will then be tested. Again, when the phone rings, please be sure NOT to answer it.
- The following image illustrates what the Channel 1 Tone Test window should like when the No Answer test is finished:



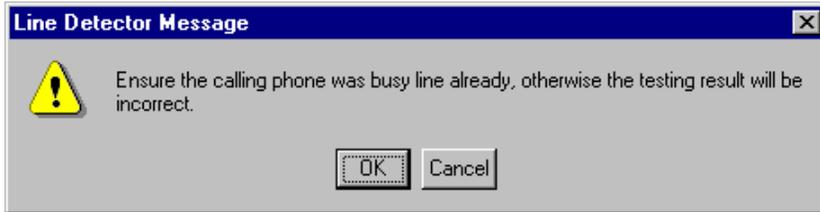
- When the test is finished, go back up to the Testing Type section, choose the next cadence to test.

2. LINE CONNECT:

- For this test, please take notice of the **Number of ring to wait** option in the **Dial Out Options** section.
- Before you conduct this test, make sure you are dialing to a telephone that you or someone else will be able to answer within the number of rings you have specified (or the number of the default setting - 5 rings).
- After selecting the Line Connect option in the Testing Type section, move your mouse over to the  button and click on it.
- After the phone has been answered, the Line Connect test will be complete.

3. LINE BUSY:

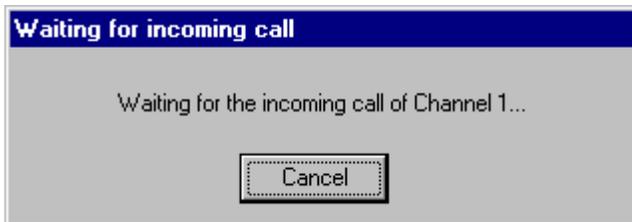
- Here, make sure that the phone you are dialing to is off the hook first, so that the busy signal cadence is tested.
- After you click on the Line Busy option in the Testing Type section, and then on the  button, the following window will appear:



- Read the message, follow the instructions, and click on the  button.
- Once the busy signal cadence is allowed to run for a few seconds, the test is complete.

4. CALLER HANG UP:

- Have another telephone ready to call the telephone with the number you are testing. Also make sure that the other telephone will be dialing to the correct channel.
- Next, choose the Caller Hang Up option in the Testing Type field, then click on the  button. The following window will appear:



- Now have the other phone dial the number you are testing, let it ring two or three times, and then hang up.
- Once you have tested all four cadences successfully, the TAPI diagnosis is complete.

Appendix A

Technical Specifications

General

- Number of ports: eight
- Max. boards per system: 16
- Digital signal processor: TI TMS 320VC5402 @ 100 MHz
- Resource sharing bus: Ctbody

Host Interface

- Electrical: Rev.2.1 of PCI bus specification
- Bus speed: 33 MHz maximum
- Shared memory: 256 Kbytes dual port static memory
- Address and interrupts automatically configured by PCI BIOS

Telephone Interface

- Line interface: Loop start
- Connectors: Four RJ-45 jacks
- Return loss: 20dB min (300 to 3300Hz at 600 Ohms impedance)
- Caller ID: International Caller ID capability via on-hook audio path

Audio Signal and Interface

- Audio I/O jack: 3.5mm audio in/out jack
- Automatic gain control (AGC)
- Silence detection: programmable (nominal -44 dBm)
- Call progress monitoring: standard and custom frequency based

Audio Encoding

- Encoding algorithms: ADPCM, u-law PCM, .WAV
- Sample rate: 8 kHz sampling
- ADPCM 32kbps @ 8 kHz
- 64 kbps u-law per ITU-T G.711

DTMF Tone Detection

- DTMF digits: 0 to 9, *, #, ABCD
- Dynamic range: -36 dBm to 0 dBm per tone
- Tone duration: 40 ms (minimum)
- Acceptable twist: 10 dB

Pulse Dialing

- 10 digits: 0 to 9
- Pulsing rate: 10 pulse/sec (nominal)
- Make/break ratio: Network compatible (configurable by country); 40 / 60 nominal

Bundling Drivers and Software

- Bundles with TAPI and wave drivers for Windows NT / 98
- Optional CT32 voice and fax development kit for Windows NT / 98

Software Compatibility

- Microsoft TAPI and wave driver compliant applications
- 3rd party applications based on WCT32 voice and fax development kit

Power Requirements

- +5 V @1.0A
- +12 V @200mA
- -12V @200mA

Size

- 312mm (L) x 107mm (H), 12.283" (L) x 4.2" (W)

Certification

- Telephone network: FCC Part 68
- EMI: FCC Part 15, Class B

Environment

- Operating temperature: 0° to 50°C (32°to 122°F)
- Storage temperature: -20° to 65°C (4° to 149°F)
- Humidity: 10 to 80%, non-condensing