Continuous Speech Processing for Linux and Windows

Demo Guide

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About This Publication

The following topics provide information about this publication:

- Purpose
- Intended Audience
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Purpose

This publication provides information on the Continuous Speech Processing (CSP) demonstration program and tells you how to run the program.

Intended Audience

This publication is written for the following audience:

- Distributors
- System Integrators
- Toolkit Developers
- Independent Software Vendors (ISVs)
- Value Added Resellers (VARs)
- Original Equipment Manufacturers (OEMs)

How to Use This Publication

Refer to this publication after you have installed the hardware and the system software which includes the CSP software.

This publication assumes that you are familiar with the Linux or Windows operating system and the C programming language.

The information in this guide is organized as follows:

- Chapter 1, “Demo Description” provides a brief overview of the CSP demo.
- Chapter 2, “System Requirements” discusses the hardware and software required to run the demo.
- Chapter 3, “Preparing to Run the Demo” lists the procedures you must follow before running the demo.

- Chapter 4, “Running the Demo” describes the steps to run the demo, the demo options, the various demo modes of operation, and how to stop the demo.
- Chapter 5, “Demo Details” provides additional information about the demo, such as the files used by the demo and the differences between various versions of the demo.

Related Information

Refer to the following documents and Web site for more information on developing your application:

- *Continuous Speech Processing API Programming Guide*
- *Continuous Speech Processing API Library Reference*
- *System Release Guide*
- *System Release Update* (available on the Dialogic Technical Support Web site only)
- *Voice Software Reference,* which includes the *Voice Features Guide, Standard Runtime Library Programmer’s Guide* and *Voice Programmer’s Guide*
- *Compatibility Guide for the Dialogic R4 API on DM3 Products*
- *SCbus Routing Function Reference*
- *GlobalCall™ API Software Reference*
- *ISDN Software Reference*
- *DM3 Configuration File Reference*
- *http://support.dialogic.com*

Demo Description 1

This chapter provides a brief description of the Continuous Speech Processing demonstration program.

The Continuous Speech Processing (CSP) demo is a single-threaded program that illustrates key CSP features such as barge-in, voice activity detection, echo-cancelled recording and echo-cancelled streaming.

There are separate versions of the demo for SpringWare boards (a console version and a version with a graphical user interface) and for DM3 boards (console version only). For information on the names and locations of the demos, see Section 4.1, “Starting the Demo”, on page 4-1.

You can run the demo in three different modes:

- manual mode – a single-channel, interactive demo
- automatic mode – a multi-channel, non-interactive demo
- diagnostic mode – a multi-channel, non-interactive demo

System Requirements 2

The requirements for running the Continuous Speech Processing (CSP) demo are described in the following sections:

2.1 Hardware Requirements

To run the CSP demo, you need at a minimum:

- One CSP-enabled board configured as the first board in the system.

If you run the CSP demo in manual mode (single-channel demo that uses the first channel of the board), you also need one of the following:

- For boards with a digital network interface, a T-1 or an E-1 line connected to your system.
- For boards with an analog interface, an analog line such as a connection to a PBX.

For other system configuration requirements, such as memory requirements, see the Release Guide for this system release.

2.2 Software Requirements

To run the CSP demo, you need the Dialogic system release with Continuous Speech Processing software.

Note: To install the CSP demo software, during the Dialogic system release installation, you must choose the Custom option in the Setup Options dialog box and choose "Continuous Speech Processing" from the Custom window. Other CSP software is installed by default with the Dialogic system release.

For a list of operating system requirements and supported compilers, see the Release Guide for this system release.

Preparing to Run the Demo 3

This chapter provides information on preparations to follow before running the Continuous Speech Processing (CSP) demo.

Before running the CSP demo, take care to follow these procedures:

1. Start Dialogic System Service for your board using *dlstart* in Linux and the Dialogic Configuration Manager (DCM) in Windows.

2. Run the demo on one type of board at a time. If you have several types of boards in your system (such as analog and digital boards, SpringWare and DM3 boards), you must start Dialogic System Service only on the board for which you are running the demo. In Windows, you must stop Dialogic System Service on all other boards. In Linux, you must remove the boards from your system.

Running the Demo 4

Information on running the Continuous Speech Processing (CSP) demo is provided in the following sections:

4.1 Starting the Demo

There are separate versions of the Continuous Speech Processing (CSP) demo for SpringWare boards (a console version and a version with a graphical user interface) and for DM3 boards (console version only).

For SpringWare boards, the CSP demo names and their default locations are as follows:

- *cspdemo* located in *usr/dialogic/demos/ec_demos/jct/* in Linux, for SpringWare boards only.
- *cspdemo* located in *\program files\dialogic\samples\sp\cspcondemo* in Windows, for SpringWare boards only.
- *cspgui* located in *\program files\dialogic\samples\sp\cspguidemo* in Windows, for SpringWare boards only. Note that this demo has the same functionality as the CSP demo console version for SpringWare boards, but with a graphical user interface based on the Microsoft Foundation Class (MFC).

For DM3 boards, the CSP demo names and their default locations are as follows:

- *cspdemo* located in *usr/dialogic/demos/ec_demos/dm3/* in Linux, for DM3 boards only.
- *cspdemo* located in *\program files\dialogic\samples\sp\cspdemoDM3* in Windows, for DM3 boards only.

Source code for each demo, except for *cspgui*, is provided.

4.1.1 CSP Console Demo

To run the console version of the CSP demo, follow these instructions:

1. Open a command prompt window and go to the directory where the demo is located.

2. At the command prompt, type

   ```
   cspdemo -<option>
   ```

   For help on demo options, type

   ```
   cspdemo -?
   ```

   The demo options are described in Table 4-1, "CSP Demo Options", on page 4-4. If you don't specify an option, default options are assumed.

4.1.2 CSP GUI Demo

Note: The GUI version of the CSP demo is supported on Windows for SpringWare boards only.

To run the GUI version of the CSP demo, follow these instructions:

1. Open a command prompt window and go to the directory where the demo is located.

2. At the command prompt, type

   ```
   cspgui
   ```

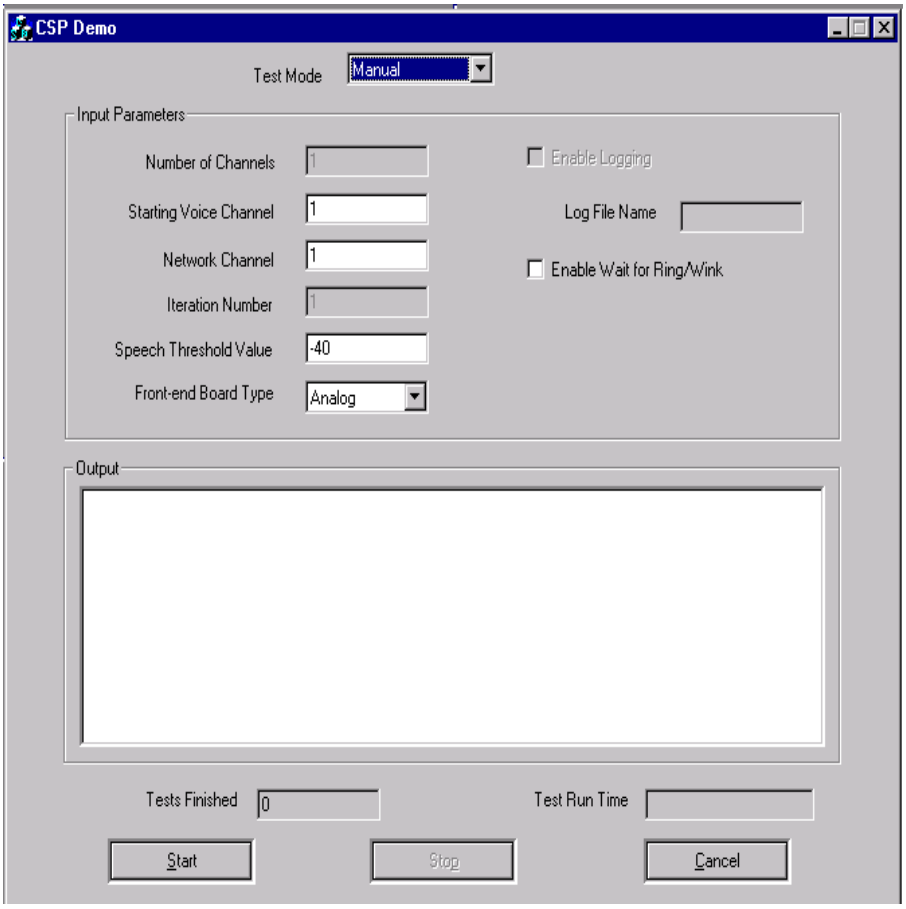
Alternatively, you can run the GUI version of the CSP demo using these instructions:

1. Open Windows Explorer and go to the directory where the demo is located.

2. Double-click on the *cspgui.exe* filename.

After you have invoked the CSP GUI demo, the screen similar to the one shown in Figure 4-1, "CSP Demo Initial Screen -- GUI Version", on page 4-3 is displayed.

Figure 4-1. CSP Demo Initial Screen -- GUI Version



For more information on the Input Parameters on the screen, see Table 4-1, “CSP Demo Options”, on page 4-4. The field names on the screen correspond to these options in the table, where N represents an integer:

- -cN = Number of Channels
- -sN = Starting Voice Channel
- -nN = Network Channel
- -iN = Iteration Number
- -hN = Speech Threshold Value
- -a, -e, -t = Front-end Board Type
- -l = Enable Logging
- -w = Enable Wait for Ring/Wink

4.2 Demo Options

You can choose from several options when running the demo as shown in Table 4-1, "CSP Demo Options", on page 4-4. The format for specifying options at the command prompt is:

```
cspdemo -<option> -<option> (and so on)
```

For example, to run a 10-channel test in automatic mode with 5 iterations and log results in *autotest.log*, type:

```
cspdemo -c10 -i5 -lautotest.log
```

Notes: ***1.*** The order in which you specify demo options is not important.

2. In the table, N represents an integer and ( ) represents an optional value.

Table 4-1. CSP Demo Options

Demo Option	Example	Description/Value
-?	-?	Displays help.
-a	-a	Board with analog front end in use. This value is assumed by default. **Note:** The options -a, -e and -t are mutually exclusive.
-cN	-c2	Specifies number of channels to use which in turn determines the demo mode. • -c1 for **manual mode** (one channel; default mode) • -c2 and higher for **automatic mode** (two or more channels) For automatic mode, enter an even number. In this mode, channels are paired. If you enter an odd number, the demo reduces that number to an even number. For example, if you enter 7, the demo revises that number to 6. **Note:** This value is ignored for the diagnostic mode. See -d option for information on setting diagnostic mode. **Note:** The manual, automatic and diagnostic modes are mutually exclusive.
-d	-d	Enables diagnostic mode. The default value is diagnostic mode disabled. We recommend that you turn on logging (-l) if you specify diagnostic mode to have a written record of the findings. In this mode, the demo tests all parameters available in **ec_setparm( )**, tests all CSP functions and runs a multi-channel test on each CSP-capable board in your system. After the tests are completed, the demo resets all values to their original setting. **Note:** The manual, automatic and diagnostic modes are mutually exclusive. **Note:** When running diagnostic mode on an E-1 board, you must also specify -e option.
-e	-e	E-1 board in use. The protocol used is A and B bits set to 1 for off-hook and 0 for on-hook. Bits C and D are ignored. If -w option is also specified, the demo waits for a wink event, which is determined by the A bit changing state. Without -w, the phone connection occurs immediately. **Note:** The options -a, -e and -t are mutually exclusive.

Table 4-1. CSP Demo Options (Continued)

Demo Option	Example	Description/Value
-hN	-h-30	Specifies the speech threshold value while a prompt is playing. This option allows you to change the value in DXCH_SPEECHPLAYTHRESH, a parameter of **ec_setparm( )**, from the default. The default value is -40 dBm. The range is +3 to -54 dBm. **Note:** You must supply the plus or minus sign with this value. If background noise level is high and triggers the voice activity detector erroneously, you can set the speech threshold to a higher value, such as -20 dBm.
-iN	-i2	Number of iterations. For a simple test, you can specify 1. For a longevity test, you can specify 2 or more. Be aware that specifying a large number can tie up your system for some time. We recommend specifying a smaller number and working upwards. The default value is one iteration. **Note:** This value is ignored for the manual and diagnostic modes.
-l(filename)	-ltest.log	Enables logging of results to a text file in the directory from which you ran the demo. If you don't specify a log name, the default file name is *cspdemo.log*. The default value is logging disabled. **Note:** This option is available for automatic mode and diagnostic mode only. For manual mode, the results are displayed on the screen.
-nN	-n3	Specifies the network interface channel for a T-1 or E-1 board. The default value is 1, that is, the first channel of the first board. This option allows you to route a voice channel on a CSP-enabled board to a network interface channel on a non-CSP-enabled board. **Note:** This option is available for manual mode only.
-sN	-s5	Enables selection of the starting voice channel. The default is that the demo runs on the first channel of the first board. You can use this option to specify any channel of any CSP-enabled board in your system. Be aware of the following usage notes: • If running in automatic mode, specify an odd number for the starting channel (channels are paired). If you enter an even number, the demo reduces it to an odd number. • This option is ignored for the diagnostic mode. • Selecting a channel on an unsupported board results in a demo failure.
-t	-t	T-1 board in use. The protocol used is Ear & Mouth (E&M) where A and B bits are set to 1 for off-hook and 0 for on-hook. Bits C and D are ignored. If -w option is also specified, the demo waits for a wink event, which is determined by the A bit changing state. Without -w, the phone connection occurs immediately. **Note:** The options -a, -e and -t are mutually exclusive.
-w	-w	Enables wait for wink on digital boards and wait for ring on analog boards. If you enable this option, the demo does not start until it receives a wink or ring event. By default, this option is disabled. **Note:** This option is available for manual mode only.

If an option is not specified when running the CSP demo, a default value applies:

- analog front end (-a)
- one channel, manual mode (-c1)
- diagnostics (-d) is disabled
- speech threshold (-h) is -40 dBm
- one iteration (-i1)
- logging (-l) is disabled
- network interface channel is the first channel of the first board (-n1)
- starting voice channel is the first channel of the first board (-s1)
- wait for wink/ring (-w) is disabled

4.3 Using the Demo

You can run the Continuous Speech Processing (CSP) demo in three different modes:

- Manual Mode – a single-channel, interactive demo
- Automatic Mode – a multi-channel, non-interactive demo
- Diagnostic Mode – a multi-channel, non-interactive demo

4.3.1 Manual Mode

To run the CSP demo in manual mode for a T-1 board, type:

```
cspdemo -t
```

To run the CSP demo in manual mode for an E-1 board, type:

```
cspdemo -e
```

To run the CSP demo in manual mode (the default mode) for an analog board, type:

```
cspdemo -a
```
OR
```
cspdemo
```

Since analog board is the default option, you can omit -a from the command line.

The manual mode is a single-channel demo that uses the first channel of the CSP-enabled board configured as the first board in your system. This mode allows you to listen to a prompt and interrupt as the prompt is playing. Messages are displayed on your screen as the demo progresses. This mode illustrates the operation of the **ec_reciottdata( )** function and the **ec_stream( )** function.

On digital boards, the manual mode also shows how to route a CSP resource to another span's network resource.

In the manual mode, the demo runs as follows:

1. After the demo starts, a welcome prompt, *sample.pcm*, is played. It starts with "Welcome …"

2. This part of the demo illustrates the operation of the **ec_reciottdata( )** function. As the prompt is playing, you can interrupt the prompt or barge-in through the T-1, E-1 or analog line.

   As soon as you speak, the prompt stops playing and echo-cancelled recording begins. TDX_BARGEIN and TEC_VAD events are generated. The demo records your message for 6 seconds and stores the message in *ec_reciott.pcm*. At the end of this time, the TEC_STREAM event is generated to indicate termination of recording.

   The demo then plays back the echo-cancelled recording of your message.

   Note that if the prompt completes without any barge-in, the TDX_PLAY is generated.

3. The welcome prompt is played again. This part of the demo illustrates the operation of the **ec_stream( )** function.

   As the prompt is playing, you can interrupt or barge-in through the T-1, E-1 or analog line.

   As soon as you speak, the prompt stops playing and the echo-cancelled recording begins. The TDX_BARGEIN and TEC_VAD events are generated. Your echo-cancelled speech in the data buffer is streamed to a user-defined callback function. A message is displayed on your screen stating that the data buffer has been received. The TEC_STREAM event is generated to indicate termination of streaming.

   The demo then plays back the echo-cancelled recording of your message.

4. The demo is completed.

4.3.2 Automatic Mode

To run the CSP demo in automatic mode, type:

```
cspdemo -c<no. of channels> -i<no. of iterations> -l<log name>
```

For example, to run a 12-channel test (one iteration is the default) and log the results in *autotest.log* file, type:

```
cspdemo -c12 -lautotest.log
```

The automatic mode is a multi-channel demo that uses the number of CSP channels specified by you in the command line. Channels are paired, with one channel playing a prompt (also called the stimulus channel) while the other partner channel simulates a user interrupting the prompt (the channel being tested).

For example, Channel 1 is paired with Channel 2. Channel 2 plays a prompt. Channel 1 waits one second and plays its own prompt to simulate barge-in. Channel 2 detects the barge-in, stops its prompt, and begins recording using **ec_reciottdata( )**. After each iteration, the two partner channels change roles. Event generation and other messages are saved to the log file as the demo progresses.

4.3.3 Diagnostic Mode

To run the CSP demo in diagnostic mode, type:

```
cspdemo -d -l<log name>
```

For example, to run a test and log the results in *dmtest.log* file, type:

```
cspdemo -d -ldmtest.log
```

Note: When running diagnostic mode on an E-1 board, you must also specify -e option.

The diagnostic mode can be used to verify operation of all parameters available through **ec_setparm( )** and all CSP functions. The demo alternatively sets each parameter to the minimum value, maximum value, NULL value and an out-of-range value and returns the appropriate message. The demo also executes a multi-channel test for one iteration on each CSP-capable board. After the demo is completed, the parameters are reset to their original values (see demo source code).

A summary of the results is reported in the log file.

Note: Because diagnostic mode includes a test for invalid parameter values, you will see error messages in the log file. This is expected. For example, you will see a message such as "FAIL: diagnostic test found 16 errors."

4.4 Stopping the Demo

Typically the CSP demo runs the specified number of iterations and stops automatically.

If necessary, you can press **Ctrl-C** at any time to exit the demo. All channels and files are properly closed by the demo.

Demo Details 5

The following sections provide further detail on the Continuous Speech Processing (CSP) demo. You do not need this information to run the demo successfully.

5.1 Files Used by the Demo

Table 5-1 lists the files used by the Continuous Speech Processing (CSP) demo. The directories in which these files are found vary according to the board type and operating system.

For SpringWare boards, the CSP demo names and their default locations are as follows:

- *cspdemo* located in *usr/dialogic/demos/ec_demos/jct/* in Linux, for SpringWare boards only.
- *cspdemo* located in *\program files\dialogic\samples\sp\cspcondemo* in Windows, for SpringWare boards only.
- *cspgui* located in *\program files\dialogic\samples\sp\cspguidemo* in Windows, for SpringWare boards only. Note that this demo has the same functionality as the CSP demo console version for SpringWare boards, but with a graphical user interface based on the Microsoft Foundation Class (MFC).

For DM3 boards, the CSP demo names and their default locations are as follows:

- *cspdemo* located in *usr/dialogic/demos/ec_demos/dm3/* in Linux, for DM3 boards only.
- *cspdemo* located in *\program files\dialogic\samples\sp\cspdemoDM3* in Windows, for DM3 boards only.

Table 5-1. Files Used by the Continuous Speech Processing Demo

File Name	Purpose
CSPdemo.log	Default name of the log file. This ASCII text file logs the results of the CSP demo run. For example, the log lists the test mode, number of channels used, number of iterations, and the activities that occur as the demo progresses.
ec_reciott.pcm	The file generated by the **ec_reciottdata( )** function. Contains a recording of your speech in response to the first prompt when you run the demo in manual mode.
ec_stream.pcm	The file generated by the **ec_stream( )** function. Contains a recording of your speech in response to the second prompt when you run the demo in manual mode.
prompt.pcm	The second welcome prompt used when running the demo in automatic and diagnostic mode. Used by the stimulus channel to simulate a person speaking.

Table 5-1. Files Used by the Continuous Speech Processing Demo

File Name	Purpose
rec_ch*xx*.pcm	The file generated by the **ec_reciottdata( )** function, where *xx* represents the number of the channel being tested. For example, *rec_ch02.pcm* is the file for channel 2 which is being tested. This file contains a recording of speech from the stimulus channel when running the demo in automatic and diagnostic mode.
sample.pcm	The welcome prompt used when the demo begins. Used when running the demo in all modes, manual, automatic, and diagnostic.

5.2 Summary of Differences Among CSP Demos

There are separate versions of the Continuous Speech Processing (CSP) demo for SpringWare boards (a console version and a version with a graphical user interface) and for DM3 boards (console version only). All versions of the demo have the same purpose and produce the same results. However, there are some slight differences among the versions.

The following summarizes the differences between the demo for SpringWare boards and DM3 boards:

- The DM3 demo uses GlobalCall functions in manual mode while the Springware demo does not.
- The DM3 demo uses the DX_MAXSIL termination condition for recording while the Springware demo uses DX_MAXTIME.
- The DM3 demo does not use **digital_sethook( )** for the T-1 and E-1 boards since it uses GlobalCall; however, the Springware demo does use **digital_sethook( )**.
- The DM3 demo does not use wink handler while the Springware demo does.

The following summarizes the differences between the demo on Linux and Windows:

- The functions **dx_fileopen( )**, **dx_fileclose( )**, **dx_write( )** are used in Windows but are not supported in Linux. Linux version uses **open( )**, **close( )**, **write( )**.
- The parameter _O_CREAT is used in Windows, while O_CREAT (without the leading underscore) is used in Linux. The parameter O_BINARY is not used in Linux.
- **Sleep( )** is used in Windows; **sleep( )** in Linux. In Linux, **sleep( )** is in unit of Seconds while in Windows, **Sleep( )** is in units of milliseconds.
- In Linux, define "NULL" to 0 for **dx_open( )**.
- In Linux, **sr_getboardcnt( )** is not supported and not used.
- Wink handle section was rewritten in Linux.
- In Linux, *windows.h* and **Beep( )** are not used. The header file *sys/time.h* is used instead of *time.h*, and *sys/io.h* is used instead of *io.h*.

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