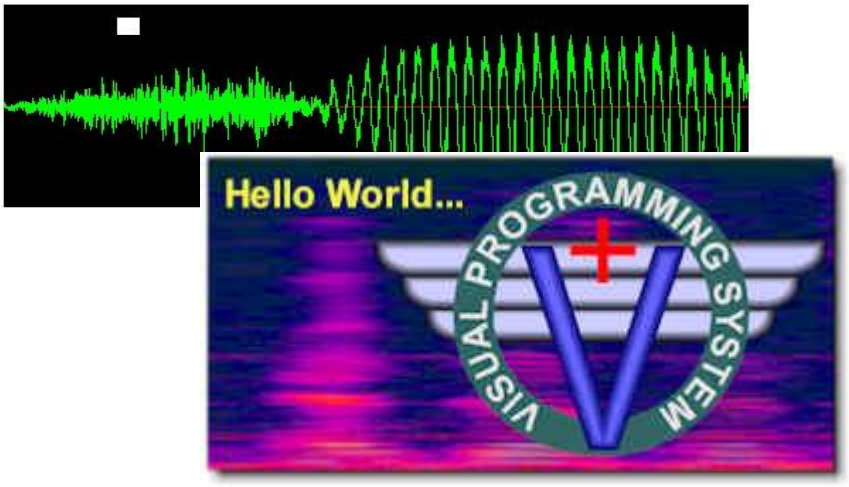
V+ Text-to-Speech I/O Device User Manual, V2.1



SimPhonics Incorporated
Printed: 4/26/2016
Filename: TTSUM1 - Text to Speech Device User Manual.docx

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REVISION HISTORY

Version	Description	I/O Device Version	Date
1.1	Added table of contents and configuration, port, dynamic text, dynamic template filenames, text templates and control tag information.		June 5, 2002
1.2	Added information on multiple devices/channels, updated Doc. No.		July 26, 2002
1.3	The V+ Text-to-Speech I/O Device Builds 120 and later are installed with 4 channels/devices. All versions prior to Build 120 have only a single channel/device installation.		August 5, 2002
1.4	The V+ Text-to-Speech I/O Device Builds 130 and later are installed with 8 channels/devices.		November 11, 2002
1.5	The Text-to-Speech device is now only available as an 8 channel device. Removed all references to 4-channel device.		March 6, 2003
1.6	Added additional script command "say port float"		May 28, 2003
1.7	Corrected miscellaneous typos; updated images; re-released document		August 29, 2003
2.0	Modified for and added detail for SAPI 5-based device	V200	October 25, 2008
2.1	SAPI-5 DirectSound output device Added additional script commands "say port alpha" and "say port phonetic alpha" Update to emerging documentation standards.	V300	2009-04-27

CONTENTS

PREFACE

This document is the SimPhonics' User Manual for the V+ Text-to-Speech I/O Device. V+, sometimes written as VPLus, and pronounced "V - Plus", is a completely new way of programming systems that interact with real-world signals in real-time. This I/O device is an add-on to V+ that allows the user to create dynamic text-to-speech based on real-time input variables.

Please note that this manual is a *living* document and is revised frequently as more enhancements are added to the system. Therefore, ensure you have the version of this documentation which matches your software (that version was shipped with your software). The latest version is available on the SimPhonics website.

The common use of this device is as an Automatic Terminal Information Service (ATIS) simulation used in simulation and training devices, although the device is written to be flexible enough for many purposes. Within this document, only ATIS examples are shown.

Before Using this Document

You must be familiar with V+ in order to use this document. Be sure to read the V+ User Manual before proceeding. See: http://www.simphonics.com/products/software/vplus/.

INTRODUCTION

What is the V+ Text-to-Speech I/O Device?

The V+ Text-to-Speech I/O Device is a software component add-on to V+, SimPhonics' visual programming language. This component adds synthetic speech generation to V+ via an I/O by turning text files into spoken words. This I/O device allows the user to program and to accurately read ASCII text. Different programming aids/components/commands are used to control the speech.

Additional uses for the Text-to-Speech device include, but are not limited to:

- Notice to Airmen
- Lesson plans
- Ground Controlled Approach (GCA)
- Role-playing
- Any repetitive speech required from the Instructor.

Tip: Sample ATIS V+ design, configuration and text template files (Atis.des, and Atis.txt) are downloaded with V+ and are located in your `'vplus install dir'\Samples\Simple ATIS` directory.

Why use the V+ Text-to-Speech I/O Device?

There are many advantages to using the V+ Text-to-Speech I/O Device:

1. Better speech quality.
2. The ability to change the speech output in real time, without stopping the program.
3. The ability to provide multiple streams of output.

Better Speech Quality

All current Text To Speech (TTS) systems have some common shortcomings; the speech often sounds unnatural because the rhythm, intonation and phonetic details are poor. As a result, listening to such speech requires a greater cognitive effort. The device uses control tags to improve the prosody of Text-to-Speech translation, making it easier to understand the speech.

Change Speech Output in Real-time

The device uses two methods for changing speech output in real-time, dynamic text and dynamic template filenames.

- **Dynamic text** uses port input values to *change speech output from within a text file*.
- **Dynamic template filenames** use port input values to *change speech output by switching text template files*. Each of those files is itself a **dynamic text** file.

Both of these methods are performed during run-time. These features can be combined to allow almost unlimited real-time speech output possibilities.

Multiple Streams
The TTS includes the ability to produce multiple streams of voice. For example, most aircraft are equipped with at least two COMM radios, which can tune two different ATIS frequencies. SimPhonics' current audio system designs can simulate many different streams of dynamic speech. The crew can now listen to two ATIS stations simultaneously, additional channels can be used for lesson plans, ground controlled approach, etc.

How does it Work?

The V+ Text-to-Speech I/O Device is a software component add-on to V+ language. The speech is generated from a text file, called a template file. The template file can contain *text*, for Text-to-Speech; *control tags,* in XML format, for controlling speech generation; and *script* that can control speech based on data within V+. Any Microsoft Speech API (SAPI) 5.x compliant speech engine should be compatible, although, as of this writing, only the Microsoft Text-to-Speech Engine, which is shipped with the I/O device, has been tested.

The template text is parsed when the speech is started, or just before a repeat of the speech template. The parsing removes the comments and converts the ports to string values. A speech text buffer is then generated based on any conditionals within the template file. This speech text buffer is then passed to the speech engine for generation of synthetic speech.

V+ uses four basic components to develop synthetic speech programs. These are text template(s), the Text-to-Speech I/O Device, the V+ Run-time System and a V+ design. See Using Dynamic Text for a graphical description of how these components interact.

Text Template An ASCII text template, `filename.txt`, is created. The text template contains the following:

- Port Assignments
- Commands (text, script and control tags that control the speech output)

V+ Text-to-Speech I/O Device The TTS I/O device is downloaded. This device includes the speech engine. It is then available for configuration through the V+ Run-time System.

V+ Run-time System The V+ Run-time System configuration menu is used to configure the TTS I/O device. During configuration, the following occurs:

- A text template (or directory) is assigned to the device.
- The number of ports is designated. The ports are automatically loaded into the Port List in the V+ Development System, making them available to the V+ Development System.

V+ Design Using the V+ Development System, the developer creates a design, matching the ports on the worksheet with the ports listed in the Text Template. The ports are used to connect data from text template, via the Text-to-Speech device, to a V+ design.

A Word on Speech Engines

The TTS I/O device is based upon the abilities of the SAPI 5.x SDK, using Microsoft's Text-to-Speech engine. Although other engines may be used, and may operate satisfactorily, its logic is guaranteed to work as described here only with that speech engine.

Even though the V+ Text to Speech Device is guaranteed to logically operate properly, SimPhonics can make no guarantees for speech quality. Though speech quality for speech engines increases almost daily, and some are very good, they are still devices whose speech is based on a "best effort" algorithm that synthesizes human speech. If the speech is not to a particular user's liking, the XML tags are provided in order to allow tuning of the speech within the parameters of the engine. Some engines may have greater control than others.

As the engine shipped with the V+ Text To Speech device supports English only, SimPhonics can only recommend its use for speaking English text. That said, some foreign language pronunciations or close facsimiles thereof may be possible using XML tags.

INSTALLATION

Computer Requirements

A Pentium 4 computer with 512M of RAM and DirectSound compatible sound device is recommended. The DirectSound 8 runtime is required.

Installing the Software

The TTS software will install the V+ I/O Device DLL, the Microsoft Speech Engine, and some documentation and samples as well as a few registry entries. Before installing this device, you must first install V+. You can obtain an evaluation copy at the SimPhonics software download page.

V+ Text-to-Speech I/O Device installation is simple and requires only a few steps. First, obtain the media that you will use for the installation. This device is shipped on CD-ROM, or can be downloaded for evaluation from the Internet. The part number for the TTS media is TTS1DEV-X86.

The I/O Device DLL is installed in, while documentation and samples are located in the subdirectory `.\VPLus Samples\Text To Speech\`

To download the V+ Text-to-Speech I/O Device:

- Close all programs.
- Navigate using your browser to http://www.simphonics.com/products/software/iodevices/tts/ for more information on this and other devices.
- Visit http://www.simphonics.com/supp/downloads/software/ and select "Text To Speech I/O Device for V+"
- Fill out the form and "Submit" it.
- An email will arrive from SimPhonics describing how to download and install the device.
- Click on and run the **"SETUPEX.EXE**."
- Select **Yes** to install the device.
- Select any defaults to complete the installation

Once the installation is complete, you may be prompted to reboot your computer.

Note: You may download this I/O device for test and evaluation only. For production use, you must license the software for each computer. See the VPLus End-User License for details.

CONFIGURING THE TTS I/O DEVICE

TTS configuration includes the following options for each voice stream for each of the streams.

- assigning a text template or directory
  - Selecting dynamic file options
- selecting the number of ports
- selecting the audio output destination (device)
- testing the speech output

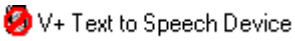
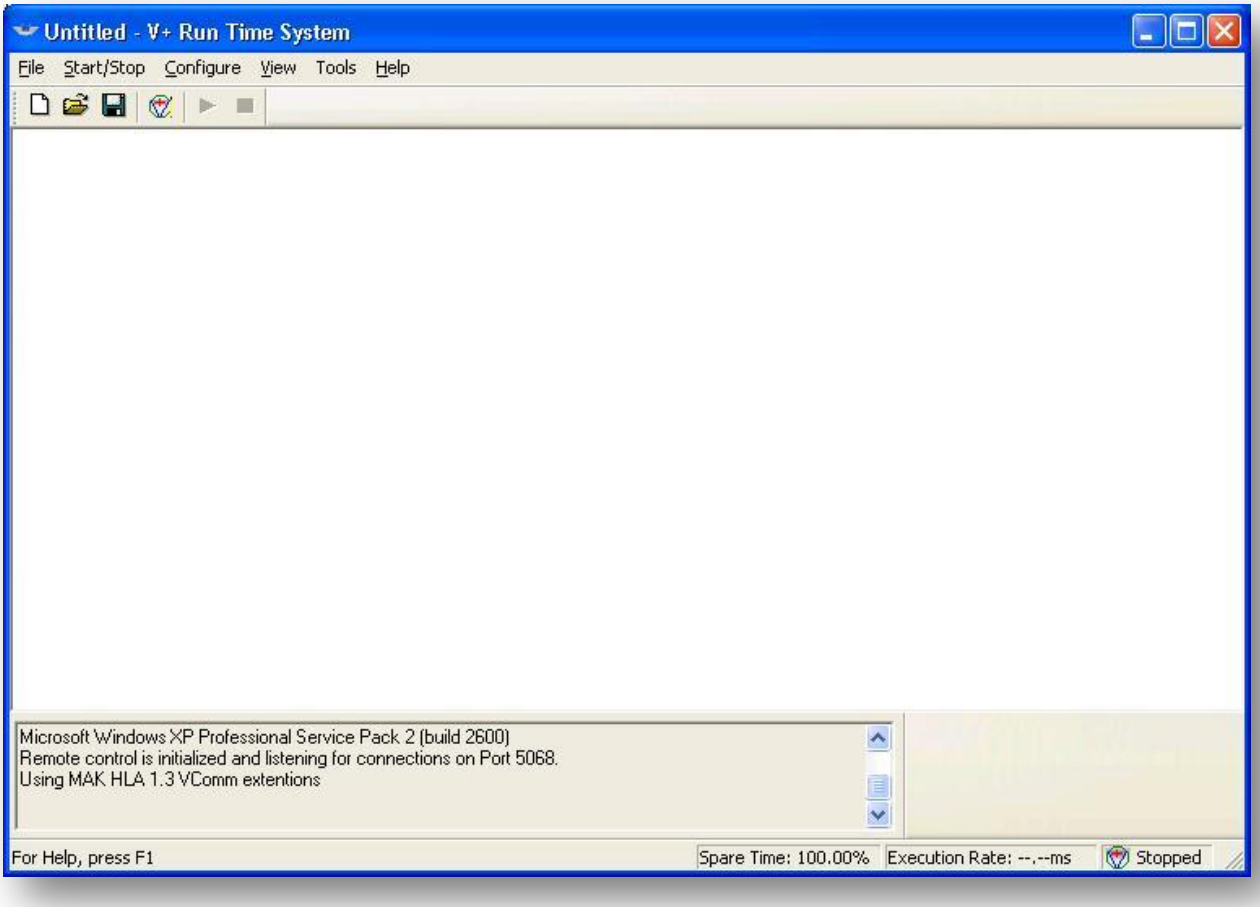


Figure 1 - Text-to-Speech I/O Device

The text templates should be created before configuring the device. See About Text Templates for more information.

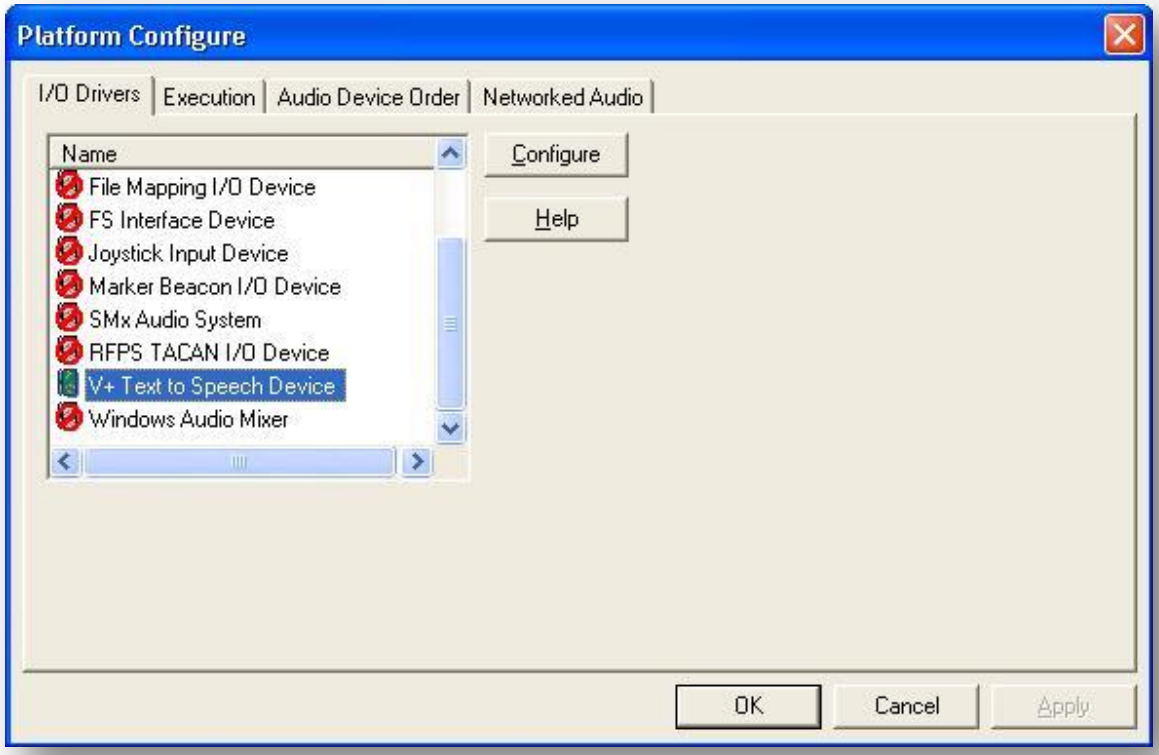
Opening the Configuration Dialog Box

- Invoke the **V+ Run Time System** from the **V+ Development System** window, or open the .vne file in the **V+ Run Time System**.

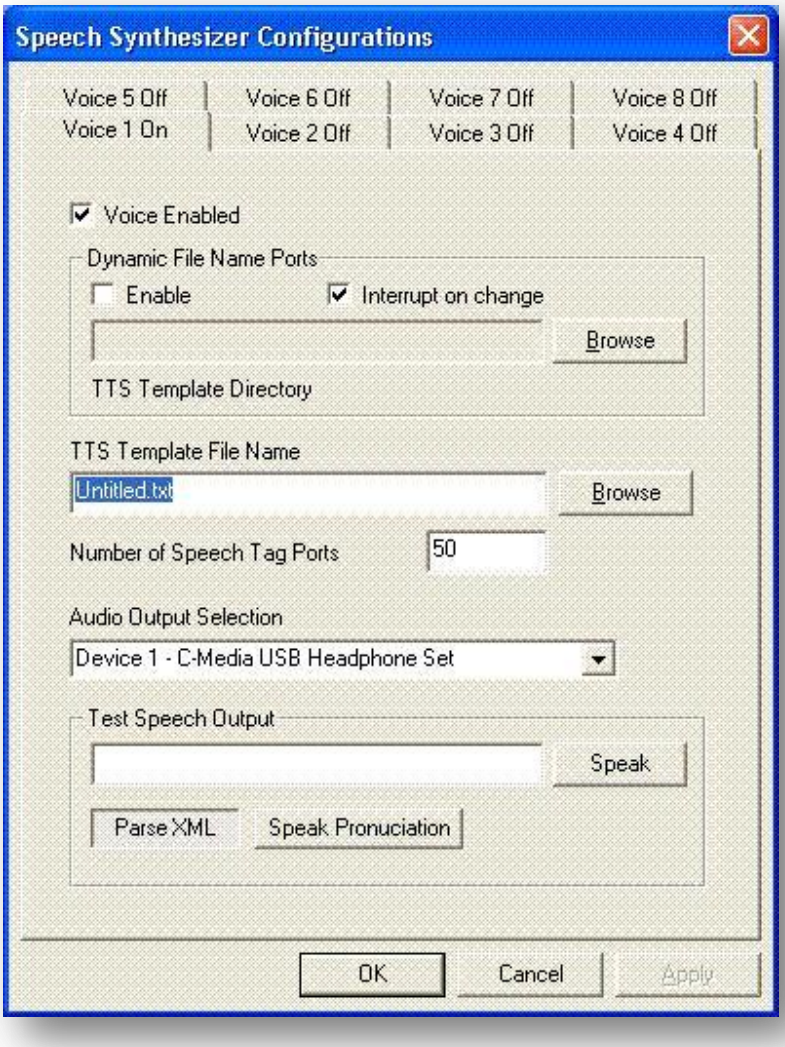


Note: Screenshots are typical. Depending on the version of VPLus and the I/O Device, the particular display on your computer may differ.

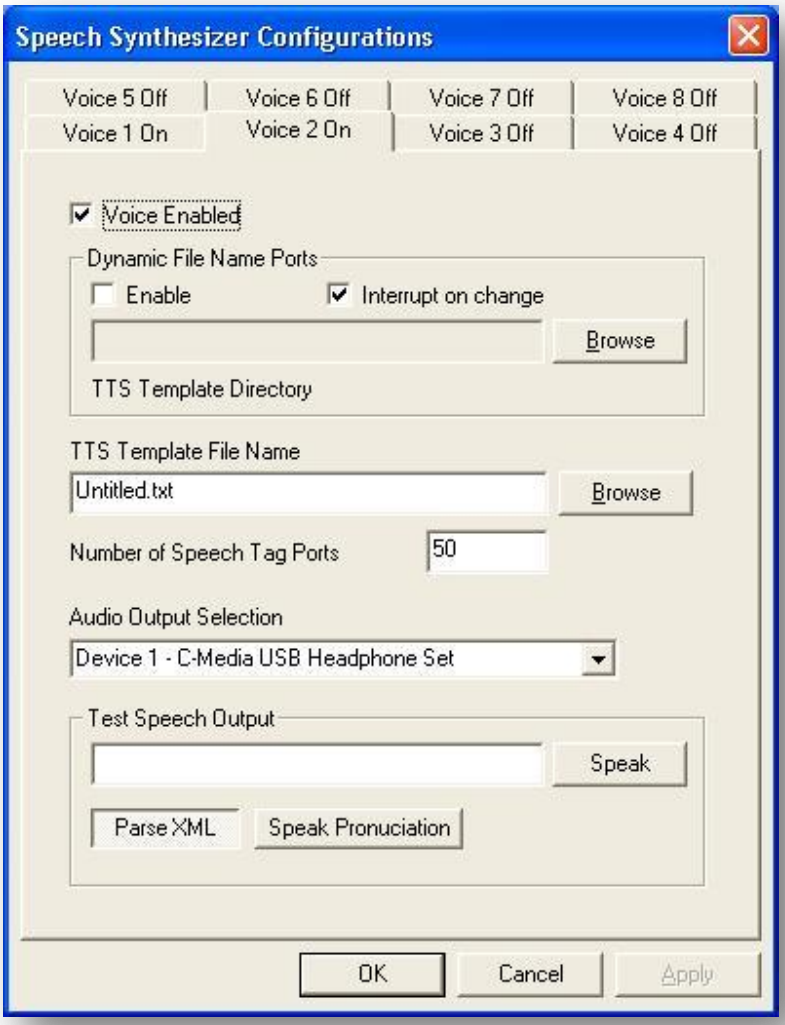
- Select **Configure**. This opens the **Platform Configure** dialog box.
- Double click the **V+ Text-to-Speech Device**. This enables the **Configure** button.



- Select the **Configure** button. This opens the **Speech Synthesizer Configuration** dialog box.



- Enable either the dynamic or static filename port.
- Select whether the dynamic file will be interrupted when a change in the filename is detected.
- To add more voice streams, select the appropriate tab on the control, and click that voice's **enable** button. This will change the tab text from "Off" to "On", showing that that voice stream is enabled. Each stream must be separately configured in this way.



Using Dynamic Filename Ports

When using the dynamic filename mode, the filename is assigned using V+ ports on the V+ Worksheet. See **Static versus Dynamic Filenames** for more information on using dynamic filename ports.

To enable dynamic filename ports:

- Select the **Enable** checkbox from the Dynamic File Name Ports section of the dialog, as shown above.
- Deselect the option to interrupt the playing file on a template name change, if desired.
- Select the **Browse** button located next to the **TTS Template Directory** field.
- Locate and select the directory where the text templates are stored.

Using Static Filename Ports

Whenever in static template filename mode, the template filename is chosen during configuration. See **Static versus Dynamic Filenames** for more information on using static filename ports.

Assigning a Text Template

- Deselect the "**Enable Dynamic Filename Ports**" check box.
- Select the **Browse** button located next to the **TTS Template Filename** field.
- Locate and select the ASCII text template.

Selecting the Number of Speech Tag Ports

- Enter the number of ports in the **Number of Speech Tag Ports** box. This number must be equal to order greater than the number of ports used in the V+ design.

Selecting the Sound Device

The "audio output destination" is the stereo audio device that you are assigning to the device. It is this channel that plays the text template selected in step "c" above. If you plan on using multiple voice streams, be careful to select a different device for each stream to avoid mixing the output of several streams of speech (for maximum flexibility, the configuration dialog does not check for duplicates in this field).

- Select the audio output destination from the **Audio Output Destination** drop box.

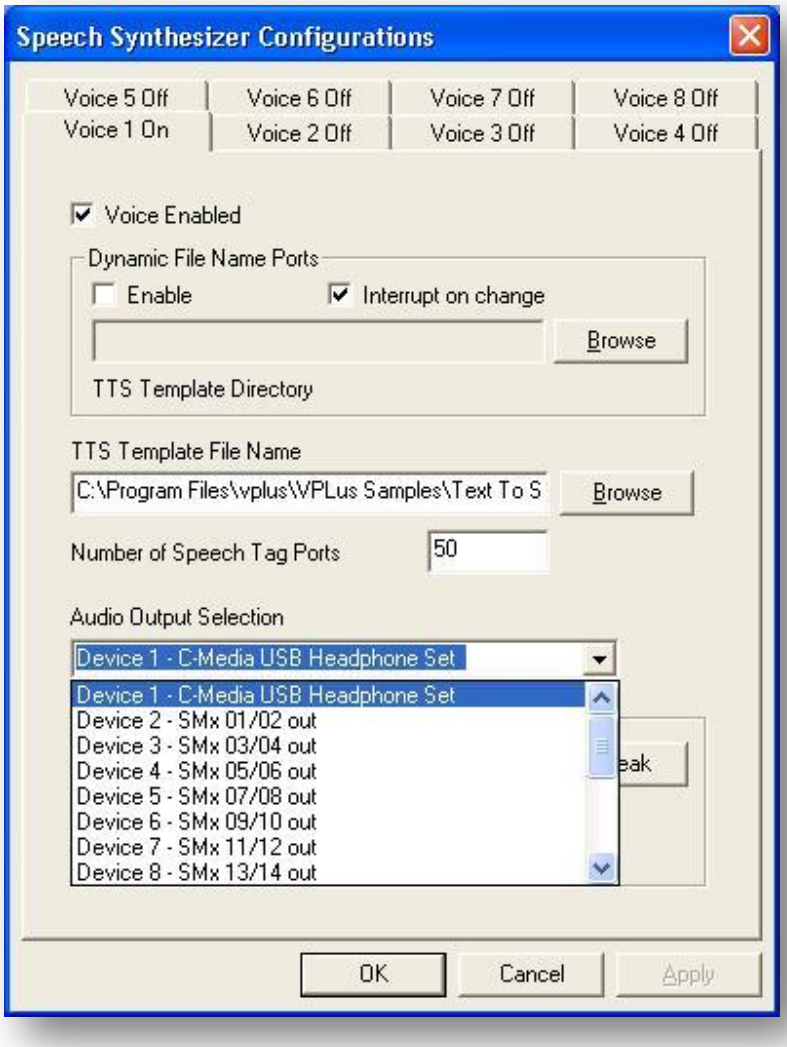


Figure 2 - Assigning a Channel to a Device

Testing the Speech Output

The Speech Synthesizer Configuration dialog box can be used to test the speech output. To do so:

- Select **Configure**. This opens the **Platform Configure** dialog box.
- Select the **V+ Text-to-Speech Device** from the list of I/O devices.
- Select the **Configure** button. This opens the **Speech Synthesizer Configuration** dialog box.
- Enter the text in the **Test Speech Output** box.
- Select the appropriate **Parse XML** and/or **Speak Pronunciation** buttons (note: these settings DO NOT affect the playing of the template file).
- Select the **Speak** button.
- When finished, select the **OK** button to close the window.

PORTS

About Text-to-Speech Ports

There are three sets of text-to-speech ports available for each Text-to-Speech device stream with a V+ design. See Ports Example for an example of how some of these ports are used in a sample V+ design.

This installation includes separate devices for each voice stream. Each device has its own set of ports (see below).

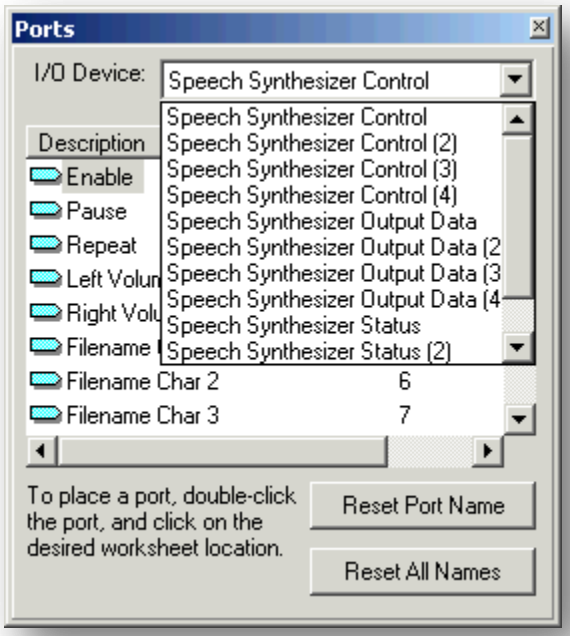


Figure 3 - Ports Dialog Box

Port List	Description
Speech Synthesizer Control Ports (n)	These output ports are used to control the speech engine. They are also used to generate and control dynamic filename ports. See Using Dynamic Filename Ports for more information. These ports accept a floating point input value.
Speech Synthesizer Output Data Ports (n)	These output ports are used within the template file script commands to generate and control dynamic speech. They accept a floating point input value.
Speech Synthesizer Status Ports (n)	These input ports are used to monitor the status of the speech engine.

Control Ports

The ports available in the **Speech Synthesizer Control (SSC) Ports** list (below) are used to control the speech engine. These ports accept a floating point input value. See Ports Example for an example of how these ports can be used in a V+ design. Below are descriptions of the control ports with their valid values.

Note: *Some control ports are assigned default values if they are not present on the worksheet. These values affect the way the program runs. See the table below for these values.*

Control Port(s)	Description	Valid Values	Default Values
enable	Starts or stops the voice stream. If repeat is not set, toggling enable off and then on will start the voice again.	1 = voice runs 0 = voice stops Toggle = voice runs	0.0 - Off
pause	Pauses or resumes the voice stream.	1 = voice pauses 0 = voice plays	(no effect)
repeat	Repeats or stops the voice at the end of the template.	1 = voice repeats at the end of the template. 0 = voice stops at the end of the template.	0.0 - Set to Not Repeat (the system stops at the end of the template)
left volume, 0-1	Controls the relative volume for the left channel of the voice output.	0.0 (no volume) to 1.0 (full volume).	1.0 - Max Volume
right volume, 0-1	Controls the relative volume for the right channel of the voice output.	0.0 (no volume) to 1.0 (full volume).	1.0 - Max Volume
filename char 1 - filename char 8	They are used to assign filename characters, when using dynamic filename ports. See About Dynamic Filename Ports for more information.	Any ASCII code value (use 0.0 when filename is less than 8 characters)	0.0 - No character (even if the dynamic port names are disabled.)

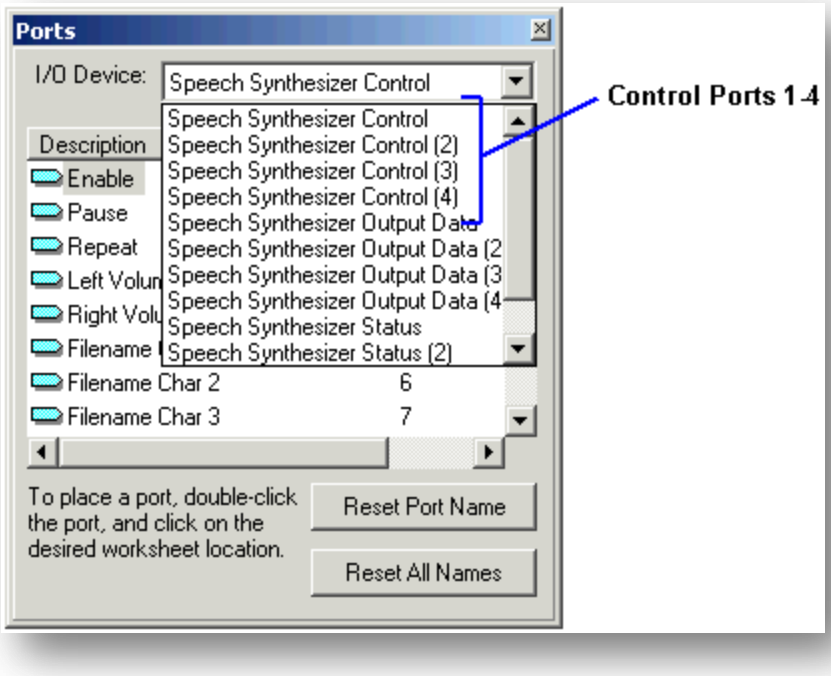


Figure 4 - Control Ports for Devices 1-4

Output Data Ports

The output ports found in **Speech Synthesizer Output Data (SSOD) Ports** list are used within the template file script commands. The following is a list of SSOD port features:

- They accept a floating point input value.
- They are used to control dynamic text by referencing the text template. See Scripting and Scripting Example for more information.
- The default number of output data ports is 50, although this number is controlled by the user when configuring the system.

See Ports Example for an example of how these ports can be used in a V+ design.

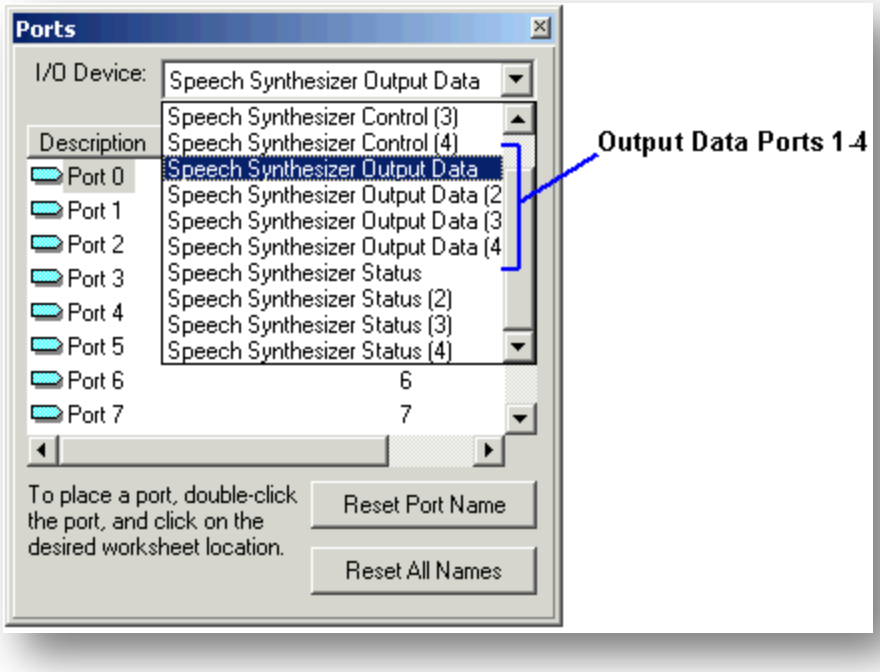


Figure 5 - Output Data Ports for Devices 1-4

Status Ports

The **Speech Synthesizer Status Ports** are input ports. These ports are used to monitor the status of the voice stream.

Status Port(s)	Description	Valid Values
Speaking	Indicates whether the voice stream is speaking.	1 = speaking 0 = not speaking
Error	Indicates whether an error has occurred in the voice stream.	0 = no error 1 = an error occurred
Word Position	Roughly indicates the character position of the first character of the current word within the character stream. *Because of the design of the system, this value may lead the voice itself by 500mS or more.*	0 - n

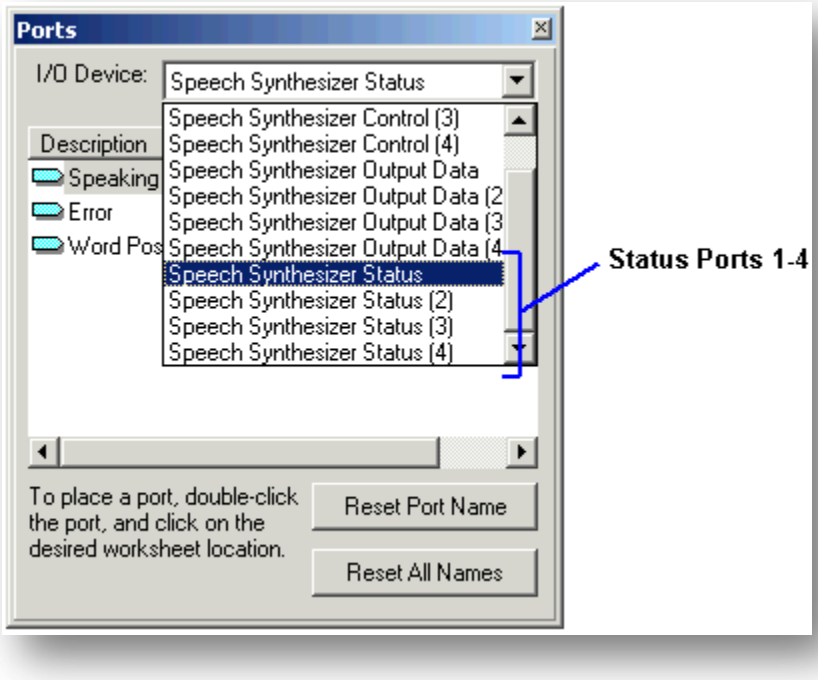


Figure 6 - Status Ports for Devices 1-4

Ports Example

Below is an example of how a simple V+ design uses different types of Text-to-Speech output ports.

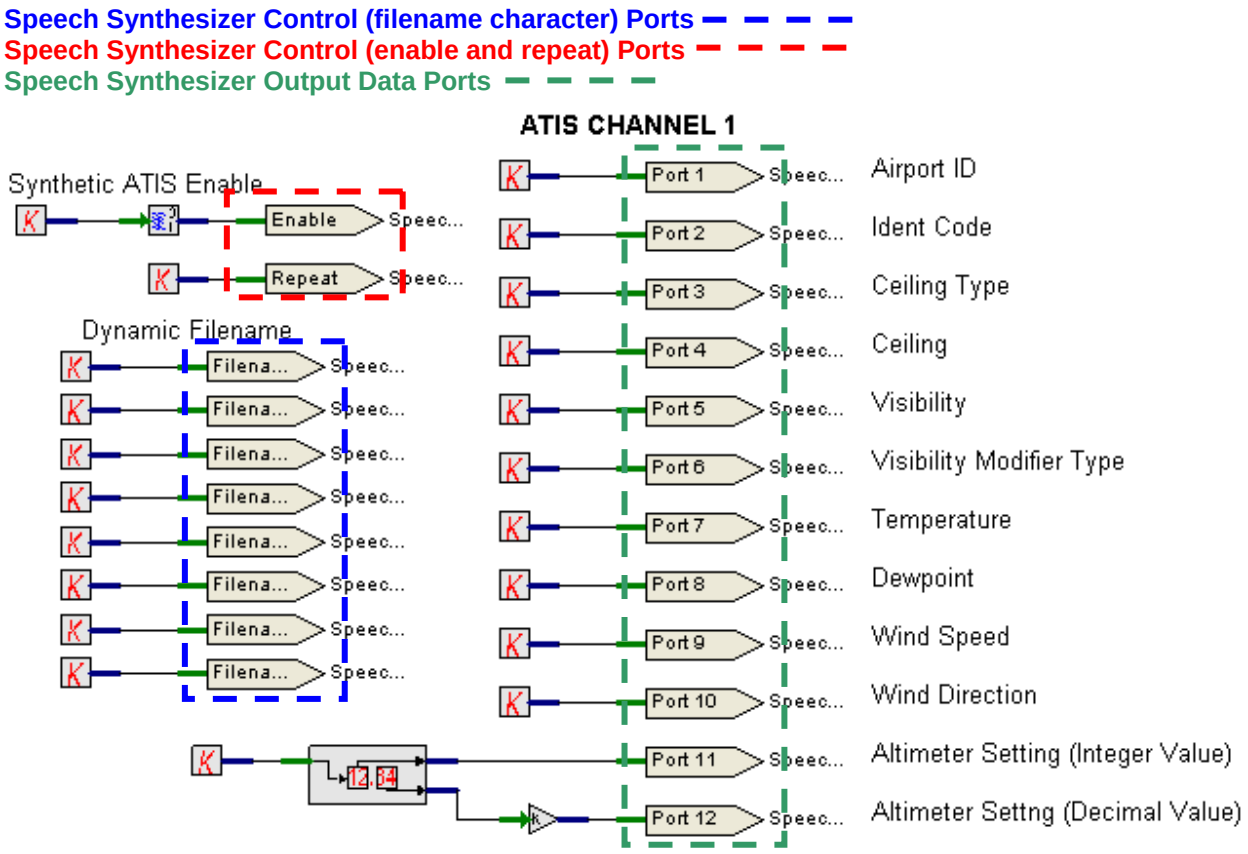


Figure 7 - Using Ports on a V+ Worksheet

Multi-Channel ATIS Design Example

Below is an example of how ports are used on a multi-channel ATIS V+ design.

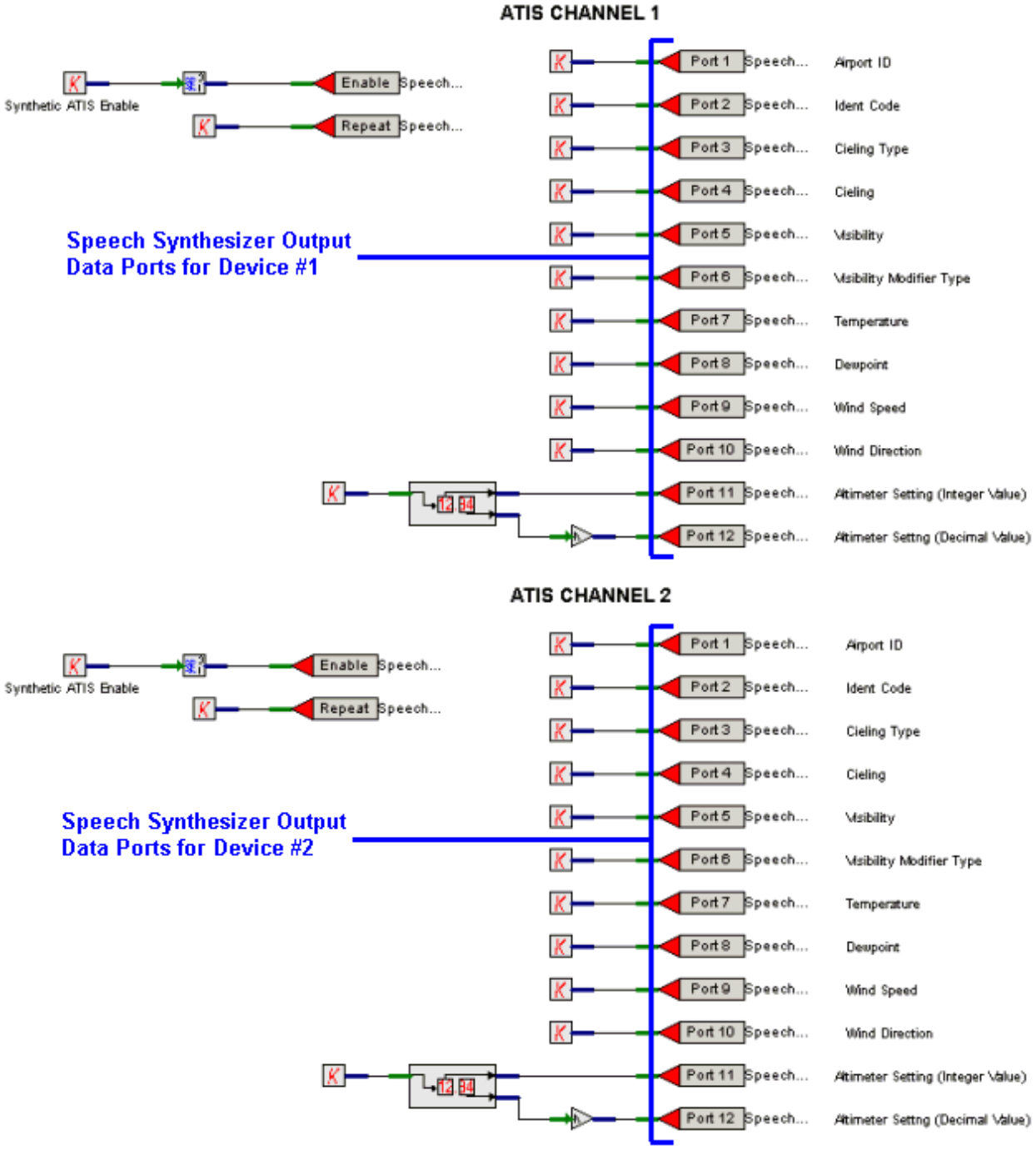


Figure 8 - Multi-Channel ATIS Design Example

DYNAMIC TEXT

About Dynamic Text

Dynamic text is used to control speech output from within the text. In order to use dynamic text, the text template must contain port assignments and scripting.

The following summarizes how dynamic text generates controls speech output:

- A text template is created, containing port assignments and script.
- The Text-to-Speech (TTS) device is configured. Two important things occur during configuration. The text template is assigned to the device and the Speech Synthesizer Output Data (SSOD) ports are loaded in the V+ Development System.
- The developer uses the V+ Development System to create a design, matching SSOD ports in the design with the port assignments in the text template.
- The end user controls the speech output by changing the SSOD port input values. When the device is Enabled or it repeats, and the SSOD port values have changed, the speech is updated to reflect the changes.

See Using Dynamic Text for an illustration of this process.

Tip: Dynamic templates can be used with Dynamic text for almost unlimited real-time speech output possibilities.

Using Dynamic Text

The diagram below provides a graphical description of how the V+ Text-to-Speech I/O Device uses dynamic text to control speech output. When port input values change in real time, the output changes on the next "read" of the file. For example, in the diagram below, if Port 3 input changes to "3" and Port 4 input changes to "1500," the engine speaks:
"Ceiling, 1500 overcast."

Note: *In addition to controlling speech within a file, V+ can also switch text templates in real-time. See About Dynamic Template Filenames for more information.*

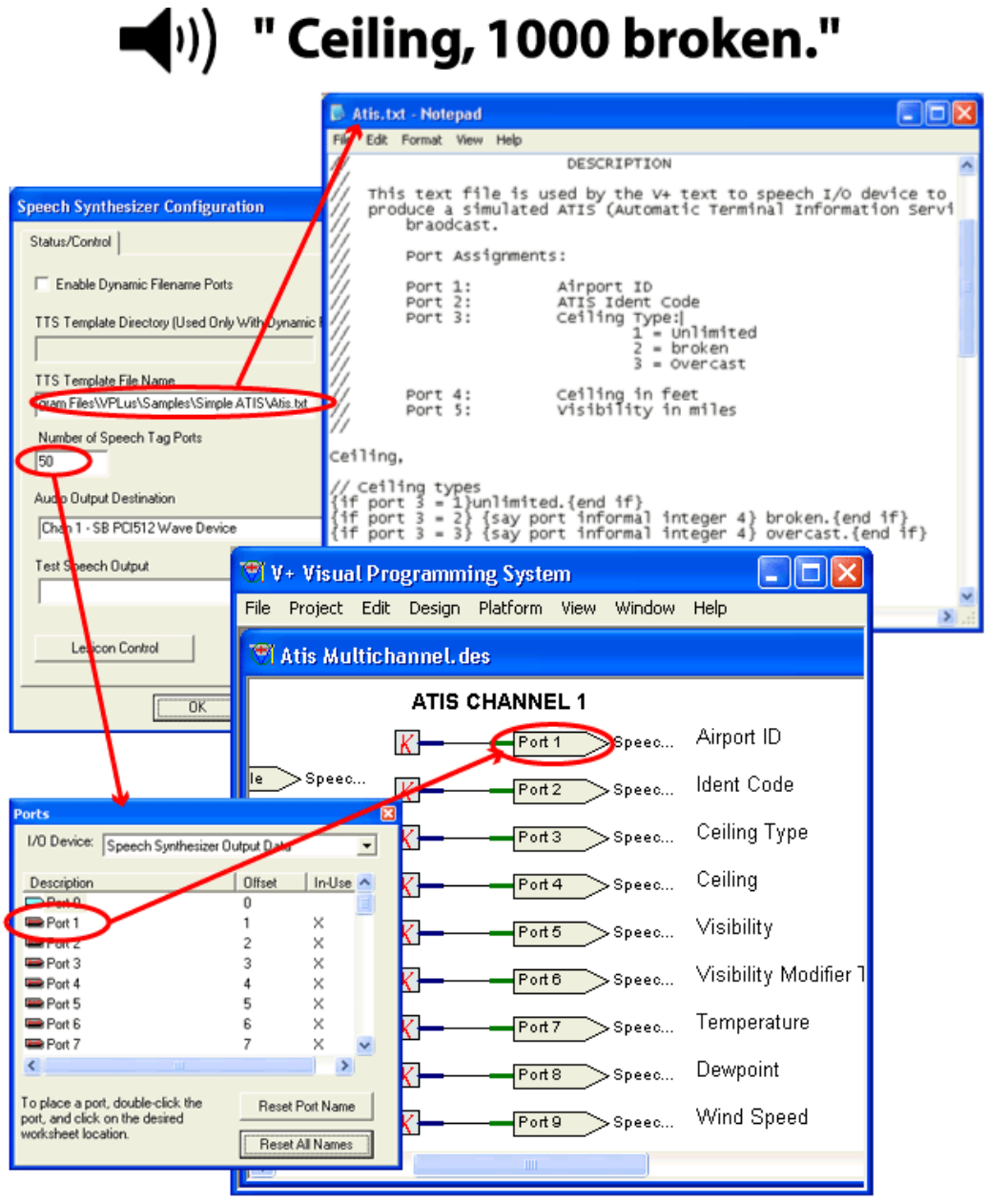


Figure 9 - Text-to-Speech Device Using Dynamic Text

DYNAMIC TEMPLATE FILENAMES

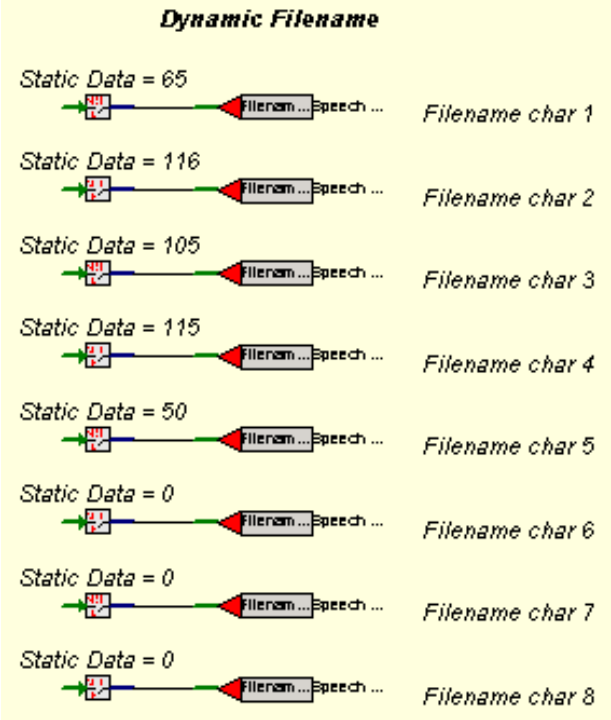
Static versus Dynamic Filenames

The speech device can operate in either dynamic or static filename mode. Whenever in static template filename mode, the template filename is chosen during configuration, and the port values determine what is spoken. When the dynamic filename mode is used, the filename is assigned using V+ ports as well. The following table lists the differences between the static and dynamic modes.

	in the static template filename mode...	in the dynamic template filename mode...
When naming templates...	the template filename can have an unlimited number of characters.	the template filename must have eight or fewer characters.
When changing templates...	the program must be stopped and the new template assigned through the Run-time System configuration menu.	the dynamic filename port input values are changed, during run-time, to reflect the new template filename. *You do not have to stop the program!*
When selecting ports...	the "filename char" ports are not used.	the 8 "filename char" ports are used. These eight ports make up the text template filename that is spoken by the device. See Using Dynamic Filename Ports for more information.

About Dynamic Filename Character Ports

Dynamic filename ports are used to select a text template from a nearly unlimited number of templates. There are 8 filename character ports found in the Speech Synthesizer Control Ports list. They accept floating point input values that represent ASCII character values (65.0='A', 66.0='B', etc.) The input values represent the eight characters of the filename that is spoken. A ".txt" extension is added to the filename automatically before the file is retrieved. The entire path/filename to the .txt file is a concatenation of the pathname assigned in the configuration menu, plus these eight characters, plus .txt. (to use less than 8 characters, set the remaining ports to 0 (not '0')).



Input	Port	ASCII Value
65	filename char 1	A
116	filename char 2	t
105	filename char 3	i
115	filename char 4	s
50	filename char 5	2
0	filename char 6	
0	filename char 7	
0	filename char 8	

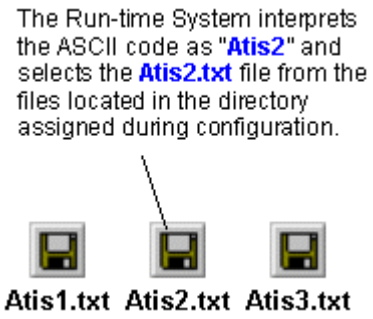


Figure 10 - Dynamic Filename Character Ports

ATIS Example

The example below is a sample Text-to-Speech V+ design that uses dynamic filename ports. This particular design is an Automatic Terminal Information Service (ATIS) simulation used in simulation and training devices. This Tes design is downloaded with V+ and is located in the: `.\VPLus Samples\Text to Speech\Simple ATIS` subdirectory.

See ATIS Template File Example for an example of a text template that is used with this V+ design.

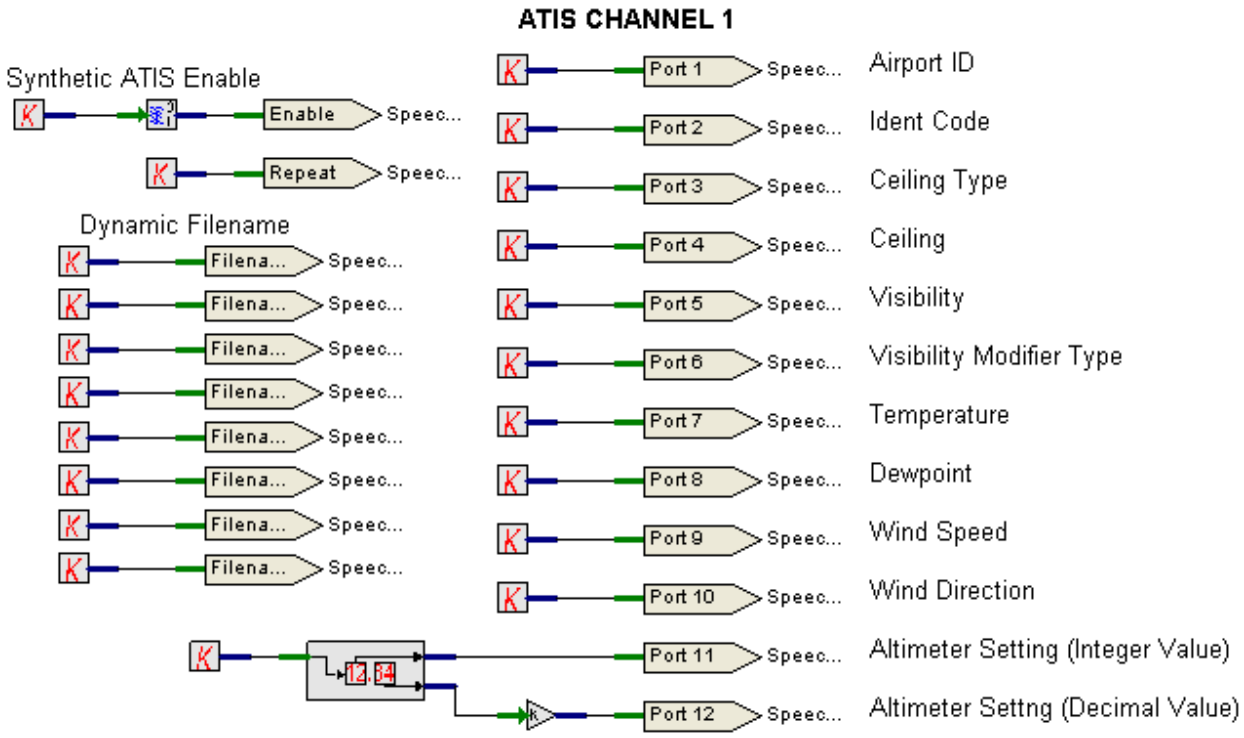


Figure 11 - ATIS V+ Worksheet Example

TEXT TEMPLATES

About Text Templates

The Text-to-Speech device produces real-time dynamic speech from a text template file. This file can contain three components, each of which handles a different task (see below).

Component	Description
text	The text represents the words that are spoken
control tags	Also called speech engine control tags. These commands are used to better simulate human speech by improving inflection, accent, timing and other factors that affect speech quality.
script	Also called V+ commands. These are used to control speech based on data within V+, by allowing dynamic control over the speech output, via ports found in the V+ design and referenced in the text template.

Before Creating a Template

Before creating a text template it is important to decide whether to use dynamic text and dynamic template filenames. These decisions affect configuration and the V+ Design.

See About Dynamic Text and Static versus Dynamic Template Filenames for more information.

Template Format

The text template file must be in ASCII format. See Template Example for an example of a text template file.

Naming Templates

When naming text templates for the V+ Text-to-Speech I/O device, please note the following:

Static template filenames:

- Each file must have a `.txt` extension.

Dynamic template filenames:

- Each filename must have eight or fewer characters.
- Each file must have a `.txt` extension.

Template Example

Below is an example of an actual Text-to-Speech text template designed to be representative of an ATIS. This sample text template, `Atis.txt`, is downloaded with V+ and is located in the: `.\VPLus Samples\Text to Speech\Simple ATIS` directory.

See ATIS Design Example for an example of the V+ design used with this template. Though the extensive comments describing the file, revision, and use of ports are not strictly necessary, it is a good idea to include such information to aid in troubleshooting.

```
//************************************************************
//
//                      ATIS TEXT TEMPLATE
//
//  VERSION:    2.0 - 2009-04-25
//  AUTHOR:     Eric Snyder
//          SimPhonics, Inc.
//
//  This file is compatible only with SAPI 5 / V300+ I/O Drivers
//
//************************************************************
//
//                       DESCRIPTION
//
//    This text file is used by the V+ text to speech I/O device to
//    produce a simple simulated ATIS (Automatic Terminal Information
Service)
//    braodcast.
//
//    Port Assignments:
//
//    Port 1:           Airport ID
//    Port 2:           ATIS Ident Code
//    Port 3:           Ceiling Type:
//                      1 = Unlimited
//                      2 = broken
//                      3 = Overcast
//
//    Port 4:           Ceiling in feet
//    Port 5:           Visibility in miles
//    Port 6:           Visibility Modifier Type
//                      1 = Fog
//                      2 = Rain
//
//    Port 7:           Temperature in degrees
//    Port 8:           Dew Point
//    Port 9:           Wind Speed
//    Port 10:    Wind Direction
//    Port 11:    Altimeter Setting (Integer Value)
//    Port 12:    Altimeter Setting (Decimal Value)
//
//************************************************************

<voice required="gender=male">
This is
{if port 1 = 1}Albany Airport,,{end if}
{if port 1 = 2}Mobile Downtown Airport,,{end if}
{if port 1 = 3}Keesler Air Force Base,,{end if}
{if port 1 = 4}Baton Rouge Municipal Airport,,{end if}
{if port 1 = 5}Biloxi Regional Airport,,{end if}
{if port 1 = 6}Lafayette Regional Airport,,{end if}
{if port 1 = 7}Bates Field,,{end if}
{if port 1 = 8}New Orleans International Airport,,{end if}
Information

// say the ATIS Ident code in the phonetic alphabet
{say port phonetic alpha 2}
```

```
...
{time}, zulu weather.
  Ceiling,

// Ceiling types
{if port 3 = 1}unlimited.{end if}
{if port 3 = 2} {say port informal integer 4} broken.{end if}
{if port 3 = 3} {say port informal integer 4} overcast.{end if}

Visibility: {say port integer 5} miles

// Visibility modifier types
{if port 6 = 1} with fog.{end if}
{if port 6 = 2} with rain.{end if}

Temperature:
{say port integer 7}.

Dew point:
{say port integer 8}.

// Winds
Winds:
{if port 9 < 3} calm.{end if}
{if port 9 > 2} {say port integer 10} at {say port integer 9}.{end if}

// Altimeter
Altimeter:
{say port integer 11} point {say port integer 12}.

Advise approach control on initial contact. You have information

// say the ATIS Ident code in the phonetic alphabet
{say port phonetic alpha 2}
```

SCRIPTING

About Scripting

Scripting allows dynamic control over the speech output, via ports found in the V+ design and referenced in the text template. Before commands are used to modify speech output, you need to know the proper syntax with which to include those commands into a text file.

Scripting Syntax

The template file may contain up to 64,000 characters of text.

The following V+ command syntax is available:

Syntax	Description
`//`	Introduces a line comment. The rest of the line is ignored by the speech file parsing logic. No "inline" comment syntax is currently available.
`{time}`	Say the current military time, digit by digit. This is the local time on the target computer.
`{say port float n}`	Say the current value of port "n" digit by digit in floating point format. For example, 0.123 would be spoken as "zero point one two three".
`{say port integer n}`	Say the current value of port "n" digit by digit in integer form. For example, 0.123 would be spoken as "zero", while 1.234 would be spoken as "one", and 123.0 would be spoken as one two three etc. Only the integer portion of the number is spoken. Note to produce proper NATO Phonetic Alphabet, the `{say port phonetic alpha}` command should be used.
`{say port informal integer n}`	Say the current value of port "n" in integer form informally. For example, 0.123 would be spoken as "zero", while 1.234 would be spoken as "one", and 123.0 would be spoken as "one hundred twenty three" etc. Only the integer portion of the number is spoken.
`{say port alpha}`	Speak the port's value as an ASCII character (65 = " A ", etc)
`{say port phonetic alpha}`	Speak the port's value as a NATO Phonetic Alphabet string. Only the values listed below are valid (others will produce no output): • 48 = "Zero" • 57 = "Niner", etc • 65 = "Alpha", etc • 97 = "Alpha", etc

`{if port n = c}`
`{if port n > c}`
`{if port n < c}`
`{end if}`
	The conditional commands allow sections of text to be spoken based on the condition of a port "n". The spaces before the operator are necessary and must be provided. Constant `c` is compared against the port. If the condition is true, the text up to the `{end if}` is spoken. If the condition is false, the text after the `{end if}` is spoken. Every `{if...}` command must have a corresponding `{end if}`. Conditionals may be nested up to 200 levels.

Scripting Example

If port 3 = 2, and port 4 = 1000, the following template text file example would cause the following speech to be generated:

"Ceiling, one thousand broken"

```
Ceiling,
{if port 3 = 1}unlimited.{end if}
{if port 3 = 2} {say port informal integer 4} broken.{end if}
{if port 3 = 3} {say port informal integer 4} overcast.{end if}
```

CONTROL TAGS

About XML Control Tags

A text-to-speech engine speaks individual words quite well. However, as the complexity of the speech commands increases, the perceived quality of its translation decreases because the engine cannot always correctly synthesize human prosody -- the inflection, accent, and timing of human speech. Speech may be changed by inserting control tags in the text file.

The W3C consortium has in draft a standard describing a standard set of speech markup that is based on XML. The SAPI 5 prosody markup is similar, but not identical to this.

In order to understand the syntax of the markup used by SAPI 5 (the XML Schema), please refer to the following document:

http://msdn.microsoft.com/en-us/library/ms717077(VS.85).aspx

APPENDIX

List of Figures

REFERENCES

For more information, refer to the SimPhonics web site:

SimPhonics Home Page: http://www.simphonics.com

SimPhonics Text-to-Speech Page:
http://www.simphonics.com/products/software/iodevices/tts/

SimPhonics Software Downloads: http://www.simphonics.com/supp/downloads/

SimPhonics Visual Programming System Page:
http://www.simphonics.com/products/software/vplus/

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