DoubleTalk PC/104

Hardware Manual

RC SYSTEMS

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General Description

DoubleTalk PC/104 is a cost effective means of adding voice output to PC/104-based systems. It supports the most popular audio and voice technologies in use today, including text-to-speech, PCM, ADPCM and CVSD. DoubleTalk PC/104 is upward compatible with RC Systems' Double-Talk PC for the ISA bus standard, and as such, can be used with software written for the Double-Talk PC (exclusive of LPC-based speech).

DoubleTalk's versatile text-to-speech synthesizer automatically converts plain English or Spanish text into medium quality speech (as compared to digitized, or pre-recorded speech), unequaled in sound quality by any other synthesizer in DoubleTalk's price class. The text-to-speech synthesizer can be accessed as a printer or communications port, enabling text-based programs capable of printing to a printer (such as word processors) or a communications port to read their data files aloud. The main advantage of the text-to-speech synthesizer is its versatility, unlimited vocabulary, and extremely low data rate (about 10 bytes per second). Speed, pitch, volume, and other parameters can be easily altered using software commands.

DoubleTalk's CVSD synthesizer supports the type of digitized speech used in such programs as IBM's "Writing to Read." CVSD-based speech can produce medium to high quality sound, but at much higher data rates than text-to-speech (typically 3,000 to 4,000 bytes per second). The PCM/ADPCM synthesizer allows digitized speech and sounds to be reproduced with the highest possible sound quality, but at high data rates (4,000 to 11,000 bytes per second). This synthesizer also allows DoubleTalk to work as a sound (Wave) device with Windows applications.

Features

- Supports three popular voice technologies:
  - Text-to-speech
  - Pulse Code Modulation (PCM/ADPCM)
  - Continuously Variable-Slope Delta modulation (CVSD)

- Independent software control of voice parameters

- Programmable tone generators

- Requires only two I/O ports (no IRQs or DMA)

- Integrated 10 MHz, 16-bit µP offloads the complex task of text-to-speech conversion

- Efficient 500 mW push-pull audio output design

- Low-level line output

- Hardware and software synchronization signals

- Standard PC/104 form factor (3.6 x 3.8 in)

- +5 V-only operation, low power consumption

Specifications

INTERNAL PROCESSOR

- Type: 10 MHz 80C188EB
- ROM: 512K
- RAM: 8K, 32K optionable

TEXT-TO-SPEECH SYNTHESIZER

- Vocabulary: Unlimited, male voice
- Operating modes: Text, character, phonetic
- Voices: 8
- Intonation levels: 10
- Pitch levels: 100
- Tone levels: 3
- Volume levels: 10
- Speeds (rates):   10
- Reverb levels: 10
- Index markers: 100
- Input buffer/dictionary: 2.8K (26K if 32K RAM installed)

PCM/ADPCM SYNTHESIZER

- Sample buffer: 4K
- Sampling rates: 100 (4 to 11 kHz, 8-bit)
- Volumes levels: 10

CVSD SYNTHESIZER

- Sampling rate: 32 kbps

TONE GENERATORS

- Musical: 3
- Precision sinusoidal: 2
- DTMF (Touch-Tone)

ELECTRICAL/MECHANICAL

- I/O ports: 2 (jumper selectable)
- Expansion bus: PC/104 8-bit (stackthrough type)
- Audio output power: 500 mW (8 Ω)
- Operating/storage temperature: 0–70° C / –55° to +85° C
- Power requirements: +5 V ±5% at 110 mA max active, 25 mA idle

Board Connectors and Controls

Figure 1 shows the location of DoubleTalk's interface connectors J1 and J2, and jumper block W1. J1 is the 8-bit stackthrough bus expansion connector. Refer to Tables 1 and 2 for the pinouts of J2 and W1.

The volume control knob (VOL) acts as a master volume control for all DoubleTalk functions. It should be set to limit the maximum volume desired from the board (all DoubleTalk operating modes also provide 10 or more software programmable volume settings).
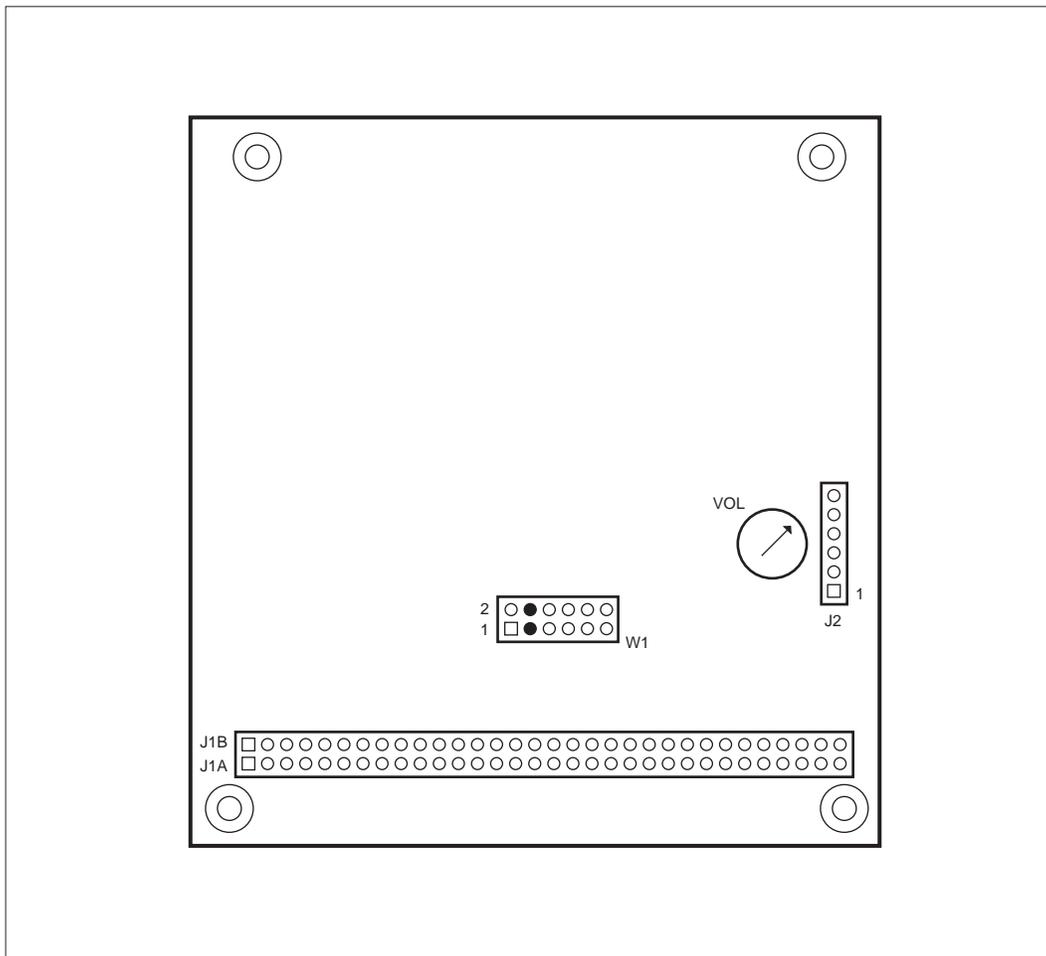
Figure 1. Connector and Jumper Locations

Setting the Base I/O Address

W1 is a 12-pin jumper block that sets the base I/O address of the board, which is normally set for 29Eh (W1 pins 3-4 shorted together). The board uses the base address set by W1, and the address immediately following it (e.g., 29Eh and 29Fh).

BASE ADR	SHORT W1 PINS
25Eh	1 & 2
29Eh	3 & 4 (default)
2DEh	5 & 6
31Eh	7 & 8
35Eh	9 & 10
39Eh	11 & 12

Table 1. Base I/O Address, W1

I/O Connector

J2 is a 6-pin male header connector that provides the audio output signals, ground, +5 V, and a synchronization output (Table 2). The ground and power pins may not be required in your application, but are provided as a convenience.

The audio output stage (Figure 2) is designed to drive a speaker connected in a bridge-tied (differential) output configuration. The speaker may be connected in a single-ended configuration by connecting it between pin 5 and ground, via a 100 µF coupling capacitor. The capacitor is necessary to block the 2.5 VDC bias voltage present which would otherwise produce a high DC current through the speaker winding to ground.

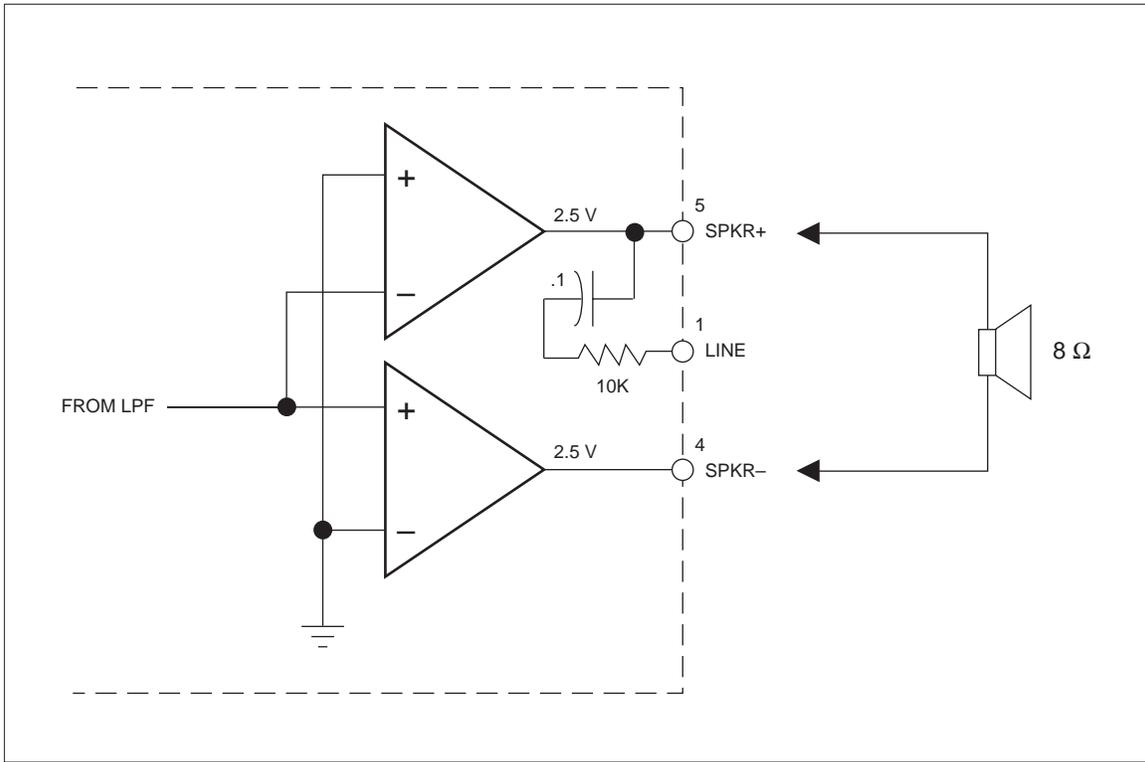| PIN	FUNCTION
1	LINE output
2	+5 VDC output
3	SYNC output
4	SPKR– output
5	SPKR+ output
6	GROUND

Table 2. I/O Connector, J2

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Figure 2. Output Stage (simplified)

The SYNC output (pin 3) is a TTL/CMOS-compatible signal which goes high when the board is producing sound (speech, tones, etc.). This output can source and sink 3 mA of current, which may be used to control devices connected to DoubleTalk, such as a transmitter or telephone DAA.

This completes the hardware description of the DoubleTalk PC/104 board. For user and programming information, refer to the *DoubleTalk Utilities* and *DoubleTalk Developer's Tools* disks, provided with this package (the Tools may be provided in archived form on the Utilities disk). NOTE: The software provided also support the DoubleTalk PC (ISA bus) and DoubleTalk LT (serial) synthesizers, also manufactured by RC Systems, which have an LPC synthesizer incorporated into them. When using the software, keep in mind that the PC/104 version does not have an LPC synthesizer. The LPC port is still implemented, however, so other related functions, such as indexing, can be performed.