

# 1 INTRODUCTION

Thank you for purchasing Analog Devices development software for Analog Devices Digital Signal Processors (DSPs). This software provides you with the following:

- An assembler for processing source files in ASCII format, producing machine-level versions of the source code, object files
- Object files in ELF/DWARF-2 binary formats, providing relocatable code and debugging information
- Relocatable data and program memory sections for placement by a linker in a processor's memory
- A preprocessor for including header files, defining macros, and conditional assembly
- Online Help
- Online access to all manuals for this product via PDF files

This book contains information on the assembler program for the ADSP-21xxx Super Harvard Architecture (SHARC<sup>®</sup>) DSPs. This family of DSPs includes over thirty 32-bit digital signal processors for computing, communications, and consumer applications.

## For Additional Information About Analog Products

Analog Devices is online on the internet at [www.analog.com](http://www.analog.com). Our web pages provide information about our broad range of products: analog integrated circuits, amplifiers, converters, and digital signal processors. For information on our digital signal processors, visit our website at [www.analog.com/dsp](http://www.analog.com/dsp). Our web pages provide access to technical information and documentation, product overviews, and product announcements. You may also obtain additional information about Analog Devices and its products in any of the following ways:

- FAX questions or requests for information to 1(781)461-3010 (North America) or 089/76 903-557 (Europe Headquarters)
- Access the Digital Signal Processor Division File Transfer Protocol (FTP) site at [ftp ftp.analog.com](ftp://ftp.analog.com) or [ftp 137.71.23.21](ftp://137.71.23.21) or <ftp://ftp.analog.com>

## For DSP Technical or Customer Support

You can reach our Customer Support in the following ways:

- E-mail development tools questions to [dsptools.support@analog.com](mailto:dsptools.support@analog.com)
- E-mail processor questions to [dsp.support@analog.com](mailto:dsp.support@analog.com)
- Phone questions to 1800-ANALOGD
- Visit our World Wide Web site at [www.analog.com/dsp](http://www.analog.com/dsp)
- Telex questions to 924491, TWX: 710/394-6577
- Cable questions to ANALOG NORWOODMASS
- Contact your local ADI sales office or an authorized ADI distributor

- Send questions by mail to:

Analog Devices, Inc.  
DSP Division  
One Technology Way  
P.O. Box 9106  
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## Purpose of this Manual

The *VisualDSP++ 2.0 Assembler & Preprocessor Manual for ADSP-21xxx DSPs* provides information on the assembler and preprocessor development software, including syntax for command lines, switches, directives, and comments. This manual provides information about writing assembly programs for the ADSP-21xxx DSPs and provides reference information on related development software.

## Intended Audience

Programmers who are familiar with Analog Devices DSPs are the primary audience for this manual. This manual assumes that the audience has a working knowledge of Analog Devices DSP architecture and DSP instruction set.

DSP programmers who are unfamiliar with Analog Devices DSPs can use this manual, but should supplement this manual with other texts (such as a chip user's manual) describing the Analog Devices DSP architecture and DSP instruction set.

## Manual Contents Description

This manual contains the following chapters. Each chapter contains guide and reference sections. Guide sections provide software overview and usage procedures. Reference sections provide comprehensive information on command syntax and typical usage examples. For information on the assembler and preprocessor software, see the following chapters:

### Chapter 2 — Assembler

The guide section provides an overview of the process of writing and building assembly programs. The reference section provides information on the assembler's switches, expressions, keywords, and directives.

### Chapter 3 — Preprocessor

The guide section contains procedures for using preprocessor commands within your source files. The reference section contains information on the preprocessor's command syntax and provides usage examples.

## What's New in this Manual

This manual describes all assembler and preprocessor features implemented for ADSP-21xxx processors in VisualDSP++ 2.0 environment.

In addition to documenting all existing assembler and preprocessor features, this manual describes a set of directives and switches, including syntax and usage examples. The manual also covers binary object file formats and debugging capabilities of the assembler. In cases where new syntax has replaced the old one, this manual adds a note about the preferred usage and explains the changes.

## Related Documents

For information on development software and Analog Devices DSPs, see the following documents:

- *VisualDSP++ 2.0 User's Guide for ADSP-21xxx DSPs*
- *VisualDSP++ 2.0 C/C++ Compiler & Library Manual for ADSP-21xxx DSPs*
- *VisualDSP++ 2.0 Linker & Utilities Manual for ADSP-21xxx DSPs*
- *VisualDSP++ Kernel (VDK) User's Guide*
- The ADSP-21060/60L, ADSP-21061/61L, ADSP-21062/62L, ADSP-21065L, ADSP-21160 (preliminary), or ADSP-21161N (preliminary) data sheets

Your VisualDSP++ software distribution CD-ROM includes this and all of the listed publications. To access these documents within the VisualDSP++ environment, use the `Help Topics` command on the VisualDSP++ `Help` menu, click the `Reference` book icon, and select the `Online Manuals` topic. From this `Help` topic, you can open any of the manuals, which are in Adobe Acrobat PDF format. If you are not using VisualDSP++, you can manually access these PDF files from the CD-ROM using Adobe Acrobat.

Other related to your design DSP publications, such as hardware and instruction set reference manuals, are available for download from

[http://www.analog.com/industry/dsp/tech\\_doc/gen\\_purpose.html](http://www.analog.com/industry/dsp/tech_doc/gen_purpose.html)

## Conventions

The following are conventions that apply to all chapters. Note that additional conventions, which apply only to specific chapters, may appear throughout this document.

Table 1-1. Notation Conventions

Example	Description
<code>Close Command</code> ( <code>File Menu</code> )	Titles in reference sections indicate the location of an item within the VisualDSP++ environment's menu system (for example, the <code>Close</code> command appears on the <code>File</code> menu)
<code>[this   that]</code>	Optional items in syntax descriptions appear within brackets and separated by vertical bars; read the example as <code>this</code> or <code>that</code> .
<code>[this, that, ...]</code>	Optional item lists in syntax descriptions appear within brackets delimited by commas and terminated with an ellipse; read the example as <code>this</code> and <code>that</code> .
<code>[this,...]</code>	Optional item lists in syntax descriptions appear within brackets delimited by commas and terminated with an ellipse; read the example as an optional comma-separated list of <code>this</code> .
<code>.SECTION</code>	Commands, directives, keywords, and feature names are in text with letter gothic font.
<i>filename</i>	Non-keyword placeholders appear in text with <i>italic</i> style format.
	A note, providing information of special interest or identifying a related DSP topic.

The name *ADSP-21xxx DSP* refers to the entire family of Analog Devices 32-Bit SHARC processors:

- ADSP-21060/60L      ADSP-21062/62L      ADSP-21065L
- ADSP-21061/61L      ADSP-21160      ADSP-21161N