

# 1 INTRODUCTION

Thank you for purchasing Analog Devices' development software for Analog Devices Digital Signal Processors (DSP). The linker and utilities in the development software facilitate your DSP software development by providing the following services:

- A *linker* for arranging object files, producing an executable program
- An *archiver* (also called a librarian) for creating libraries of partially linked objects, speeding linking of often used routines.
- A set of *file conversion utilities* for porting legacy code generated using the 6.1 Release of the development tools, which was command-line driven.

VisualDSP++<sup>®</sup> 2.0 is Analog Devices development tools suite for Analog Devices DSP. It includes the following components: Integrated Development and Debugging Environment (IDDE), C/C++ optimizing compiler, assembler, linker, loader, splitter, RTOS, simulator, emulator software, help and documentation, and example programs.

This book contains information on the linker and utilities programs for the ADSP-21xx DSPs, Analog Devices' 16-bit, fixed-point digital signal processors for computing, communications, and consumer applications.



The ADSP-21xx Family includes the ADSP-218x and ADSP-219x DSPs ONLY --- no other DSPs are supported.

Currently, ADSP-21xx DSPs are as follows:

ADSP-2181, ADSP-2183, ADSP-2184/84L/84N,  
ADSP-2185/85L/85M/85N, ADSP-2186/86L/86M/86N,  
ADSP-2187L/87N, ADSP-2188M/88N, ADSP-2189M/89N,  
ADSP-2191, and ADSP-2192-12.

VisualDSP++ provides you with the following:

- An Integrated Development and Debugging Environment (IDDE) with support for editing programs, managing projects, and controlling build tools
- A source level, object oriented debugger (within IDDE) with support for DSP simulation and emulation
- Context-sensitive help for the development environment
- Online access to all documentation for this product, in PDF format

## **For Additional Information About Analog Products**

Analog Devices is online at <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 Processing Division FTP site:  
[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 Technical or Customer Support

You can reach our DSP Tools Customer Support in the following ways:

- E-mail questions to [dsptools.support@analog.com](mailto:dsptools.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:

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DSP Division  
One Technology Way  
P.O. Box 9106  
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### Purpose of This Manual

The *VisualDSP++ 2.0 Linker & Utilities Manual for ADSP-21xx DSPs* provides information on the linking process and describes the syntax for the linker's command language—a scripting language that the linker reads from the linker description file. This manual leads you through using the linker and archiver to produce DSP programs, and provides reference information on the file utility 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.

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

Chapters may contain guide and reference sections. Guide sections provide software usage procedures, typical usage examples, and error message information. Reference sections provide comprehensive information on menus, dialogs, and usage syntax.

This manual contains the following chapters.

- [Chapter 2–Linker](#)  
Describes the linker software and command line switches; shows how to use the linker description file to define your target DSP system for linking.
- [Chapter 3–Archiver](#)  
Describes the archiver software and command-line switches.
- [Chapter 4–ADSP-218x Loader](#)  
Provides an overview of the ADSP-218x loader software and command-line switches; shows how to use the different boot-kernels for booting different types of DSP systems.

- [Chapter 5–ADSP-2191 Loader](#)

Provides an overview of the ADSP-2191 loader software and command-line switches; shows how to use the different boot-kernels to perform the boot-loading through either various interface.

- [Chapter 6–ADSP-2192 Loader](#)

Provides an overview of the ADSP-2192 boot loader utility and run-time loader as well as command-line switches; shows how to perform the boot-loading ADSP-2192 DSPs through either PCI and USB interface.

- [Chapter 7–Splitter](#)

Provides an overview of the splitter software and command-line switches; shows how to prepare non-potable-PROM-image files, which execute from DSP external memory.

- [Appendix A–File Formats](#)

Lists and describes the file formats that the development tools use as inputs or produce as outputs.

- [Appendix B–Utilities](#)

Describes the file utilities that provide legacy and file conversion support.

- [Appendix C–Linker Legacy Support](#)

Describes legacy support issues for developers porting software developed with previous releases of the development tools (VisualDSP Release 6.1, VisualDSP Release 7.0 and previous).

## What's New in This Manual

This edition of the *VisualDSP++ 2.0 Linker & Utilities Manual for ADSP-21xx DSPs* documents linker support for VisualDSP++ and the new family of ADSP-219x processors. This support includes:

- Preprocessor commands (*e.g.* `#define`) are supported in Linker Description Files (LDFs). Also in the LDF, the `PACKING()` command supports `B0` (empty) bytes.
- The linker supports command-line switches for preprocessing macros and eliminating unused symbols.

## Related Documents

For information about development software and Analog Devices DSPs, see the following publications:

- *ADSP-218x DSP Hardware Reference*
- *ADSP-218x DSP Instruction Set Reference*
- *ADSP-219x/2191 DSP Hardware Reference*
- *ADSP-219x/2192 DSP Hardware Reference*
- *ADSP-219x DSP Instruction Set Reference*
- *VisualDSP++ 2.0 Getting Started Guide for ADSP-21xx DSPs*
- *VisualDSP++ 2.0 User's Guide for ADSP-21xx DSPs*
- *VisualDSP++ 2.0 Assembler and Preprocessor Manual for ADSP-218x DSPs*
- *VisualDSP++ 2.0 Assembler and Preprocessor Manual for ADSP-219x DSPs*

- *VisualDSP++ 2.0 C Compiler and Library Manual for ADSP-218x DSPs*
- *VisualDSP++ 2.0 C/C++ Compiler and Library Manual for ADSP-219x DSPs*
- *VisualDSP++ Kernel (VDK) User's Guide*
- The ADSP-2181, ADSP-2183, ADSP-2184/84L/84N, ADSP-2185/85L/85M/85N, ADSP-2186/86L/86M/86N, ADSP-2187L/87N, ADSP-2188M/88N, ADSP-2189M/89N, ADSP-2191, and ADSP-2192-12 data sheets (final or preliminary versions)

All of the manuals are included on the software distribution CD-ROM. To access these documents from the VisualDSP++, use the `Help Topics` command in the VisualDSP++'s `Help` menu and select the `Reference book` icon. From the `Online Manuals` 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.

## Conventions

The following conventions apply to all chapters. Additional conventions, which apply only to specific chapters, appear throughout this document.

Table 1-1. Notation Conventions

| Example                                                                             | Description                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>Close Command</code><br>( <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>                                                          | Alternative items in syntax descriptions appear within curly brackets and separated by vertical bars; read the example as <code>this</code> or <code>that</code> . One or the other is required.  |
| <code>[this   that]</code>                                                          | Optional items in syntax descriptions appear within brackets and separated by vertical bars; read the example as an optional <code>this</code> or <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.                                                                                                             |