
Preface

Things You Should Know When First Using CODE V

1. Read:
 - *How To Use This Manual*, which describes the special features of this Reference Manual.
 - *CODE V Documentation*, which describes the documentation provided with CODE V.
2. How you use this material is up to you, depending on your learning style and how quickly you have to come up to speed. Eventually you will acquire a mental “model” in your mind of CODE V’s structure and how things work; once you have this “user model” in mind, everything will seem more natural to you. We have designed the structure with great care to give you all of the power of CODE V and its interface to the computer’s operating system, and yet retain simplicity. The first appearance will be one of complexity, but as you use it you will see the simplicity.
3. Some people learn best by plunging in and trying things. If you are one, try the following “quick study” course:
 - Browse through Chapter 1, *Operating CODE V*, picking up enough to sign on and know what other material is in there for future reference.
 - Get the concept of Immediate Commands (“Immediate Commands” on page 1-30 and “Immediate Commands/Defaults” on page 24-9), so that when you want to change your working environment, you will know where to look. You can also put them into a file (DEFAULTS.SEQ) that will set up your own chosen environment each time you sign on to CODE V.
 - Get the concept that you feed in lens data and get it into shape for other calculations through the Lens Data Manager (the LDM). The LDM is described in Chapters 2-16. The lens data is available to you and to the rest of the program at all times, until you start another lens or exit.
 - The “other calculations” are called “options” and comprise Chapters 17-24. In between options, you are automatically back in the LDM (shown by the CODE V> prompt on the command line), ready to change lens data or run other options.
 - When you are in the LDM, it can accept LDM commands and Immediate commands. When you are in an option (shown by XXX> prompt on the command line, where XXX is the option mnemonic), it can accept its own commands and Immediate commands. (Immediate commands are valid anytime).
 - A few options can alter the lens (Automatic Design to optimize, TOR to generate tolerances, etc.), but most analyze different aspects of the lens, or generate information for mechanical design and fabrication.

Now try CODE V, using the following additional information:

- If you want to use the Graphical User Interface (GUI) for input and control, browse through “Exploring the CODE V Workspace” on page 1-46 and then try the *Test Drive* or *Introductory User’s Guide*.
 - If you want to use commands on the command line, you need to understand the rules given in “Command Entry Rules” on page 1-39 which shows you how to read the commands as written in the *Reference Manual* and the *Prompting Guide*, and how to type them in. But don’t worry, the syntax checker will let you know what, if anything is wrong.
4. If you want a more leisurely pace before you try CODE V, there isn’t any, except to read a little more in this section and do a quick scan of the other parts of this manual and the other documents so you will know where to find things.
 5. If all else fails, contact our Technical Support. We offer telephone support every working day, plus seminars several times a year. Look up our Web site, <http://www.opticalres.com>, to get details about how to contact us or our latest seminar schedule.



Note: Once you are familiar with commands, look at the Macro Command Language (Chapter 25, *Macro-PLUS*). You do not have to use the language, but you may find that it offers easier alternatives for control and input, great flexibility for handling special problems, and letting you extend the functionality of CODE V.

How To Use This Manual

Reference Manual Style Features

- **Comprehensive table of contents** for the entire Reference Manual at the beginning of each volume.
- **Table of contents** for each chapter, with contiguous page numbering within each chapter, to help in quickly finding topics of interest.
- **Indexes** for the whole Reference Manual. These currently include an Option Index, and a Command and Subject Index.

Commands and their equivalents in the GUI are summarized in an easy-to-read, boxed format. For example, the feature allowing you to evaluate the value of a macro expression is described as follows:

Command Syntax		
Screen Control	Explanation	Default
WRX x_beam_half_width....z		
Beam half width: X-direction	Specifies initial beam-width radius (at the object plane) at the $1/e^2$ intensity point in the X meridian.	None. Either X-direction or Y-direction (WRX or WRY) must be entered; if one is omitted, it will be set equal to the other.

Each component in this table format has the following purpose:

Syntax Statement

Follows rules for reading and entry defined in “Command Entry Rules” on page 1-39. Commands that represent variables and their control codes for Automatic Design have a reference to their partner added to the syntax box (see, for example, the CUY command).

Screen Control

Identifies the feature used in the GUI to perform the described command.

Explanation

In general, a concise but complete description of what the command does, and its limitations. Examples of correct syntax are included if they are needed to clear up ambiguities, but not to illustrate optical points. Examples of multiple commands to accomplish a particular task are placed in nearby sections on usage or discussion of input and output.

Default

Describes the predefined value for a command. If the command is omitted, the default describes what value is used by CODE V for that parameter. If no default is given, there is no default action. If the command, when issued, has values that are supplied by default, they are provided in the explanation section.

Style Features

LDM (Lens Data Manager)

Chapters 2-16

These sections contain summaries of commands for GUI and command-line users, step-by-step instructions for using these commands in the GUI, and “What You Need to Know” sections that contain detailed information about the LDM features in CODE V.

Options

Purpose

Provides a quick overview of what the option does, so you can tell whether it is the one you need. Also it is in the chapter Table of Contents, for the same purpose.

When to Use

Provides information about when you should use the option, more details about what the option does, and details about any interactions of the option with other features in CODE V.

Default Operation

Tells what will happen when the option is run with no additional option commands - the base on which you can build and modify the option's action. This usually is the simplest, most frequently used, and/or most optically logical use of the option.

Command Mnemonics (alphabetical)

Provides a summary list of the command mnemonics so that you can verify by quick scan that the one you are looking for is there.

Commands

Descriptions of commands are organized by topic; each topic describes a group of commands related to achieving a particular task. For example, all commands in an option that relate to setting up drawing parameters would be organized in a topic called, “Defining Plotting Parameters.”

Discussion of Input and Computations

Discusses the default computations, nuances of commands (HOW, WHEN and WHY to use), how commands affect the computation and are used to solve particular optical problems, and examples of input.

Description of Output

Covers interpretation of output, how commands can alter the form of output and examples of commands needed to generate specific listings or plots. Included are examples of runs you can make to duplicate the output shown.

Technical Notes

If present, provide information and references which may contribute to the understanding of the behavior of the CODE V option.

For each option, the portion of text that is likely to be needed most frequently (when to use the option and default operation) is first, to aid in quick reference. The remaining sections need to be read once or are referenced infrequently.

Immediate Commands/Defaults

Explanatory notes are in a Usage section following the commands.

Utility Functions/Options

Like other options, explanatory notes are covered in discussions of input and output.

CODE V Documentation

What is included in the documentation set?

The full CODE V documentation set consists of:

1. *Introductory User's Guide*
2. *Test Drive* (an introduction to the GUI)
3. *Prompting Guide*
4. Reference Manual - This manual, in four volumes
5. *Photonics Modeling Guide*

What is the best way to use these materials?

Introductory User's Guide

The best place to start for understanding CODE V and its use:

- A comprehensive introduction to CODE V using the GUI and sampling most frequently used features
- Examples of how to use CODE V to design and evaluate lenses, with examples using both the GUI and command line

Test Drive

Best for a short (1 hour) self-guided demonstration of simple operations in CODE V.

Prompting Guide

Best for the command line user; familiar commands will have enough material that no further information is needed; unfamiliar commands will trigger use of the Reference Manual for more detail. Contains:

- The complete command syntax definition for every command
- An identifying phrase with critical information
- An abbreviated representation of the default effect of omitting the command (it sometimes serves as an example, also).

Reference Manual

The most complete definition of CODE V.

Photonics Modeling Guide

Provides step-by-step instructions for setting up several common telecom systems.

Why is the Reference Manual in multiple volumes?

Our goals are to provide:

- The most comprehensive program:
 - Over 1,000 commands are available to model almost any conceivable lens system and to apply a broad range of calculations to it. More than 350 commands are available just to describe the attributes of the lens itself (in the LDM).
- The easiest-to-use program:
 - Only about 10 LDM commands are needed to describe centered lens systems
 - Useful, optically valid defaults are provided for missing data
 - In almost all options, defaults produce standard results that are useful in their entirety or as a building block for further runs
 - A full help facility of several levels is available at all times
 - Comprehensible messages that give information about what is happening, warnings of possible problems, and errors on unallowable inputs
- A designer-oriented tool:
 - Planned and developed by active optical engineers, for optical engineers, for efficiency of use