

# STEP Translators User Guide

---

CADD5® 5i Release 11

DOC40005-006

---

**Copyright © 2001 Parametric Technology Corporation. All Rights Reserved.**

User documentation from Parametric Technology Corporation (PTC) is subject to copyright laws of the United States and other countries and is provided under a license agreement, which restricts copying, disclosure, and use of such documentation. PTC hereby grants to the licensed user the right to make copies in printed form of PTC user documentation provided on software or documentation media, but only for internal, noncommercial use by the licensed user in accordance with the license agreement under which the applicable software and documentation are licensed. Any copy made hereunder shall include the Parametric Technology Corporation copyright notice and any other proprietary notice provided by PTC. User documentation may not be disclosed, transferred, or modified without the prior written consent of PTC and no authorization is granted to make copies for such purposes.

Information described in this document is furnished for general information only, is subject to change without notice, and should not be construed as a warranty or commitment by PTC. PTC assumes no responsibility or liability for any errors or inaccuracies that may appear in this document.

The software described in this document is provided under written license agreement, contains valuable trade secrets and proprietary information, and is protected by the copyright laws of the United States and other countries. UNAUTHORIZED USE OF SOFTWARE OR ITS DOCUMENTATION CAN RESULT IN CIVIL DAMAGES AND CRIMINAL PROSECUTION.

**Registered Trademarks of Parametric Technology Corporation or a Subsidiary**

Advanced Surface Design, CADD5, CADDShade, Computervision, Computervision Services, Electronic Product Definition, EPD, HARNESSDESIGN, Info\*Engine, InPart, MEDUSA, Optegra, Parametric Technology, Parametric Technology Corporation, Pro/ENGINEER, Pro/HELP, Pro/INTRALINK, Pro/MECHANICA, Pro/TOOLKIT, PTC, PT/Products, Windchill, InPart logo, and PTC logo.

**Trademarks of Parametric Technology Corporation or a Subsidiary**

3DPAINT, Associative Topology Bus, Behavioral Modeler, BOMBOT, CDRS, CounterPart, CV, CVact, CVaec, CVdesign, CV-DORS, CVMAC, CVNC, CVToolmaker, DesignSuite, DIMENSION III, DIVISION, DVSAFEWORK, DVS, e-Series, EDE, e/ENGINEER, Electrical Design Entry, Expert Machinist, Expert Toolmaker, Flexible Engineering, *i*-Series, ICEM, Import Data Doctor, Information for Innovation, ISSM, MEDEA, ModelCHECK, NC Builder, Nitidus, PARTBOT, PartSpeak, Pro/ANIMATE, Pro/ASSEMBLY, Pro/CABLING, Pro/CASTING, Pro/CDT, Pro/CMM, Pro/COMPOSITE, Pro/CONVERT, Pro/DATA for PDGS, Pro/DESIGNER, Pro/DESKTOP, Pro/DETAIL, Pro/DIAGRAM, Pro/DIEFACE, Pro/DRAW, Pro/ECAD, Pro/ENGINE, Pro/FEATURE, Pro/FEM-POST, Pro/FLY-THROUGH, Pro/HARNESS-MFG, Pro/INTERFACE for CADD5, Pro/INTERFACE for CATIA, Pro/LANGUAGE, Pro/LEGACY, Pro/LIBRARYACCESS, Pro/MESH, Pro/Model.View, Pro/MOLDESIGN, Pro/NC-ADVANCED, Pro/NC-CHECK, Pro/NC-MILL, Pro/NC-SHEETMETAL, Pro/NC-TURN, Pro/NC-WEDM, Pro/NC-Wire EDM, Pro/NCPOST, Pro/NETWORK ANIMATOR, Pro/NOTEBOOK, Pro/PDM, Pro/PHOTORENDER, Pro/PHOTORENDER TEXTURE LIBRARY, Pro/PIPING, Pro/PLASTIC ADVISOR, Pro/PLOT, Pro/POWER DESIGN, Pro/PROCESS, Pro/REPORT, Pro/REVIEW, Pro/SCAN-TOOLS, Pro/SHEETMETAL, Pro/SURFACE, Pro/VERIFY, Pro/Web.Link, Pro/Web.Publish, Pro/WELDING, Product Structure Navigator, PTC *i*-Series, Shaping Innovation, Shrinkwrap, The Product Development Company, Virtual Design Environment, Windchill e-Series, CV-Computervision logo, DIVISION logo, and ICEM logo.

**Third-Party Trademarks**

Oracle is a registered trademark of Oracle Corporation. Windows and Windows NT are registered trademarks of Microsoft Corporation. Java and all Java based marks are trademarks or registered trademarks of Sun Microsystems, Inc. CATIA is a registered trademark of Dassault Systems. PDGS is a registered trademark of Ford Motor Company. SAP and R/3 are registered trademarks of SAP AG Germany. FLEX $m$  is a registered trademark of GLOBEtrouter Software, Inc. VisTools library is copyrighted software of Visual Kinematics, Inc. (VKI) containing confidential trade secret information belonging to VKI. HOOPS graphics system is a proprietary software product of, and copyrighted by, Tech Soft America, Inc. All other brand or product names are trademarks or registered trademarks of their respective holders.

---

---

**UNITED STATES GOVERNMENT RESTRICTED RIGHTS LEGEND**

This document and the software described herein are Commercial Computer Documentation and Software, pursuant to FAR 12.212(a)-(b) or DFARS 227.7202-1(a) and 227.7202-3(a), and are provided to the Government under a limited commercial license only. For procurements predating the above clauses, use, duplication, or disclosure by the Government is subject to the restrictions set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software Clause at DFARS 252.227-7013 or Commercial Computer Software-Restricted Rights at FAR 52.227-19, as applicable.

**Parametric Technology Corporation, 140 Kendrick Street, Needham, MA 02494-2714**

**8 January 2001**

---



---

# Table of Contents

---

## Preface

Related Documents .....	ix
Book Conventions .....	x
Window Managers and the User Interface .....	xi
Online User Documentation .....	xi
Online Command Help .....	xii
Printing Documentation .....	xii
Resources and Services .....	xiii
Documentation Comments .....	xiii

## Introduction

What is STEP? .....	1-2
What are STEP Translators? .....	1-3
Preparing to Use the STEP Translator .....	1-4
Who Needs STEP Translators? .....	1-5
Definitions .....	1-6
Application Protocol .....	1-6
Product Information .....	1-6
Resource Model .....	1-6

---

## The Translation Process

Translation: STEP-CADDS Using Application Protocols _____	2-2
Limitations _____	2-2
The Put Commands Limitation _____	2-2
The Get Commands Limitations _____	2-3
File and Path Name Conventions _____	2-3
Translating Non-geometric Data _____	2-4
Translation Parameters _____	2-5
Comments _____	2-5
Section Headers _____	2-5
Parameter Name and Value _____	2-5
Equals Sign and Semicolon _____	2-6
Text String _____	2-6
Translation Output _____	2-7
Status Output _____	2-7
Log File _____	2-7

## Translating Data from CADDS to STEP: The Put Commands

PUTAP203 _____	3-2
Command _____	3-2
Command Line Parameters _____	3-2
Quitting the Translator _____	3-4
Importing CADDS Parts from CGOS _____	3-4
Extracting CADDS Parts from Optegra _____	3-4
Sample Translation _____	3-5
PUTAP214 _____	3-9

## Translating Data from STEP to CADDS: The Get Commands

GETAP203 _____	4-2
Command Line _____	4-2

---

Command Line Parameters _____	4-2
Quitting the Translator _____	4-4
Sample Translation _____	4-5
GETAP214 _____	4-8

## User Interface for STEP Protocols

Overview of User Interface for STEP Protocols _____	5-2
Setting up Datashop _____	5-2
Activating the Datashop _____	5-2
Using the Options on the Datashop Interface _____	5-4
Options in the Translator Selector Window _____	5-4
Overview of the Working Window _____	5-8
Using the Options on the Working Window _____	5-8

## Entity Mapping Tables

CADDS to AP 203 (Put and Get) _____	A-2
AP203 (Put and Get) to CADDS _____	A-4
CADDS to AP214 (Put and Get) _____	A-8
AP214 (Put and Get) to CADDS _____	A-9

## List of Messages

Message Types _____	B-2
Message List _____	B-3

## Glossary





---

# Preface

---

*STEP Translators User Guide* tells you how to use STEP translators to convert CADDs data to STEP data and vice versa. Through this data exchange process, manufacturers, suppliers, customers and others can share product information.

## Related Documents

The following documents may be helpful as you use *STEP Translators User Guide*:

- *PTC Translator Products User Guide*
- *Application Protocol IS 10303 - 203*
- *Application Protocol DRAFT 10303 - 214*
- *Express Language ISO 10303 - 11*

## Book Conventions

The following table illustrates and explains conventions used in writing about CADDs applications.

Convention	Example	Explanation
Menu selections and options	List Section option, Specify Layer field	Indicates a selection you must make from a menu or property sheet or a text field that you must fill in.
User-selected graphic location	X, d <sub>1</sub> or P1	Marks a location or entity selection in graphic examples.
User input in CADDs text fields and on any command line	<code>cvaec.hd.data.param</code> <code>tar -xvf /dev/rst0</code>	Enter the text in a CADDs text field or on any command line.
System output	<code>Binary transfer complete.</code>	Indicates system responses in the CADDs text window or on any command line.
Variable in user input	<code>tar -cvf /dev/rst0 filename</code>	Replace the variable with an appropriate substitute; for example, replace filename with an actual file name.
Variable in text	<b>tagname</b>	Indicates a variable that requires an appropriate substitute when used in a real operation; for example, replace <b>tagname</b> with an actual tag name.
CADDs commands and modifiers	INSERT LINE TANTO	Shows CADDs commands and modifiers as they appear in the command line interface.
Text string	"SRFGROUPA" or 'SRFGROUPA'	Shows text strings. You must enclose text string with single or double quotation marks.
Integer	n	Supply an integer for the <i>n</i> .
Real number	x	Supply a real number for the <i>x</i> .
#	# <code>mkdir /cdrom</code>	Indicates the root (superuser) prompt on command lines.
%	% <code>rlogin remote_system_name</code> <code>-l root</code>	Indicates the C shell prompt on command lines.
\$	\$ <code>rlogin remote_system_name -l</code> <code>root</code>	Indicates the Bourne shell prompt on command lines.

## Window Managers and the User Interface

According to the window manager that you use, the look and feel of the user interface in CADDs can change. Refer to the following table:

**Look and Feel of User Interface Elements**

User Interface Element	Common Desktop Environment (CDE) on Solaris, HP, DEC, and IBM	Window Manager Other Than CDE on Solaris, HP, DEC, IBM, SGI, and NT
Option button	ON — Round, filled in the center OFF — Round, empty	ON — Diamond, filled OFF — Diamond, empty
Toggle key	ON — Square with a check mark OFF — Square, empty	ON — Square, filled OFF — Square, empty

## Online User Documentation

Online documentation for each book is provided in HTML if the documentation CD-ROM is installed. You can view the online documentation in the following ways:

- From an HTML browser
- From the Information Access button on the CADDs desktop or the Local Data Manager (LDM)

Please note: The LDM is valid only for standalone CADDs.

You can also view the online documentation directly from the CD-ROM without installing it.

From an HTML Browser:

1. Navigate to the directory where the documents are installed. For example,
  - `/usr/apl/cadds/data/html/htmldoc/` (UNIX)
  - `Drive:\usr\apl\cadds\data\html\htmldoc\` (Windows NT)
2. Click `mainmenu.html`. A list of available CADDs documentation appears.
3. Click the book title you want to view.

From the Information Access Button on the CADDs Desktop or LDM:

1. Start CADDs.
2. Choose Information Access, the *i* button, in the top-left corner of the CADDs desktop or the LDM.
3. Choose DOCUMENTATION. A list of available CADDs documentation appears.
4. Click the book title you want to view.

From the Documentation CD-ROM:

**1. Mount the documentation CD-ROM.**

**2. Point your browser to:**

CDROM\_mount\_point/html/doc/mainmenu.html (UNIX)

CDROM\_Drive:\html\doc\mainmenu.html (Windows NT)

## Online Command Help

You can view the online command help directly from the CADDSS desktop in the following ways:

- From the Information Access button on the CADDSS desktop or the LDM
- From the command line

From the Information Access Button on the CADDSS Desktop or LDM:

- 1. Start CADDSS.**
- 2. Choose Information Access, the *i* button, in the top-left corner of the CADDSS desktop or the LDM.**
- 3. Choose COMMAND HELP. The Command Help property sheet opens displaying a list of verb-noun combinations of commands.**

From the Command Line: Type the exclamation mark (!) to display online documentation before typing the verb-noun combination as follows:

```
#01#!INSERT LINE
```

## Printing Documentation

A PDF (Portable Document Format) file is included on the CD-ROM for each online book. See the first page of each online book for the document number referenced in the PDF file name. Check with your system administrator if you need more information.

You must have Acrobat Reader installed to view and print PDF files.

The default documentation directories are:

- /usr/apl/caddss/data/html/pdf/doc\_number.pdf (UNIX)
- CDROM\_Drive:\usr\apl\caddss\data\html\pdf\doc\_number.pdf (Windows NT)

## Resources and Services

For resources and services to help you with PTC (Parametric Technology Corporation) software products, see the *PTC Customer Service Guide*. It includes instructions for using the World Wide Web or fax transmissions for customer support.

## Documentation Comments

PTC welcomes your suggestions and comments. You can send feedback in the following ways:

- Send comments electronically to `doc-webhelp@ptc.com`.
- Fill out and mail the PTC Documentation Survey located in the *PTC Customer Service Guide*.



# Introduction

---

This chapter describes the components and function of STEP Translators and the commands used to run them. It also defines some terms used in this document.

- What is STEP?
- What are STEP Translators?
- Preparing to Use the STEP Translator
- Who Needs STEP Translators?
- Definitions

## What is STEP?

The Standard for the Exchange of Product Model Data (STEP) is a set of standards used for the exchange of configuration management data and three-dimensional designs of mechanical parts and assemblies between application systems. It consists of:

- a set of parts describing data formats and usage called resource models and application protocols
- implementation standards

STEP is used to standardize product information worldwide. Product information is used by manufacturers, customers, suppliers and others to design, produce, and maintain products.

Translation between STEP and CAD/CAM systems such as CADDs is carried out using the application protocols.

The language used to specify information models in STEP is EXPRESS. This language was developed specifically for modeling engineering data. It conforms to a formal syntax that can be processed by computer software.



## What are STEP Translators?

STEP translators convert data from a CAD/CAM system to STEP data and vice versa.

Currently, bidirectional translation of CADDs and STEP data requires two STEP application protocols: AP203 and AP214. These application protocols use the commands `put` and `get`.

The commands are issued at the operating system prompt and are listed in the following table:

<b>Commands</b>	<b>Description</b>
<code>putap203</code>	Translates CADDs data to STEP AP 203 and optionally translates CADDs data to STEP AP 214
<code>getap203</code>	Translates a STEP AP 203 file to a CADDs part and optionally translates a STEP AP 214 file to a CADDs part

## Preparing to Use the STEP Translator

Issue the following command, before using STEP on the SUN, HP and Digital Platforms:

```
chmod 755 /usr/spl/cvtrans/cvuts/scripts/*tap2*
```

To prepare for using STEP on an HP Platform only, issue the following commands:

```
chown root /usr/apl/cvtrans/cvuts/scripts/*tap*  
chgrp other /usr/apl/cvtrans/cvuts/scripts/*tap2*
```

## Who Needs STEP Translators?

CADD users who want to exchange product model data and product information with users of other CAD/CAM systems need STEP Translators. This user guide helps them in using these translators.

# Definitions

## Application Protocol

An application protocol permits the implementation of bidirectional translation between STEP and CAD/CAM systems (for example, CADD5).

An application protocol defines a standard subset of integrated resources and semantics for the use of these resources. It provides an application-specific interpretation of the context-independent entities.

## Product Information

Product information is the complete set of data associated with a product, that is, information relating to engineering design, manufacturing, analysis, service, documentation, and requirements.

## Resource Model

A resource model defines and handles collection of information models, each of which, groups all the logically related data entities. Each resource model is detailed in a separate STEP part.

Resources are of two types:

- Integrated Generic Resources such as shape representation, presentation, product structure and configuration management
- Integrated Application Resources such as drafting, finite element analysis, and kinematics

# The Translation Process

---

This chapter describes the aspects of STEP-CADDS translation, application protocols used, limitations, file and path name conventions and non-geometric data translation. It also describes, with examples, the configuration file that contains parameters for translation and the output log file.

- Translation: STEP-CADDS Using Application Protocols
- Translation Parameters
- Translation Output

# Translation: STEP-CADDS Using Application Protocols

Bidirectional translation between STEP and CADDS is carried out using two application protocols:

- AP203: Configuration Controlled Design (Mechanical Applications) (IS)

AP203 consists of two logical parts:

- Configuration Management (CM) data
- Geometry data

There are six conformance classes in AP203:

Class 1: CM data only

Class 2: CM data, non-topology surface and wireframe

Class 3: CM data, wireframe with topology

Class 4: CM data, manifold surface with topology

Class 5: CM data, faceted BREP (Boundary REPresentation)

Class 6: CM data, advanced BREP

CM data is read by the translator from an AP203 Class 1 file. CADDS closed solid models are converted to STEP AP 203 Advanced Brep Solid (Class 6). CADDS open shell models are converted to AP 203 Manifold Surface models with topology representation (Class 4). Only four of the six conformance classes are supported: 1, 2, 4, and 6.

- AP214: Core Data for Automotive Mechanical Design Processes (Work Draft Stage)

## Limitations

The limitations on the `Put` and `Get` commands are specified in this section.

### The Put Commands Limitation

AP203 does not support subfigures. Any subfigure encountered during translation is decomposed into its constituent geometry. A loop-back in the opposite direction does not create any subfigures in the CADDS part.

## The Get Commands Limitations

- FACE\_BOUND entities that reference VERTEX\_LOOP entities are not supported.
- Translation of CM data to the AP203 Class 1 file is not supported.

## File and Path Name Conventions

You can apply either the file and path name conventions for the CADDSS Graphical Operating System (CGOS) or for UNIX. The differences between the pathname and extension separators in CGOS and UNIX are described in the table below.

	CGOS	UNIX
Root directory	= (equals)	/ (slash)
Path separator	. (period)	/ (slash)
Extension	. (period)	@ (at)
Underscore	_ (underscore)	& (ampersand)

- Do not use the ampersand character (&) as the last character in filenames that you enter from the operating system. The operating system interprets “&” as a command to put a process into the background. If you need to use “&” as your last character, precede it with a backslash, for example:

```
=user.trans.test.part\&
```

This is interpreted as:

```
/user/trans/test/part_
```

- Use only lowercase characters in your path names. Uppercase characters are automatically converted into lowercase characters within CADDSS.
- Assume that a `_bcd` directory called `/users/trans/test/_bcd` exists.
  - To create an AP203 or AP214 file called `/users/trans/test/_bcd/part1.stp` (or `=user.trans.test._bcdpart1@stp` in the CGOS mode), specify the STEP file `part1.stp` file as `/users/trans/test/_bcd/part1.stp` or `/users/trans/test/part1.stp`. In either case, the `part1.stp` file is placed in the `_bcd` directory.
  - To read an AP203 file called `/users/trans/test/_bcd/step2.stp`, specify the file as `/users/trans/test/step2.stp` or `/users/trans/test/_bcd/step2.stp`
- If a `_bcd` directory does not exist, then a new file is created with the name `/users/trans/test/part1.stp`

The path and file name requirements for CADDs, IGES, and STEP files for Translators are:

- The path and file name of a CADDs part must not exceed 60 characters. Directory names can be 20 characters or fewer. A CADDs part name must be shorter than 20 characters.
- The combined path and file name of the IGES/VDA file must not exceed 60 characters. Directory names can be 19 characters or fewer. IGES and VDA file names cannot exceed 20 characters.
- You can specify any length for STEP path or file names.

## Translating Non-geometric Data

A Configuration Management file may contain non-geometric data that adds product information relating to Configuration Management and product structure



# Translation Parameters

Various parameters are used to control the translation process. These parameters and the associated values can be specified in the configuration file. This is an ASCII file that contains the parameters required to run the translators. This file can be used either without any modification, or it can be altered.

The syntax used in the configuration file is as follows:

```
/* Configuration File Comments. */  
  
section_header:          /* Start of section */  
  
parameter1 = 37;        /* Integer value */  
  
parameter2 = 48.9;      /* Real value */  
  
parameter3 = "string value"; /* Text string */
```

## Comments

- Comments are enclosed between the characters, /\* \*/.
- Comments may appear after a "#". In this case, the rest of the data on the physical line is considered to be a comment.
- Comments may appear anywhere in the file.

## Section Headers

Section headers are used to divide the configuration file into sections, one for each translator. Parameters in the same section are associated. Each section is named after the translator to which it corresponds, that is, GET203 and PUT203.

## Parameter Name and Value

- The parameter name may be located anywhere in the file after the section header.
- A parameter name and value pair may span more than one physical line but the name and value must be separated by an equal sign.
- All parameters are assumed to be case-insensitive.
- A value must be followed by a semicolon. There cannot be an equal sign within a parameter value.

## Equals Sign and Semicolon

There may be a zero or one or more blank spaces before and after the equals sign and before and after the semicolon.

## Text String

If a value represents a text string, it must be enclosed in double quotes.

Only one configuration file is needed for the AP203 or the AP214 translator. Groups of parameters needed for each translator may exist in the same file separated by section headers or they may exist in separate files. The specific configuration file parameters used by each translator are described later.

The file name parameter may include a directory path. If the path is not specified, the current directory is assumed.

An example of a configuration file is provided below.

```
/* Configuration file example */
PUT203:
ap_file           = "test.step";
part_name        = "testpart";
log_file         = "test.log";
cm_file          = "cmfile.cm";
file_create      = "overwrite";
cgos_mode        = "no";
class_filter     = "all";
class_force      = "all";
max_msg          = -1; /* -1 = no limit */
pnt_tol          = 0.0001;
trace            = "no";
pcurve          = "no";

description      = "CADDs part geometry";
author           = "PTC";
organization     = "PTC";
authorization    = "PTC";
/* end of parameters */
```

# Translation Output

Each invocation of a STEP AP203 or AP214 translator produces:

- informational output, including status messages written to the standard output, and
- a log file

## Status Output

The translator generates a banner and messages on start up, during processing. These messages provide information about:

- the translator product being used
- the CADDs part or STEP file being processed
- processing status
- the completion of the translation

During processing, the translator indicates the percentage of translation that has been completed by a PERCENTAGE DONE indicator.

It indicates the start of the translation process by a banner such as the one below.

```
          CADDs STEP AP 203 Tool
          Put Translator
          Version 1.3
*****
DATE: Mon, Mar 18, 1996
TIME: 14:05:58
*****
CADDs part being read   : testpart
STEP file being written : test.step
TOTAL CADDs ENTITIES READ : 13
PERCENT FINISHED      : 100.0%
```

## Log File

The log file contains a record of all that was found during translation - a summary of the data translated, the configuration parameters, native and target entity counts, informational and error messages, date, time and so forth.

The content of the log file varies for different translators.

A sample log file generated during a generic conversion is presented in the remaining part of this section.

CADDS STEP AP203 Tool  
Put Translator  
Version 1.3

=====  
Date: Wed, jun 12, 1996  
Time: 10:49:52  
=====

=====  
Configuration File Parameters:  
=====

Configuration file name: put.cfg  
part\_name: testpart  
cm\_file: None specified  
ap\_file: \_bcd/test.step  
file\_create: overwrite  
log\_file: \_bcd/test.log  
class\_filter: all  
class\_force: all  
max\_msg: -1  
cgos\_mode: no  
file\_create: overwrite  
pnt\_tol: 0.000100;  
trace: no  
trans\_type ap203  
pcurve: no  
description: CADDS part geometry  
author: PTC  
organization: PTC  
authorization:PTC

=====  
Cadds Parts Processed :  
=====

CADDS part name: testpart  
=====

CADDS Entities Found in part :

TypeEntity Name	Count
3Line	400
5Arc/Circle	153
12N-Spline	1206
14N-Surface	458
16Tabulated Cylinder	120
17Surface of Revolution	6
18Ruled Surface	67
88Plane/Face/Hole	78
91solid or Trimmed Surface	1
92Face	729
93Edge	1759
94Vertex	1033

-----  
Total 6010

```

=====
STEP File Header Section Entities:
-----
File_description:
=====
description: Cadds part geometry
implementation_level: 1
File_name:
=====
name: _bcd/test.step
time_stamp: 1996-03-18T14:05:58
author: PTC
organization: Italcad spa
preprocessor_version: CADD5 STEP AP203 Tool, Put translator
originating_system: PTC - CADD5
authorization: PTC
File_schema:
=====
schema_identifiers: config_control_design
  
```

```

=====
Entity Summary for Data Section:
-----
  
```

TypeEntity Name	Count
13approval_date_time	3
29document_type	1
36document	1
58product_definition_with_associated_documents	1
8010b_spline_curve_with_knots	289
8012b_spline_surface_with_knots	207
8013cartesian_point	67666
8018closed_shell	1
8035edge_curve	1759
8036edge_loop	754
8043face_bound	25
8044face_outer_bound	729
8055manifold_solid_brep	1
8062oriented_edge	3518
8079quasi_uniform_curve	400
8104trimmed_curve	12
8110vertex_point	1033
8203product_related_product_category	1
8206application_context	1
8215product_category_relationship	1
8216plane_angle_measure_with_unit	1
8219dimensional_exponents	1
8223advanced_brep_shape_representation	1
8224product	1
8228product_definition_shape	1
8230advanced_face	729

8238product_category	1
8240shape_definition_representation	1
8247mechanical_context	1
8249uncertainty_measure_with_unit	1
8300application_protocol_definition	1
8301security_classification	1
8302security_classification_level	1
8303person	8
8304organization	8
8306person_and_organization	8
8307approval_person_organization	3
8308approval_role	3
8309approval	3
8311cc_design_approva	13
8312date_and_time	5
8313calendar_date	5
8314local_time	5
8315coordinated_universal_time_offset	5
8316person_and_organization_role	5
8319cc_design_security_classification	1
8321cc_design_person_and_organization_assignment	5
8322cc_design_date_and_time_assignment	2
8323product_definition_formation_with_specified_source	1
8324date_time_role	2
8326approval_status	3
8327design_context	1
8999external_map	5
=====	
Total	77225
=====	
Error Summary:	
Information:	0
Status:	0
Warning:	0
Error:	0
Fatal:	0
=====	
Elapsed Time:	
-----	
Processor:	00:03:33
Clock:	00:04:39
=====	

# Translating Data from CADD5 to STEP: The Put Commands

---

This chapter describes and provides an example of the `put` commands that translate data from CADD5 to STEP. It describes the command line syntax and parameters. It also explains how CADD5 parts are imported from CGOS and Optegra.

- PUTAP203
- Sample Translation
- PUTAP214

## PUTAP203

This command translates CADD5 geometry and configuration management data to STEP AP203.

### Command

Use the following syntax to invoke the program:

```
putap203 config_file_name [parameter_name parameter_value]
```

where:

Command parameters	Description
PUTAP203:	CADD5 to AP203 data translator
config_file_name:	Path and file name of the translator configuration file
parameter_name:	Configuration parameter. This name must be that of one of the configuration file parameters
parameter_value:	Value used to set a named configuration parameter

### Command Line Parameters

- The configuration file name is a necessary command line parameter and it is always the first parameter.
- Other command line parameters may be name/value pairs that override the configuration file parameter values. It is not necessary that all parameters be specified during translation.

The following parameters specify options for the CADD5 to AP203 translator:

Parameter Name	Type	Description and Value
ap_file	string	STEP AP203 file name
part_name	string	CADD5 part name to be translated. Default CM data will be created.



Please note: The CADDs part name works in conjunction with the CV\_PATH environment variable.

Parameter Name	Type	Description and Value
cm_file	string	Specifies the filename for the incoming AP 203 Class 1 data (CM). If no CM file is specified, default CM data will be created. Otherwise, the CM data from the specified file will be used.
log_file	string	Specifies the filename for the output log file.
max_msg	int	Specifies the maximum number of times a particular message will be put out to the logfile. A value of -1 specifies no limit.
file_create	string	Specifies whether to overwrite any existing ap_file of the same name. The other option is to specify "no overwrite".
class_filter	string	Specifies which class to filter. This will leave just the geometry of the desired class. all = translates all data (default). C2 = translates surface and wire frame geometry only. C4 = translates surface with topology only. C6 = translates brep with topology only.
class_force	string	Specifies the highest class that will be created. All geometry of higher classes will be forced to the class specified. all = outputs geometry of all classes (default). C4 = converts solids to C4 class. Any C2 class geometry will be output as C2. C2 = converts all entities to surface and wire frame geometry only (no topology).
pnt_tol	float	Specifies the point coincidence tolerance. The default value is 0.00001.
cgos_mode	string	no = absolute UNIX path names apply (default). yes = CGOS path names apply.
trace	string	no = Do not output MIPTR data to log file (default). yes = Output MIPTR data to log file.
pcurve	string	no = Do not output parameter space curves (default). yes = Output parameter space curves.
description	string	String value used in the STEP file header section. It describes the contents of the STEP file.
author	string	String value used in the STEP file header section. It specifies the author of the STEP file.
organization	string	String value used in the STEP file header section. It specifies the organization of the author.
authorization	string	String value used in the STEP file header section. It specifies the person who authorized this STEP file.
trans_type	string	ap203 = AP 203 STEP file will be created. ap214 = AP 214 STEP file will be created.

## Quitting the Translator

To quit the translator during execution, type `Control-C` (^C = system interrupt) on your keyboard.

## Importing CADD5 Parts from CGOS

When you import a CADD5 part from the CADD5 Graphical Operating System (CGOS) platform, follow these steps inside CADD5 before using the translator:

1. Activate the part.
2. Perform a CHECK DBASE.
3. Perform a PACK DBASE.
4. Activate all the drawings (use LIST DRAW ALL to find the names of these drawings). The following message appears:

```
REGENERATING GRAPHICS
```

5. Select EXIT PART FILE.

## Extracting CADD5 Parts from Optegra

If the part you want to convert is already on your system, no special preparation is necessary before you use the translation commands. However, if the part is in Optegra, you must first enter a separate “get part” command for each file to be processed:

```
##get part <filename>
```

## Sample Translation

Assume that the command line used to run PUTAP203 is

```
putap203 put.cfg pnt_tol 0.00001
```

where `put.cfg` is the configuration file. The command line parameter `pnt_tol` specifies a new tolerance which overrides the one in the configuration file. The translator reads a local CADD5 part named “part1” and produces a STEP file, “part1.step”.

```
/* Configuration file example */
PUT203:
ap_file           = "test.step";
part_name        = "testpart";
log_file         = "test.log";
cm_file          = "cmfile.cm";
file_create      = "overwrite";
cgos_mode        = "no";
class_filter     = "all";
class_force      = "all";
max_msg          = -1; /* -1 = no limit */
pnt_tol          = 0.0001;
trace            = "no";
pcurve           = "no";

description      = "CADD5 part geometry";
author           = "PTC";
organization     = "PTC";
authorization    = "PTC";
/* end of parameters */
```

You can specify the CADD5 part to be translated in two ways:

- By using the AP203 Class 1 file provided:  
 In the configuration file, add the `cm_file` option that specifies the Class 1 file. The name of the CADD5 part should be located in the second field of the DOCUMENT entity (refer to AP 10303-203 document).
- By using the `part_name` option:  
 When this option is used, default CM data will be created in the STEP file.

```
CADD5 STEP AP203 Tool
Put Translator
Version 1.3
```

```
=====
Date: Fri, Jun 12, 1998
Time: 10:49:52
=====
```

Configuration File Parameters :

```
-----
Configuration file name: put.cfg
part_name:      testpart
cm_file:       None specified
ap_file:       _bcd/test.step
file_create:   overwrite
log_file:      _bcd/test.log
class_filter:  all
class_force:   all
max_msg:       -1
cgos_mode:     no
pnt_tol:       0.000100;
trace:         no
trans_type     ap203
pcurve:        no
description:   CADDs part geometry
author:        PTC
organization:  PTC
=====
```

Cadd Parts Processed :

```
-----
CADDs part name: testpart
=====
```

CADDs Entities Found in part :

Type	Entity Name	Count
3	Line	400
5	Arc/Circle	153
12	N-Spline	1206
14	N-Surface	458
16	Tabulated Cylinder	120
17	Surface of Revolution	6
18	Ruled Surface	67
88	Plane/Face/Hole	78
91	solid or Trimmed Surface	1
92	Face	729
93	Edge	1759
94	Vertex	1033
Total		6010

STEP File Header SECTION Entities:

```
-----
File_description:
=====
description: Cadd part geometry
implementation_level: 1
File_name:
=====
name: _bcd/test.step
time_stamp: 1998-03-18T14:05:58
author: PTC
```

```
organization: Italcad spa
preprocessor_version: CADDs STEP AP203 Tool, Put translator
originating_system: PTC- CADDs
authorization: PTC
File_schema:
```

```
=====
```

```
schema_identifiers: config_control_design
```

```
=====
```

```
Entity Summary for Data Section
```

```
-----
```

```
=====
```

```
Entity Summary for Data Section:
```

```
-----
```

Type	Entity Name	Count
13	approval_date_time	3
29	document_type	1
36	document	1
58	product_definition_with_associated_documents	1
8010	b_spline_curve_with_knots	289
8013	cartesian_point	67666
8018	closed_shell	1
8035	edge_curve	1759
8036	edge_loop	754
8043	face_bound	25
8044	face_outer_bound	729
8055	manifold_solid_brep	1
8062	oriented_edge	3518
8079	quasi_uniform_curve	400
8104	trimmed_curve	12
8110	vertex_point	1033
8203	product_related_product_category	1
8206	application_context	1
8215	product_category_relationship	1
8216	plane_angle_measure_with_unit	1
8219	dimensional_exponents	1
8223	advanced_brep_shape_representation	1
8224	product	1
8228	product_definition_shape	1
8230	advanced_face	729
8238	product_category	1
8240	shape_definition_representation	1
8247	mechanical_context	1
8249	uncertainty_measure_with_unit	1
8300	application_protocol_definition	1
8301	security_classification	1
8302	security_classification_level	1
8303	person	8
8304	organization	8
8306	person_and_organization	8
8307	approval_person_organization	3
8308	approval_role	3
8309	approval	3

8311	cc_design_approval	3
8312	date_and_time	5
8313	calendar_date	5
8314	local_time	5
8315	coordinated_universal_time_offset	5
8316	person_and_organization_role	5
8319	cc_design_security_classification	1
8321	cc_design_person_and_organization_assignment	5
8322	cc_design_date_and_time_assignment	2
8323	product_definition_formation_with_specified_source	1
8324	date_time_role	2
8326	approval_status	3
8327	design_context	1
8999	external_map	5
=====		
	Total	77225
=====		

=====  
Error Summary:  
Information: 0  
Status: 0  
Warning: 0  
Error: 0  
Fatal: 0  
=====

Elapsed Time:  
-----  
Processor: 00:00:01  
Clock: 00:00:09  
=====

## PUTAP214

To produce an AP214 STEP file, use the PUTAP203 translator with the option `trans_type` set to AP214. The translation will automatically generate a compliant file.





# Translating Data from STEP to CADD5: The Get Commands

---

This chapter describes, with an example, the `get` commands used to translate data from STEP to CADD5. The syntax and the parameters of the command lines are described.

- GETAP203
- Sample Translation
- GETAP214

# GETAP203

The GETAP203 command translates a STEP AP203 file to a CADDs part.

## Command Line

The command line syntax is given below followed by an explanation of the terms contained in it.

```
getap203 config_file_name [parameter_name parameter_value]
```

<b>GETAP203</b>	<b>AP203 to CADDs data translator name</b>
config_file_name	Path and file name of the translator configuration file
parameter_name	Configuration parameter. This name must be the same as that of a configuration file parameter.
parameter_value	Value used to set the named configuration parameter

## Command Line Parameters

- The configuration file name is required. This must always be the first parameter.
- Other command line parameters may be names or name/value pairs that override the configuration file parameter values. You do not need to specify all parameters during translation.

The following parameters specify the options for the AP203 to CADDs translator:

<b>Parameter Name</b>	<b>Type</b>	<b>Description and Value</b>
ap_file	string	STEP AP203 file to be input
cm_file	string	AP203 Class 1 (CM) data file name. This option has not yet been implemented.
part_name	string	Name of part to be created. If more than one part is created, the first one is named as specified. Subsequent part names are appended with 001, 002, 003, etc.

Parameter Name	Type	Description and Value
part_create	string	<p>"overwrite" = overwrite existing part (default)</p> <p>"nooverwrite" = do not overwrite existing part</p> <p>"seed" = use specified part (see seed_name) as template</p>
seed_name	string	Used only if part_create is set to seed. It specifies the part to be opened as a template. This name should be different from the part_name.
log_file	string	Output log file name
part_prec	string	<p>"double": create the CADD5 part with double precision (default)</p> <p>"single": create the CADD5 part with single precision</p>
max_msg	int	Specifies the maximum number of times the same message (error or warning) is written to the log file. -1 specifies no limit.
cgos_mode	string	<p>"yes": CGOS path and file name applies</p> <p>"no": UNIX path and file name syntax applies (default)</p>
mesh	int array	Surface mesh number. This 2 element array specifies how many grid lines to draw on the surfaces in CADD5.
sew_partial	string	<p>"no": Do not try to partially sew the solid. (default)</p> <p>"yes": If solid does not completely sew, partially sew it.</p>
split	string	<p>"no": do not perform continuity checking on curves and surfaces and do not smooth or split the entity</p> <p>"yes": perform continuity checking on curves and surfaces and smooth or split the entity when appropriate</p>
smooth	string	<p>"no": do not smooth (default)</p> <p>"yes": smooth surfaces that have internal discontinuities. The surface shape may change as a result of smoothing.</p>
cont_tol	float	Sets the linear distance tolerance to detect discontinuities. Default value is 0.0001.
ang_tol	float	Sets the angular tolerance to detect a discontinuities. Default value is 0.5 degree.
pnt_tol	float	Defines a general tolerance to determine if two points are the same. This value is used in all tolerance calculations except when checking continuity. Default value is 0.001.

Parameter Name	Type	Description and Value
def_unit	string	Specifies the units to be used in CADDs if the units from the STEP file cannot be read: MM millimeter CM centimeter M meter KM kilometer MI mil MICRON micron MINC micro inch IN inch FT feet MI mile
trans_type	string	AP203 AP214
use_direct_solid	string	"no": trim each face and sew into a solid (default) "yes": create entire solid structure and add it to the database in one step.

Please note: The parameters `split`, `smooth`, `cont_tol` and `ang_tol`, work together. The parameters `ang_tol` and `cont_tol` detect internal discontinuities depending on their tolerance values. When a discontinuity is detected, the default process is to split the entity at that point. When `smooth` is set to `yes`, splitting does not occur. When `split` is set to `no`, discontinuities are ignored.

## Quitting the Translator

To quit the translator during execution, type `Control-C` (^ C = system interrupt) on your keyboard.

## Sample Translation

Assume that the command line used to run GETAP203 is

```
getap203 get.cfg pnt_tol 0.00001
```

where get.cfg is the configuration file containing the following text:

```
GET203:
ap_file      = "test.step";
part_name    = "testpart";
log_file     = "test.log";
part_create  = "overwrite";
seed_name    = "xxx";
cgos_mode    = "no";
max_msg      = -1;
split        = "no";
smooth       = "no";
cont_tol     = 0.0001;
ang_tol      = 0.5;
pnt_tol      = 0.001;
part_prec    = "double";
def_unit     = "INCH";
```

This translation process generates a log file "part1.log" with this text inside:

```
          CADD5 STEP AP 203 Tool
          Get translator
          Version 1.3
=====
Date:    Fri, May 22, 1998
Time:    13:28:10
=====
Configuration File Parameters :
-----
Configuration file name:  get.cfg

ap_file:      test.step
part_name:    testpart
part_create:  overwrite
seed_name:    xxx
log_file:     _bcd/test1.log
max_msg:      -1
cgos_mode:    no
part_prec:    double
def_unit:     inch
split:        no
smooth:       no
cont_tol:     0.000100
ang_tol:      0.500000
pnt_tol:      0.000010
```

```

    mesh (u, v):      3,3
    sew_partial:      no
=====
STEP File Header Section Entities:
=====
File_description
=====
description:
implementation_level: 1
File_name
=====
name: PART
time_stamp: 1998-11-06T12:16:13
author: PTC
organization: PTC
preprocessor_version:
originating_system:
authorisation: PTC
File_schema
=====
schema_identifiers: CONFIG_CONTROL_DESIGN
=====
Entity Summary for Data Section:
Type      Entity Name                                     Count
-----
9      person                                           8
11     cc_design_person_and_organization_assignment      5
12     approval                                           3
14     date_and_time                                       5
16     approval_date_time                                  3
17     approval_role                                       3
18     coordinated_universal_time_offset                 5
21     person_and_organization_role                       5
25     calendar_date                                       5
32     document_type                                       1
40     document                                           1
52     date_time_role                                       2
59     cc_design_approval                                   3
62     product_version_with_specified_source              1
63     product_definition_with_associated_documents       1
66     organization                                         8
70     security_classification                             1
71     date_and_time_assignment                           2
72     approval_status                                     3
76     security_classification_level                       1
78     approval_person_organization                       3
80     cc_design_security_classification                  1
82     cc_design_date_and_time_assignment                 2
83     person_and_organization                             8
85     local_time                                          85
8010   b_spline_curve_with_knots                           54
8012   b_spline_surface_with_knots                         14
8013   cartesian_point                                    380
8018   closed_shell                                       1

```

8030	definitional_representation_item	84
8035	edge_curve	42
8036	edge_loop	16
8044	face_outer_bound	16
8045	face_surface	16
8052	intersection_curve	42
8055	manifold_solid_brep	1
8062	oriented_edge	84
8063	oriented_face	13
8068	parametric_representation_context	84
8070	pcurve	84
8079	quasi_uniform_curve	64
8110	vertex_point	28
8203	product_related_product_category	1
8206	application_context	1
8207	product_context	1
8212	product_definition_context	1
8215	product_category_relationship	1
8216	plane_angle_measure_with_unit	1
8219	dimensional_exponents	2
8223	advanced_brep_representation	1
8224	product	1
8228	product_definition_shape	1
8238	product_category	1
8240	shape_definition_representation	1
8999	external_map	5

-----  
Total 1126  
=====

CADDs Entities Created in part :

Entity

No.	Name	Count
12	N-Spline	42
14	N-Surface	16
91	Solid or Trimmed Surface	1
92	Face	16
93	Edge	42
94	Vertex	28

-----  
Total 145  
=====

Error Summary:

```

Information: 0
Status:      0
Warning:     0
Error:       0
Fatal:       0
Elapsed Time:
Processor:   00:00:06
Clock:      00:00:16
    
```

## GETAP214

To input an AP214 STEP file, set the trans\_type option to AP214.



# User Interface for STEP Protocols

---

You can use the translator commands through the Datashop user interface for application protocols like AP203, AP214, IGES and VDA. For details on IGES and VDA protocols, refer to *PTC Translator Products User Guide*.

This chapter describes how you can use the PUTAP203, PUTAP214, GET203 and GETAP214 commands through the Datashop user interface for STEP AP203 and STEP AP214.

- Overview of User Interface for STEP Protocols
- Using the Options on the Datashop Interface

# Overview of User Interface for STEP Protocols

The user interface for all the STEP translator protocols is Datashop. Using Datashop you can easily change the translator options and also translate multiple files using the same modifier configuration.

Please note: You can still use the translator commands directly from the operating system prompt, even without the user interface.

## Setting up Datashop

The Datashop does not require any additional setup and can be setup along with the regular translator protocols. The license requirement is the same as the STEP translator.

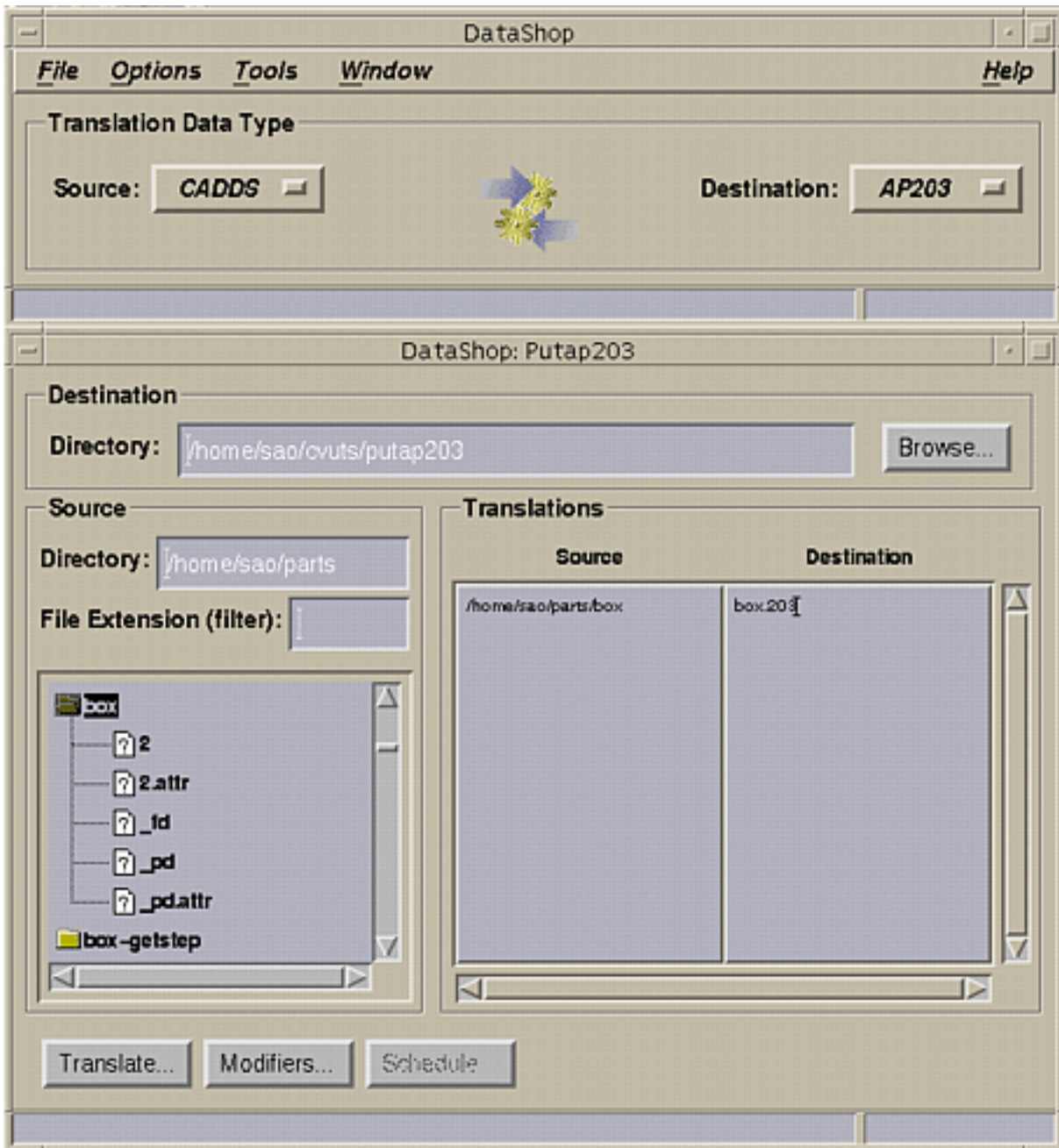
## Activating the Datashop

Once you have set up the Datashop, you can activate this interface from the operating system prompt. Issue the following command at the OS prompt.

```
datashop_gui
```

The following menu appears.

Figure 5-1 DataShop User Interface for STEP protocols



The above menu shows the user interface for AP203 protocols. This menu is basically divided into two parts. The first part of the menu is called the Translator Selector window which is the main window and the other part is called the Working window.

## Using the Options on the Datashop Interface

This section describes the various options available on the Datashop menu for the STEP protocols.

### Options in the Translator Selector Window

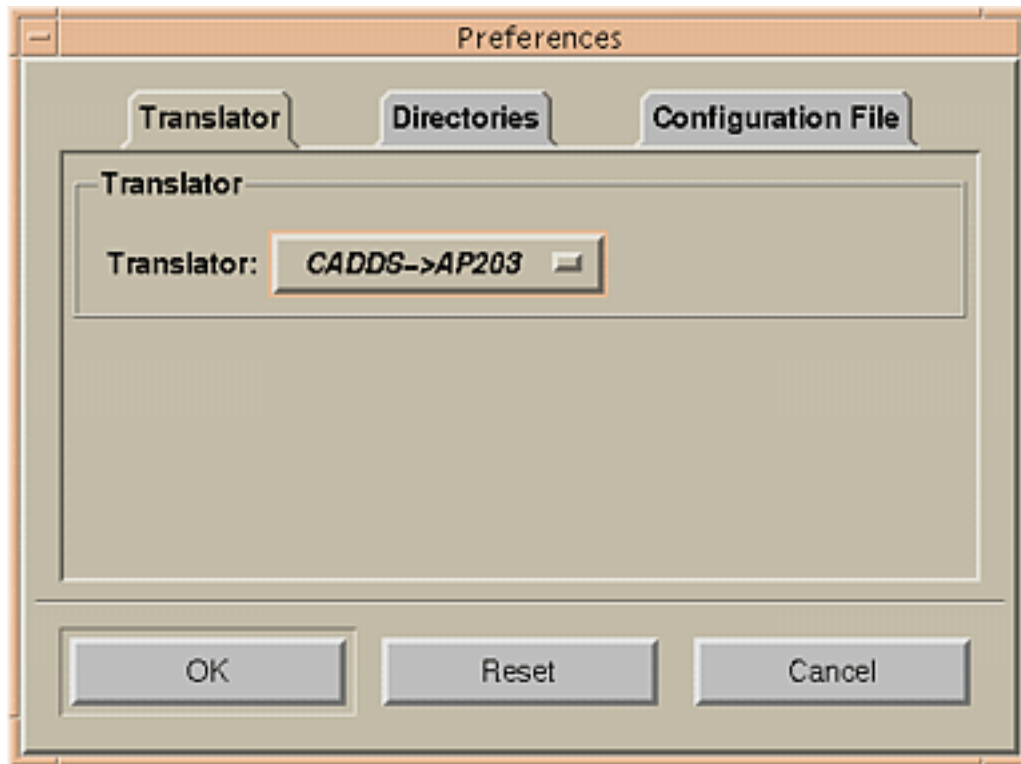
1. Click the File option on the top bar of this menu. The Quit option appears as shown below.



- Choose the Quit option to exit Datashop and go back to the operating system prompt. While exiting, the various settings that you have specified are saved. The changes are saved in a `Preferences` file under the `.datashop` directory. This directory is automatically created under `$HOME` while exiting.
2. Click Options from the top bar. The following menu appears.



- Click General Options. The Preferences menu appears. The options on this menu allow you to customize the Datashop by setting up the various default parameters.



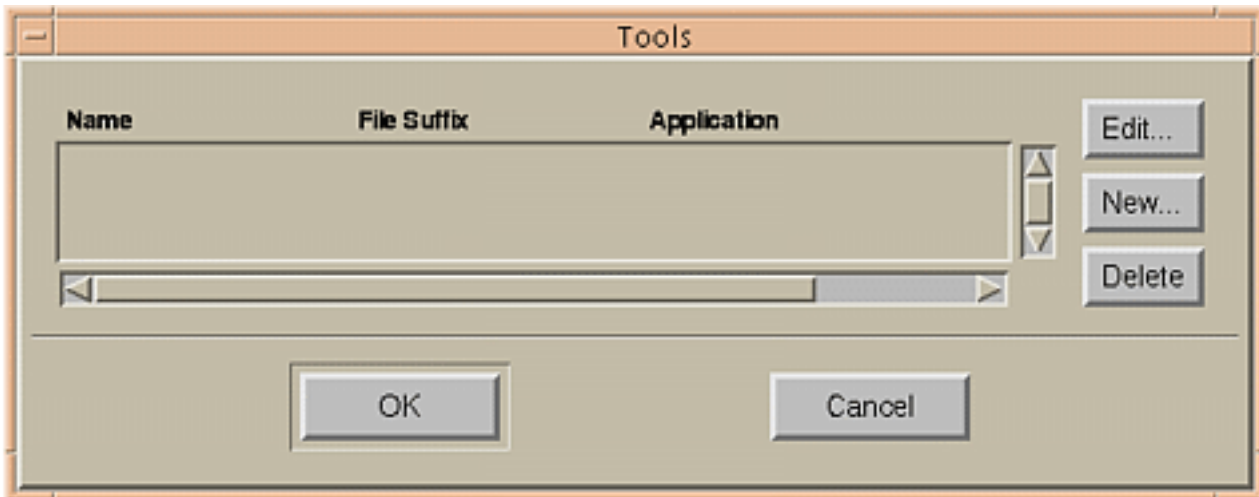
- Choose the Translator option to set the default translator. When Datashop is invoked, it comes up with this default translator.
  - Choose the Directories option to assign the default directories. These directories are accessed by the file browser, while running the translator.
  - Choose the Configuration File option to assign a default configuration file for each translator.
3. Choose the Tools option if you want to include any external tools to be used with the Datashop. The following menu appears.



- Choose the Add New Tool option to include any new tool. The Tools menu appears as shown below. Choose the New option to specify the tools name and the full path from where it should be accessed in the corresponding fields.

Some examples of tools that can be added are:

- A texteditor for all files with .txt extensions
- STEP Works for all files with .203 .214 or .stp extensions
- IGES Works for files ending with .igs
- Choose the View option to modify any existing tool. The following menu appears.

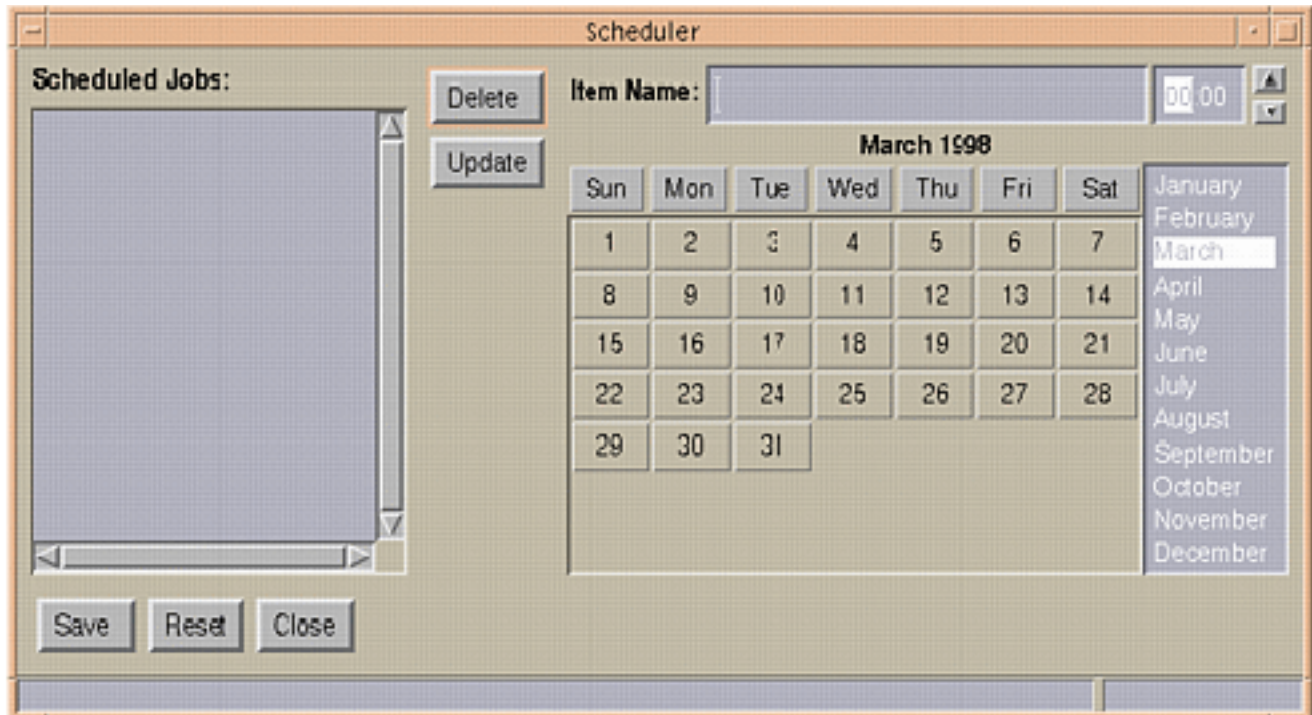


- Use the Edit option to modify the existing tools list.
  - Use the Delete option to delete the tools that are not required.
  - Click OK to save the changes to the Tools menu and return to the Datashop menu.
4. Choose the Window option. The following menu appears.



- The Tools option brings up the same Tools menu that appears with the Tools -> View option.

- Choose the Scheduler option if you want to schedule translations for a later date. The following menu appears.



Please note: You must specify the source and the destination files and the translator modifiers using the Datashop menu, before scheduling jobs.

- Specify the name of the job in the Item Name field. Specify the time in the time field present adjacent to it. Use the up or the down arrow to select a time.
- Specify the date, day and month, when you want the scheduler to run the selected translations by using the calendar.
- You can update, delete, or reset the scheduled jobs using the corresponding options provided on the scheduler.
- Choose the Save option to save all your scheduled jobs.
- Click Close when you finish setting up schedules. The scheduled jobs are listed in the Scheduled Jobs scrolling window.
- 5. Choose the Help option to bring up a help window.
- 6. Click the Source and the Destination list button to select the required translation, that is, CADD5 to AP203 or AP214 or vice versa.
- 7. Based on the selections made from the Source and Destination list buttons, the Working window changes appropriately.

## Overview of the Working Window

The working window is the area where you actually carry out the translation work. The working window consists of three areas.

**Top Area:** The top area allows you to specify the destination directory. This is the directory where the translated files are created.

**Middle Area :** The middle area is a file browser. It allows you to select the source files that you want to translate. You can change the directory of the file browser by entering the directory name in the Current Directory field.

**Please note:** You can also select multiple files by holding the <control> key down while making selections.

**Bottom Area:** The bottom area contains the action buttons. Use the Modifier button to change the modifiers and then the Translate button to do the translation.

## Using the Options on the Working Window

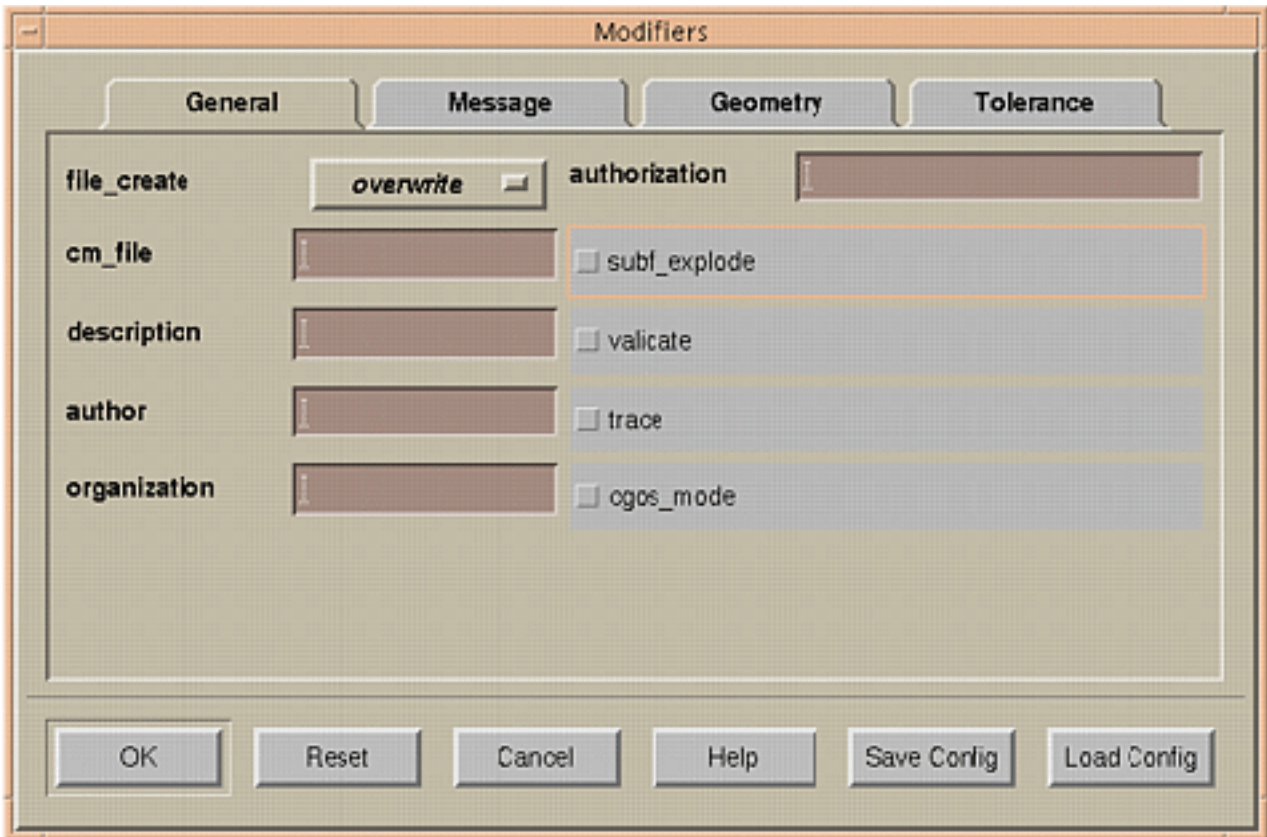
1. Specify a file name along with the complete path for the translated file, in the Destination Directory field.
2. Select a source file to be translated using the Browser option.
3. Choose the File Extension (filter) from the scroll list provided below this option and specify the file extension. Only files with this extension are displayed in the source window. For example, to display files ending in .203, you can enter 203 in the filter window. The source file that is selected and the destination file that is specified for translation is displayed in the corresponding Translations window during translations.

**Please note:** To clear the Translations window place the cursor in a blank area in the file tree window and click with the left mouse button.

4. Choose the Modifiers button to specify the appropriate options for this translation. The following menu appears. The modifiers available are the same as the command line parameters. For details on the command line parameters for the PUTAP203 command see section “Command Line Parameters” on

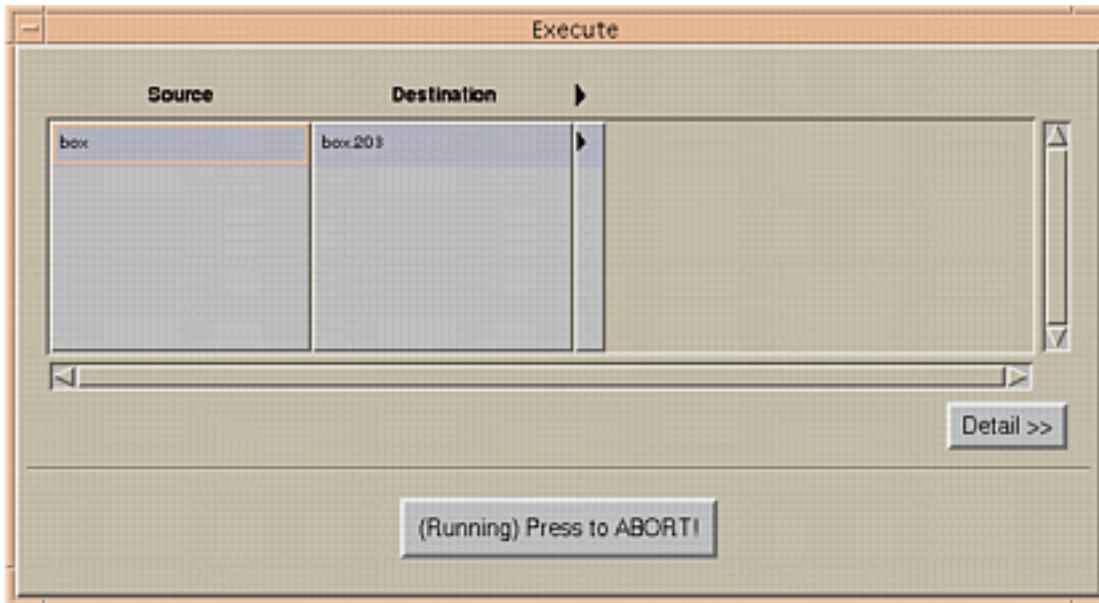


page 3-2. For details on the command line parameters for the GETAP203 command see section “Command Line Parameters” on page 4-2.



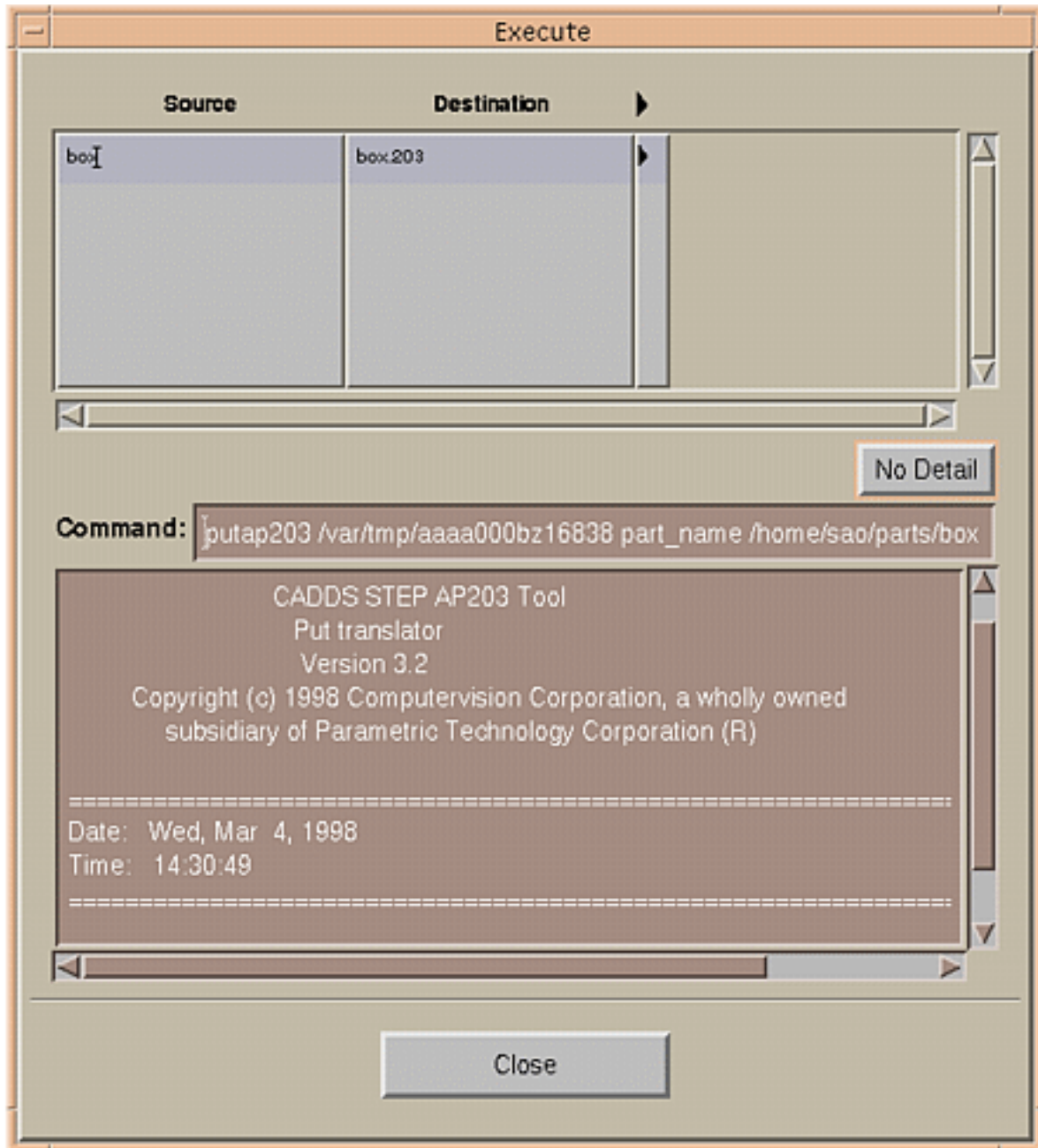
- Choose the Load Config button to load an existing configuration file containing the required settings.
- Choose the Save Config option to save your settings for future use.
- Click OK to return to the Working window on the Datashop interface.

5. Click the Translate option to carry out the translation. When this option is clicked, the following menu appears.



- The status window displays the status of the translations. This field is indicated by the forward arrow.
- Click the Abort button to stop the current translation.

- Click the Detail option to see more details on the translations and the output. The Execute menu changes as follows.



- The command line output generated by the user interface is displayed in the Command field. You can copy this string to the command prompt and execute the translator command without the user interface.
- The translator screen output is displayed below the command line output.
- Click Close to close the Execute window.



# Entity Mapping Tables

---

This appendix contains tables that illustrate corresponding points (where they exist) between the CADDs and STEP environments. Entity Mapping is carried out automatically by STEP Translators.

- CADDs to AP 203 (Put and Get)
- AP203 (Put and Get) to CADDs
- CADDs to AP214 (Put and Get)
- AP214 (Put and Get) to CADDs

## CADDs to AP 203 (Put and Get)

During translation, CADDs entities are retrieved from the CADDs part and converted into an intermediate format. Any conversion or manipulation of entities during translation (that is, NURBS curve to polyline) happens during this phase. Entities are then implicitly formatted to STEP.

<b>CADDs Entity</b>	<b>STEP Entity</b>
Point	cartesian_point
Line	trimmed_curve (line)
Arc	trimmed_curve (circle)
Conic (ellipse)	trimmed_curve (ellipse)
Conic (hyperbola)	trimmed_curve (hyperbola)
Conic (parabola)	trimmed_curve (parabola)
Spline	b_spline_curve_with_knots
B-spline	b_spline_curve_with_knots
Curve Pole	b_spline_curve_with_knots
Curve Point	----
Surface Point	----
N-spline	b_spline_curve_with_knots
Nsurface	b_spline_surface_with_knots
Tabulated Cylinder	rectangular_trimmed_surface (surface_of_linear_extrusion)
Surface of Revolution	rectangular_trimmed_surface (surface_of_revolution)
Ruled Surface	b_spline_surface
B-spline Surface	b_spline_surface_with_knots
Surface Pole	b_spline_surface_with_knots
Scalar	----
Vector	----
Shape	polyline
Rectangle	polyline
Crosshatch	----
Feature Control Symbol and Flagnote	----
Linear/Ordinate Dimension	----
Angular Dimension	----
Radial Dimension	----
General Label	----
Diameter Dimension	----
Profile Tool Path	----
Pocket Tool Path	----

<b>CADDs Entity</b>	<b>STEP Entity</b>
Regenerative MABS Tool Path	----
Point-to-point Tool Path	----
Surface Machining Tool Path	----
Surface Intersection Tool Path	----
Draft Curve	----
String	polyline
Nodal Line	----
Finite Element Modeling Element	----
Grid Point	----
Mass Point	----
Contour Map	----
Subfigure Instance	----
Connect Node	----
Text Node	----
Nodal Figure Instance	----
Text	----
Nodal Text	----
Relation	----
Plane/Face/Hole (Plane)	plane
Plane/Face/Hole (Face)	----
Plane/Face/Hole (Hole)	----
Subassembly Instance	----
Solid or Trimmed Surface (Solid)	manifold_solid_brep
Solid or Trimmed Surface (Trimmed Surface)	curve_bounded_surface
Shell	manifold_solid_brep
Face	face_surface
Loop	loop
Edge	edge_curve
Vertex	vertex_point
Part Parameter Entity	----

## AP203 (Put and Get) to CADD5

This table indicates the mapping of AP203 geometric entities to their CADD5 equivalent.

<b>STEP Entity</b>	<b>CADD5 Entity</b>
point	----
Cartesian_point	Point
point_on_curve	Point
point_on_surface	Point
point_replica	Point
degenerate_pcurve	Point
evaluated_degenerate_pcurve	Point
direction	----
vector	----
placement	----
axis1_placement	----
axis2_placement_2d	----
axis2_placement_3d	----
cartesian_transformation_operator	----
cartesian_transformation_operator_3d	----
cartesian_transformation_operator_2d	----
curve	----
line	Line
circle	Arc
ellipse	Conic (ellipse)
hyperbola	Conic (hyperbola)
parabola	Conic (parabola)
bounded_curve	----
polyline	String
b_spline_curve	----
b_spline_curve_with_knots	Nspline
uniform_curve	Nspline
quasi_uniform_curve	Nspline
bezier_curve	Nspline
trimmed_curve	----
composite_curve	----
composite_curve_segment	----



<b>STEP Entity</b>	<b>CADD5 Entity</b>
reparameterized_composite_curve_segment	----
pcurve	Parameter space curve
surface_curve	Nspline
intersection_curve	Nspline
seam_curve	Nspline
composite_curve_on_surface	Nspline Parameter space curve
offset_curve_2d	Nspline
offset_curve_3d	Nspline
curve_replica	----
elementary_surface	----
plane	Plane/Face/Hole (Plane)
cylindrical_surface	Nsurface
conical_surface	Nsurface
spherical_surface	Nsurface
toroidal_surface	Nsurface
swept_surface	----
surface_of_linear_extrusion	Nsurface
surface_of_revolution	Surface of Revolution
bounded_surface	----
b_spline_surface	----
b_spline_surface_with_knots	Nsurface
uniform_surface	Nsurface
quasi_uniform_surface	Nsurface
bezier_surface	Nsurface
rectangular_trimmed_surface	Solid or Trimmed Surface
curve_bounded_surface	Solid or Trimmed Surface
boundary_curve	Used by Trimmed Surface
outer_boundary_curve	Used by Trimmed Surface
rectangular_composite_surface	----
surface_patch	----
offset_surface	Nsurface
surface_replica	----
TOPOLOGY SCHEMA	
topological_representation_item	----
vertex	----

<b>STEP Entity</b>	<b>CADD5 Entity</b>
vertex_point	Vertex
edge	Edge
edge_curve	Edge
oriented_edge	Edge
path	Used in Face
oriented_path	Used in Face
open_path	Used in Face
loop	Used in Face
vertex_loop	Edge
edge_loop	Used in Face
poly_loop	Used in Face
face_bound	Used in Face
face_outer_bound	Used in Face
face	----
face_surface	Face
oriented_face	Face
subface	Face
connected_face_set	Solid or Trimmed Surface
vertex_shell	Solid or Trimmed Surface
wire_shell	Solid or Trimmed Surface
open_shell	Solid or Trimmed Surface
oriented_open_shell	Solid or Trimmed Surface
closed_shell	Solid or Trimmed Surface
oriented_closed_shell	Solid or Trimmed Surface
connected_edge_set	----
<b>GEOMETRIC MODEL</b>	
solid_model	----
manifold_solid_brep	Solid or Trimmed Surface
brep_with_voids	Solid or Trimmed Surface
faceted_brep	Solid or Trimmed Surface
csg_solid	----
boolean_result	----
sphere	----
right_circular_cone	----
right_circular_cylinder	----
torus	----
block	----

<b>STEP Entity</b>	<b>CADD5 Entity</b>
right_angular_wedge	----
swept_area_solid	----
solid_of_linear_extrusion	----
solid_of_revolution	----
half_space_solid	----
boxed_half_space	----
box_domain	----
solid_replica	Solid or Trimmed Surface
shell_based_surface_model	Solid or Trimmed Surface
face_based_surface_model	Solid or Trimmed Surface
shell_based_wireframe_model	Solid or Trimmed Surface
edge_based_wireframe_model	Solid or Trimmed Surface
geometric_set	----
geometric_curve_set	----
geometric_set_replica	----

## CADDs to AP214 (Put and Get)

The CADDs to AP214 Mapping Table is the same as the CADDs to AP203 Mapping Table with one exception: In AP203, the Trimmed Surface (Solid or Trimmed Surface) entity is mapped to the `curve_bounded_surface` while in AP214 the Trimmed Surface is mapped to the `oriented_open_shell`.

<b>CADDs Entity</b>	<b>AP214 Entity</b>
Solid or Trimmed Surface (Trimmed Surface)	<code>oriented_open_shell</code>

## AP214 (Put and Get) to CADD5

The AP214 to CADD5 Mapping Table is the same as the AP203 to CADD5 Mapping Table, except for the fact that the following entities are not part of AP214:

- point\_replica
- offset\_curve\_2d
- curve\_replica
- rectangular\_trimmed\_surface
- curve\_bounded\_surface
- boundary\_curve
- outer\_boundary\_curve
- rectangular\_composite\_surface
- surface\_patch
- surface\_replica
- oriented\_path
- open\_path
- subface
- wire\_shell
- connected\_edge\_set
- edge\_based\_wireframe\_model
- geometric\_set\_replica



# List of Messages

---

This appendix provides a list of the messages that appear when using the PUTAP203, PUTAP214, GETAP203 and GETAP214 commands.

- Message Types
- Message List

# Message Types

The messages associated with AP203 and AP214 translators are of the following types:

**Fatal:** A problem occurred from which the translator could not recover such as an I/O error or insufficient memory.

**Error:** A problem occurred within the translator, for example, an entity had bad data or a non-application subsystem failed. Usually, the translator can run to completion after this type of message.

**Warning:** A problem from which the translator could recover occurred, for example, there was missing data that the translator could supply or there were unsupported entities of which the user has been informed. The translator continues to completion after this type of message.

**Status:** This message provides general information, such as that a specific file has been successfully parsed or formatted or the translation has been successfully completed.

**General:** This message is the same as the one above except for the fact that an associated banner is not issued.

The format of bannered, non-general message types is as follows:

```
*** Message_type (Name_of_message) ***  
Message text -- one or more lines.
```

where the

- Message\_type is Fatal, Error, Warning or Status,
- Name\_of\_message denotes the message name and the name of the message file that it is stored in, and
- Message text is the body of the message.



## Message List

Messages are divided into groups identified by the first four characters of the message name. The messages, arranged alphabetically, are listed below.

### AITX\_STEP\_PARSE\_ERROR

An error occurred while parsing the STEP file to be translated to CADDs. Check to make sure that the specified file is not corrupted or that it conforms to the schema that this translator expects.

### AITX\_INIT

An error occurred while initializing an internal subsystem. This will cause the translator to fail. Check to see if there is enough memory and disk space.

### AITX\_UNSUPPORTED\_ENTITY

An entity that is not supported by this translator was encountered. The entity has been ignored and processing will continue.

### AITX\_UNITS\_ERR

An entity other than GLOBAL\_UNIT\_ASSIGNED\_CONTEXT or EXTERNAL\_MAP was encountered. The units of the STEP file cannot be processed unless these entities are present.

### AITX\_MAPPING\_ERROR

This entity failed during mapping - either it is an internal (GDX) problem or the entity is invalid.

### AOTX\_CM\_PARSE\_ERROR

An error occurred while parsing the STEP Class 1 (part 21) file. Check to make sure that the specified file is not corrupted or that it conforms to the schema that this translator expects.

### AOTX\_CLASS\_FORCE

The class\_filter and class\_force options give you the ability to create valid AP203 files from a CADDs part. However, it is not possible to force geometry to a higher class. Please choose a different class\_filter or class\_force option.

AOTX\_NO\_PDWADS

The input configuration management data file must have a `PRODUCT_DEFINITION_WITH_ASSOCIATED_DOCUMENTS` entity. This entity points to a `DOCUMENT` entity which contains the CADDs part name.

AOTX\_TOO\_MANY\_PDWADS

The translator can handle only a certain number of `PRODUCT_DEFINITION_WITH_ASSOCIATED_DOCUMENTS` entities. If you need to process more, please submit an enhancement request.

CGDX\_MALLOC\_ERR

While trying to allocate memory space for processing, an error was detected. This type of error can be caused by several problems. The first of these is bad data in either the part or the exchange file. The second problem that might cause this error is not enough swap space. Check the data being translated. If it looks good, increase your swap space.

CGDX\_BAD\_TK\_GET

While using `CVDORS` to read an entity from the database, an error was returned from the database interface. The entity will be skipped and processing will continue.

CGDX\_CREATE\_ERROR

An error was returned trying to unlock a `GDX` entity. The entity will not be created in the `GDX` file. This is usually caused by either lack of memory or disk space.

CGDX\_LIBERRORDESC

You need to look up the message in the documentation for a description of the problem.

CGDX\_ZEROLINELENGTH

`CADDs` does not allow line entities to have a length of zero. The line specified by `id` has this characteristic. The entity will be bypassed.

CGDX\_CURVEBADMULTIPLICITY

Multiplicity of knots  $>$  order (degree+1) is invalid. We will try to remove the offending knots along with their corresponding control points. Because there is no

way to identify which knot is truly the knot that should be removed, we are making a BEST GUESS.

#### CGDX\_SURFACEBADMULTIPLICITY

Multiplicity of knots  $>$  order (degree+1) is invalid. We will try to remove the offending knots along with their corresponding control points. Because there is no way to identify which knot is truly the knot that should be removed, we are making a BEST GUESS.

#### CGDX\_BADKNOTREMOVAL

Each curve and surface that is translated into the CADDs system is checked for redundant knots. If any are found, they are removed. The entity is still created in CADDs so it might cause problems in later operations such as trimming, shading, or NC.

#### CGDX\_BADPARAM\_VALS

The Isoparametric values of a surface are outside the range of the surface as defined by the knot values of the surface. The bad value will be set to the maximum or minimum of the knot value.

#### CGDX\_BADARCDATA

CADDs requires some arc length for an arc. If the start and end are the same, check database or oscadd would report an error. The same is true for radii that are less than or equal to 0. The arc will not be created in the database.

#### CGDX\_TSURFMULTRESULT

Multiple results are usually encountered when a trimming curve or loop is going in the wrong direction, for example, a square surface with the trimming curve being a circle. Normally, the one surface remains inside the circle. What you have in this case is the four corners remaining after the circle was removed. If this is actually the case, then the problem is in the input file and not the translator.

#### CGDX\_BADMTXNOFIX

A bad matrix was encountered. It was so bad, we were unable to adjust the matrix so that it fit within tolerance. The entity will have the identity matrix attached to it as reported.

CGDX\_SOLID\_CREATE

An error has occurred while creating a tsurf from a surface or while creating a polycurve from a loop.

CGDX\_SHELL\_CREATE

An error has occurred while creating a tsurf from a surface or while creating a polycurve from a loop.

CGDX\_SOLID\_SEW

One or more of the trimmed faces may be incorrect causing a sewing failure.

CGDX\_SURF\_SEW

Something may be wrong with this untrimmed surface.

CGDX\_ENTITY\_CONVERSION

Description: An error occurred while converting from one GDX entity to another.

CGDX\_TRIMMING\_ERROR

Make sure that the curves are on the surface. Adjusting the pnt\_tol and/or cont\_tol may help.

CGDX\_CONTOUR\_ERROR

An error has occurred while processing the trimming curves. Check the underlying geometry.

CUGN\_INIT

An error occurred while initializing an internal subsystem. This will cause the translator to fail. Check to see if there is enough memory and disk space.

CUGN\_MEM\_EXC

While trying to allocate or free memory, an error was detected. This can be caused by lack of swap space. If increasing the swap space does not help, report an error.

CUGN\_IO\_EXC

While trying to do I/O, an error was detected. This happens while trying to access data from the disk.

CUGN\_CFG\_FILE\_NOT\_FOUND

The STEP translators require that a configuration file be supplied for each translation.

CUGN\_PARSE\_ERROR

An error occurred while parsing the specified STEP (part 21) file. Make sure that the file is not corrupted or that it conforms to the schema that this translator expects.

CUGN\_ATTRIBUTE\_NOT\_FOUND

The configuration parameter found on the command line or in the configuration file is incorrect. Check the spelling or that it is a valid parameter for this translator.

CUGN\_PART\_NOT\_OPENED

The specified CADDs part could not be opened. Check to be sure that the name is valid or that the CADDs path has been properly set.

CUGN\_PART\_NOT\_CLOSED

An error occurred while closing the CADDs part. This should never happen. Report a bug to your PTC support person.

CUGN\_PART\_NOT\_OPEN

A valid CADDs part must be opened before being closed. A valid part has not been opened yet.

CUGN\_MDA\_MODEL\_NOT\_OPEN

A valid CADDs model must be opened before being closed. A valid model has not been opened yet.

CUGN\_CREATE\_ERROR

An error was returned trying to unlock a GDX entity. The entity will not be created in the GDX file. This is usually caused by either lack of memory or disk space.

CUGN\_DATALOAD\_VIEWFONT\_ERROR

A call was made to load the font and view information into the structure (cvig\_pviewfont.h) for processing views associativity and line font definitions.

Possible bad subrecords have been detected. This will cause default information to be loaded for this entity.

CUGN\_DBREAD\_ERROR

While trying to read data from the CADDs part, the database I/O routine returned an error code of something other than successful. The values for the return code are defined in the CADDs database manual. You might want to do some database repair using the oscadd or check and pack dbase.

CUGN\_ENTITY\_NOT\_SUPPORTED

STEP translators do not support all CADDs entities. For example, the AP 203 translator does support or translate the CADDs dimension entities.

CUGN\_MALLOC\_ERR

While trying to allocate memory space for processing, an error was detected. This type of error can be caused by several problems. The first of these is bad data in either the part or the exchange file. The second problem that might cause this error is not enough swap space. Check the data being translated. If it looks good, increase your swap space.

CUGN\_BAD\_LEN\_UNIT

The length measure units of the STEP file are bad or possibly there was an internal error. Make sure that the units are correct. The default unit (optionally set by the user) value was used to create the CADDs part

CUGN\_CREATE\_UNITS\_ERR

The translator specified a bad unit value for STEP units creation. Report this as a problem.

CUGN\_LICENSE\_IN\_USE

The number of licenses available are in use. If addition licenses are needed, then contact your PTC representative.

CUGN\_LICENSE\_NOT\_AVAIL

This translator uses CVlms as its license manager. The file it checks is: /usr/CVswlm/cvlm/cvlm.licenses. If you do not have this file, you do not have authorization to run this translator.

CUGN\_NO\_LICENSE

After accessing the PTC license manager, you do not have authority to run this translator.

CUGN\_INIT\_LICENSE

This translator uses CVlms as its license manager. The file it checks is: /usr/CVswlm/cvlm/cvlm.licenses. If you do not have this file, you do not have authorization to run this translator.

CUGN\_FILE\_DELETE

The Part, or file could not be deleted. Check owner or permissions on the file.

CUGN\_FILE\_EXISTS

The Part, or file to be created exists. The operation being performed is going to destroy the existing file. If you want that particular file to be destroyed you must either delete it yourself or use the overwrite option.

CUGN\_BAD\_CFG\_VALUE

One of the parameters in the configuration file has a bad value. The log file should specify the parameter and its value.

CUGN\_MISSING\_PARAM

One of the parameters in the configuration file was not specified or is missing. Depending on the parameter, this is an error or warning condition.

CUGN\_DEFAULT\_SET

The translator will set the configuration parameter to the default value automatically. This is due to a missing or incorrect value.

CUGN\_CM\_FILE\_NOT\_FOUND

The specified Configuration Management (CM) file was not found. This part 21 file supplies CM data for the output STEP file. The CM file is not necessary to create a valid AP 203 file. The translator will automatically create one if the cm\_file option is not used.

CUGN\_AP\_FILE\_NOT\_FOUND

The specified STEP AP file to be translated to CADDSS was not found. Check the file name and path.

CUGN\_CM\_FILE\_NOT\_SPECIFIED

To produce a valid STEP AP file, CM data entities (in the form of a valid) AP203 Class 1 file) need to be supplied to the translator. If an appropriate file is not available, the option part\_name can be used. This option specifies two things: 1) the name of the CADDs part to be translated and 2) that the translator creates CM entities automatically.

CUGN\_SEED\_PART\_NOT\_SPECIFIED

The part\_create parameter was set to seed\_part. This requires that the user specify a CADDs part name to be used as a template when creating a new part for the input translation.

CUGN\_PART\_NOT\_SPECIFIED

The CADDs part name need only be specified if one is not supplied in the CM file (cm\_file option). If a cm\_file is not available or one is not supplied in the CM file or if you want to override the one in the CM file, use the part\_name option to specify one.

CUGN\_NOOVERWRITE

The STEP file entered in ap\_file option exists. The operation being performed is going to overwrite the existing file. If you want that particular file to be overwritten, you must either delete it yourself or set the file\_create option to overwrite

CUGN\_MISSING\_SECTION

The AP 203 Put translator tries to read a configuration file which contains the Section (header) PUT203. The specified configuration file does not contain that Section.

CUTS\_MALLOC\_ERR

While trying to allocate memory space for processing, an error was detected. This type of error can be caused by several problems. The first of these is bad data in either the part or the exchange file. The second problem that might cause this error is not enough swap space. Check the data being translated. IF it looks good, increase your swap space.

CUTS\_PART\_NOT\_OPEN

A valid CADDs part must be opened before being closed. A valid part has not been opened yet.



CUTS\_MDA\_MODEL\_NOT\_OPEN

A valid CADDs model must be opened before being closed. A valid model has not been opened yet.

CUTS\_BAD\_TK\_GET

While using CVDORS to read an entity from the database, an error was returned from the database interface. The entity will be skipped and processing will continue.

CUTS\_CREATE\_ERROR

An error was returned trying to unlock a GDX entity. The entity will not be created in the GDX file. This is usually caused by either lack of memory or disk space.

CUTS\_DATALOAD\_VIEWFONT\_ERROR

A call was made to load the font and view information into the structure (cvig\_pviewfont.h) for processing views associativity and line font definitions. Possible bad subrecords have been detected. This will cause default information to be loaded for this entity.

CUTS\_DBREAD\_ERROR

While trying to read data from the CADDs part, the database I/O routine returned an error code of something other than successful. The values for the return code are defined in the CADDs database manual. You might want to do some database repair using the oscadd or check and pack dbase.

CUTS\_UNSUPPORTED\_ENTITY

An entity that is not supported by this translator was encountered. The entity has been ignored and processing will continue.

CUTS\_SURFCREATE

This surface may be too large for CADDs to handle or the surface data has been corrupted during translation.



---

# Glossary

---

B-spline

Is a smooth curve connecting a series of locations in three-dimensional space. A B-spline can be created by specifying interpolation points, polygon points, or locations through which to smooth a curve

BREP

Boundary Representation

CAD/CAM

Computer Aided Design/Computer Aided Manufacturing

CM

Configuration Management

Connect Node

An attachment point for nodal lines, shown as a diamond in shape. A Cnode logically connects nodal lines and may be related to text nodes. A Cnode may be a member of a nodal figure. With the commands used for plant design, Cnodes represent faces of nozzles and fittings or the free-standing ends of pipe segments.

IGES

Initial Graphics Exchange Specification

Isoparametric

A means of parametrizing a curve by controlling the location of points in an Iso -u or Iso -v manner.

Nodal Line

A multi-segmented intelligent line or string that begins and ends at connect nodes. A nodal line logically connects nodal figures, or it may be a member of a nodal figure. An Nline may have related nodal text. With the commands used for plant design, Nlines represent pipe, instrument lines, and the internal flow paths within fittings.

STEP

Standard for the Exchange of Product Model Data is a set of standards used for the exchange of configuration management data and three-dimensional designs of mechanical parts and assemblies between application systems

---

# Index

---

## A

Application Protocol 1-2, 1-6, 2-2  
  AP203 1-3, 2-2  
    conformance class 2-2  
    message B-2  
    Parts  
      **configuration management data** 2-2  
      **geometry data** 2-2  
  AP214 1-3, 2-2  
    message B-2  
entity mapping table  
  AP214 to CADDs A-9  
  CADDs to AP214 A-8  
message B-2  
  error B-2  
  fatal B-2  
  format B-2  
  general B-2  
  group B-3  
  status B-2  
  warning B-2  
output 2-7  
  banner 2-7  
    **example** 2-7  
  log file 2-7  
  message 2-7  
  Percentage Done Indicator 2-7

## C

configuration file 2-5, 2-6, 3-5

  example 2-6, 4-5  
  parameter 2-6, 3-5  
  syntax 2-5  
    colon 2-6  
    comment 2-5  
    equals sign 2-6  
    parameter name 2-5  
    parameter value 2-5  
    section header 2-5, 2-6  
    text string 2-6  
configuration management file 2-4  
convention  
  file name 2-3  
    ampersand 2-3  
    CADDs Graphical Operating System 2-3  
    creating a file 2-3  
    reading a file 2-3  
    UNIX 2-3  
  path name 2-3  
    CADDs Graphical Operating System 2-3  
    UNIX 2-3  
    upper/lower case letter 2-3

## D

Datashop  
  Activating 5-2  
  Setting up 5-2  
  Translator Selector Window 5-4  
  User Interface for AP203 5-2  
  Using the options 5-4  
  Working Window 5-8  
Documentation, printing from Portable

Document Format (PDF) file xii

## E

entity mapping table A-1  
EXPRESS 1-2

## G

get 1-3  
  getap203 1-3  
    command line 4-2  
    command line parameter 4-2  
      **configuration file name** 4-2  
    quitting 4-4

## I

implementation standard 1-2

## L

log file 2-7  
  example 2-8, 4-5

## P

Printing documentation from Portable  
  Document Format (PDF) file xii  
product information 1-2, 1-5, 1-6, 2-4  
put 1-3  
  putap203 1-3, 3-2, 3-9  
    command line parameter 3-2  
      **configuration file name** 3-2  
    extracting a CADDs part from  
      Optegra 3-4  
    importing a CADDs part from CGOS 3-4  
    quitting 3-4  
    specifying a CADDs part for  
      translation 3-5

## R

Resource Model 1-2, 1-6  
  Integrated Application Resource 1-6  
  Integrated Generic Resource 1-6

## S

STEP 1-2, 1-4

## T

translation 1-2, 1-3, 1-6, 2-5, 2-7  
  parameter 2-5  
  STEP-CADDs 2-2  
    CADDs closed solid model 2-2  
    CADDs open shell model 2-2  
    configuration management data 2-4  
    limitation 2-2  
      **get** 2-3  
      **put** 2-2  
    STEP AP203 Advanced Brep Solid 2-2  
    STEP AP203 Manifold Surface Model 2-2  
    subfigure 2-2  
  translator 1-3, 1-5, 2-6