Vision ®
Components

The Smart Camera People

Getting Started VC Smart Cameras

Software Installation, Hardware Setup and Communication

for VC Smart Cameras with Texas Instruments DSP

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References under "Support + Download" on www.vision-components.com**:**

    „Tech News" – for up to date information on VC Software and Documentation.

    „Knowledge Base / FAQ" - searchable Database with latest software developments, frequently asked questions and demo programs.

    "Download Center" for all documentation and Software downloads – refer to the following table:

Description	Title on Website	Download Center
Introduction to VC Smart Camera programming	Programming Tutorial for VC20XX and VC40XX Cameras	Service & Support ▸ Download Center ▸ Documentation ▸ Getting Started VC
Demo programs and sample code used in the Programming Tutorial	Tutorial_Code	Service & Support ▸ Download Center ▸ Documentation ▸ Getting Started VC
VC4XXX Hardware Manual	VC4XXX Smart Cameras Hardware Documentation	Service & Support ▸ Download Center ▸ Documentation ▸ Hardware
VCRT Operation System Functions Manual	VCRT 5.0 Software Manual	Service & Support ▸ Download Center ▸ Documentation ▸ Software
VCRT Operation System TCP/IP Functions Manual	VCRT 5.0 TCP/IP Manual	Service & Support ▸ Download Center ▸ Documentation ▸ Software
VCLIB 3.0 Image Processing Library Manual	VCLIB 3.0 Software Manual	Service & Support ▸ Download Center ▸ Documentation ▸ Software

The Light bulb highlights hints and ideas that may be helpful for a development.

This warning sign alerts of possible pitfalls to avoid. Please pay careful attention to sections marked with this sign.

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Table of Contents

1 How to use this manual

This manual represents a step by step guide that is designed to minimize the set up and installation time of your entire VC Smart Camera development environment.

This guide is valid only for VC Smart Cameras with Texas Instruments DSP – not for cameras with ADSP DSP (VCMXX, VCSBC11- 50, VCXX).

This guide has been kept as detailed as necessary to accommodate first time users and as brief as possible to explain every step from software installation to uploading first programs to the camera. Additional information about software compatibility, communication trouble shooting, registration of the VC software in order to access the customer support section and more has been provided in the appendix.

We advise all users to carefully read at least the regular sections of this manual.

Working through the **"Programming Tutorial"** as a second step completes the introduction to programming VC Smart Cameras and allows the creation of first applications with minimal training time.

2 Software Overview

The following software tools are required for programming and operating Vision Components Smart Cameras with Texas Instruments processor:
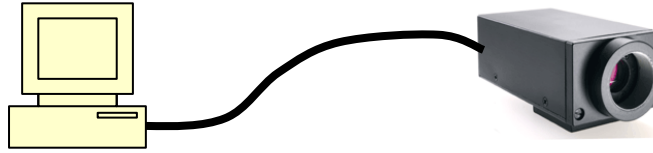
On the PC (VC SDK-TI)[1]	On the Camera
Ti Code Composer Studio C cross compiler	
Vision Components VCRT operation system function libraries	Vision Components VCRT operation system
Vision Components VCLIB image processing Libraries	

Ti Code Composer Studio C cross compiler

Code Composer Studio (CCS) is a comfortable graphical development platform for programming Vision Component Smart cameras. Following these installation instructions allows quick creation of camera programs based on the predefined project files that already include all settings necessary. This documentation describes the main CCS functions required for creating camera programs. Refer to the extensive help and documentation resources available under the CCS help menu.
Note that currently only the **Code Composer Studio Versions 3.1, 3.3 and 4.x** are approved for programming VC cameras, versions 2.x are not supported anymore.
Attention must be paid to the compiler (Code Generation Tools, CGT) version – refer to the next section for details. For an up to date list of approved CCS and CGT versions, please refer to the "Support News" section in the "Support + Download" area of the VC website.

Also refer to section 4.6 for adjusting the compiler settings to match the different CCS versions.

VCRT operation system function libraries for PC

The VCRT PC library includes all main camera functions that are not image processing functions:
- Image acquisition functions
- Video Control Functions
- Memory allocation functions
- DRAM access and flash functions
- IO functions
- RS232 / Telnet functions
- TCP/IP functions
- System variables

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[1] The Software Development Kit required to program VC Smart Cameras with TI DSP is now called "VC SDK-Ti", order number: VK000096.

Included further are a range of utility functions. Refer to the VCRT5 documentation for further reference. This document also details the shell functions available for controlling VC cameras.

Vision Components VCRT Smart Camera operation system

VCRT is a purpose developed real- time, multi- tasking operating system that fully utilizes the calculation performance of the latest Texas Instrument DSP's.

The main features are:

- Interrupt driven, jitter free background image acquisition (hardware or software triggered)
- Image acquisition, transfer and processing possible in parallel.
- Handling of all camera communication and IOs
- Programmable input and output lookup table
- Memory management for flash, DRAM and MMC / SD
- Shell environment for controlling the main camera functions

Refer to the VCRT5 documentation for further reference on the VCRT operation system functions. While the VCLIB functions are independent form the camera programmed, some cameras feature special VCRT functions depending on the particular hardware. Refer to the programming section included in the corresponding camera documentations in this case (for instance information on programming the additional serial interface of the VC4XXX cameras is included in the VC4XXX product manual).

VCLIB image processing Libraries for PC

The VCLIB includes the extensive range of image processing functions available for VC cameras – for instance:
- Macros simplifying the processing and display of captured images
- Functions for processing grey scale images
- Functions for processing and evaluating binary images
- Graphics functions for adding graphics and text to image or overlay

To ensure compatibility and to ease the installation process the VCLIB setup is combined with the VCRT setup in one installation. **Two different setup files are available for download, depending on the version of Code Composer Studio: 3.x or 4.x.**

3 Code Composer Studio

3.1   Use of the correct Code Composer Studio Version

Please only install and use CCS versions approved by Vision Components, as we have to adjust to changes of the TI compiler.

At the time of printing of this manual, **only the following CCS versions are approved** for programming VC cameras:

Current development platforms: CCS v. 4.x and CCS v 3.3
→   Code Composer Studio v. 4.x ("Platinum") with Code Generation Tools 6.0.28 (refer to the next section for details)
→   Code Composer Studio v. 3.3 ("Platinum") with Code Generation Tools 6.0.28 or 5.1.13 (refer to the next section for details)

For C++ programmers it is advised to use Code Generation Tools version 6.1.x (6.1.19 at the time of printing), because of its support of the STL C++ library.

Alternative CCS Versions:
→   Code Composer Studio v. 3.1. with Code Generation Tools 5.1.13

Check the "**Tech News**" section on our website for an updated list of approved SW configurations! Note the compiler and linker adjustments or different project files required in order to accommodate different CCS versions (refer to section 4.4 and 4.6).

For new users, it is advised to use the newer version CCS v4.x! Please follow the steps in the next chapter.

3.2   Downloading CCS

3.2.1   Customers with full VCRT/VCLIB licence

For paying customers, Vision Components ships a CD of Code Composer Studio 3.3. However it is advised to install the newer version CCS v4.

This version is only available for download here (registration on the TI website is necessary):

http://processors.wiki.ti.com/index.php/Download_CCS (first download link)

This version is a complete version but limited to 30 days (extension to 120 possible). To get a full licence, please send your **CCS 3 Service Code** to TI (this code is inside the CD cover of CCS 3.3), at the following email address, and ask for a CCS v4 activation ID:

ccs_subscriptions@list.ti.com

You will get a full licence in return, and instructions on how to activate it.

It is not necessary to install CCS 3 from the CD if you want to install CCS v4!

3.2.2   Customers with loan licence

Customers who have a camera on loan can work with the time-limited (30 days) version:

http://processors.wiki.ti.com/index.php/Download_CCS (first download link)

and extend the licence to 120 days on the TI website (this can be managed online after registration, on this page:
http://processors.wiki.ti.com/index.php/CCSv4_Getting_Started_Guide#Extending_the_license_for_90_days).

4 Installation with Code Composer Studio 3.1 and 3.3

⚠ This chapter describes the installation with Code Composer Studio 3.x. **If you have Code Composer Studio 4.x, go directly to the next chapter, Installation with Code Composer Studio 4.x.**

4.1 Installation of Code Composer Studio 3.1 and 3.3

Please follow the installation steps below:

1. Log in to your PC with administrator rights.
2. In case of updating an existing installation take a backup copy of your projects saved in the TI directory.
3. CCS 3.1 and CCS3.3 (Full and Eval. Versions): Select "Custom Install" or "Typical Install".
4. ⚠ **CCS 3.1 and CCS3.3 (Full and Eval. Versions):** Change the installation directory to **C:\ti** as VC Libraries require this working directory. The installation path needs to be changed prior to selecting program features.
5. CCS 3.1 and CCS3.3 (Full and Eval. Versions): Select Program features to install: TMS320C6000 Platform Support (also install TMS320C6400 Platform Support if available).
6. Select "Next"
7. Select "Next" – the installation process begins. This may take several minutes.
8. Acknowledge following message: "Setup has generated the file <DosRun.bat> in C:\ti…"
9. Use the "Update Advisor" in the help menu of the CCS program to download available updates. For registration please use the CCS Service Code printed on the "Registration and Subscription Service Card" in your "CCS Development Tools" folder (Full CCS license only).
10. Note that currently only CCS v. 3.1 and v.3.3 are approved for programming of VC Cameras. We have to adjust our SW and project files due to often undocumented changes between CCS versions. As this is a time consuming process, it may not always be possible to use the latest CCS or CGTools versions. Check in the "Support" News for an up to date list of approved development tools!
11. ⚠ If using CCS 3.3, download and install this version of the compiler : "**Code Generation Tools 6.0.28**" from the TI site. Use the Menu Help -> Update Advisor -> Check for updates in Code Composer, then log in on the webpage that appears, and look for Code Generation Tools Updates. Look for the 6.0.28 for windows and download it. Choose **C:\ti\c6000\cgtools** as destination folder and acknowledge when the installation program asks about replacing files ("yes to all")
12. Tick "Yes, I want to restart my computer now" and click the "Finish" button to restart the computer.
13. Re- boot your PC after completion of each installation or update.

4.2 Setup of Code Composer Studio 3.1 and 3.3

When you run Code Composer Studio for the first time, the setup utility opens :
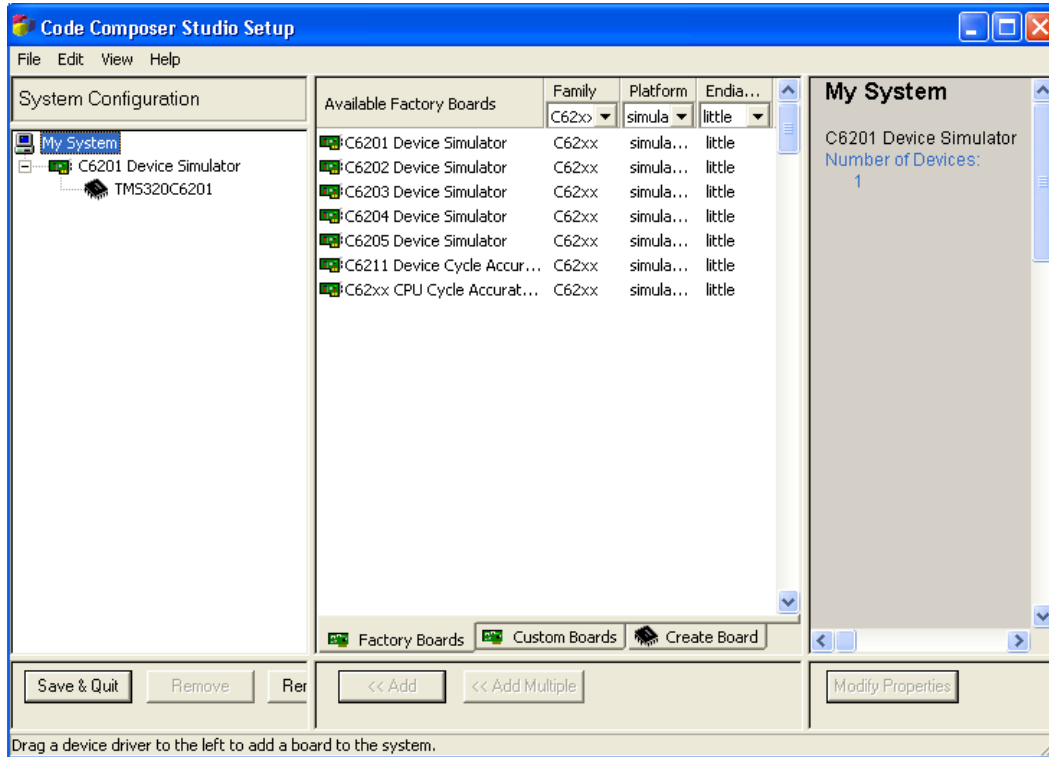
With the CCS 3.1 or 3.3 setup program all settings are made at the main user interface. Selecting Family "C62xx", Platform Simulator and Endianness "little" shows the boards available.

Select the first board and add it to "My System" on the left hand side (use drag and drop or the "Add" button).

When finished click "Save & Quit".

4.3   Installation of VCRT and VCLIB PC Libraries

Both libraries VCRT5.XX and VCLIB3.XX are combined into one single setup file for instance: TI-VCRT530e_VCLIB311_CCS3_Setup.exe

The "TI-VCRT5XX_VCLIB3XX_CCS3_Setup.exe" setup file also includes the previous VCLIB Version 2.0 for TI DSP's. Use the batch files are provided under C:\ti\myprojects to compile with different libraries[2].

Newer VCRT and VCLIB updates are also provided at the specified download location as collection of header and library files for advanced users.

Download Process of "TI-VCRT5XX_VCLIB3XX_CCS3_Setup.exe":

The latest VCRT and VCLib PC Libraries can be downloaded form the VC Website under:

Service & Support ▶ Download Center ▶ Software ▶ VC Libraries

In order to access this download section you have to register on our website and also need to register your "VC SDK-Ti" License Code, that is printed on the delivery docket for your VC Software development kit for Smart Cameras with Ti DSP. Please refer to Appendix B: Registration on the VC Website.

Installation Process of "TI-VCRT5XX_VCLIB3XX_CCS3_Setup.exe":

1. Please backup your programs in the C:\ti directory prior to installation when upgrading VCRT / VCLIB versions (only files with the same name are overwritten during installation). From VCRT523 / VCLIB 3.01 the PC Library update is also provided as collection of header and library files.
2. Run TI-VCRT5XX_VCLIBXXX_CCS3_Setup.exe and install the VC libraries to the default directory C:\ti .

Take the time to register your Vision Components development software (see Appendix B) now to ensure easy access to:

- -   Software updates of the VCRT and VCLIB PC libraries
- -   Camera operating system updates
- -   Up to date documentation downloads
- -   Download of utility and demo software that speeds up your development!

Refer to the Appendix of this document on information about:

-   How to obtain Library and Software updates from the Vision Components website
- -   How to register your Software at the Vision Components website

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[2] VCLIB 2.0 is set by default for TI-VCRT518_VCLIB300_setup.exe – newer versions default to VCLIB 3.0

4.3.1   Download and Installation of VC Special Libraries

In addition to the VC SDK-Ti, Vision Components also offers special libraries:

- VC Extension Lib (new Extension Lib with a range of additional functions)
- VC Color Library (Color Library for Bayer to RGB / HIS conversions and more)
- VC OCR Library (text recognition library)
- VC Bar Code Reader Library (1D Barcode Reader Library – different standards)
- VC Smart Reader Library (ECC 200 Data Matrix Reader Library)
- VC Smart Finder Library (Contour-based Pattern Matching)
- VC Solar Solution (Solar Wafer Measurement).

Each library is available for download after registration of a valid license key as described above (except for Smart Reader, Smart Finder and Solar Solution, please contact our sales department).

4.3.2   VC's new licensing System

Vision Components issues two types of licenses:

- ***One-year-license for VC SDK-Ti, Extension Lib, Color Lib, OCR Lib.*** A 12 month update subscription service is included in each full license, which allows free update download within 1 year after SW purchase / registration. The initial subscription period of full licenses is extendable on a yearly basis by registering a new license code.

  The following one-year-licenses are available:

License Number Prefix	License Type Description
T	Full License of VC SDK-Ti (VCRT and VCLib)
LT	Evaluation license, valid for a limited time only

License Number Prefix	License Type Description
C, LC	Full and evaluation Color Lib licenses
E, LE	Full and evaluation Extension Lib licenses
O, LO	Full and evaluation OCR Lib licenses

- ***Single license for Smart Finder, Smart Reader, Barcode Reader and Solar Solution.*** In this case a license per camera is needed.

For each license type, evaluation licenses are also available (fully-featured but time limited).

Refer to the Appendix for registration instructions.

4.3.3   Initialization of VC Library Functions within the Camera Program

All special libraries require initialization within the camera program code prior to using its functions. From beginning of 2007 also new VCLib Libraries require initialization.

Initialization is done calling the „init_licence() function using the corresponding license code as shown below:

```
void main(void)
{

        /* Initialize VC Licenses*/

        init_licence("T1122334455"); /* initialization of full VC SDK-Ti license*/

        init_licence("LC1122334455"); /* initialization of an evaluation Color Lib License */
}
```

Function description (also refer to Color_Lib.pdf - Color library for VC cameras Version 3.0):

init_licence   **initialize license code**

synopsis   `I32 init_licence (char *code)`

Please always check the return value of the function init_licence: the function returns 0 if the licence is valid, -5 if the licence is not valid.

Checking the return value is important : if the licence if not valid, some functions simply will not work, without any error message.

Single licenses (Smart Reader, Smart Finder and Solar Solution) are under the form of two codes which have to be initialized in the source code. Refer to the documentation of the libraries.

4.4   Generated File Structure on PC

The following file structure is generated after installation of Code Composer Studio and VC's VCRT and VCLIB libraries:
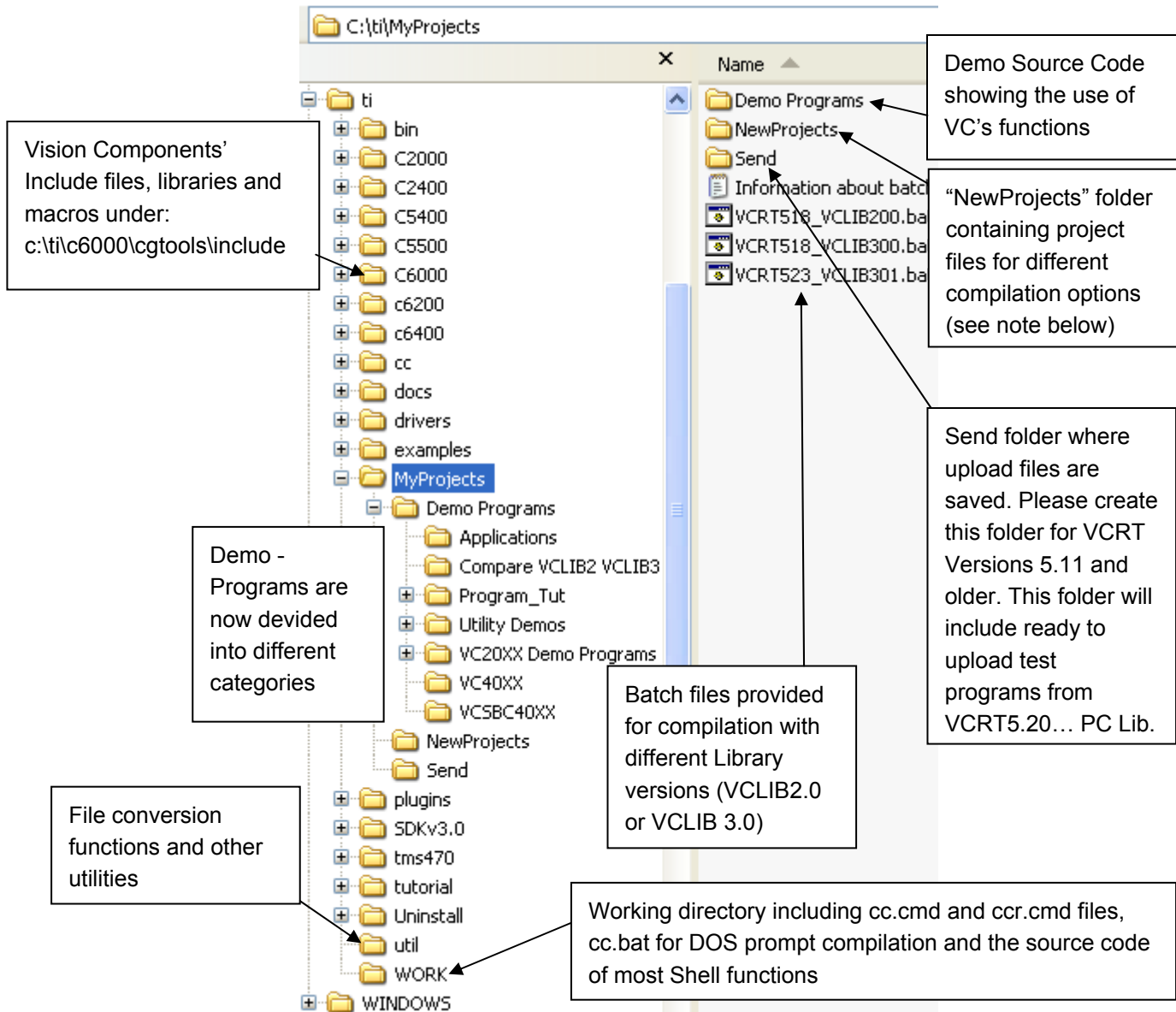
Compiling Code with different VCRT, VCLib or CCS Versions:

The "NewProjects" folder (under c:\ti\myprojects) includes several project files for compilation with different VCRT and CCS versions. For example "new528_CCS3xr.pjt" includes the correct settings to compile code with VCRT 5.28 and Code Composer Version 3.1 or 3.3. The appended "r" for instance "new528_CCS3xr.pjt" means compilation of auto relocatable code – using this project file is recommended for new projects. Selecting the corresponding libraries can be done by executing the batch files provided under C:\Ti\myprojects.

Refer to section 4.6 and Appendix A for compiler setting changes for different VCRT & VCLIB PC library versions and a software version history.

4.5   Creating a CCS project

1.   Start CCS3.1 or v. 3.3   CCS 2 ('C6000).lnk

The following Main Screen of CCS appears:
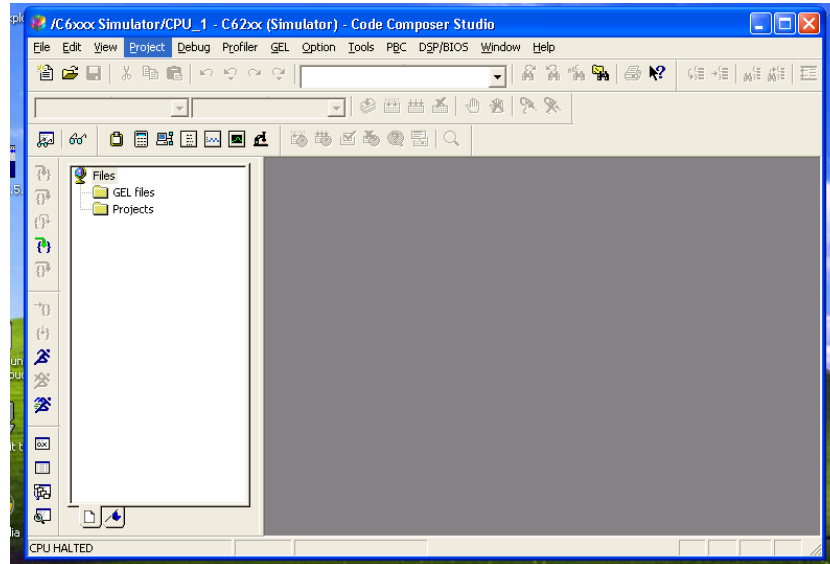
2.   Create a Project older under C:\ti\myprojects and copy a project file e.g. "new528_CCS3xr.pjt"
     from C:\ti\myprojects\newprojects into your project directory.
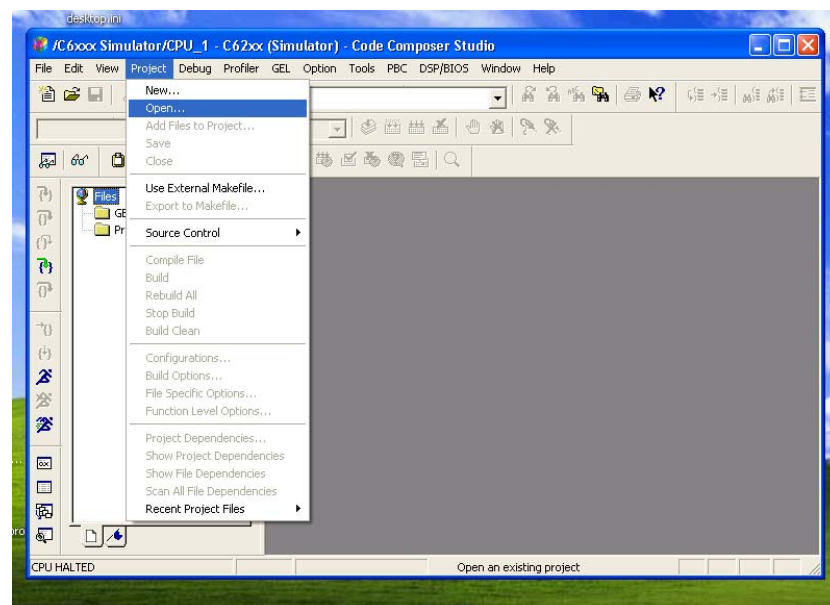
3.   Open the predefined project file "new528_CCS3xr.pjt" in your project directory that contains all
     compiler and linker settings.

4.6 Adjusting Compiler and Linker Settings

1. Go to menu "Project -> Build Options:
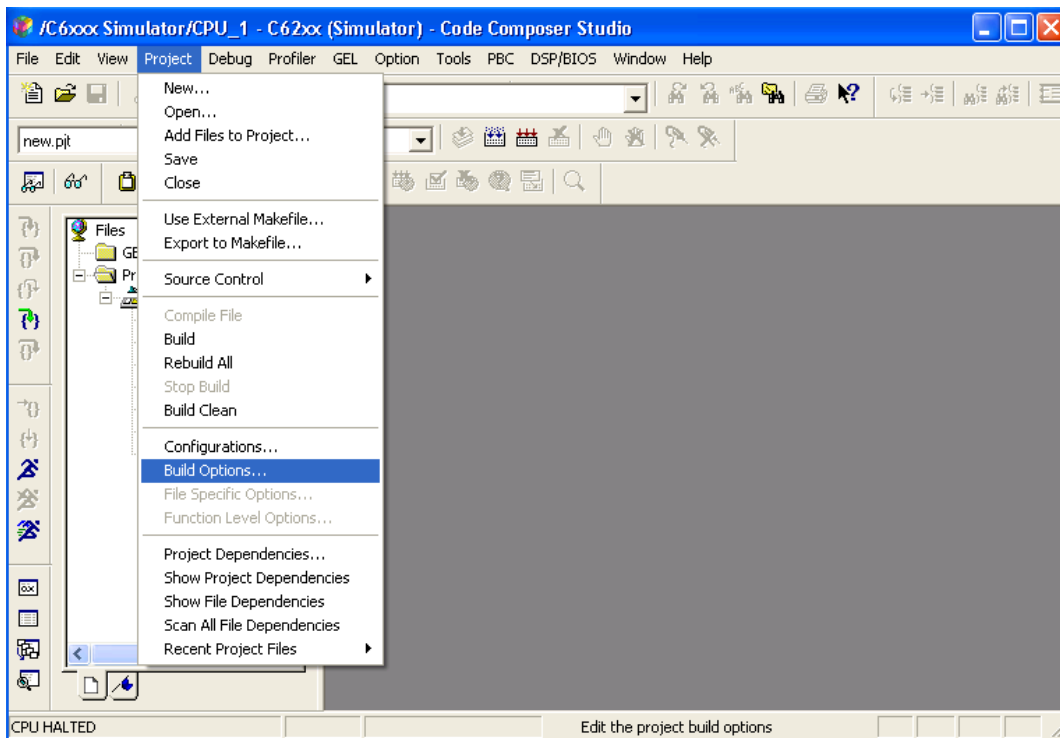
2. The following menu appears on screen:
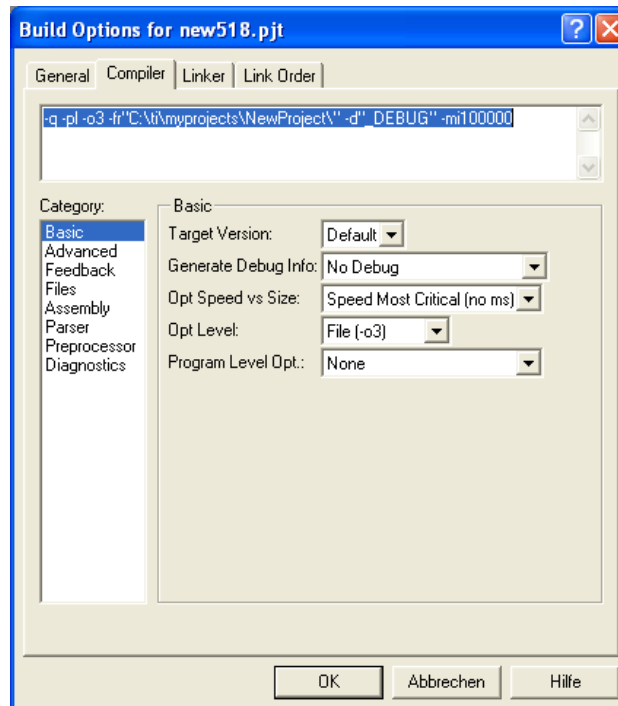
3. Click the "General" Tab.

4.6.1 The default settings of the "General" tab (final build steps) are:
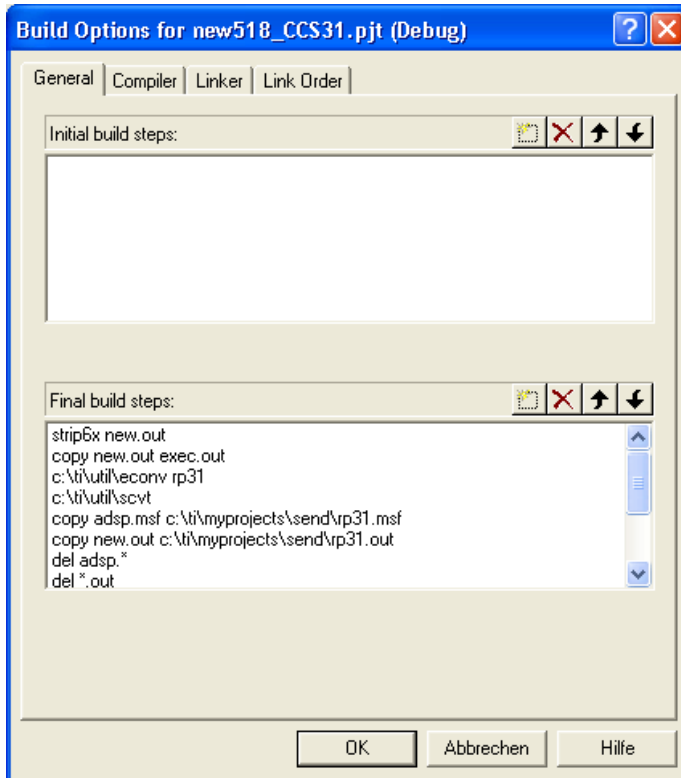
The first line: **strip6x new.out** (removing debugging information from the executable code) is required for CCS 3.1 and higher! [3]
(From CCS 3.1 also the library call "rts6201.lib" in C:\ti\work\cc.cmd needs to be changed into "rts6200").

The next lines convert the executable *.out" file into an *.msf file for serial and Telnet upload.
(Refer to the VCRT5 documentation for details).

Both executable files – *.msf and *.out files are copied to the send folder under C:\ti\myprojects\send

All redundant files are deleted form the project directory.

4.6.2 Changing the name of the compiled program

The program name can be changed under the "General" tab.
The first marked entry in the second line of the screenshot below, defines the program name in the camera memory if the msf file is uploaded via serial interface or Telnet.
Changing new.msf to a different name just changes the file name.
Modifying "new.out" changes the program name in the camera memory for *.out file upload via FTP (also refer to sections 8.3.1and 8.4).

---
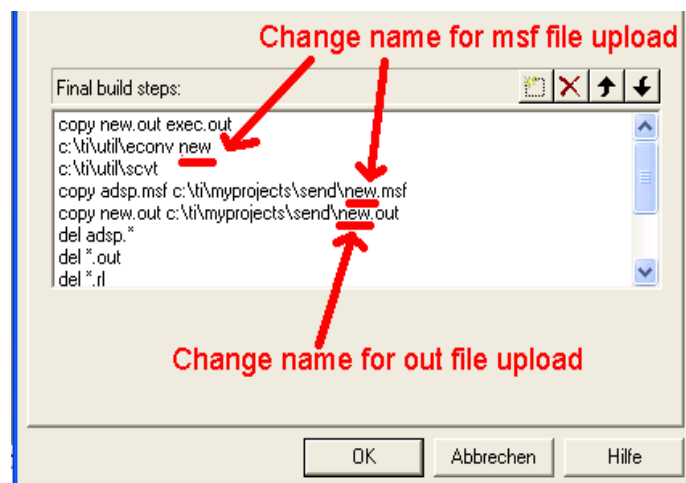
[3] See the summary of all required setting adjustments in section 4.6.5

4.6.3   The default Compiler settings are:
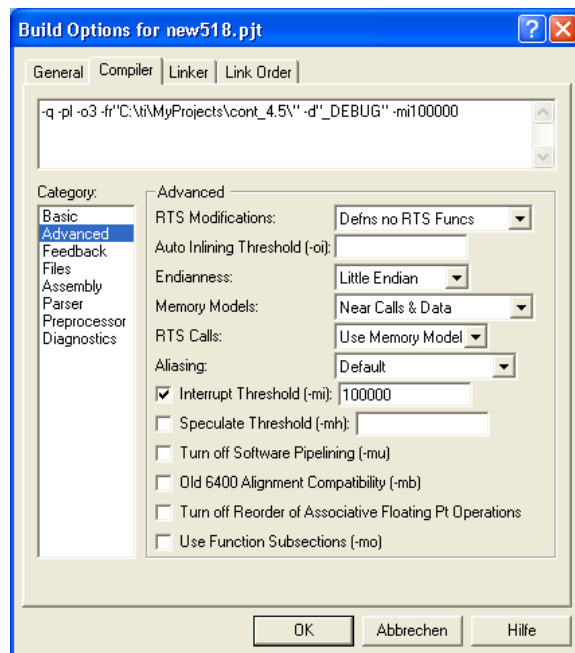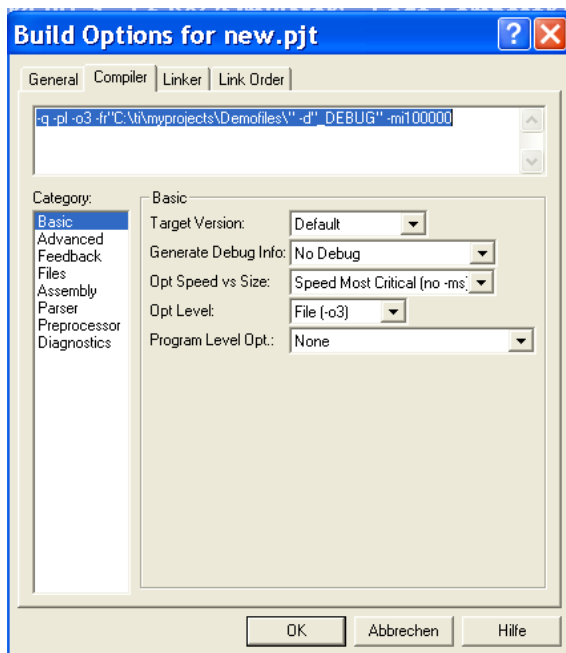
The advanced compiler setting "-mi100000" sets the interrupt threshold to 100,000 cycles, defining the maximum frequency interrupts are queried. Omitting this setting can speed up some functions significantly. However in this case it is important to ensure that inner loops perform less than 100,000 cycles, as interrupts (e.g. timer) can be out of sync otherwise. The "**Code Optimization**" document, part of the "Advanced Programming Seminar" covers the speed optimization of programs in detail (download under: **Service & Support** ▸ **Download Center** ▸ **Documentation** ▸ **VC Seminars**).

4.6.4   The default linker settings are:
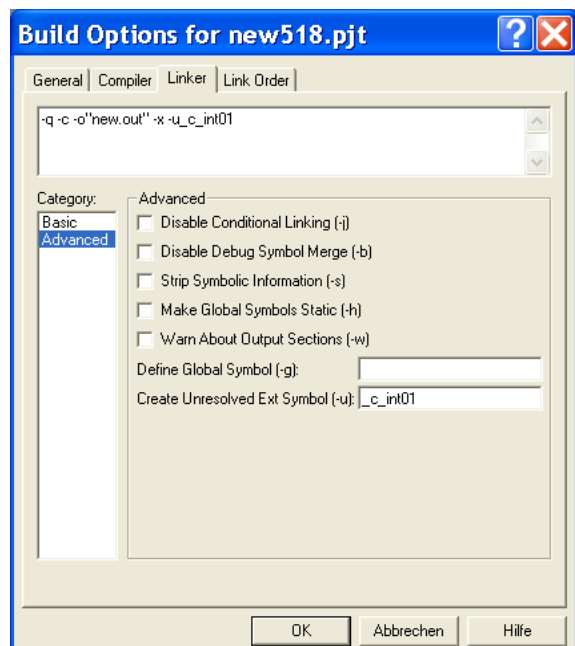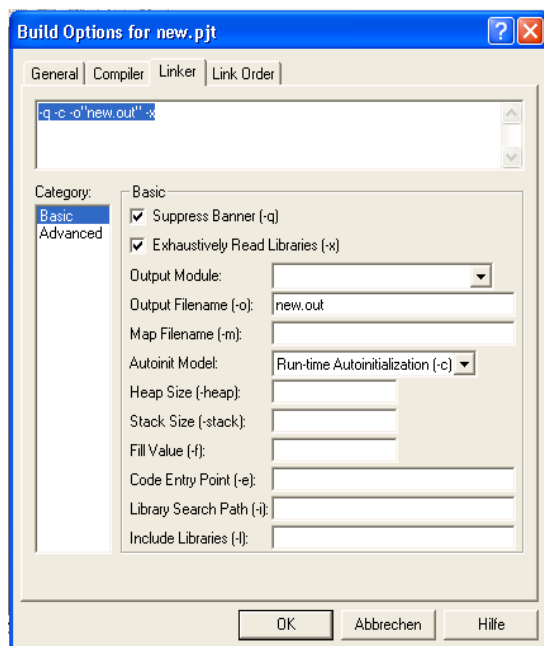
From PC Library Version VCRT 5.18 the linker setting "-u_c_int01" is required (also refer to the following section for setting changes).

4.6.5   Summary of adjustments required with Software Updates

Software Update / Change	Setting Changes required:
From CCS2.1. to CCS 3.1 and newer	Add "**strip6x new.out"** to the "Final Build Steps" Rename "rts6201.lib" in C:\ti\work\cc.cmd needs to "rts6200" Add "-priority" in cc.cmd file – this overrides other linker settings
Upgrading to PC Library VCRT 5.18 from older versions	Add "**-u_c_int01**" to Advanced Complier settings
Upgrading to PC Library VCRT 5.23 and newer from older versions	Using the new cc.cmd file and ccr.cmd file for relocatable code (automatically selected with "new52X_CCS3Xr.pjt")
Using the VC Color Lib and Extension Lib	Uncomment the following lines in the cc.cmd file: /* -l colorlib.lib */ /* -l extlib.lib */ Initialize your license key at the beginning of the camera program: init_licence("PC1122334455") Refer to section 4.3.3 for details
Using new VCRT / VCLib libraries from April 2007	Initialize your license key at the beginning of the camera program: init_licence("T1122334455") Refer to section 4.3.3 for details

4.7 Compiling C Programs

This section describes program compilation using Code Composer Studio. For DOS prompt compilation, copy the path settings from C:\ti\DosRun.bat to the beginning of C:\ti\work\cc.bat and adjust the compiler settings according to section 4.6.

1. Start Code Composer Studio 3.1.
2. Open a project file "new528_CCS3xr.pjt" as described in section **4.5**.

Now CCS opens a new project:
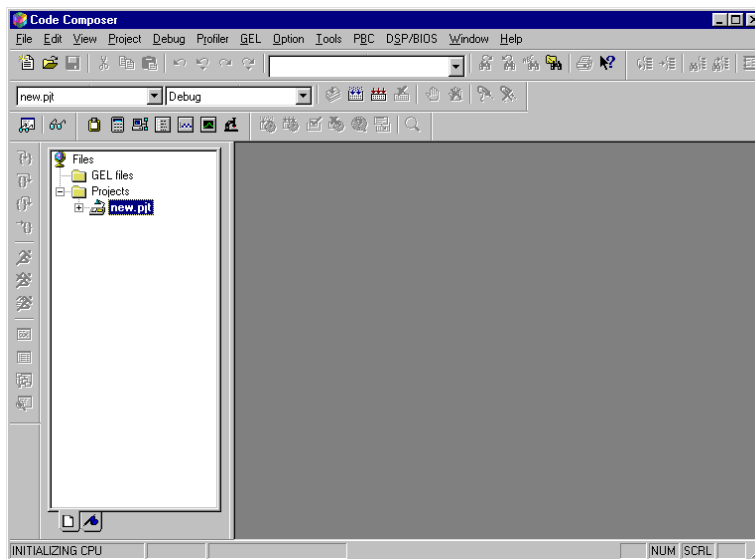
3. Copy your source code to your project directory (for instance C:\ti\myprojects\NewProject).
4. Press again the right mouse button and select "Add Files" and browse to the source file – for instance "blob.c" (alternatively use the pull down menu "Projects" and then "Add Files to Project" and browse to blob.c).
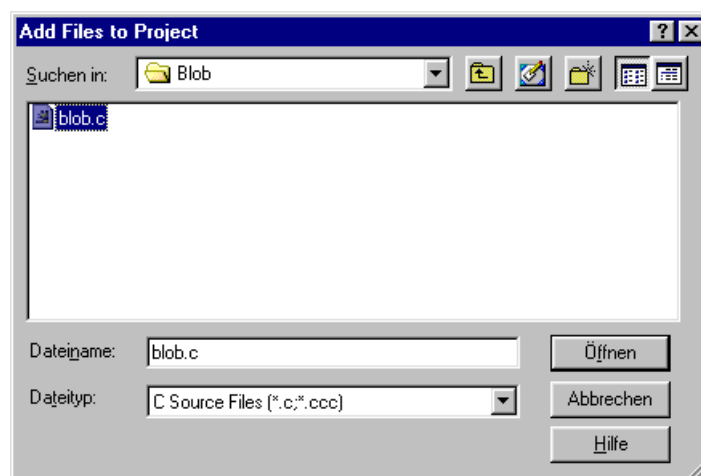
5. Now you can open you source code if you double click to blob.c and you can compile the file by clicking on the "build all" button (see red circle in following screenshot).
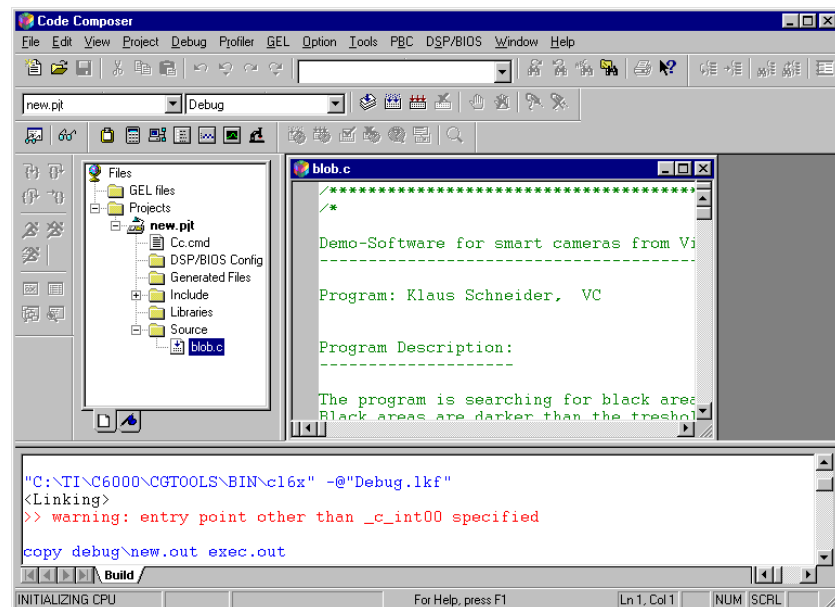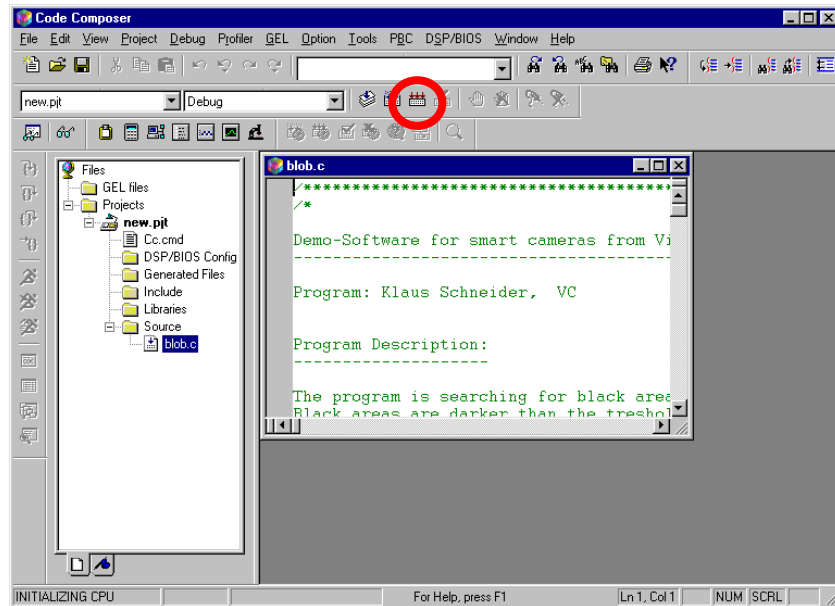
6. The compiler warning: "**entry point other than _c_int00 specified**" is not relevant as VCRT uses a different entry point.

According to the Build options 2 output files are generated through compilation (see section 4.6.2):
- new.out
- new.msf

Both files are stored under C:\ti\myprojects\send if the configuration of CCS has been done as described in section **4.2**.

New.out can be uploaded into the camera memory using FTP transfer. The msf file is required for uploading programs using RS232 serial communication or Telnet port 23. See section 8.3.18 for details on communication with the camera and details on program file upload.

5 Installation with Code Composer Studio 4.x

This chapter describes the installation with Code Composer Studio 4.x. **If you have Code Composer Studio 3.x, please read chapter 4.**

5.1 Installation of Code Composer Studio 4.x

Please follow the installation steps below:

1. Log in to your PC with administrator rights.
2. In case of updating an existing installation take a backup copy of your projects saved in the TI directory.
3. Run the setup program
4. Choose an installation directory, for example **C:\ti**.
5. Select "Next"
6. The setup program asks for the product configuration, choose "Platinum Edition"
7. Select "Next"
8. The setup program asks for the components to install : check the "Code Composer Studio v4" box for a complete install
9. Select "Next"
10. Select "Next" – the installation process begins. This may take several minutes.
11. When the installation is complete, select "Finish".
12. Download the following version of the compiler : "**Code Generation Tools 6.0.28**" from the following link: **http://www.vision-components.com/~downloads/ti_cgt_c6000_6.0.28_setup_win32.zip**. During setup choose "Typical install" and install to a directory of your choice in the CCS 4 install directory (for example **C:\ti\CGTools_6.0.28, the folder name should contain no space!**).
13. Go to next chapter: installation of VC Libraries.

Please note that have to adjust our SW and project files due to often undocumented changes between CCS versions. As this is a time consuming process, it may not always be possible to use the latest CCS or CGTools versions. Check in the "Support" News for an up to date list of approved development tools!

5.2   Installation of VCRT and VCLIB PC libraries

Both libraries VCRT5.XX and VCLIB3.XX are combined into one single setup file for instance: TI-VCRT530e_VCLIB311_CCS4_Setup.exe

Newer VCRT and VCLIB updates are also provided at the specified download location as collection of header and library files for advanced users.

Download Process of "TI-VCRT5XX_VCLIB3XX_CCS4_Setup.exe":

The latest VCRT and VCLib PC Libraries can be downloaded form the VC Website under:

Service & Support ▶ Download Center ▶ Software ▶ VC Libraries

In order to access this download section you have to register on our website and also need to register your "VC SDK-Ti" License Code, that is printed on the delivery docket for your VC Software development kit for Smart Cameras with Ti DSP. Please refer to Appendix B: Registration on the VC Website.

Installation Process of "TI-VCRT5XX_VCLIB3XX_CCS4_Setup.exe":

Run TI-VCRT5XX_VCLIBXXX_CCS4_Setup.exe and install the VC libraries **to the same folder as CCS4** (for example **C:\ti**).

Take the time to register your Vision Components development software (see Appendix B) now to ensure easy access to:

- Software updates of the VCRT and VCLIB PC libraries
- Camera operating system updates
- Up to date documentation downloads
- Download of utility and demo software that speeds up your development!

Refer to the Appendix of this document on information about:

How to obtain Library and Software updates from the Vision Components website
- How to register your Software at the Vision Components website

5.2.1   Download and Installation of VC Special Libraries

In addition to the VC SDK-Ti, Vision Components also offers special libraries:

- VC Extension Lib (new Extension Lib with a range of additional functions)
- VC Color Library (Color Library for Bayer to RGB / HIS conversions and more)
- VC OCR Library (text recognition library)
- VC Bar Code Reader Library (1D Barcode Reader Library – different standards)
- VC Smart Reader Library (ECC 200 Data Matrix Reader Library)
- VC Smart Finder Library (Contour-based Pattern Matching)
- VC Solar Solution (Solar Wafer Measurement).

Each library is available for download after registration of a valid license key as described above (except for Smart Reader, Smart Finder and Solar Solution, please contact our sales department).

5.2.2   VC's new licensing System

Vision Components issues two types of licenses:

- ***One-year-license for VC SDK-Ti, Extension Lib, Color Lib, OCR Lib.*** A 12 month update subscription service is included in each full license, which allows free update download within 1 year after SW purchase / registration. The initial subscription period of full licenses is extendable on a yearly basis by registering a new license code.

   The following one-year-licenses are available:

License Number Prefix	License Type Description
T	Full License of VC SDK-Ti (VCRT and VCLib)
LT	Evaluation license, valid for a limited time only

License Number Prefix	License Type Description
C, LC	Full and evaluation Color Lib licenses
E, LE	Full and evaluation Extension Lib licenses
O, LO	Full and evaluation OCR Lib licenses

- ***Single license for Smart Finder, Smart Reader, Barcode Reader and Solar Solution.*** In this case a license per camera is needed.

For each license type, evaluation licenses are also available (fully-featured but time limited).

Refer to the Appendix for registration instructions.

5.2.3   Initialization of VC Library Functions within the Camera Program

All special libraries require initialization within the camera program code prior to using its functions. From beginning of 2007 also new VCLib Libraries require initialization.

Initialization is done calling the „init_licence() function using the corresponding license code as shown below:

```
void main(void)
{

        /* Initialize VC Licenses*/

        init_licence("T1122334455"); /* initialization of full VC SDK-Ti license*/

        init_licence("LC1122334455"); /* initialization of an evaluation Color Lib License */
}
```

Function description (also refer to Color_Lib.pdf - Color library for VC cameras Version 3.0):

init_licence   **initialize license code**

synopsis   `I32 init_licence (char *code)`

⚠️ **Please always check the return value of the function init_licence: the function returns 0 if the licence is valid, -5 if the licence is not valid.**

Checking the return value is important: if the licence if not valid, some functions simply will not work, without any error message.

Single licenses (Smart Reader, Smart Finder and Solar Solution) are under the form of two codes which have to be initialized in the source code. Refer to the documentation of the libraries.

5.3 Generated file structure on PC

The following file structure is generated after installation of Code Composer Studio and VC's VCRT and VCLIB libraries:
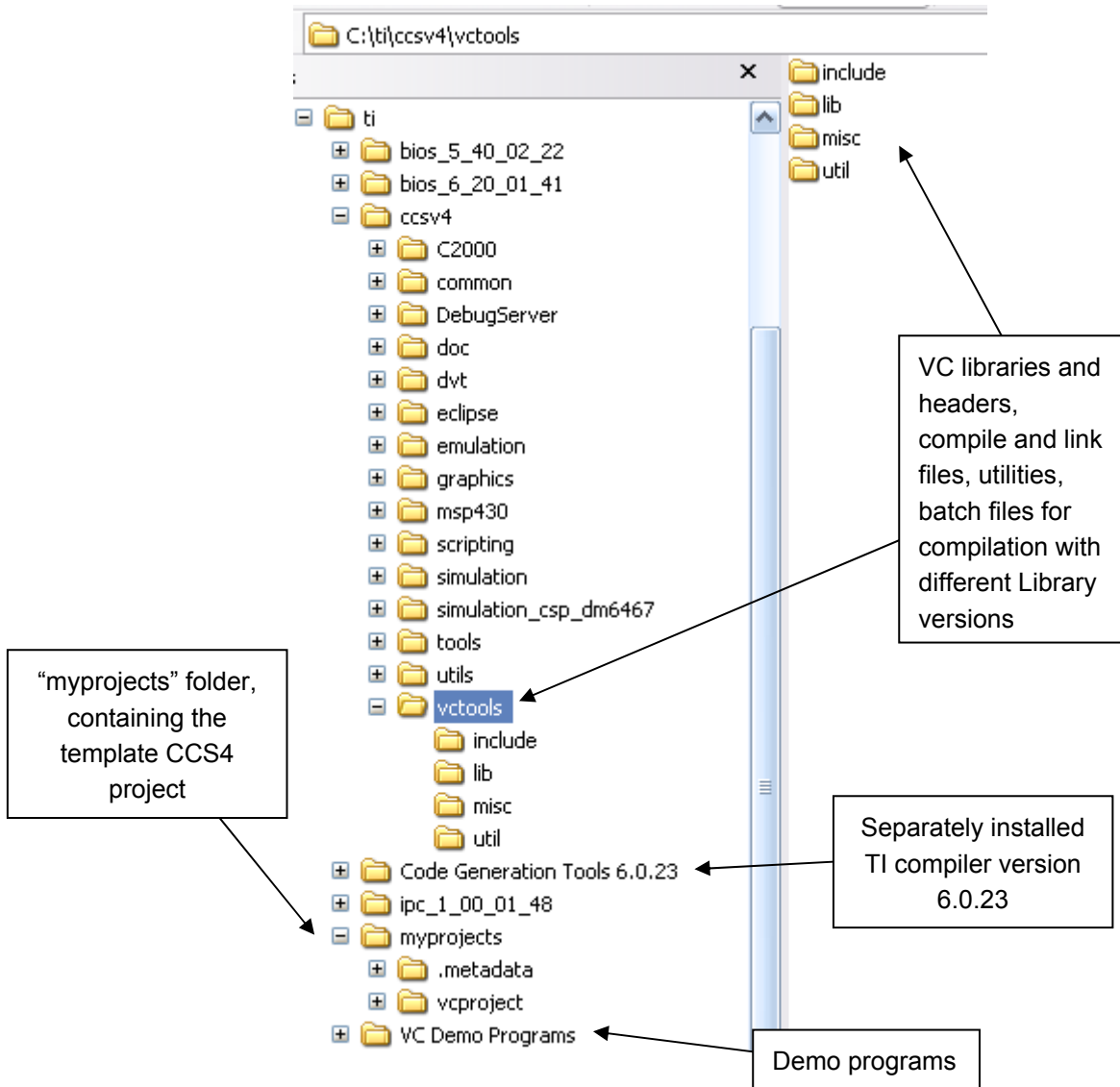
You are now ready to compile your first program.

5.4   Creating the first CCS4 project

With the installation of VC Libraries, Vision Components provides a template CCS4 project, containing all the necessary compiler and linker settings to create programs which will run properly on VC cameras.

1. Run CCS 4. The program asks you to choose a "workspace", the place where all your CCS 4 projects will be saved. The template project was installed in the **\myprojects** folder of the install folder. If you want to use this folder for your future projects too, choose it as workspace, for example **C:\ti\myprojects**, and select "OK"

2. A dialog opens, asking you to specify a license file:
   - if you have a full license, select "Activate a license" and then "Register" and follow the registration steps on the TI website
   - if you have the evaluation version, it can be used 30 days for free, and then 90 extra days if you register on the TI website (explanations **on this page**).

3. Close the welcome tab of CCS 4.

4. The main CCS window appears:
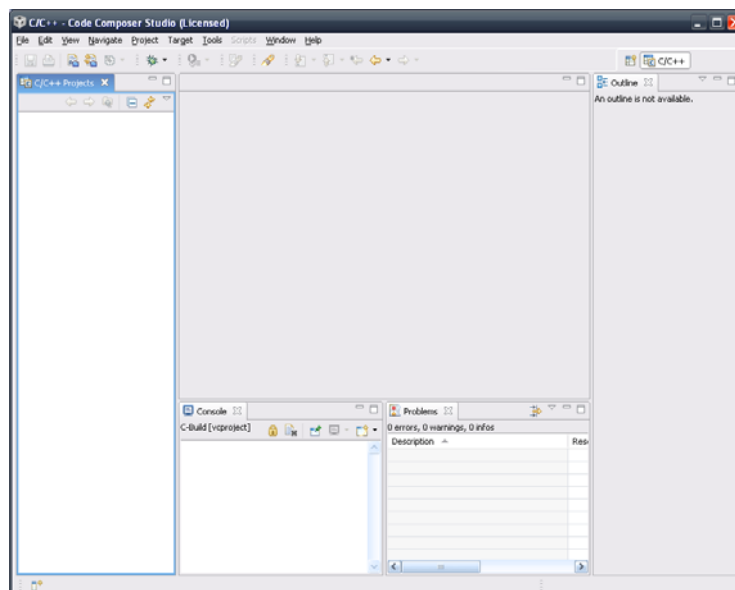
5. Choose the menu item Help → Software Updates → Find and install, then "Search for new features to install", check "Code Composer Studio Updates", click on "Finish" and install the available updates (or "Service Releases", at the time of printing, newest version is **CCS 4.2.3**).

6. Import the template CCS4 project provided by VC. For this, go to menu Project → Import Existing CCS/CCE Eclipse Project. Browse to your workspace and choose this folder (set at install, for example **C:\ti\myprojects**). Select the project **vcproject** that appears in the list. Click on Finish.
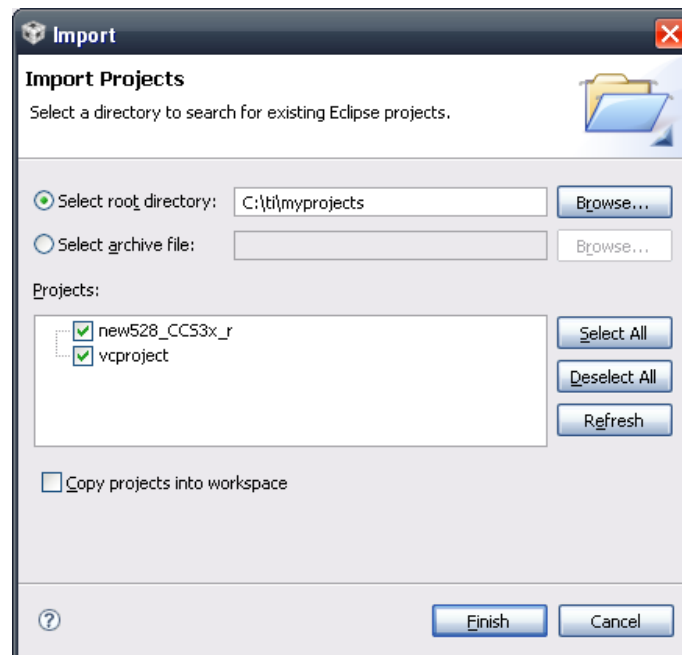
3. The project **vcproject** appears in the left column. It shows the include folders, a sample program "hello.c" and the link command file which contains the libraries to be linked.
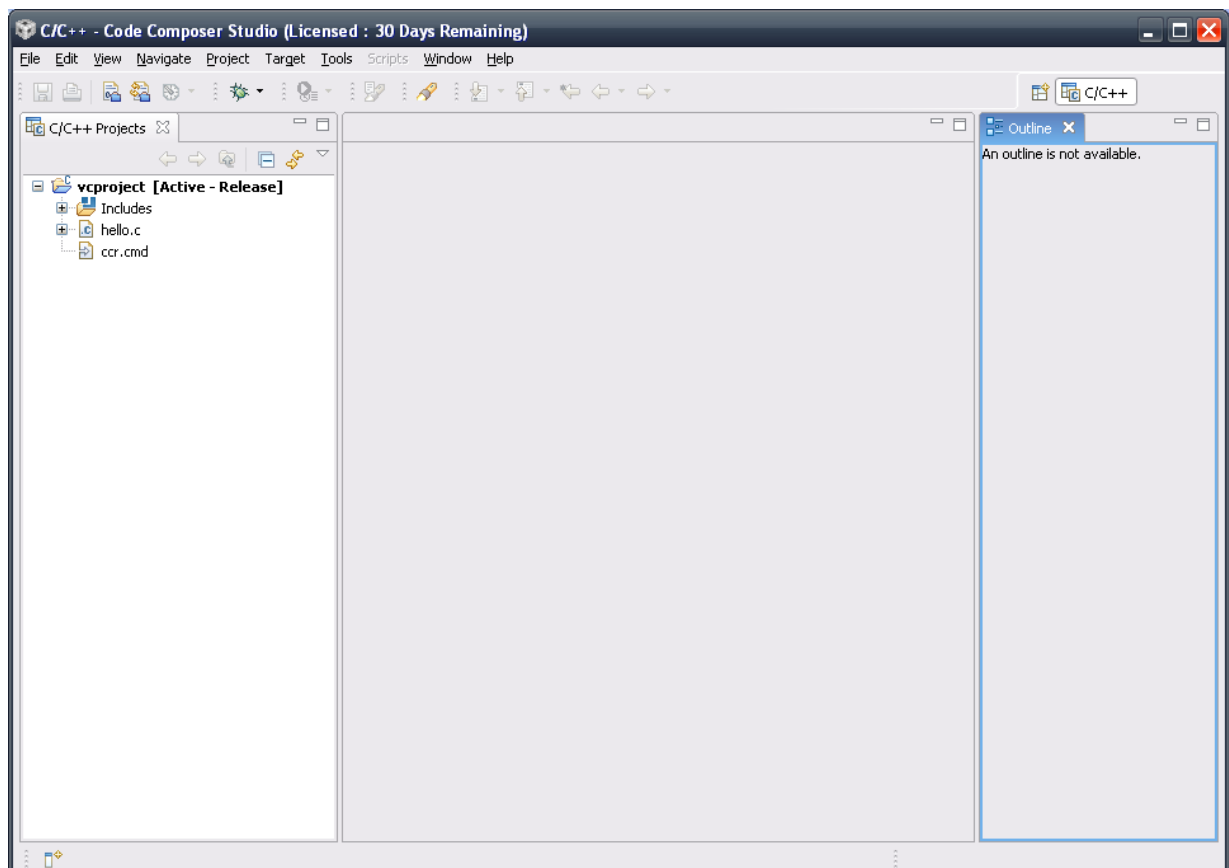
5.5   Adjusting compiler and linker settings

This section describes the compiler and linker options necessary for compilation. Note that the illustrations correspond to the CG Tools version 6.0.23. For versions 6.1.x for example the menu items will differ but the necessary settings stay the same.

Note: the paths used in the template project file (for example include and lib folders) now use the CCS4 macros (for example "${CCS_INSTALL_ROOT}" for the install folder, etc.), to make compilation independent from the CCS and VC libraries install folder.

5.5.1   General settings

Right-click on the project and choose "Build Properties...". Click on "CCS Build" in the left column. For compilation with a VC4XXX or VC64XX camera, the following general settings are needed:

- Device Variant: Generic C64XX device
- Code Generation Tools: version 6.0.23 (if the version doesn't appear in the list, click on "More…" and in the dialog indicate the CGTools installation folder)
- Linker command file: ccr.cmd
- Runtime Support Library: from VCRT 5.29, the rts6400.lib is supported for compilation with C64xx processors. But as it's already linked in the linker command file (ccr.cmd), the field has to be empty!
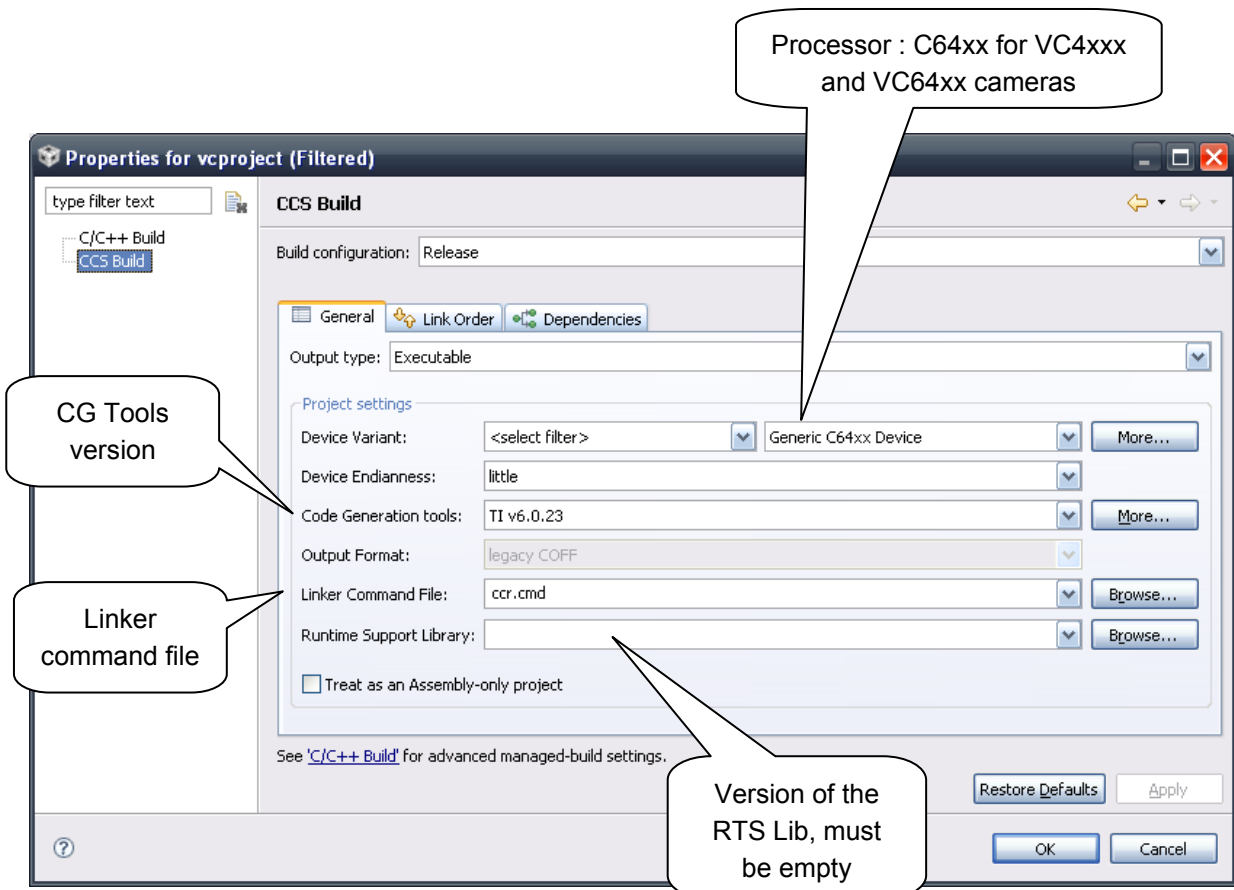
5.5.2   Changing the name of the compiled program

Click on "C/C++ Build" in the left column, and choose the "Buils Settings" tab. Here you can give the name of your choice to your program. Leave ".out" as extension.
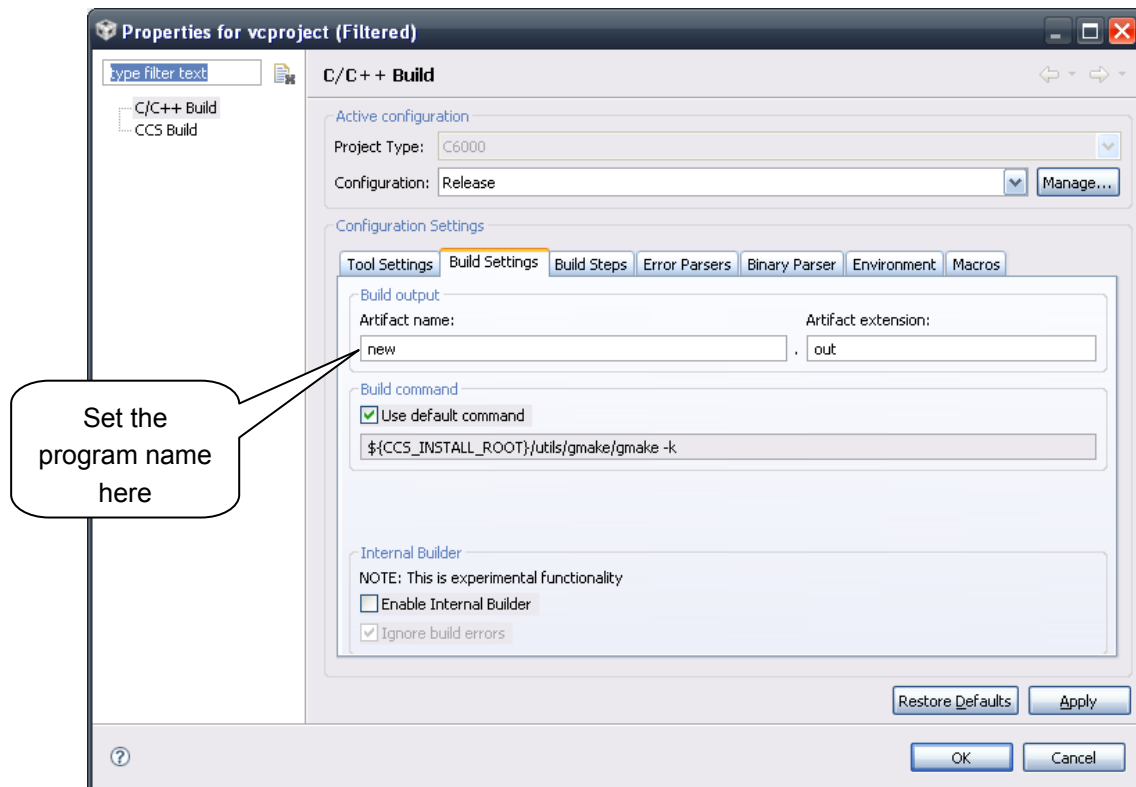
5.5.3   Compiler settings

The most important compiler settings are:
  - include file search paths
  - interrupt threshold: The advanced compiler setting "-mi100000" sets the interrupt threshold to 100,000 cycles, defining the maximum frequency interrupts are queried. Omitting this setting can speed up some functions significantly. However in this case it is important to ensure that inner loops perform less than 100,000 cycles, as interrupts (e.g. timer) can be out of sync otherwise. The "**Code Optimization**" document, part of the "Advanced Programming Seminar" covers the speed optimization of programs in detail.

5.5.4   Linker settings

The most important linker settings are:
-    relocatable output module: relocatable code is now standard, it brings more comfort for the user because VCRT manages program loading in memory automatically (whereas with absolute linked code, memory address of the program has to be taken care of). For more information have a look at the VC Programming Tutorial
-    library search paths
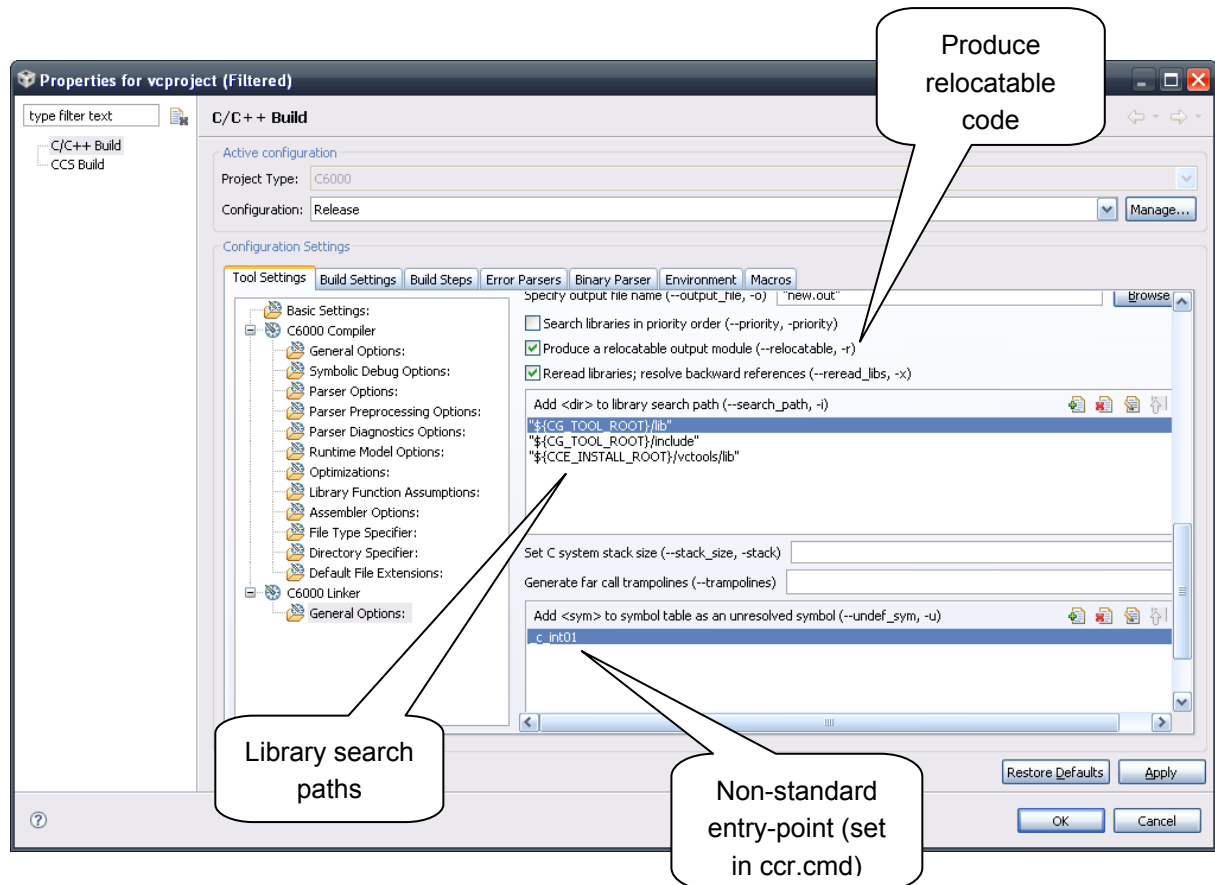
5.5.5   Final build steps

After compilation a batch file is executed:

```
rem Remove debug info
strip6x %1.out

rem create .msf file
copy %1.out exec.out
%2\vctools\util\econv %1
%2\vctools\util\scvt

rem copy .out and .msf file to send folder
copy adsp.msf %3\send\%1.msf
copy %1.out %3\send\%1.out
```

```
del adsp.*
```

The first line: **strip6x new.out** removes debugging information from the executable code and makes the file smaller.

The next lines **convert the executable *.out" file into an *.msf file** for serial and Telnet upload. (Refer to **chapter 8.3** of this document and to the VCRT5 documentation for details).

Both executable files – *.msf and *.out files are copied to the send folder.

All redundant files are deleted form the project directory.
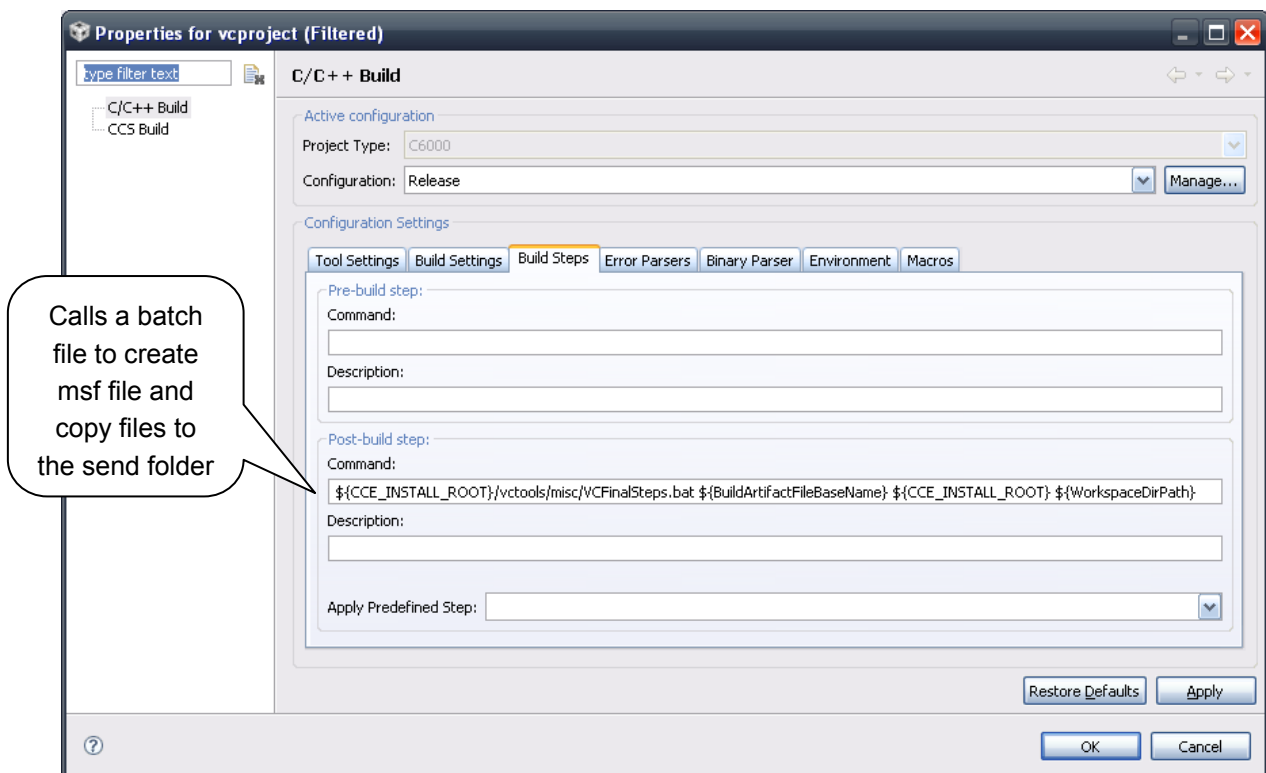
5.6   Compiling a C program

5.6.1   Compiling "Hello World"

1. The template project **vcproject** already contains a hello.c source file. Double-click on it to make it appear in the editor. You can compile the file by clicking on the "Build active project" button.
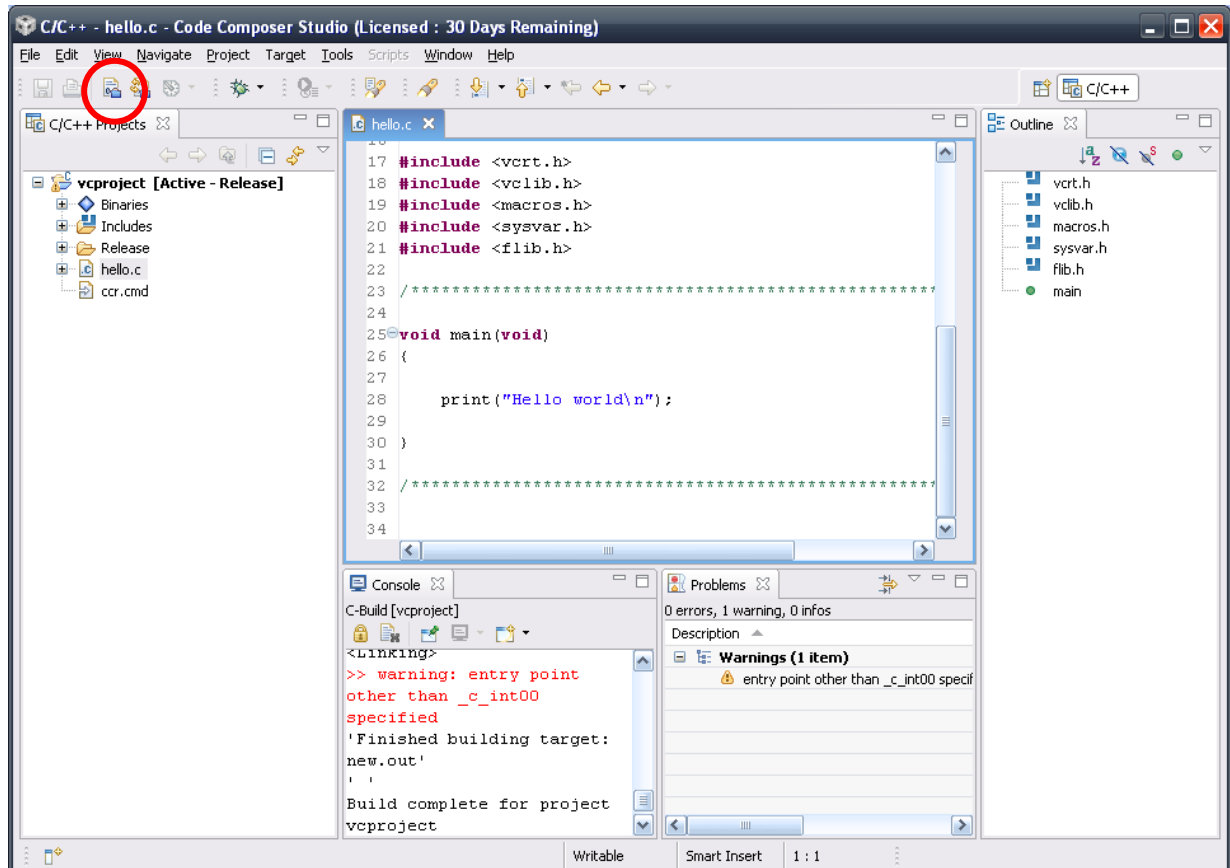
2. The compiler warning: "**entry point other than _c_int00 specified**" is not relevant as VCRT uses a different entry point.

3. According to the build options two output files "new.out" and "new.msf" are generated through the compilation process. These files are stored in the "send" folder of your CCS4 project folder.

The file "new.out" can now be uploaded into the camera memory using FTP transfer.

5.6.2 Compiling other source files

To create a new source file:
- right-click on the project, and choose New → Source File. Name it and confirm. The new source file appears in the project tree.

To compile another existing source file:
- in CCS4, right-click on the source file (in the first example hello.c) and choose "Delete"
- then right-click on the project, choose "Add Files to Project…" and select your new source file. CCS4 will copy it automatically to your project folder.

5.6.3 Creating new projects

To create new projects without losing the compiling options for VC cameras, simply copy the original project **vcproject**:
- right-click on the project and choose "Copy"
- right-click on the blank space in the left column and choose "Paste"
- in the dialog box, give your new project a name, and confirm with OK
- the new project is created and is available in the "C/C++ Projects" column.

6 PC TCP/IP Configuration for VC's Ethernet Cameras

This section explains the PC Network settings required for communicating with VC Smart Cameras.

1. Check that the Fire Wall of your Computer is turned off.
2. Select an IP address for your PC that falls into the same group as the camera default address 192.168.0.65. This is required in order to establish communication with the camera. It is possible to change the camera IP address (see section 8.5).

The default IP address for all VC20XX, VC4XXX and VC6XXX smart cameras is 192.168.0.65.
The current camera IP address is displayed on the VGA output at every camera startup.

Use the following PC settings for communicating with the camera set to default:

IP address: 192.168.0.XXX (select a free IP address form 1 to 254 for the last entry)
Subnet mask: 255.255.255.0
Set the default Gateway according to you requirements.

Automatic IP address allocation by your DHCP server can be used from camera OS 5.18, if your LAN uses the same subnet as the camera (see section 8.5).

If your LAN uses a different subnet, manual configuration of your PC settings are required to match the camera settings. Internet and LAN access might be lost in this case. It is possible to configure a second IP address for your computer to access the network – alternatively two network cards can be used. Contact your system administrator for assistance.

The camera IP address is not limited to the local area network 192.168.0.XXX. Any IP address can be used as long as camera and PC work in the same net defined by the subnet mask.
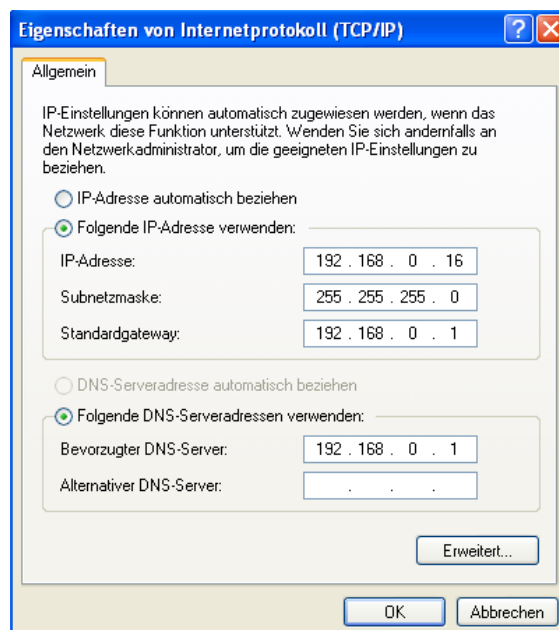
7   Cabling of VC Smart Cameras

Please refer to these camera manuals for information on how to connect the cameras correctly and detailed technical specifications of all interfaces – they are available for download under:

www.vision-components.com → Service & Support → Download Center → Documentations → **Hardware Documentation**

- **VC nano Series Smart Camera Operating Manual** for VC4012nano, VC6010nano, VC6210nano & VC6211nano cameras

- **VCSBC nano Series Smart Camera Operating Manual** for VCSBC4012nano, VCSBC6010nano, VCSBC6210nano & VCSBC6211nano cameras

- **VCSBC4012 Operating Manual** for VCSBC4012 smart camera

- **VCSBC64XX Smart Camera Operating Manual** for all VCSBC64XX smart cameras

- **VC4XXX Smart Cameras Operating Manual** for all VC4XXX smart cameras

- **VC4002L Hardware Manual** for the VC4002L linescan smart camera

- **VC20XX Hardware Manual** for older VC20XX smart camera models

8 Communicating with the Camera

The VC Smart Cameras feature one standard interface that can address the camera shell (similar to the DOS shell, Prompt: $):

- Serial RS232 (up to 115200 bd) for serial VC20XX cameras
- Ethernet TCP/IP Telnet Port 23 for all other VC cameras.

From camera OS VCRT 5.29 the standard interface can be changed to the additional serial interface using the shell command "sw". Please refer to the VCRT5 documentation for details.

8.1 The Camera Shell

The VCRT shell allows to control the main camera functions via keyboard commands, for instance:

Function	Keyboard Command
Uploading of programs from PC in to camera flash memory	$lo (and then activating the upload function of the terminal program).
Program execution	$myprogram
Display the File Directory on fd (md)	$dir ($dir md:/)
Delete Files (from directory content)	$del myfile
Packing the EPROM (freeing memory of deleted files)	$pk
Turn video output to live (still) mode	$vd –l (vd –d)
Check Camera OS version	$ver
Display ASCII file content	$type myASCIIfile (e.g. #ID to display camera ID)

All keyboard commands require confirmation with "Return". Refer to the "VCRT5.pdf" manual for a complete list of available shell functions.

In order to access the camera shell, any suitable terminal program like ProComm, HyperTerminal or TeraTerm can be used.
The following section describes the use of TeraTerm - please use TeraTerm for testing your setup.
TeraTerm 2.3 can be downloaded from:
http://hp.vector.co.jp/authors/VA002416/teraterm.html (freeware)

VC20XX, VC4XXX and VC64XX cameras also **support FTP standard commands** SYSTEM, PWD, CWD, LIST, DEL) and direct access to the MMC / SD via FTP (from VCRT 5.18.).
File up- and download is now possible with all Ethernet cameras using a standard FTP client. [4]

Use "Total Commander" in order to test your system – refer to section 8.4 for a detailed instruction.
Download Total Commander:

http://www.ghisler.com , Vers. 7.56 at the time of writing (free test for one month, after that small payment required). The test version is included in the new development software CD from Vision Components.

---

[4] The „FTP_Demo" tool is only supported until VCRT 5.17 – use a standard FTP program instead with newer OS versions.

8.2   Camera Directory Structure and supported File Types

All VC Smart Cameras feature a flash EPROM as non volatile program and data storage media. Most cameras also incorporate a 16MB MMC or 512 MB SD card as extended data storage.

The following overview highlights the file handling differences between flash and MMC / SD:

Flash EPROM	MMC / SD
- Does not support standard file extensions! The following files types are supported and automatically converted into numerical file extensions (FTP transfer): - exe → 000 - asc → 001 (also: asc, htm, html, txt from VCRT 5.25) - dat → 002 - jpg → 003 - binary → 231 This extension is also displayed if one of the file types above is not recognized (adjust file extensions on PC in this case).	- Does support standard file extensions
- EPROM required packing in order to free memory after file deletion (see 8.1).	- MMC and SD are self organizing, i.e. packing after deletion not required.
- it is not possible to create subdirectories	- Creation of subdirectories possible - $mkdir md:/subdir
- Faster access	- Slower access
- Protected first flash EPROM sector: fd:/sys/ Accessible with "$dir –x" - Working directory: fd:/user	- No subdirectories - Path: md:/
- File upload per Telnet/ RS232 /FTP possible	- File upload only per FTP possible
- Only *.msf file upload (see section 8.3.1)	- Upload of standard file types (no *.msf)
- Default directory for program execution	- Executing programs from MMC possible after calling : $cx md: (back: $cx fd:)

Refer to the following sections for further reference:

Program upload via Telnet / RS232	8.3.2
Program upload via FTP	8.4
Msf files and file conversions	8.3.1

Refer to the following documentation for further reference (see inner cover text):

Shell commands	VCRT5 Documentation
File conversion of ascii and jpeg files	VCRT5 Documentation
Flash EPROM sizes and other hw specification of your camera	VC Smart Cameras Hardware documentations
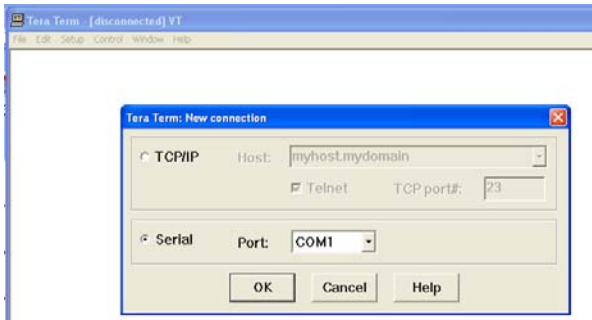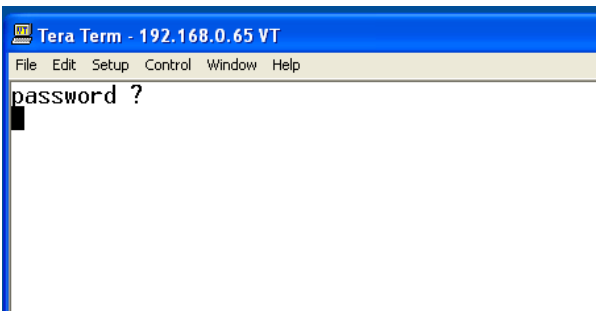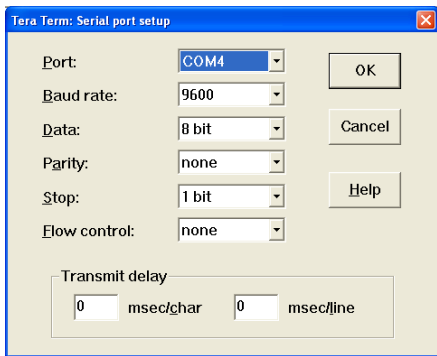
8.3   Camera Shell access via Terminal Program (TeraTerm)
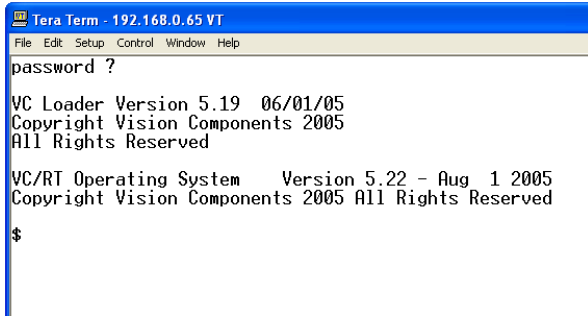
Follow these step by step instructions for establishing a connection with the camera shell via TeraTerm. The left hand side shows the steps for communicating with an Ethernet camera – the right hand side displays the connection with a serial camera.

Both interfaces – Telnet Port 23 via TCP/ IP and the serial interface work the same way once established:

Shell commands or program IO functions (like print instructions or so called "RS232 (V24) functions" in the VCRT5 manual) behave in an identical way.

See Appendix D for troubleshooting advice on Telnet and RS232 communication.

Ethernet Cameras	Serial Cameras
1. At TeraTerm start up select "TCP/IP" and "Telnet" and specify the camera IP address (shown at startup video output). The default IP address is 192.168.0.65 as shown. 2. Confirm your input selecting "OK"	1. Select "Serial" and the connected COM port (ensure the voltage level of the serial interface is sufficient or use USB to serial converter, see section **Fehler! Verweisquelle konnte nicht gefunden werden.**) 2. Confirm with "OK"
3. The TeraTerm window asks for a password (Telnet feature). Password input is not required – confirm with "Return".	3. At the main TeraTerm Window adjust the serial port settings if required (under "Setup" -> "Serial Port". Select the default settings as shown.
	  Default baud rate is 9600Bd as shown.

4. The camera welcome prompt is displayed including the OS version number and the $ prompt. The camera shell is now accessible.	4. Only the $ prompt is displayed. The full welcome prompt is displayed only, if the camera is restarted (power interrupted for a few seconds).

Notes:

From camera OS VCRT 5.26:

→ Added KEEPALIVE to FTP and TELNET Server: If link is down for more than 100 seconds the tcp connection will be closed

→ Added telnet session TAKE OVER feature: Telnet currently deals only with one shell connection. Now its possible to take over a running telnet connection and drop the old one.

→ do gracious ARP at boot time to force ARP cache updates

→ Refer to "Appendix C: Communication Troubleshooting" if you are unable to connect to the camera.

If the camera executes a program started after power up, this is started through an autoexec file in the camera memory. Refer to section 8.6 on information about bypassing the autoexec execution.

8.3.1 Converting "*.out" Files into "*.msf" Files for Serial and Telnet upload

After establishing a connection with the camera via RS232 or Telnet, programs can be uploaded. As described at the beginning of section 8 and section 8.3.2, the shell command "lo" is used for uploading "*.msf" files into the camera.
Msf files, or Motorola S-Record files are a file format chosen for safer serial and Telnet file transmission, including checksums. Note that ONLY *.msf files can be uploaded via RS232 or Telnet! This does not only count for programs, but any other file (*.txt, *.jpg, *.dat, etc) as well. Refer to the "Supplied Utilities" section of the "VCRT5" manual for a complete documentation of available file conversion utilities.

The conversion of program files (lCOFF compatible *.out) files is shown in the following table. Also compare with the "final build steps" in the CCS Build options (4.6.2). The file conversion is already included in all supplied project files (see section 4.6.1).

The conversion steps for program files are:

Commands:	Explanation
1. copy new.out exec.out	Renaming the correct input file name for using the "econvert" function
2. c:\ti\util\econv prog1	First conversion step – "prog1" is the program name in camera memory.
3. c:\ti\util\scvt	Final conversion step – output file is: "adsp.msf"
4. copy adsp.msf c:\ti\myprojects\send\prog1.msf	Renaming the "*.msf"- file (and moving into the send folder)

Note:
- The creation of *.msf files is required for serial and Telnet upload only!
- Msf files cannot be uploaded by FTP. Using FTP, the linker output file (*.out file) is directly uploaded into flash memory or MMC / SD.
- No file conversion is necessary for FTP upload (this counts for all file formats).
- The file size about doubles from an *.out to an *.msf file – however The additional information is again removed when the program is saved to camera memory.
- The conversion programs mentioned above are only for converting "*.out" files. Refer to the VCRT documentation for further information on converting other file types.

8.3.2   Program uploading using TeraTerm

After establishing a connection with the camera via RS232 or Telnet, programs can be uploaded. As described at the beginning of section 8, the shell command lo is used for uploading *.msf files into the camera.
The following steps are required for *.msf file upload with TeraTerm:

Commands:	Explanation
1. "$lo"	Calling the shell command "lo" without parameter activates the file upload. Confirm with Return. The camera sends "start address for file: xxxxxx" and waits for activation of the terminal upload function (program specific).
2. Select "Send File" under the "File" menu and browse for the *.msf file to upload.	Terminal program specific. Refer to the VCRT documentation for upload with ProComm.

During Transmission the terminal program window shows increasing rows of dots. If text lines are displayed and "ERROR 07: illegal command call" then the file format is not recognized or the shell command "lo" has been omitted.

```
$lo
load s-records
FLASH mode
start address for file: 000000
..................................................................
..................................................................
..................................................................
..................................................................
..................................................................
..................................................................
..................................................................
..................................................................
..................................................................
..................................................................
..................................................................
............................................
load successful   3E10

$
```

8.4   FTP Communication with "Total Commander"

1. Install Total commander (for instance "tcmdr750a.exe") and start the program.
2. Click "FTP connect" in Pull down menu "Net" or use the corresponding symbol.
3. Click "New Connection" and adjust the settings as shown (input email address as password). Leave this configuration menu:

4. Highlight the configured connection and click "connect"
5. The camera should connect instantly and the directory structure should be displayed
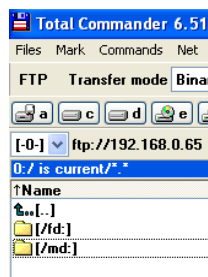
6. You can now open the fd or md folder, copy and paste files from PC to camera flash or MMC (SD for VC40XX) and vice versa, delete files on the camera, etc.

Msf files cannot be uploaded by FTP. Using FTP, the linker output file (*.out file) and other file types are directly uploaded into flash memory or MMC / SD.

8.5   Changing the IP address on Ethernet cameras

The camera IP address is changed by uploading a #IP file into the camera memory. This is an ASCII file containing the IP address settings:

The **default IP address** of all Vision Components Smart Cameras is **192.168.0.65**

In order to operate more than one camera on a network, each camera requires an individual IP address. Changing the IP address of a camera is done the following way:

Edit the file ASCII.INP – under C:\ti\myprojects\demofiles VCRTXXX\ Ethernet New IP

Type in the new IP address (**RETURN at the end of every line required!**)

For example:

#IP file entry:	Explanation
IP: 192.168.0.81↵	New camera IP address – change at next start up
MSK: 255.255.0.0↵	Mask for setting the IP address subgroup
GTW: 192.168.0.1↵	Specify gateway if required
DHCP↵	Adding "DHCP" to the "#IP"- file requests the IP address allocation from the DHCP server. In case DHCP allocation is not possible, the camera is set to the IP address specified in the first line. If no other IP address is specified in this file, the camera is set to its default IP address: 192.168.0.65
PWD: mypassword↵	It is possible to protect the access to the camera with a password. The password set in the #IP file will be asked for both Telnet and FTP connections to the camera (for FTP: username is don't care)
NS1: 192.168.0.1↵ NS2: 192.168.0.2↵	NS1 and NS2 are the IP addresses of DNS servers. When these (or at least one) are available in the #IP file, VCRT automatically starts the DNS resolver at startup and allows to use the name resolving functions.

Execute the "cc_IP.bat" file

Download the ip.msf file to the camera

Alternatively the #IP file can also be uploaded using FTP. Rename the Ascii.inp file into #IP.001 after editing and upload this file directly into the flash memory using a standard FTP client.

The new IP address is displayed on the monitor connected to the camera for a few seconds at every power up. The file "ip.msf" is displayed as "#IP" in the camera memory (flash EPROM). Deleting this file resets the camera to its standard IP address of 192.168.0.65 at next start up.

You can check the #IP file at the camera shell with the command: $type #IP
It is advised to perform this #IP file check prior to re- booting the camera!

8.5.1   Resetting the IP address to the default address

In case an invalid IP address has been created (for instance 0.0.0.0) resuming communication with the camera may not be possible (i.e. deleting the existing #IP file on the camera). In this case it is necessary to reset the IP address without establishing a communication first.

8.5.1.1   Resetting the IP address with VC20XX Smart Cameras:

For resetting the IP address of VC20XX Smart Cameras a Keypad is required the use of a C6 keypad, order number VK000002, is required (see section **Fehler! Verweisquelle konnte nicht gefunden werden.** for details).

Note that due to the modified trigger interface VC40XX and VC44XX cameras require a different keypad model.

Product description	VC Order Number	Image
VCSKB Keypad C6	VK000002	
VCSKB Keypad C4	VK000238	Identical appearance, ID mark on the back

Resetting the IP address is done by sending an ESC string to the camera with the keypad during camera start up. Press the ESC button on the keypad repeatedly during startup to ensure the sequence is received at the right moment.

Resetting the IP address in the way described also bypasses the execution of an autoexec in flash memory.

8.5.1.2   Resetting the IP address with VC4XXX and VC6XXX Smart Cameras using "VCnet":

A new tool – the "Vcnet Recovery Tool" is provided for resetting the IP address of the VC cameras. Vcnet Recovery is supported from camera OS VCRT 5.21.

In order to use the VCnet Recovery tool, follow the steps below:

1. Download and install **Java** on your PC.

2. Download **VCnet Recovery Tool** from **www.vision–components.com** -> Service & Support -> Download Center -> Software ▸*Software Utilities*

3. Unpack the "vcnet1.2.zip" folder a directory on your harddrive (for instance C:\ti\Util…).

4. Open the Dos command line window and change to the directory containing "vcnet.jar".

5. Execute the following command from the DOS Window "java -jar vcnet.jar -snr 5912345" , by specifying the camera serial number as shown. This command sends vcp packets via UDP broadcast for the next 15 seconds. Sending this command resets the corresponding camera to the default IP address and bypasses Autoexec execution. Further options below.

6. Boot the corresponding camera (power on) during the next 15 seconds. During start up the camera listens 0.5 seconds for vcp packets send with vcnet.jar.

7. If a valid vcp packet is received from camera an answer packet is sent (see example below). The camera continues booting in standard configuration:

Default IP address:	192.168.0.65
Mask:	255.255.255.0
Gateway:	none

An autoexec in flash memory is not executed.

Note:

→ An autoexec file residing in flash memory is not executed when VCnet is called!

→ The IP reset and auto exec bypass is only temporary! In order to change the IP address or autoexec, the corresponding file needs to be changed.

→ The timeout for receiving packets is set to 15 seconds after start of VCnet.

→ Since UDP is not a "fail safe" protocol, execution of VCNet may not work at the first time. Repeat calling VCNet if necessary.

Example of resetting a VCSBC4018, S/N 0100151:

C:\Programme\VCnet>java -jar vcnet.jar -snr 0100151

VCnet Recovering Tool Version 1.2 - Copyright Vision Components 2005

Recovering Serial Number = 100151

Listening on port 67 for incoming packets!

Packet 2 from: /0.0.0.0

===Data as Text:===

model: VC4018E

S/N: 0100151

DC: 06/10/05 09:23:06

MAC: 00-06-1F-01-87-37

IP: 192.168.0.81

MSK: 255.255.255.0

GTW: 192.168.0.1

….

Using VCnet Recovery Tool Ver. 1.2 it is now possible to set the new IP address, mask and Gateway individually:

Function call:	Camera configuration at next start-up:
"java -jar vcnet.jar -snr 5912345 192.168.2.1"	IP = 192.168.2.1
"java -jar vcnet.jar -snr 5912345 192.168.2.1 255.255.0.0"	IP = 192.168.2.1 Mask = 255.255.0.0
"java -jar vcnet.jar -snr 5912345 192.168.2.1 255.255.255.0 192.168.2.254	As above, but in addition setting the gateway to 192.168.2.254

8.6   Starting Camera Programs with an Autoexec

Together with the VCRT and VCLIB Libraries - all files mentioned in this section are included in the demo files that are copied to:

> C:\ti\MyProjects\Demo Programs\Utility Demos\AutoexecC:\ti\myprojects\ Demofiles VRCTXXX\Autoexec (check the "Support News" for an up to date demo program structure).

Steps for generating an Autoexec file:

1. Edit the file ASCII.INP – Make sure that a Return (CR + LF) is inserted at the end of each line. The command in that line will not be executed otherwise! This is often the reason why programs are not executed.

2. Type in the commands and don't forget the RETURN after every command

    for example:

    bd 115200   /*sets the camera baud rate to 115200*/
    sh 10000   /*sets the shutter speed to 10ms*/
    …img3par &   /*starts a background program with lower priority
    myprog   /*starts the program "myprog" previously uploaded into the camera EPROM*/

3. Execute the "cc_autoexec.bat" file in the directory mentioned above.
4. Upload the autoexec.msf file to the camera

The camera now starts the commands inside the autoexec file after every power up.

Alternatively the autoexec file can also be uploaded using FTP. Rename the Ascii.inp file into autoexec.001 after editing and upload this file directly into the flash memory using a standard FTP client.

8.6.1   Preventing the execution of an autoexec file for Serial cameras

If the camera executes a program started after power up, this is started through an autoexec file in the camera memory. To bypass the execution of the Autoexec, press the "Esc" button on your keyboard repeatedly during power up. The terminal program on the PC side (e.g. TeraTerm, HyperTerminal, ProComm) has to be set to 9600 Bd during this process.

8.6.2   Preventing the Execution of an Autoexec file for Ethernet cameras

1. Execution of an Autoexec can be bypassed by attempting to connect with the terminal program while the camera is booting. The camera still uses its current IP address. This works best if the connection within the camera is started shortly after connecting the camera to a power supply (step 2, table section 8.3). This prevents the autoexec file from execution. The IP address set with a #IP file in the camera memory is kept (this method may be difficult with fast booting VC4XXX cameras).

2. Pressing Escape during camera power up on a keypad connected to the trigger input does not only bypass the autoexec but also defaults the camera to the standard IP address of 192.168.0.65. This is the only way of accessing the camera if an invalid IP address has been created with the #IP file (see section 8.5.1).
3. Alternatively VCNet can be used to bypass autoexec execution (see section 8.5.1).

Appendix A: Download of VCRT and VCLib PC- Updates

Updates for VCRT and VCLIB for VC4XXX and VC64XX Smart Camera can be downloaded from the Vision Components website. *www.vision-components.com*

All Software updates are located under: **Service & Support** ▶ **Download Center** ▶ **Software**

- The latest VCRT and VCLIB PC library updates are available under "VC Libraries"
- "**VC Libraries**" also includes VC Special Libraries like the "Extension- and ColorLib (registration of corresponding License Code required, refer to section 4.3.2).
- "**VCRT Camera OS**" provides all camera operation systems, divided in "Release…" and "Development…" providing also newer non-release camera operating systems if new features are required.
- The "**Demo Programs**" directory includes general demo programs, useful for learning VC camera programming, but also working demo programs of VC's special libraries.
- Further training manuals ("**Programming Tutorial Basic**" and several "**Advanced Tutorials**" and demo programs are available under "**Documentation"**. The Knowledge Base also includes a range of latest programs, attached to the corresponding entries.
- The "**Software Utilities**" section includes a range of useful programs – like the "img2" image transfer server and ATX PC client, VCZip, Vcnet and more.

⚠ In order to access these updates, **registration on the VC website** and also the r**egistration of the corresponding software license** is required. Also see the following appendix section on software registration. Vision Components has mailed out license key numbers for all development software purchased.

Please use this license key to register your software as described in the following section.

In case you have purchased a development bundle, but did not receive a license code, please contact your distributor or **Vision Components Support** for assistance.

Appendix B: Registration on the VC Website

For registration of a software license you must be a registered user and logged in to the VC website. The following describes both registrations:

A User Registration

1. Submit your Registration, following the "Login" link on the top right of the Vision Components homepage: **www.vision-components.com**

2. Click on the link **Not a member yet? click here to register** and fill in the form. Your email address will be your user name.
3. An activation link is sent to the email address specified. Please click on this link in order to validate your login.
4. Log in at the VC homepage, using the "Login" Link.
5. You now have access to our Download-Center and can register your software licenses.

B Software Registration

Please register your VC licenses to ensure access to the corresponding customer areas and software update downloads! For this go to:

Service & Support ▸ Download Center ▸ Software Request

Enter the license code in the form and click on "Request Software". Wait for the confirmation email.

C Updating a previously registered License

Proceed as in point B with your new software license.

Note: A software license can only be registered with one user!

Appendix C: Communication Troubleshooting

Troubleshooting Telnet Communication with TeraTerm

1. Connect the Camera directly to the PC using the cross link cable and adapter as shown in the installation document (or connect via Hub to the PC).
2. Make sure your PC network connection is set to the same subnet as the camera (i.e. 192.168.0.XXX, mask: 255.255.255.0 – refer to section 6).
3. Turn off "automatic allocation of IP address" as described in section 6.
4. Turn off any fire wall on your PC.
5. check with "arp –a" at the DOS input window (under accessories) if there are any entries for the camera's IP you are using – e.g. 192.168.0.65. If so, delete that arp entry at the DOS prompt with the following command: "arp –d 192.168.0.65" (calling arp –d without parameter deletes all arp entries). This step is not required after VCRT 5.26 camera OS!
6. Re check with "arp-a" if the arp entry for that IP address has been deleted successfully.
7. Check if the IP address is already in use in your network (for instance with "ping 192.168.0.65"). (in that case you get a message "goodbye" and the connection shuts down). If so, disconnect your PC from your network and connect straight to the camera using the cross link cable and change the camera IP address as shown in section 8.5.
   From VCRT 5.26 it is possible to take over an existing Telnet session.
8. Re- start the camera (power up). Confirm that the camera IP address is still the default address (192.168.0.65) – check at startup the video output of camera. Wait until a live image is displayed on the VGA output.
9. Install and start TeraTerm (with Administrator rights on your PC), Refer to section 8.3. Adjust TCP/IP settings as shown.
10. if the welcome prompt is not displayed, please shut down TeraTerm, reboot the camera and try again to re- establish a connection.(Usually the connection works at the very first attempt, but sometimes a camera re- boot may be required).
11. Try to connect to the camera using the VCNet tool (see chapter 10.5.1.2).
12. if still no connection can be achieved, check all cables (swap with another set of cables if possible). Check correct pin allocation for self made connections.

Troubleshooting Serial RS232 Communication of VC20XX cameras using TeraTerm

1. Check the communication settings (refer to section 8.3).
2. Check if the camera executes a program at startup and bypass the autoexec as described in section 8.6.19.
3. Ensure that your serial PC interface provides a sufficient voltage level of $\pm$ 5V to communicate with VC cameras or use USB to serial converter.

If all this does not produce a result – the camera communication is probably not working correctly. In this case please contact Vision Components support or your local distributor for further assistance.

Appendix D: Shipping Cameras for Repair

- In case of a suspected hardware fault, please contact at first your distributor/ point of purchase for assistance.
- If the problem cannot be solved locally, please use the following link to fill in the RMA form on the website under "Service & Support":

Service & Support ▸ Return / Repair service

- Please provide a detailed fault description and also let us know how you have tested this fault in case the defect is not obvious.
- Login on to the VC website automatically fills in your address details.
- Clicking the "Send" button after filling the form displays the RMA result sheet with the RMA number and a summary of your fault description and details, as well as the shipment address. This summary page is also sent to your email address.
- Please print out this page and include it with your camera shipment.
- Please always use courier services (FedEx, UPS, DHL, etc) for shipping, since we are unable to get customs clearance if cameras are sent by normal mail services.

Repair / Hardware Upgrade Costs:
- Warranty repairs are free of charge if not due to camera misuse.
- After expiry of the warranty period most repairs or upgrades are done at a small flat fee. Check with your distributor for details.

Hardware or SW fault?
- To save time and costs, please **only send cameras with definite hardware faults**.
- Please ensure the failure is not due to:
    - A SW problem (for instance most suspected Flash errors are SW problems / Communication errors are often due to wrong IP settings, etc.)
    - Hardware failure of accessories (cables, connected sensors, etc.)

Please check the VC documentation and the Knowledge Base / FAQ for possible SW errors.

If in doubt please contact **Vision Components Support** for assistance prior to shipping!

Vision Components can only accept products for repair that have been directly purchased form us or one of our authorized distributors.

Please contact your point of sale, if you have purchased a VC Smart Camera from another vendor!

Visit the Vision Components site **www.vision-components.com** for further information and documentation and software downloads:

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Software (User- and SW License Registration required)	- Software Updates (VCRT & Libs) - Demo Code - Software utilities
Tech News	Tech News – new SW and Documentation
Knowledge Base / FAQ	FAQ Database with programming Examples and Demo Code
Return / Repair Service	Form for Allocation of Repair Numbers.
Loan systems	Info about VC loan cameras