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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

Since the VC4XXX smart camera family employs a TI processor, the programming environment and functions for the VC20XX cameras can be used for this camera.

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

> „**Support 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 Areas**" for all documentation and Software downloads – refer to the following table:

Description	Title on Website	Download Area
Schnellstart VC – Deutsche Version dieses Handbuches 🇩🇪.	📕 Schnellstart VC Smart Kameras	Registered User Area ▸Getting Started VC SDK TI
Introduction to VC Smart Camera programming	📕 Programming Tutorial for VC20XX and VC40XX Cameras	Registered User Area ▸Getting Started VC SDK TI
Demo programs and sample code used in the Programming Tutorial	🗔 Tutorial_Code	Registered User Area ▸Getting Started VC SDK TI
VC4XXX Hardware Manual	📕 VC4XXX Smart Cameras Hardware Documentation	Public Download Area ▸Hardware Documentation VC Smart Cameras
VCRT Operation System Functions Manual	📕 VCRT 5.0 Software Manual	Registered User Area ▸Software documentation VC Smart Cameras
VCRT Operation System TCP/IP Functions Manual	📕 VCRT 5.0 TCP/IP Manual	Registered User Area ▸Software documentation VC Smart Cameras
VCLIB 2.0 /3.0 Image Processing Library Manual	📕 VCLIB 2.0/ 3.0 Software Manual	Registered User Area ▸Software documentation VC Smart Cameras

💡 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.

1.1   Software Overview

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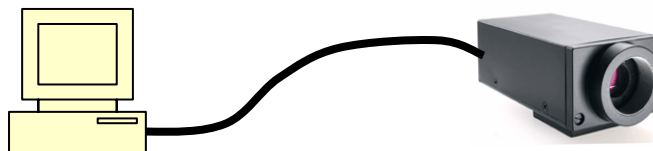
On the PC (VC SDK-TI)[1]	On the Camera
Ti Code Composer Studio C cross compiler	
Vision Components VCRT operation system function libraries	Vision Components VCRT operation system
Vision Components VCLIB image processing Libraries	

Ti Code Composer Studio C cross compiler

Code Composer Studio 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 2.1 and 3.1** are approved for programming VC cameras.
At the time of printing the latest **CCS v. 3.3**. can only be used with the last compiler for CCS 3.1: **C6000 Code Generation Tools v5.1.12** – 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 6.1 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

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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.

- System variables

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 VC40XX cameras is included in the VC40XX 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 has now been combined with the VCRT setup into one installation.

2 Code Composer Studio

Vision Components currently ships the original TI CCS installation disks as full version 2.0 with a CCS V2.1 Update. Please install CCS2.0 at first and then the update. The installation works similar for all CCS versions. Differences in the installation process are highlighted of the installation process are described in the text.

The latest Code Composer Studio Version 3.3 (Platinum Edition) can now also be used for programming VC Smart Cameras. However at present the compiler of this new CCS version needs to be replaced with the latest compiler version of the CCS 3.1 – refer to the following section for details.

After registration of the "Code Composer Studio Service Code" included with the original installation manual, the CCS Updates and bug fixes can be downloaded from the Ti website **www.ti.com**. This is most conveniently done using the "Update Advisor" from the help menu of your CCS installation.

Alternatively during the initial 15 month subscription period after registration, CCS updates can be requested free of charge at the following email address: **texasinstruments@worldmarkinc.com**
The request has to be made in English. The subscription period can be extended on an annual basis. Refer to the Ti site for details.

2.1   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 platform: CCS v. 3.1
   → Code Composer Studio **v. 3.1** (from this Version also referred to as: Platinum Edition).

   There are 2 different releases of this CCS Version, that are both suitable:

      o Code Composer Studio IDE Platinum v. 3.1
      o Code Composer Studio v. 3.1 SDK Version as part of the "TMS3206416T DSK Starter Kit" as shipped by VC from mid 2007. Note that **only the CCS 3.1 DSK installation CD** is required for programming VC Smart cameras!

Alternative CCS Version:

   → Code Composer Studio v. 3.3. with compiler versions up to Code Generation Tools 5.1.12 only (refer to the next section for details)!
   → Code Composer Studio v. 2.1 – note that newer VC code may not be tested with CCS 2.1

Check the "Support 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 5 and 6.1).

2.2   Download of CCS Evaluation Version

A 120 day evaluation version of Code Composer Studio Platinum Edition (Version 3.3, 568 MB) is available from the TI website **www.ti.com** under:

www.TI.com →Digital Signal Processing→Platforms →DSP Design Support → Getting Started→ Free Evaluation Tools

Or under:

TI Home > **Digital Signal Processing** > **DSP Design Support** > **Tools & Software Overview** > **Code Composer Studio IDE** > Free Evaluation Tools

It is possible to either order a SW CD online or to download the trial CCStudio Development Tools **v3.3** (FETs). User registration on the Ti Website may be required.

Note the special installation advice about the CCS 3.3 Evaluation software in the following section.

2.3   Installation of Code Composer Studio

The installation is slightly different for CCS 2.0, 2.1, 3.1, 3.3 and the Platinum Edition Evaluation Ver. 3.1 as described.

Please follow the installation steps below:

1. Log in to your PC with administrator rights.
2. CCS 2.X only: Select „Install" -> „Code Composer Studio"
3. CCS 2.X only: Select „New Installation" if you install CCS for he first time – otherwise select „merge"
4. In case of updating an existing installation take a backup copy of your projects saved in the TI directory.
5. CCS 3.1 and CCS3.3 (Full and Eval. Versions): Select "Custom Install" or "Typical Install".
6. **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.

7. 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).
8. Select "Next"
9. Select "Next" – the installation process begins. This may take several minutes.
10. Acknowledge following message: "Setup has generated the file <DosRun.bat> in C:\ti…"
11. After installation of CCS 2.0 and the 2.1 update: Please register your TI CCS copy within 30 days of the purchase date to ensure 15 month subscription service including free software updates directly from Texas Instruments (by download from the Ti website or CD updates by mail).
12. 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).
13. Note that currently only CCS v. 2.1 and 3.1 as well as CCS. v.3.3 with older CgTools compiler 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!
14. If using CCS 3.3: Download and install the last compiler for CCS 3.1, "Code Generation Tools 5.1.12" from the Ti site – best using the "Update Advisor" as described above.
15. Tick "Yes, I want to restart my computer now" and click the "Finish" button to restart the computer.
16. Re- boot your PC after completion of each installation or update.

3 Setup of Code Composer Studio

The following sections show the configuration of Code Composer Studio 2.1 (refer to section 3.1) and 3.1 and 3.3 (refer to section 3.2).

3.1   Setup of CCS 2.1

Setup CCS 2 ('C6000).lnk

1. Starting the setup program "Setup CS2 ('C6000)" the following screen appears:
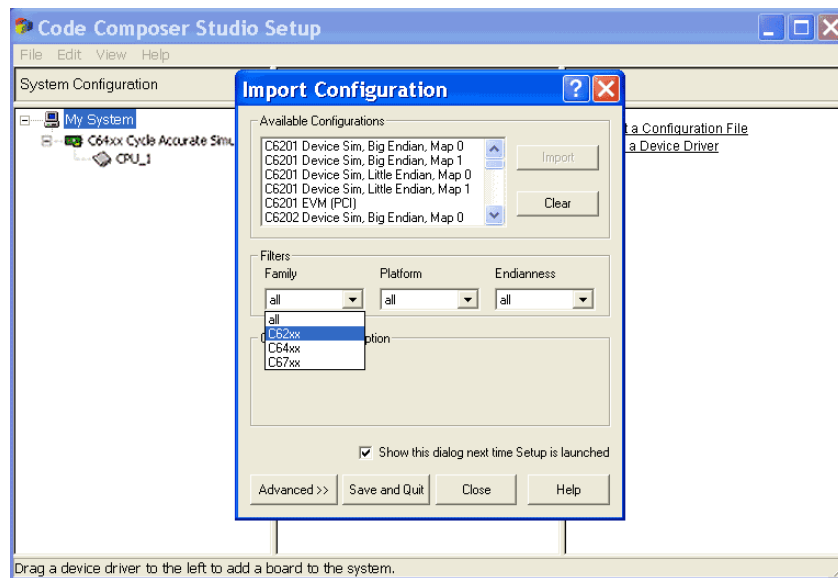
2. Please select the "**C6x family**" with CCS Version 2.1.
3. Select "little Endianess" and then "Save and Quit".
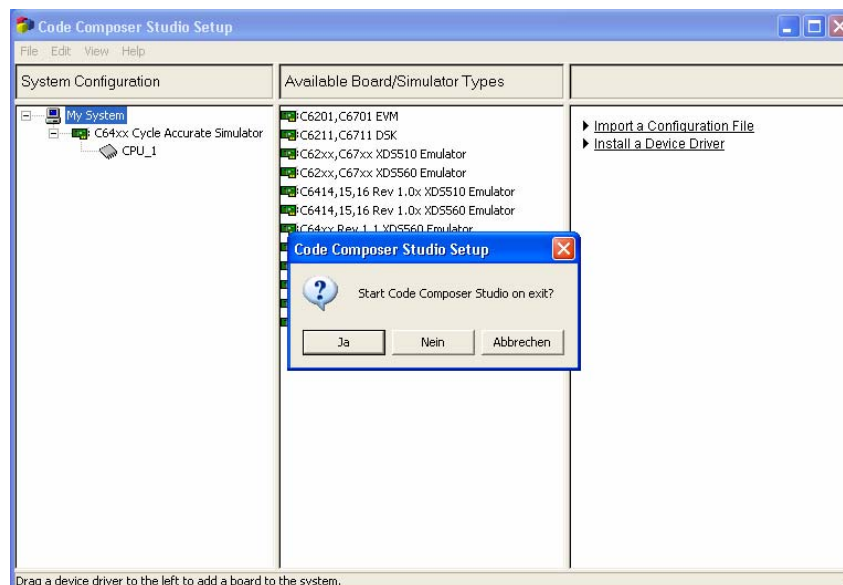
4. Please select „Cancel" (due to the German Windows version here the right most button: „Abbrechen")
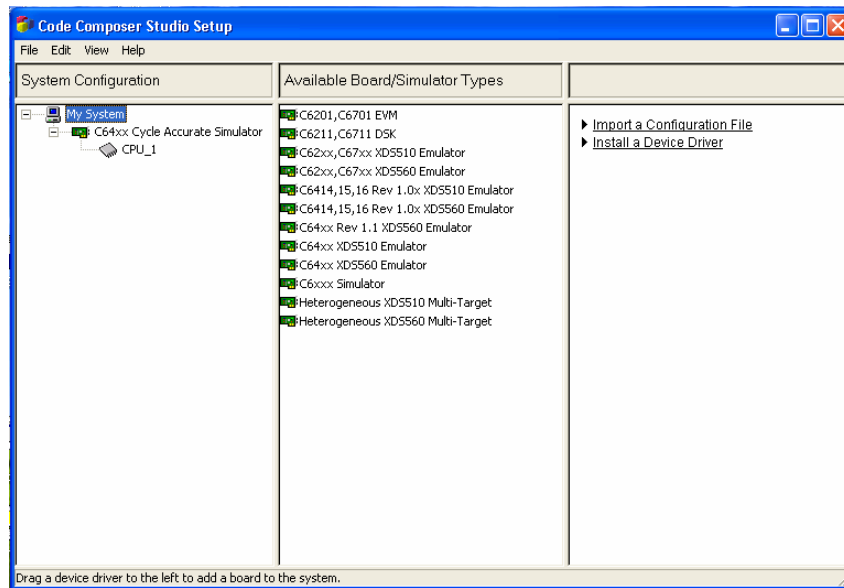
5. Remove any already existing boards under "System Configuration" (click right mouse button on the "C64 Cycle Accurate Simulator" - or any other under "my System" listed board - , and then select remove).

The following screen shows no board under "System Configuration":
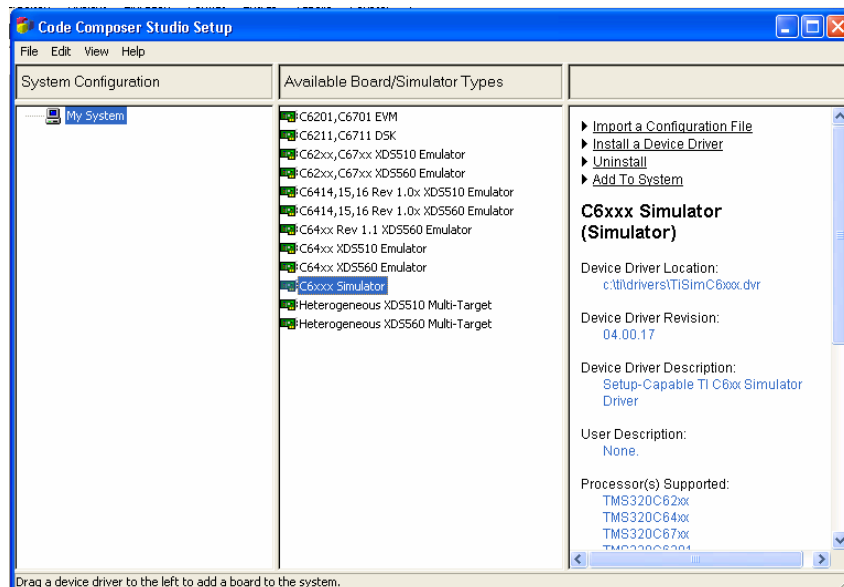
6. Select the C6xxx Simulator and drag and drop it to "my System" in the left menu.

The following menu appears:
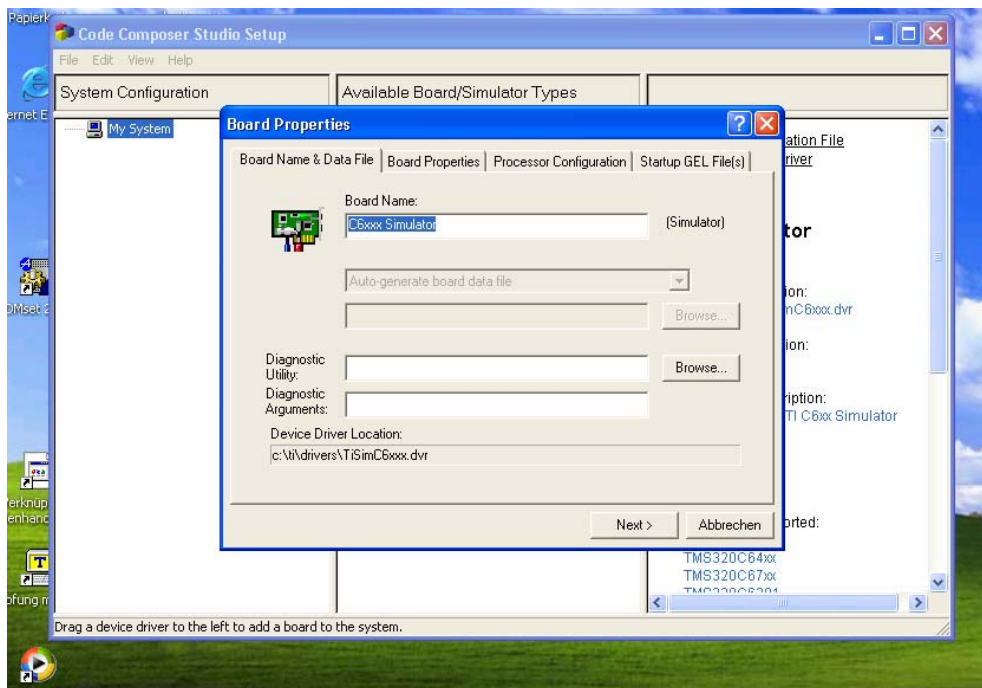
7. Select "Next to move to the "Board Properties" tag.
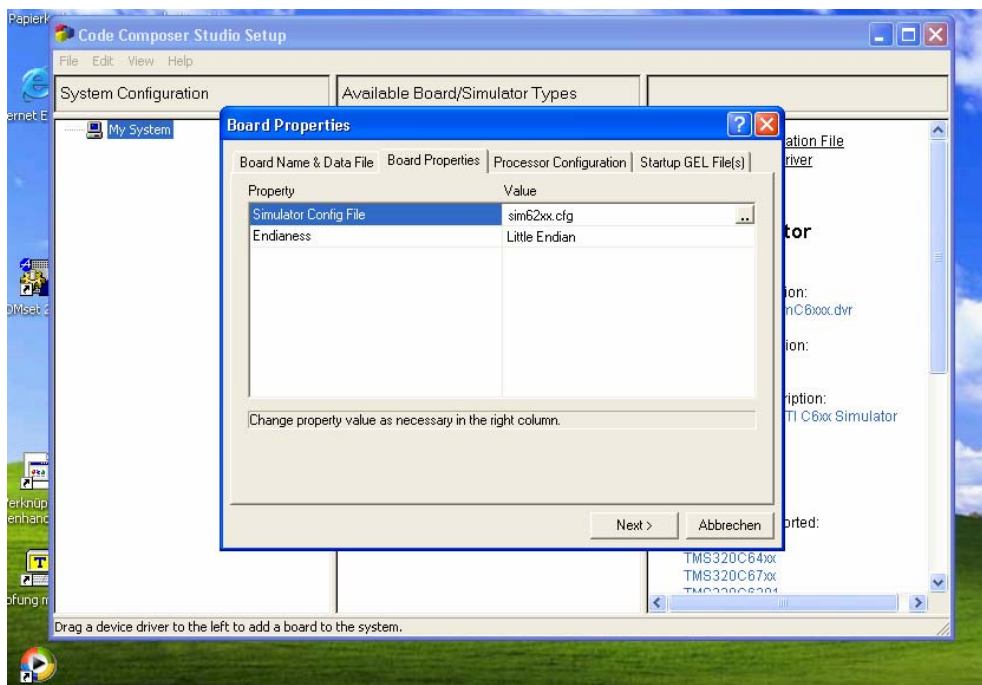
8. Select "Next"
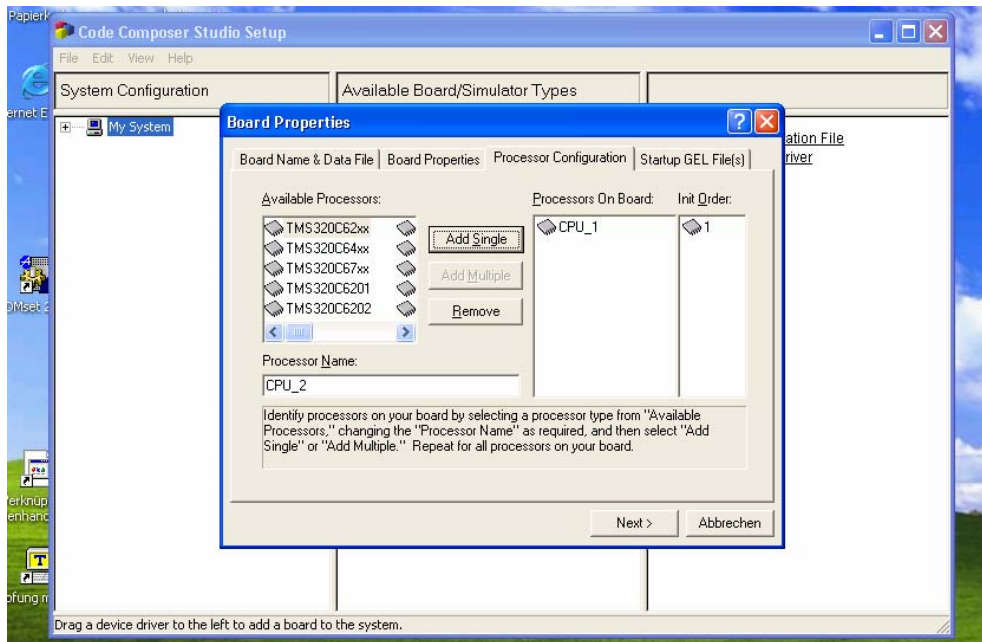
9. Select and highlight the "TMS320C62xx" processor and then click the "Add Single" button.

Programming VC40XX or VCSBC40XX cameras still works with the TMS320C62xx CPU selected. However for optimum performance, select the TMS320C64xx processor for these cameras.

10. Select "Next"
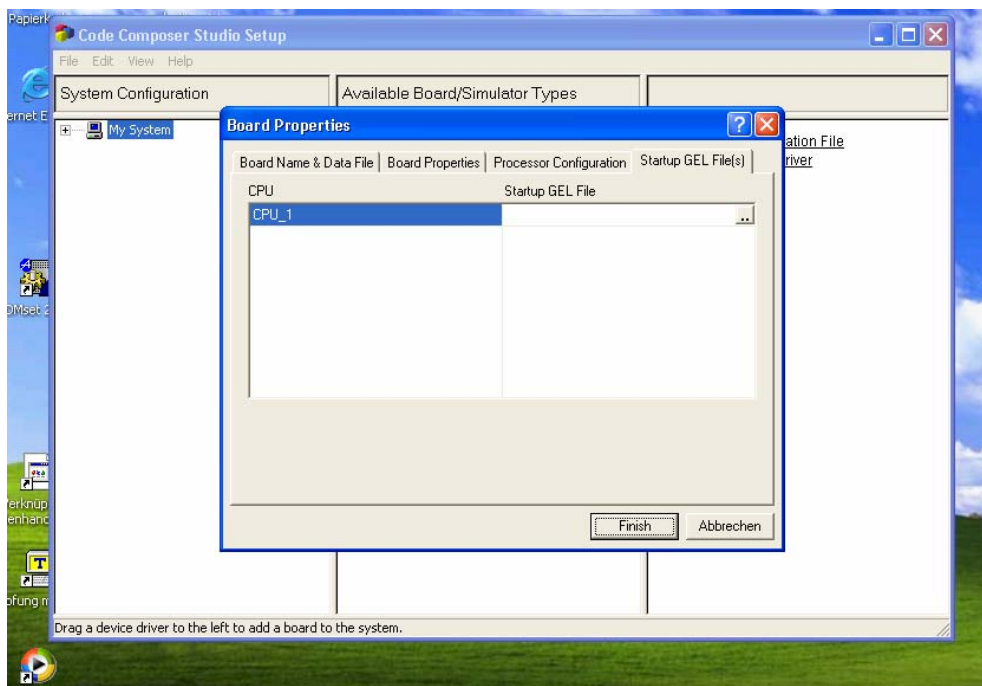
11. Click Finish to save the settings
12. Exit the Setup Program now.
13. Select "Yes" when prompted to "Save changes to system configuration"
14. Select "No" when prompted to "Start CCS on exit" to start CCS at a later time.

3.2 Setup of CCS 3.1and 3.3
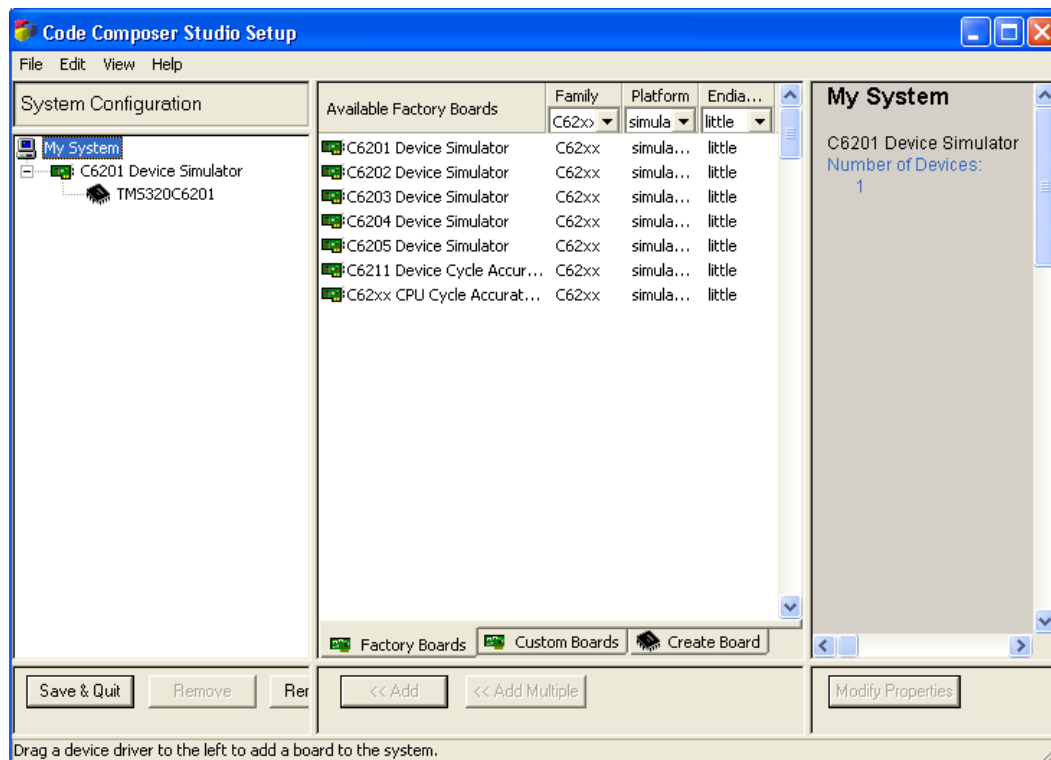
With the CCS3.1 setup program all settings are made at the main user interface. Selecting Family "C62xx", Platform Simulator and Endianness "little" shows the boards available.

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

4 Installation of VCRT and VCLIB PC Libraries

Since the release of the new VCLIB 3.0 in January 2005 both libraries VCRT5.XX and VCLIB3.0 are combined into one single setup file for instance: TI-VCRT500_VCLIB300_Setup.exe

The "TI-VCRT5XX_VCLIB3XX_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 loacation as collection of header and library files for advanced user.

Download of Process of "TI-VCRT5XX_VCLIB3XX_Setup.exe":

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

Support + Download
Download Areas ▶ **Customer Area** ▶ **VC Libraries** ▶ **VCRT & VCLIB PC Library Updates for VC20XX & VC40XX**

In order to access this download section you have to be a "Registered User" 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 C: Registration on the VC Website.

Installation Process of "TI-VCRT5XX_VCLIB3XX_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_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 C) 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:

Software compatibility overview for all software packages required including the corresponding compiler setting adjustments.
- 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

4.1   Download and Installation of VC Special Libraries

In addition to the VC SDK-Ti, Vision Components now 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 Data Matrix Code Reader Library (ECC 200 2D Barcode Reader Library)
- VC Bar Code Reader Library (1D Barcode Reader Library – different standards)
- VC OCR Library (text recognition library).

Each library is available for download after registration of a valid license key as described above.

4.2   VC's new licensing System

Vision Components now issues not only full licenses for the VC SDK-TI and the VC Special Libraries. A range of different license types is now available for each software product, allowing greater flexibility. P and Q licenses for instance can be offered at a lower price, reducing the costs for programming these entry level camera models.
A 12 month update subscription service is included in each full and restricted 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 an update license code.

1. **Licenses available for the VC SDK-TI:**

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
PT	License restricted to programming VC4018
QT	License restricted to programming VC4038

2. **VC Special Licenses available:**

License Number Prefix	License Type Description
C, LC, PC, QC	Full, Evaluation and restricted Color Lib licenses
M, LM, PM, QM	Full, Evaluation and restricted DMC Reader Lib licenses
E, LE, PE, QE	Full, Evaluation and restricted Extension Lib licenses

3. **Update Licenses available:**

License Number Prefix	License Type Description
TU, MU, CU, EU	Update Licenses for the corresponding full T, M, C, U licenses, extending the initial 12 month update subscription period be another year.

Refer to the Appendix for registration instructions.

4.3   Initialization of VC Library Functions within the Camera Program

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

Initialization is done calling the „init_lincence() 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("PC1122334455"); /* initialization of a Color Lib License restricted to programming
                                VC4018 cameras */

Function description (also refer to Color_Lib.pdf - Color library for VC cameras Version 2.0):

init_licence   **initialize license code**

synopsis   `I32 init_licence (char *code)`

5 Generated File Structure on PC

The following file structure is generated after installation of Code Composer Studio and VC's VCRT and VCLIB libraries:

Vision Components' Include files, libraries and macros under: c:\ti\c6000\cgtools\include

Demo Source Code showing the use of VC's functions

"NewProjects" folder containing project files for different compilation options (see note below)

Demo - Programs are now devided into different categories

Send folder where upload files are saved. Please create this folder for VCRT Versions 5.11 and older. This folder will include ready to upload test programs from VCRT5.20… PC Lib.

File conversion functions and other utilities

Batch files provided for compilation with different Library versions (VCLIB2.0 or VCLIB 3.0)

Working directory including cc.cmd and ccr.cmd files, cc.bat for DOS prompt compilation and the source code of most Shell functions

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 "new525_CCS31.pjt" includes the correct settings to compile code with VCRT 5.25 and Code Composer Version 3.1. The appended "r" for instance "new525_CCS31r.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 6.1 and Appendix A for compiler setting changes for different VCRT & VCLIB PC library versions and a software version history.

6   Compiler Settings Code Composer Studio

1. Start CCS3.1 (CCS2.1) or v. 3.3   CCS 2 ('C6000).lnk

The following Main Screen of CCS appears:
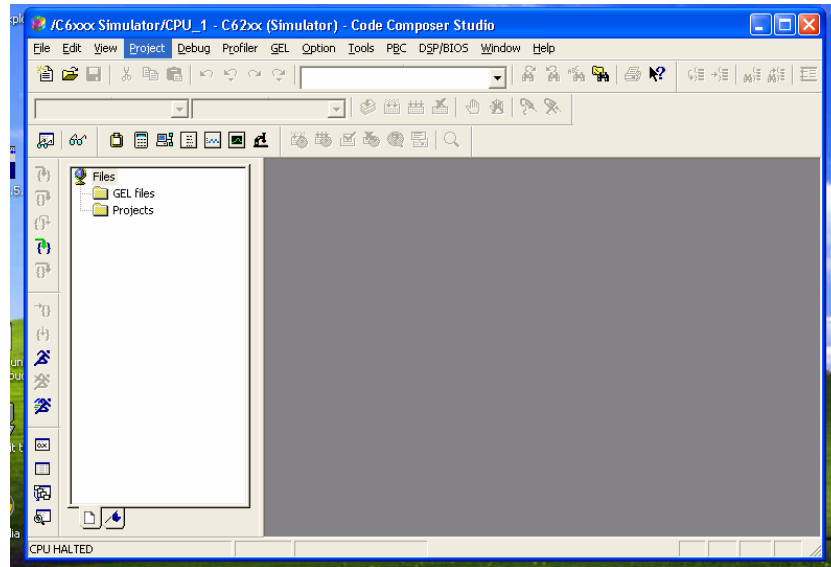
2. Create a Project older under C:\ti\myprojects and copy a project file e.g. "new525_CCS31r.pjt" from C:\ti\myprojects\newprojects into your project directory.
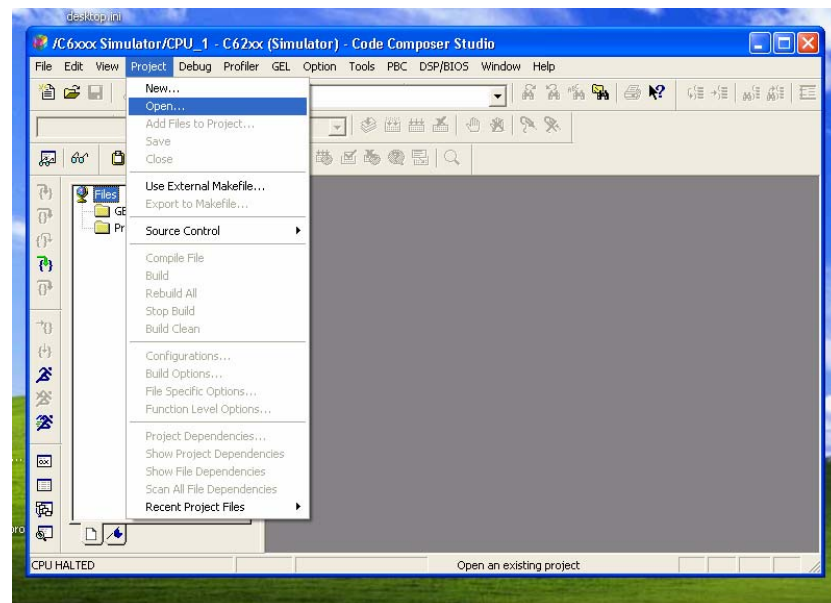
3. Open the predefined project file "new525_CCS31r.pjt" in your project directory that contains all compiler and linker settings.

6.1 Adjust Compiler and Linker Settings

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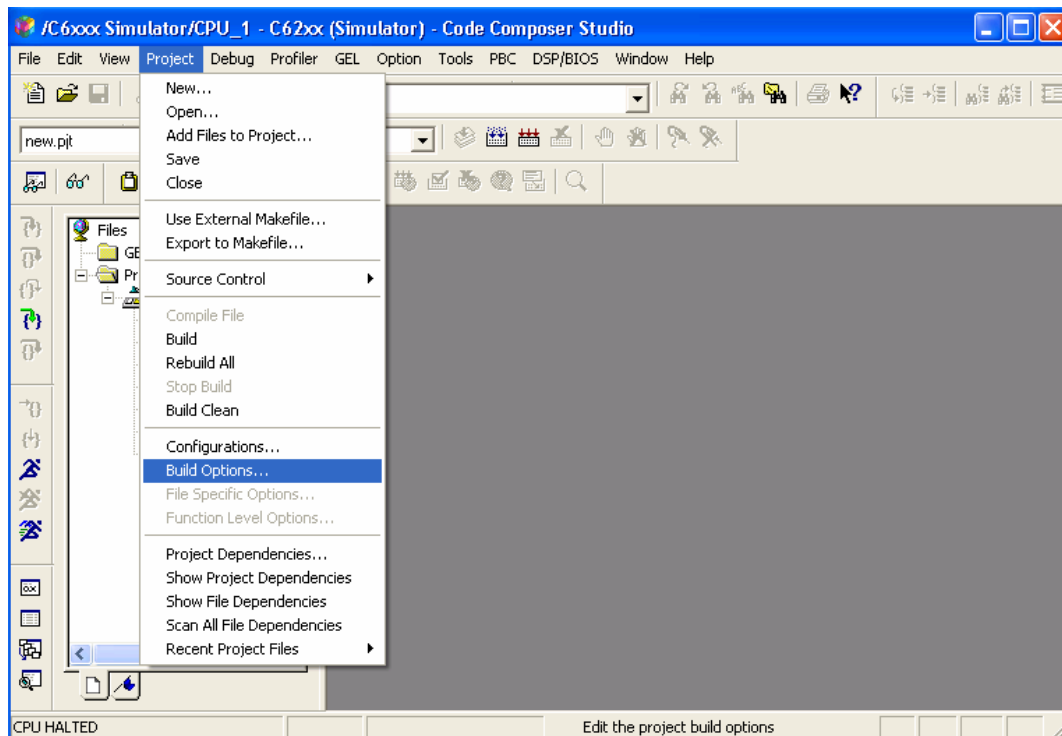
2. The following menu appears on screen:
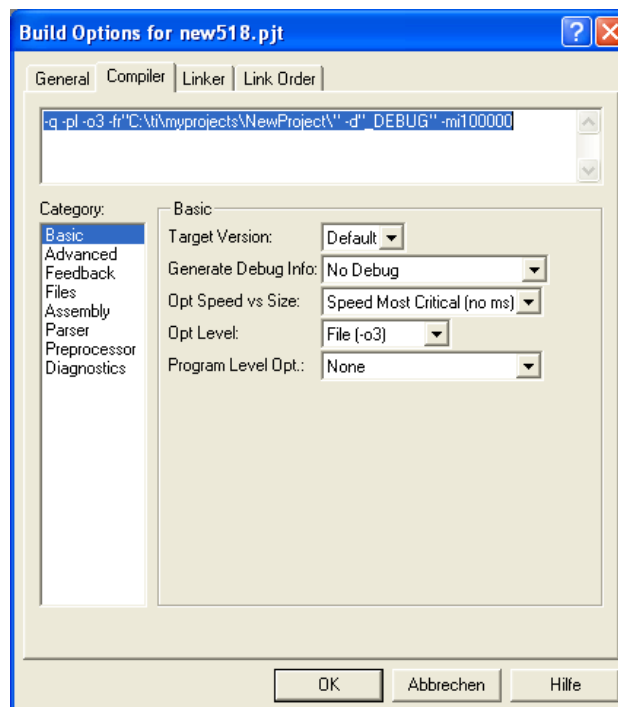
3. Click the "General" Tab.

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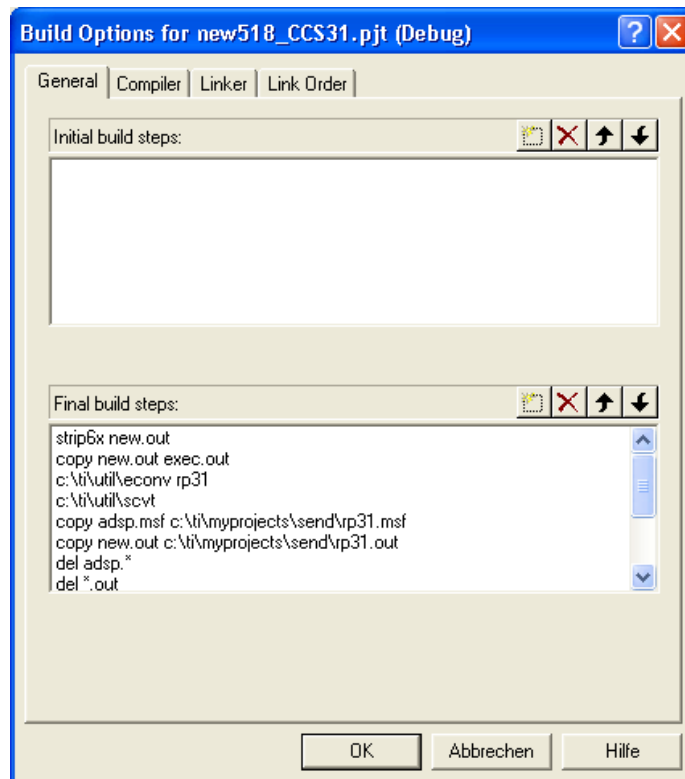
The first line: **strip6x new.out** (removing debugging information from the executable code) is required for CCS 3.1 and higher! [3]
(From CCS 3.1 also the library call "rts6201.lib" in C:\ti\work\cc.cmd needs to be changed into "rts6200").

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.

6.1.2   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 10.3.1and 10.4).

---
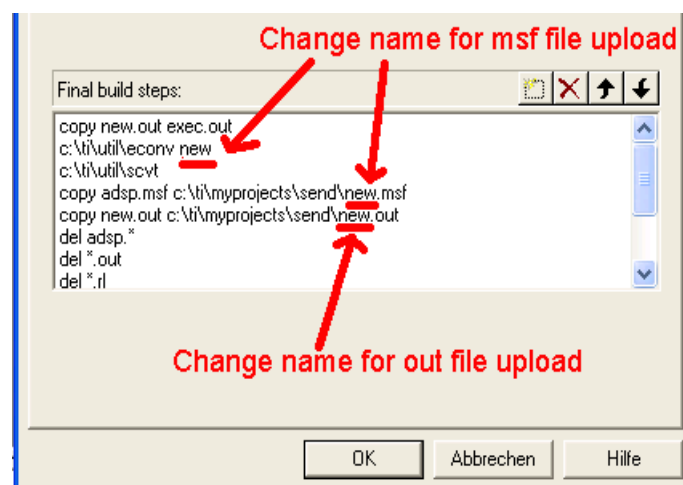
[3] See the summary of all required setting adjustments in section 6.1.5

6.1.3 The default Compiler settings are:
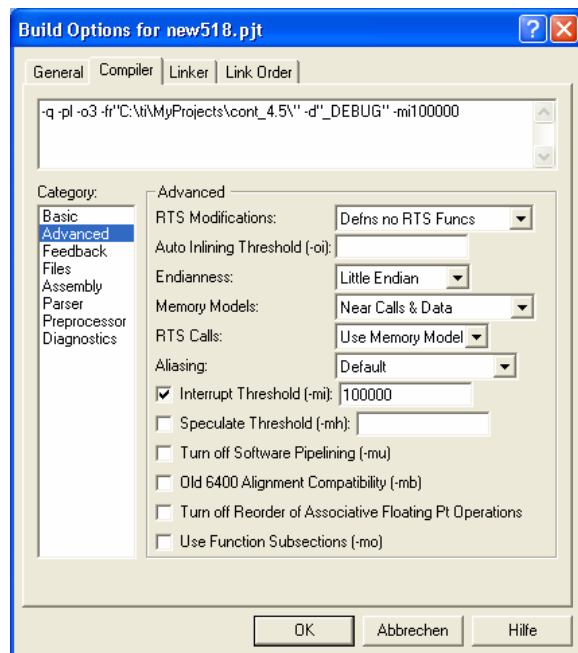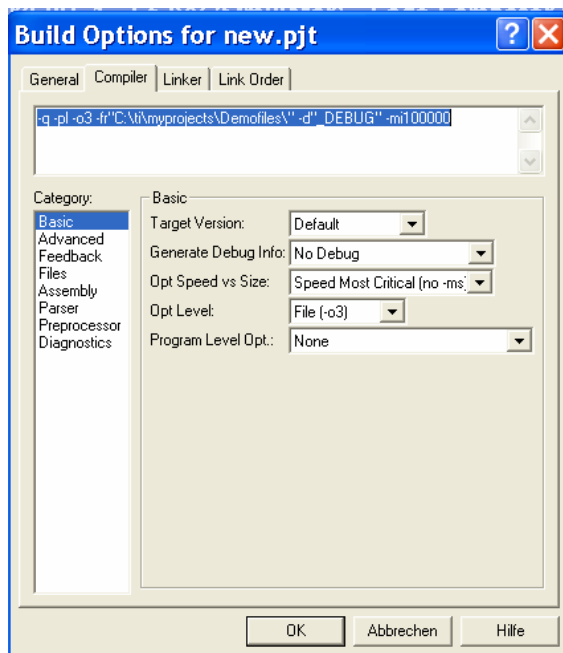
The advanced compiler setting "-mi100000" sets the interrupt threshold to 100,000 cycles, defining the maximum frequency interrupts are queried. Omitting this setting can speed up some functions significantly. However in this case it is important to ensure that inner loops perform less than 100,000 cycles, 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: Support + Download → **Registered User Area** ▸**VC Advanced Programming Seminar**)

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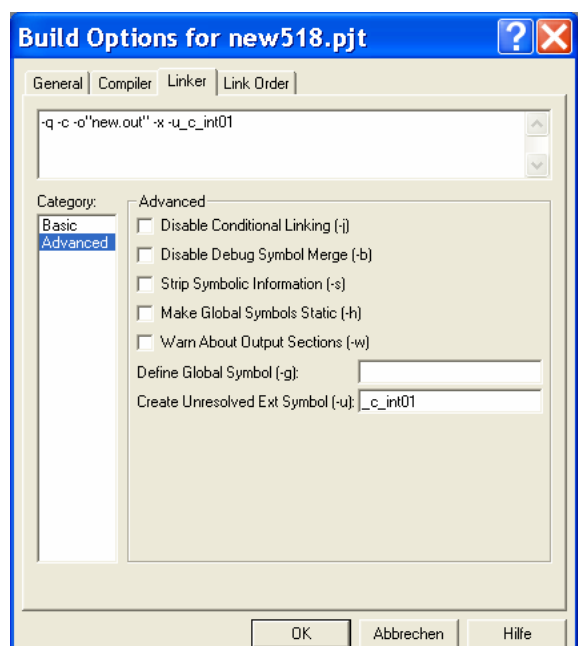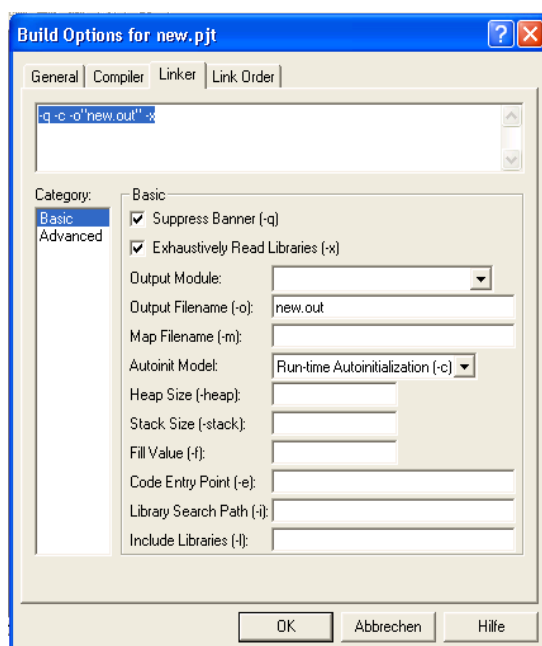
From PC Library Version VCRT 5.18 the linker setting "-u_c_int01" is required (also refer to the following section for setting changes).

6.1.5   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 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 for details

7 Compiling C Programs with Code Composer Studio

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 6.1.

1. Start Code Composer Studio 3.1 (2.1) as described at the beginning of section 6.
2. Open a project file "new52X_CCS3Xr.pjt" as described in section 6.

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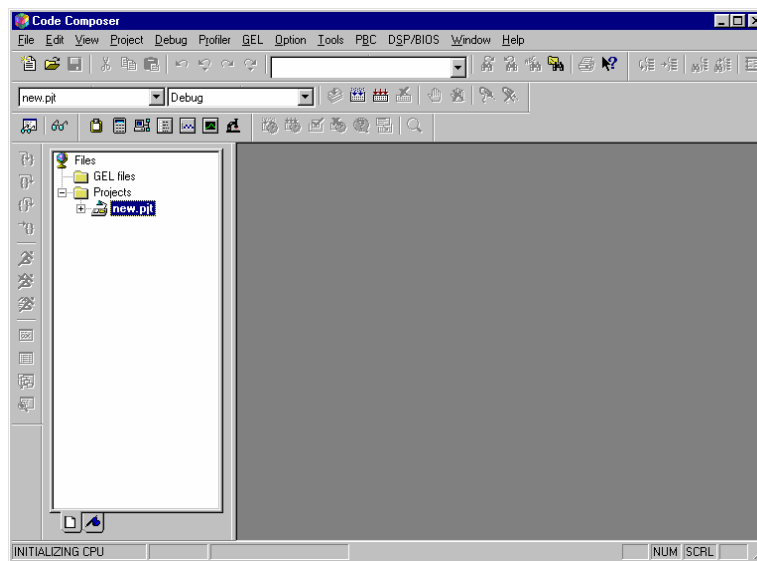
3. Copy your source code to your project directory (for instance C:\ti\myprojects\NewProject in section 6).
4. Press again the right mouse button and select "Add Files" and browse to the source file – for instance "blob.c" (alternatively use the pull down menu "Projects" and then "Add Files to Project"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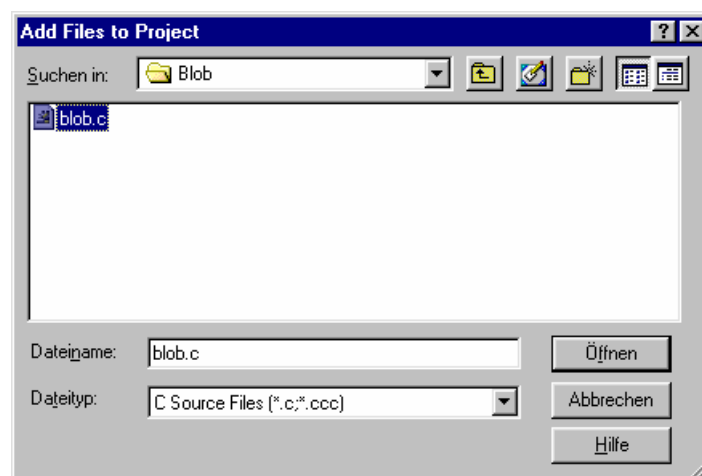
5. Now you can open you source code if you double click to blob.c and you can compile the file by clicking on the "build all" button (see red circle in following screenshot).
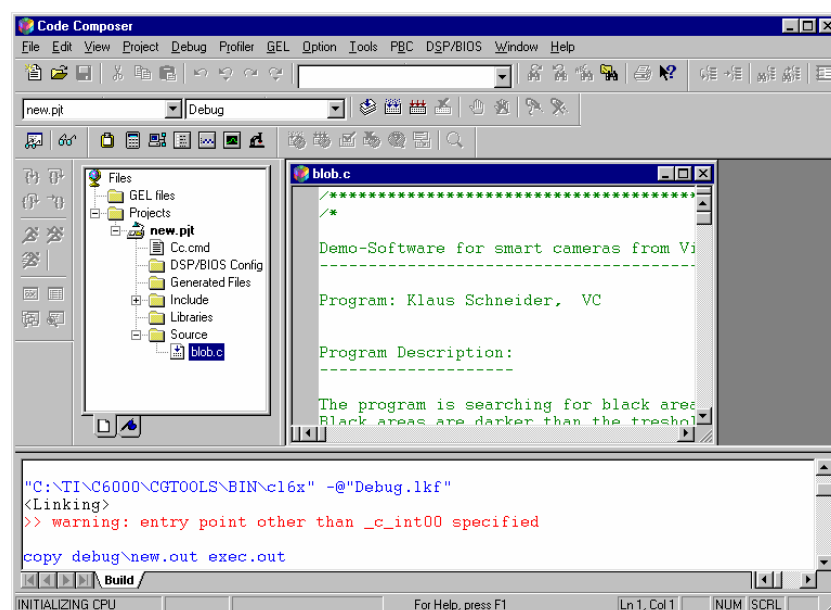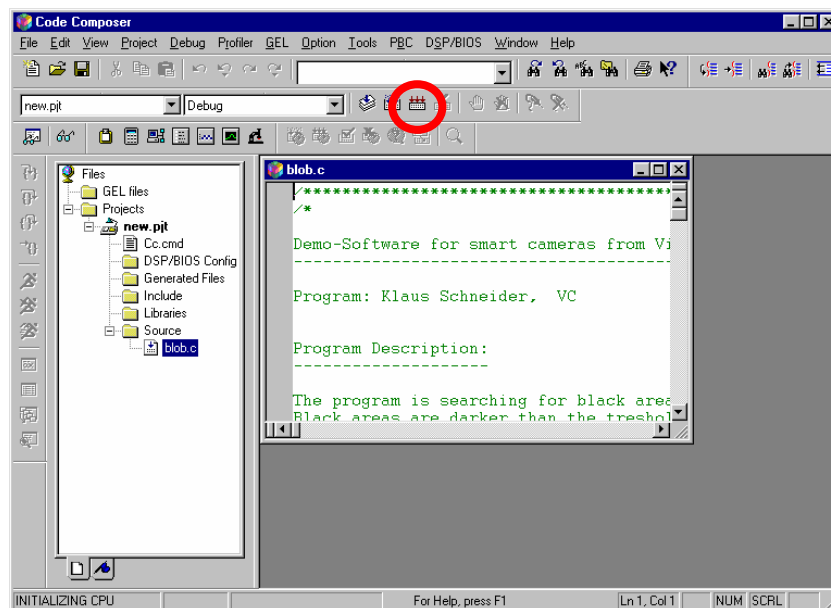
6. The compiler warning: "**entry point other than _c_int00 specified**" is not relevant as VCRT uses a different entry point.

According to the Build options 2 output files are generated through compilation (see section 6.1.2):
- 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 6.

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 10.3.1- for details on communication with the camera and details on program file upload.

8 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 10.5).

The default IP address for all VC20XX and VC40XX 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 10.5).

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.
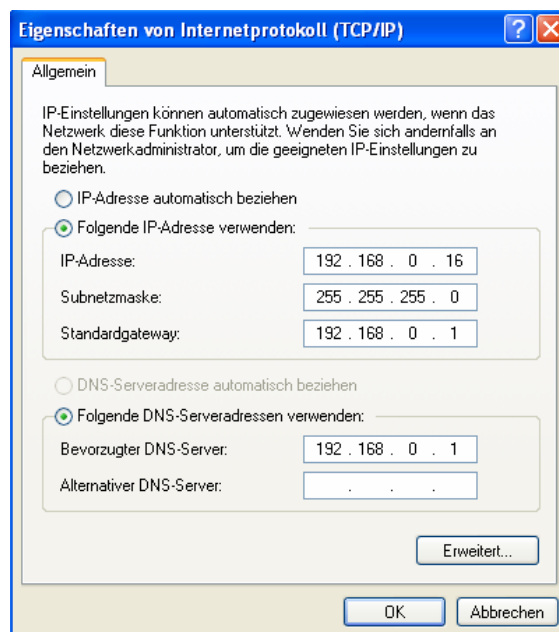
9 Cabling of VC20XX and VC40XX Smart Cameras

This section describes in detail the different ways of connecting the VC20XX and VC40XX cameras. Please refer to the product section of the Vision Components Website or the hardware documentation and use the corresponding part number for ordering cables and other accessories required[4].

Please also refer to these camera manuals for detailed technical specifications of all interfaces – they are available for download from:

Under **www.vision-comp.com** -> Support -> Public Download area -> **Hardware Manuals**

- **VC40XX Smart Cameras Hardware Documentation**
- **VCSBC4018 Manual**
- **VC20XX Hardware Manual**

9.1 Connecting VC20XX and VC40XX cameras

The following interfaces are identical for VC20XX and VC4XXX and are described together:

- Video Interface
- PLC IO and Power Supply Interface
- LAN Interface/ Standard Serial Interface
- Trigger- (New pin allocation for VC4XXX)/ Keypad- / Serial V24 Interface (VC4XXX only)

The VCSBC4018 requires special connectors and cables. Refer to the VCSBC4018 documentation for the wiring of this camera.
According to the processor type, cables for the VC20XX series are often referred to as "C6" cables. These C6 cables are still in use for the VC4XX series, unless the pin allocation has changed. Refer to the following sections for details.

---

[4] Order numbers are listed in the "accessory" section of each camera manual or in the "Products" section on the VC website.

9.1.1   Connecting the Video Interface

The VGA cables are identical for all VC20XX and 4XXX cameras – for this reason the so called "C6" cables initially named for the VC20XX series are still used for the VC4XXX series.
There are 3 different cabling options available:

-   SVGA HD-SUB 15 pin male - for connecting to a CRT or TFT monitor cable.
-   SVGA HD-SUB 15 pin male – for connecting directly to a TFT monitor.
-   SVGA cable without second connector.

All 3 cabling options are available in 5m 10m and 25m length. Refer to the product section of **www.vision-comp.com** for an up to date list of order numbers or refer to the accessory section of the VC40XX manual.

9.1.2   PLC IO and Power Supply Interface

The Power/ IO interface and subsequently the corresponding cables also remain unchanged between the VC20XX and VC40XX cameras. C6 cables are therefore still in use.
There are two cabling options for this interface:

-   Connecting a 24V power supply already confectioned with the corresponding HSR socket. This option only includes the power supply – PLC IO signals are not connected (order number: VK000119, 47-63 Hz, 100 – 240VAC, European wall socket, 3m cable length).

-   Connecting the standard Power/ PLC C6 cable, 12 core without second connector, refer to the VC40XX manual for details. This cable is available in 5m, 10m and 25m cable length. A rack mount DIN rail 24V power supply is also available from Vision Components, order number: VK000036 (7.5W, 50-60 Hz, 100-240VAC).

9.1.3   LAN Interface/ Standard Serial Interface

VC20XX cameras either feature a LAN interface (100 Mbit full duplex) or a serial V24 RS232 interface. Cameras with serial interface display the "V24" instead of the "LAN" symbol shown in the image at the beginning of section 9.1. Ethernet cameras are named "VC20XXE" – serial cameras "VC20XX".

VC4XXX feature both – an Ethernet interface as standard interface and also an additional RS232, which is connected via the "Trigger-/ Keypad- / Serial V24 Interface. The connection of this additional serial interface is described in the following section.

LAN interface Cables:

- LAN interface cables are available ready confectioned with an RJ45 connector on the other end with length of 5m, 10m and 20m.
- For connecting the camera directly to the PC (without a hub or switch) a cross link cable is required in addition to the LAN cable mentioned above. The order number of this adaptor set is: VK000156

Serial V24, RS232 interface Cables:

- Serial C6 cables for the standard V24 interface can be used only with serial VC20XX cameras! These cables feature a female HRS connector on the camera side and can either be ordered with or without a standard 9 pin female DSUB connector on the other end.
- All serial cables are deliverable in length of 5m, 10m and 25m. Refer to the website for the corresponding order numbers.

Note that all VC20XX serial inputs require a minimum signal Voltage of $\pm$ 5V. Latest PC's and notebooks sometimes only deliver around $\pm$ 3.3V – use USB to serial converter in this case. The VC4XXX series work with LVTTL levels of $\pm$ 3.3V (see the "Serial Interface Specification" article in the "Knowledge Base").

9.1.4   Trigger- / Keypad- / Serial V24 and Encoder Interface (VC40XX only)

The trigger interface allows the connection of 3 different cables / devices:

- Trigger IO cable
- Keypad
- Additional serial interface cable (VC4XXX only)
- Encoder Interface (VC4XXX from mid 2006) – all cameras with 1 as third S/N digit.

Multiple devices can be connected to this interface at the same time, using one or two Y adaptor cable, order number VK000124:

Camera side: **Other side:**

2 female HRS
1 male HRS   connector, offering
connector   the same connectivity
                                                                                                            as the camera
                                                                                                            interface.

Trigger Input and Output cable:

Due to the introduction of the additional serial interface, the pin allocation of the VC4XXX trigger interface, has been changed:

- The C6 trigger cable of the VC20XX series is still in use for the VC4XXX camera. However note that the pin allocation has been changed! Refer to the VC4XXX documentation for further reference.
- Note that the driving circuit of a VC20XX trigger input requires adjustment in order to be used with a VC4XXX camera! Otherwise the VC4XXX camera may get damaged!
- The trigger C6 IO cable is available in 5m, 10m, and 25m length.

Encoder Interface:

From mid 2006 most VC4XXX Smart Cameras can be shipped with a high speed incremental encoder input. This makes it possible to synchronize the image acquisition simply with a conveyor belt movement. Using the encoder interface disables the serial RS232 interface.
Refer to the VC4XXX Hardware Manual on details about this encoder interface.

Keypad:

- The keypad is a useful device that can be used for instance to change program parameter directly on the camera without using a PC. The keypad includes the following keys: Return, Escape, F1 and F2 and the 4 arrow keys (up, down, left, right).

- Note that there are two different Keypads for both camera series:
    - The VCSKBC6 keypad, VK000002 for VC20XX cameras
    - The VCSKBC4 keypad, VK000238 for VC40XX cameras

Additional serial interface cable (VC4XXX only):

- C4 serial cable, connector camera side: 6 pin HRS male (in contrast to the female C6 serial cable used for VC20XX cameras)
- Second side either without connector or with standard 9 pin DSUB PC interface.
- The standard length of 5m, 10m and 25m are available for both cabling options.
- Refer to the VC4XXX documentation for order numbers on these cables.

10 Communicating with the Camera

VC20XX and VC40XX 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 VV20XXE cameras.
- Ethernet TCP/IP Telnet Port 23 for VC40XX and VCSBC40XX cameras.

From camera OS VCRT 5.25 the standard interface can be changed to the additional serial interface. Please refer to the "Knowledge Base" in the support area for details.

10.1 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 and VC40XX 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. [5]

Use "Total Commander" in order to test your system – refer to section 10.4 for a detailed instruction. Download Total Commander:

http://www.ghisler.com , Vers. 6.5.3 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.

---

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

10.2 Camera Directory Structure and supported File Types

All VC20XX and VC4XXX cameras feature a flash EPROM as non volatile program and data storage media. Most cameras also incorporate a 16MB MMC or 128 MB SD card as extended data storage. The new "High End" camera range VC44XX, incorporating a 1 GHz Ti DSP, features a 512 Mbyte SD card.

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 10.1).	- 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 10.3.1)	- 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	10.3.2
Program upload via FTP	10.4
Msf files and file conversions	10.3.1

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	VC20XX_HW, VC40XX, VCSBC4018 /-16 documentation
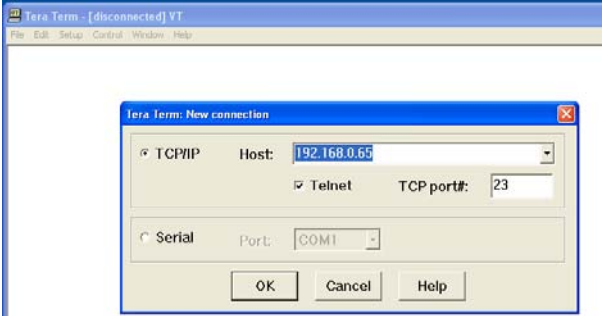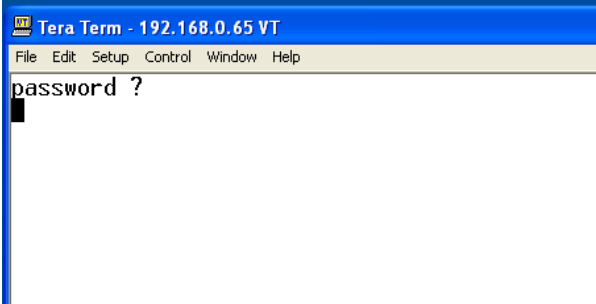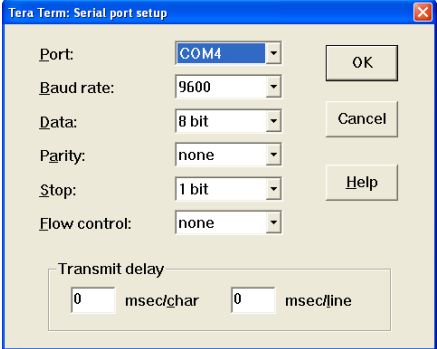
10.3 Camera Shell access via Terminal Program (TeraTerm)
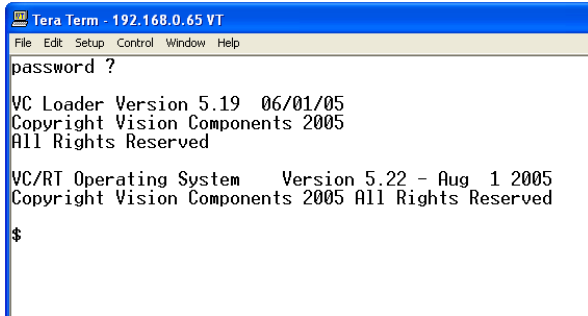
Follow these step by step instructions for establishing a connection with the camera shell via TeraTerm. The left hand side shows the steps for communicating with an Ethernet camera – the right hand side displays the connection with a serial camera.
Both interfaces – Telnet Port 23 via TCP/ IP and the 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 9.1.3) 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 D: 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 10.6 on information about bypassing the autoexec execution.

10.3.1   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 10 and section 10.3.2, 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 (6.1.2). The file conversion is already included in all supplied project files (see section 6.1.1).

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.

10.3.2 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 10, 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

$
```

10.4 FTP Communication with "Total Commander"

1. Install Total commander (for instance "tcmdr651.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
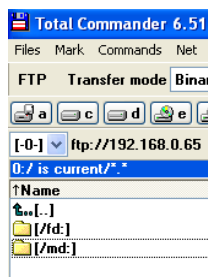
6. You can now open the fd or md folder, copy and paste files from PC to camera flash or MMC (SD for VC40XX) and vice versa, delete files on the camera, etc.

⚠️ 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.

10.5 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!)

1. 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↵	**New for camera OS VCRT 5.18:** 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

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!

10.5.1 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.

10.5.1.1 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 9.1.4 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.

10.5.1.2 Resetting the IP address with VCSBC4018 and VC40XX Smart Cameras using "VCnet":

A new tool – the "Vcnet Recovery Tool" is provided for resetting the IP address of the VCSBC4018 and VC40XX 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 the "**Java(TM) 2 Runtime Environment, Standard Edition 1.4.XX**" on your PC (Download from **www.sun.com** - > Downloads - > J2SE v 1.4.2_11 JRE).

2. Download **VCnet Recovery Tool for VC40XX and VCSBC4018** from **www.vision–comp.com** -> Support -> Customer Area ▶ *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

10.6 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.

10.6.1 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.

10.6.2 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 it's 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 10.3). 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 10.5.1).
3. Alternatively VCNet can be used to bypass autoexec execution (see section 10.5.1).

Appendix A: SW Compatibility Chart

Code Composer Studio Version	VCRT and VCLIB PC Library Versions	VC20XX Camera OS Versions	VC40XX and VCSBC 4018 Camera OS	Date of Changes	Changes
2.1	VCRT 5.08 / VCRT508_setup.exe VCLIB 1.0 TI-VCLIB10.exe	VCRT 5.08 / VCRT 5.09		Mid 2003	VCRT PC Lib 5.18 and VCRT Camera 5.18 / 5.19
2.1	VCRT 5.11 TI-VCRT511_setup.exe VCLIB 1.0 TI-VCLIB10+Ext_setup.exe (Extension Lib now included)	VCRT5.11 Serial VCRT5.12 Ethernet		Begin. 2004	VCRT PC lib 5.11, VCRT 5.11 OS for serial and VCRT5.12 for Ethernet C.
2.1	VCRT 5.11 TI-VCRT511_setup.exe VCLIB 1.0 TI-VCLIB10+Ext_setup.exe	VCRT 5.11 (VC2068: VCRT5.13) Serial VCRT 5.16 Ethernet		Mid 2004	VCRT 5.16 OS for VC20 Ethernet Cameras VCRT 5.13 for VC2068, serial
2.1	VCRT 5.16 TI-VCRT516_setup.exe VCLIB 1.0 TI-VCLIB10+Ext_setup.exe	VCRT 5.11 (VC2068: VCRT5.13) Serial VCRT 5.16 Ethernet		Sept 2004	New OS PC LIB VCRT 5.16
2.1	TI-VCRT516_VCLIB300_Setup.exe (includes VCLIB10 – now renamed VCLIB2.01 and the new VCLIB 3.0).	VCRT 5.11 (VC2068: VCRT5.13) Serial VCRT 5.16 Ethernet		Jan 2005	VCRT and VCLIB PC Lib's now combined into one setup New VCLIB 3.0 [2]
2.1	TI-VCRT516_VCLIB300_Setup.exe	VCRT5.17 for all VC20XX camera models		Feb 2005	VCRT5.17 Camera OS with new File system [3]
2.1.	VCRT 5.18 / VCLIB 2.0 and VCLIB 3.0: TI-VCRT518_VCLIB300_Setup.exe	VCRT5.18		Apr 2005	VCRT 5.18 PC lib released. [4]
2.1	**VCRT 5.18 / VCLIB 2.0 and VCLIB 3.0 TI-VCRT518_VCLIB300_Setup.exe**	**VCRT5.18**	VCRT 5.22	**August 2005**	**CCS3.1 now approved [5]**
3.1	VCRT 5.23 / VCLIB 3.01 TI-VCRT523_VCLIB301_Setup.exe New Special Libs avaliable seperately: - ColorLIB 2.01 - Extension LIB 1.01	VCRT 5.23	VCRT 5.23	January 2006	Auto Relocation now supported. New Color and Extension Lib. Initialisation of Licence in program required. Use new Project files under c:\ti\myprojects\new projects

Software products compatibility chart – software tools in one row are compatible

[1] The new setup includes batch files under "my projects" that allow switching between VCLIB 2.0 and 3.0. From now on lib and header file names include the version number and are then copied to the default file name (i.e. vclib_300.h is copied to vclib.lib).
[2] VCLIB 3.0 with up top 4 times faster functions than before. Some functions now in "flib.lib" (include flib.h in program).
[3] Reformatting of MMC required when updating OS to VCRT 5.17 from previous OS – refer to Update_Instructions.pdf
[4] New Linker setting: -u c_int01" required removing TI bug in exit routine. Setting included in new518.pjt. Access to fd: and md: with standard ftp client is now possible. Added DHCP client.
[5] Include "strip6x new.out" as first line in "Build options –> General Tab –> Final build Stepps" or use new project file: "new518_CCS31.pjt". Change cc.cmd line: "–l rts6201.lib2" to "–l rts6200.lib".

Newer camera OS and PC library versions are compatible if the show the same version number (e.g. camera OS: VCRT 5.25 and PC libraries included in: TI-VCRT525_VCLIB300_Setup.exe).

Appendix B: Download of VCRT and VCLib PC- Updates

Updates for VCRT and VCLIB for VC20XX and VC40XX Smart Camera can be downloaded from the Vision Components website. ***www.vision-components.com***

All Software updates are located under: **Support + Download → Customer Download Area**:

- The latest VCRT and VCLIB PC library updates are available under "VC Libraries" → and then: "VCRT & VCLIB PC Library Updates for VC20XX & VC40XX Cameras**"** – The same directory also holds older installation versions of VC's development libraries.
- "VC Libraries" also includes VC Special Libraries like the "Extension-, Color- and Data Matrix Code Reader Lib (registration of corresponding License Code required, refer to section 4.2).
- "VCRT Camera OS" provides all camera operation systems, divided in "latest…" and "Archives…". providing also older camera operating systems if required.
- The "Demo Code and Software" 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 in the "**Registered User Area"**. 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 C: 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 "Register" link on the bottom left of the Vision Components homepage: **www.vision-components.com**
2. Choose your user name and password.
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 Form".
5. The following "User Menu" appears:

The "Log In Form" prior and after to logging in.

B Software Registration

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

Registration of an VC TI-SDK or Special Software Library for Smart Cameras with Texas Instruments DSP:

— Enter the License Code in that cell below, starting with corresponding character code (e.g. T233B23C32 or QE6C3223B325):

Submit your registration

submit

C Updating a previously registered License

Please click on the corresponding license code and follow the instructions.

List of your previously registered licenses**:**

Registered Licenses	Register Date
A124B12312C	06.02.2006
A124B12312C	19.01.2006

Note that this list does not include the character code part of each license code!

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

1. Submit your software Registration.
2. Submitting a correct license number now gives you instant access to all customer download areas including the corresponding software updates.

Appendix D: 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 8).
3. Turn off "automatic allocation of IP address" as described in section 8.
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 10.5. 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 10.3. 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. 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 10.3).
2. Check if the camera executes a program at startup and bypass the autoexec as described in section 10.6.19.
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 E: 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 "Support + Download":

Support + Download

Send Camera for
Repair

- Please provide a detailed fault description and also let us know how you have tested this fault in case the defect is not obvious.
- Carefully select if your country of residence is within or without the EU. This automatically prints the correct shipment address on the RMA result sheet (important for customs clearance).
- Login on to the VC website automatically fills in your address details.
- Clicking the "submit" button displays the RMA result sheet with the RMA number and a summary of your fault description and details. 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:

Web Site Menu Links	Content
Contact	Distributor list / Enquiry forms
Home	Latest News from VC
Our Company	VC Company Information
News and Events	Trade Show dates VC Publications Sign in for free VC Seminars
VC Network	Description of Partner Companies Application Overview 3rd Party Hard- and SW Products for VC Smart Cameras
Products VC Smart Camera Overview	Product Overview: VC44XX High End Camera Series VC40XX Standard Camera Series VC4016 / 18 Entry Level Cameras VC4002L Line Scan Camera VCSBC Single Board Cameras VC20XX Smart Cameras VCSBC Board Cameras VCM + Visicube Camera Sensors
VC Smart Camera Software VC Software Development Kit Ti:	VCRT Operating System VCLIB Image Processing Library
VC Special Libraries:	M200 Data Matrix Code Reader VCOCR Text Recognition Library Color Lib
Support:	
Support News (User Registration required)	Tech News – new SW and Documentation
Knowledge Base / FAQ (User Registration required)	Searchable FAQ Database with programming Examples and Demo Code

Download Area
 	
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        Registered User Area
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	- Getting Started 🇬🇧 🇩🇪 🇫🇷
	- Programming Manuals
	- Training Manuals and Demo Code
	- Software Updates
	- Demo Code

RMA Number Form	Form for Allocation of Repair Numbers.