

Spartan-3A DSP FPGA Video Starter Kit Assembly

Getting Started with Demos

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About This Guide

This user guide provides a first time user of the Spartan-3A DSP FPGA Video Starter Kit essential tools for getting started with the Xilinx provided demos. It outlines the basic hardware and software requirements necessary for the demos and how to setup the kit's contents accordingly.

References

1. *Getting Started with XtremeDSP Solution Video Starter Kit: Spartan-3A DSP FPGA Edition*(UG455)
http://www.xilinx.com/support/documentation/boards_and_kits/UG455.pdf
2. *Spartan-3A DSP FPGA Video Starter Kit: User Guide* (UG456)
http://www.xilinx.com/support/documentation/boards_and_kits/UG456.pdf
3. FMC-Video Daughter Card: *Quick Start Guide* (UG457)
http://china.xilinx.com/support/documentation/boards_and_kits/ug457.pdf
4. XtremeDSP™ Solution FMC-Video Daughter Board: *Technical Reference Guide* (UG458)
http://www.xilinx.com/support/documentation/boards_and_kits/ug458.pdf
5. *Spartan-3A DSP FPGA Video Starter Kit: Software User Guide* (UG514)
http://www.xilinx.com/support/documentation/boards_and_kits/UG514.pdf
6. *Spartan-3A DSP FPGA Family: Data Sheet* (DS610)
http://www.xilinx.com/support/documentation/data_sheets/ds610.pdf
7. XtremeDSP Spartan-3A DSP 3400A Development Board: *Technical Reference Guide*
http://www.xilinx.com/support/documentation/boards_and_kits/ug498_s3a_3400_board.pdf
8. Integrating custom logic in camera frame demo by Jeffrey Olsen
<http://www.egr.msu.edu/classes/ece480/capstone/fall10/group03/doc.html>

Acronyms

The following are acronyms and terms that may be used throughout this document.

Abbreviation	Meaning
BSB	Base System Builder (component of the EDK)
CD	Compact Disc
DSP	Digital Signal Processing
DVD	Digital Versatile Disc
DVI	Digital Video Interface
EDK	Xilinx Embedded Development Kit
EDK	Embedded Development Kit
FPGA	Field Programmable Gate Array
HDL	Hardware Description Language
IIC	Inter-Integrated Circuit
ISE	Integrated Software Environment
PC	Personal Computer
SDK	Software Development Kit
USB	Universal Serial Bus
VGA	Video Graphics Array
VSK	Video Starter Kit
XPS	Xilinx Platform Studio

Table 1: Table of Acronyms Used

Introduction

The Spartan-3A DSP FPGA Video Starter Kit is a tool designed to assist users in video processing applications. By utilizing an FPGA, parallel processing increases speed and performance of a system at minimal cost.

In addition to several necessary cables, the kit's contents can be categorized into three sectors: Spartan-3A DSP 3400A Development Platform, FMC-Video daughter card, and VGA camera. The FMC-Video daughter card is an optional component¹ for the system which increases the video capability of the Development Platform but is necessary in using the Xilinx provided demos thus will be used in this application note.

This document contains basic information for setting up the system and information regarding how to run the Xilinx provided demos. This document does not include instructions for modifying the demos or steps for a user to implement their own designs.

Before connecting any components or installing any software, it is essential that the user reads this document thoroughly to prevent damage to the system.



Figure 1: Spartan-3A DSP FPGA Video Starter Kit

¹ This document utilizes the FMC-Video daughter card; setup of the system will differ if the user prefers to not use this card.

Kit Contents

Before proceeding, be sure to confirm that the Video Starter Kit includes the listed contents². If cables are missing, the user may proceed only if identical cables are substituted. Improper use of cabling may cause harm to the system.

Remember, the following is not an exhaustive list of kit contents; it contains the essential components for running the Xilinx provided demos. Additional hardware and software will be necessary to modify the demos and are not covered in this document.

Hardware Contents

Cables:	Quantity:
• Analog VGA to DVI Adaptor	1
• Cat 5 Ethernet Crossover Cable	1
• Cat 6 Ethernet Patch Cable	1
• DVI Cable	1
• Null Modem Cable	1
• Power Adapter with locale specific connector	1
• RCA Composite Cable	1
• S-Video Cable	1
• VGA Cable	1
Hardware Components:	Quantity:
• Compact Flash Card with Boot Image Loaded	1
• FMC-Video Daughter Card ³	1
• Spartan-3A DSP 3400A Development Platform	1
• VGA Camera Module ⁴	1

² This is not an exhaustive list of contents; it only contains the essential components for running the Xilinx provided demos.

³ The FMC-Video daughter card is an optional component when using the VSK however it will be utilized in this document. If the user would prefer to not use this card then please see the referenced documents for additional information.

⁴ Although the VGA camera is listed as an essential component to the system, a substitute method will be described within this document which does not utilize the VGA camera but rather another computer as the input. If the VGA camera is missing or inoperable, this additional method may be used.

Additional Contents

The following is a list of contents that may be helpful to users that wish to understand the technical details of the system in addition to this high-level application note. These contents are *not required* to proceed in the demo process since the Compact Flash already contains the Xilinx demos but some contents may be required if the user wishes to modify these demos.

- Documentation

The documentation listed provides additional resources that may be helpful in technical understanding of the board and demos but is not required to run the demos.

Documentation located in the VSK Resources CD⁵:

- Spartan-3A DSP FPGA VSK: *Quick Start Guide* (UG455)
- Spartan-3A DSP FPGA VSK: *User Guide* (UG456)
- Spartan-3A DSP FPGA VSK: *Software Guide* (UG514)
- Spartan-3A DSP FPGA Family: *Data Sheet* (DS610)

Additional Documentation:

- XtremeDSP Spartan-3A DSP 3400A Development Board: *Technical Reference Guide*
- FMC-Video Daughter Card: *Quick Start Guide* (UG457)
- XtremeDSP™ Solution FMC-Video Daughter Board: *Technical Reference Guide* (UG458)

- Xilinx Demo Designs

- Compact Flash Image
- EDK:
 - DVI Pass-Through
 - DVI Frame Buffer
 - Camera Frame Buffer
 - S-Video Frame Buffer
- HDL:
 - Pass-Through Test
 - Loopback Test

- Schematics

These schematics are intended to educate the user further on the system's configuration.

⁵ Web-links to the most recent versions of these documents are located in the referenced document section on page 4 within this application note.

System Requirements

System requirements will vary depending on the user's need for the Spartan-3A DSP FPGA Video Starter Kit. The following are the necessary requirements that are *not* included in the kit to run the Xilinx provided demos.

Hardware

- Personal computer with a USB port available
- External monitor with VGA input (or separate video display screen to output the demo)
- USB to RS232 Interface Cable
- VGA Cable
- DVI-I Dual Link Connector

Software

- Terminal Program⁶ (such as Window's HyperTerminal)

⁶ Windows computers are already configured with a HyperTerminal. For Windows XP, the HyperTerminal is located under Start>All Programs>Accessories>Communications.

System Setup

The following contains the basic setup for the VSK to run the provided demos. See Appendix A for example application of the Camera Frame Buffer Demo.

Connecting the System

To ensure correct assembly of the system, follow the steps provided. Be sure to begin with no components connected and no power applied to the system.

1. Locate the Spartan-3A DSP 3400A Development Platform (shown in Figure 3). Now locate the FMC-Video Daughter Card (shown in Figure 2). Plug the pins marked A of the FMC-Video Daughter Card in Figure 2 into the slot marked D of the Spartan-3A Board shown in Figure 3.

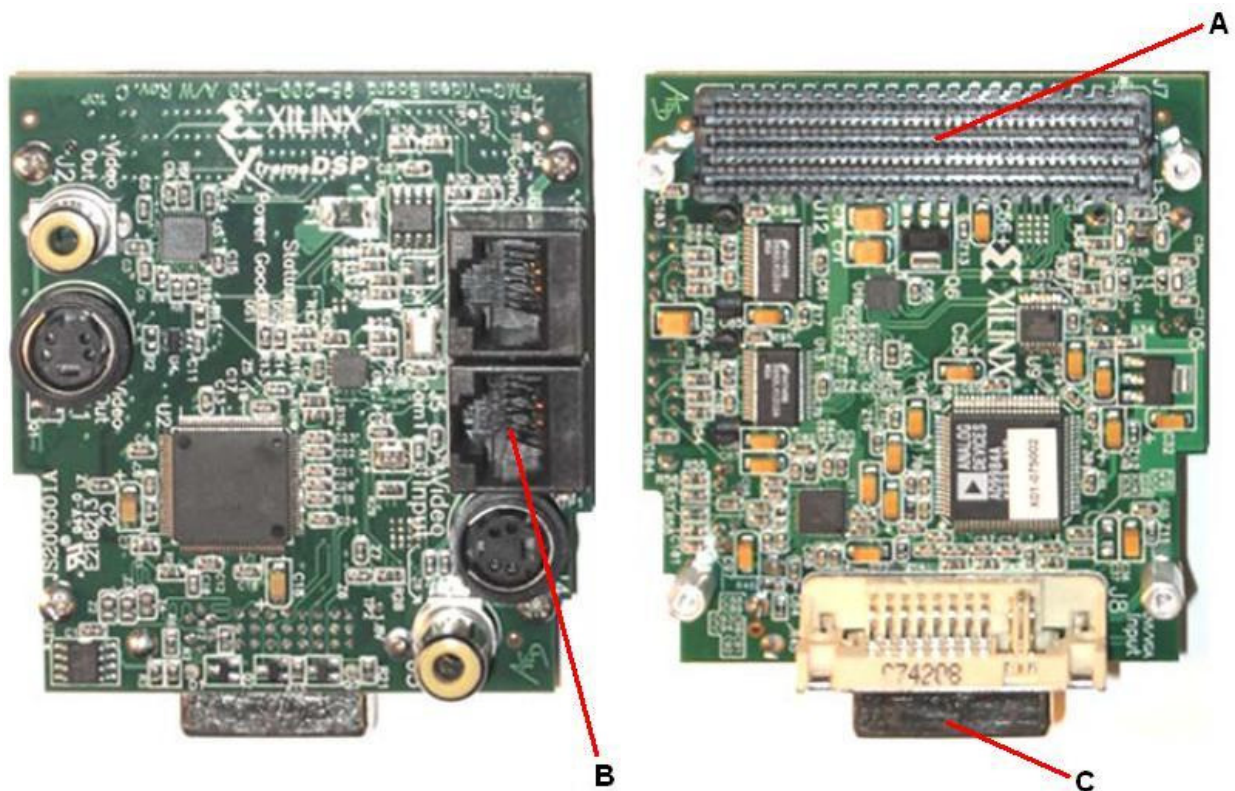


Figure 2: FMC-Video Daughter Card (Left: Top/Arial View, Right: Bottom/Underside View)

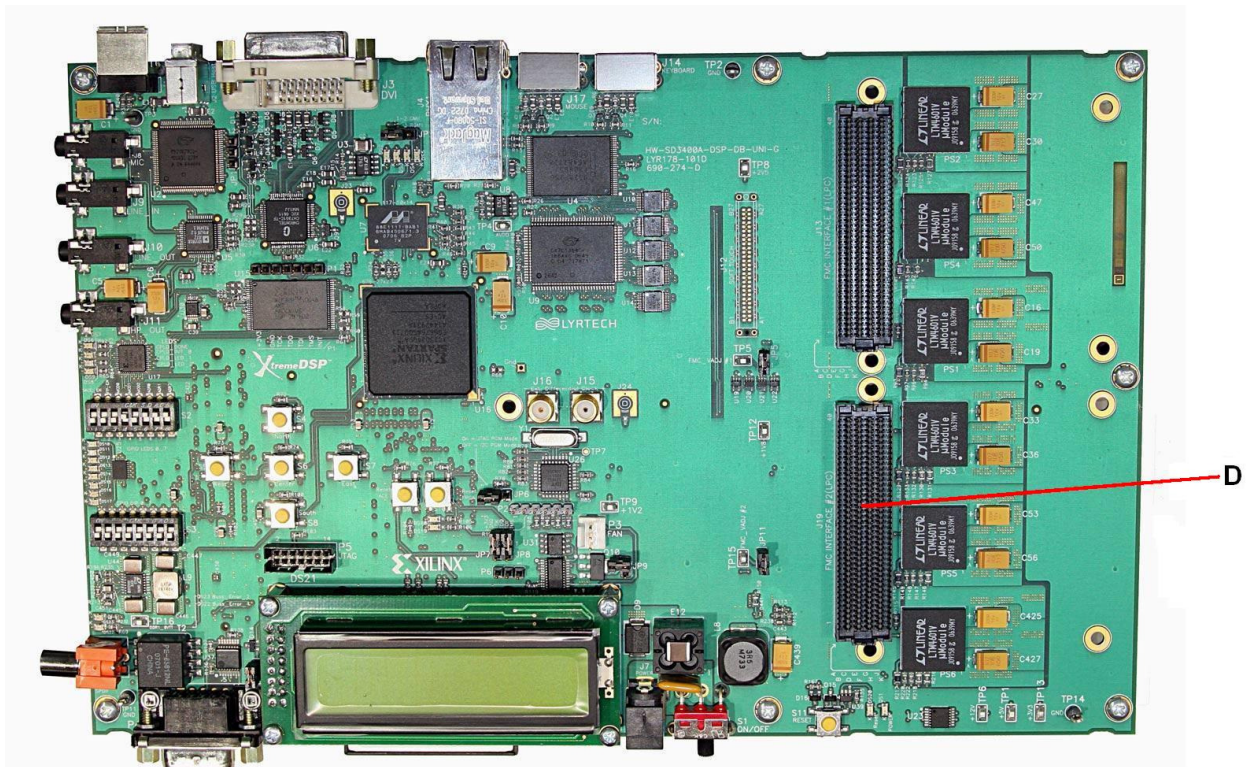


Figure 3: Spartan-3A DSP 3400A Development Platform

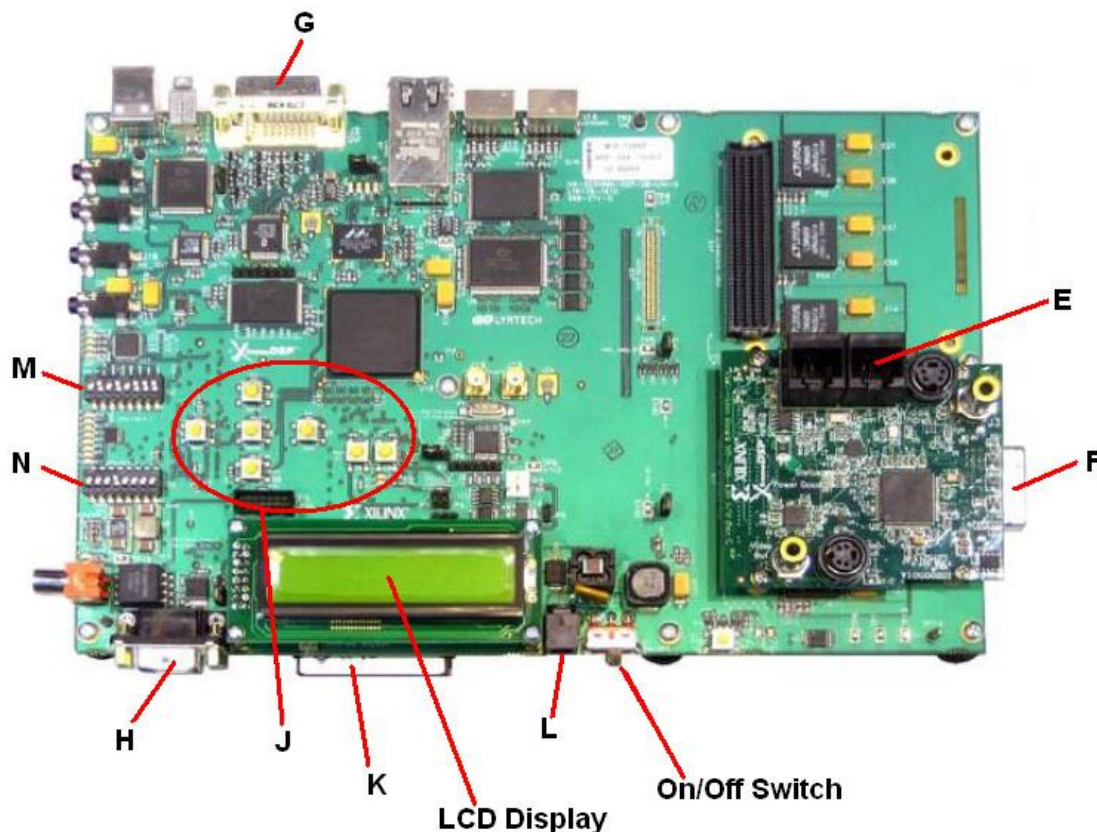


Figure 4: Spartan-3A DSP 3400A Development Platform with FMC-Video Daughter Card

2. Insert the Compact Flash into Development board's slot marked K in Figure 4 if it is not already in place.
3. Ensure that the switch marked M in Figure 4 (known as S2 on the board), is set to 01010111 (0 being down closer to LCD display and 1 being up away from LCD display). Also ensure that the switch marked N in Figure 4 (known as S3 on the board), is set to 00010000. This allows the demos to be run.
4. The seven push buttons marked as J in Figure 4 have labels on the board next to each as shown in Table 2. These will be referenced in the next section.

Push Buttons
S4: North (Up selection)
S5: West (Left selection)
S6: Center (Enter/Okay Selection)
S7: East (Right Selection)
S8: South (Down Selection)
S9: Reset ACE (Press to Reset Demo. This will not erase the demo from the Compact Flash)
S10: Reset FPGA (Do not press while following this document's example)

Table 2: Push Buttons

5. Before plugging in the power cable, ensure that the board's power switch is off. Locate the on/off switch (marked respectively in Figure 4), and note that switched to the *right* is powered off and to the *left* is powered on. Plug the power adapter into a standard wall outlet and the other end into the port marked L in Figure 4.
6. Assemble the camera and tripod by screwing the tripod into the base of the camera. Next plug the CAT6 Ethernet cable from the camera into the port marked E in Figure 4. The camera will be a live video feed for the demo⁷.



Figure 5: VGA Camera Module Assembled

⁷ An alternative to using the camera as the video input is to use a separate computer as the video source. This can be done by plugging a VGA cable from a computer (not the one running the HyperTerminal), into the port on the FMC-Video Daughter Card marked F in Figure 4. Make sure to have the computer broadcast its desktop (similar to presenting the PC's desktop on a projector). Also, be sure to remove the CAT6 cable that is running to the FMC-Video Daughter Card.

7. Next, grab the USB to RS232 Interface cable and plug the USB into a personal computer which has a Terminal Program (such as HyperTerminal) and the 9-pin other end into the port marked H in Figure 4.
8. Finally, connect the DVI-I Dual Link Connector to one end of the VGA cable and then into port G in Figure 4. Plug the other end of the VGA cable into an external monitor display (the output of the demo will be shown on this display).

This completes the assembly of the kit.

Using the Demos

This application note uses Microsoft's provided HyperTerminal as the terminal program. All steps will reference HyperTerminal hereafter⁸.

1. Ensure all connections have been made. Return to the previous section titled *Connecting the System* if unsure.
2. Apply power to the system by flipping the on/off switch⁹ on the board to on.
3. Open HyperTerminal on the PC. For most Microsoft Windows Platforms, HyperTerminal is located by going to Start>All Programs>Accessories>Communications>HyperTerminal.
4. The home screen of HyperTerminal will appear as shown in Figure 6 below. Create a name for the connection that will be created and choose an icon representation. Click *OK* when complete.



Figure 6: HyperTerminal Home Screen

5. Next, a *Connect To* prompt will open. Select the appropriate COM port of the PC for the application. Click *OK* when complete.

⁸ The demos can also be reached by using the push buttons (see Table 2) to scroll through the choices on the LCD Display on the board. This can be accomplished by switching the On/Off switch to the *on* position and following the LCD display. Although convenient, the push buttons can only select a demo, they do not allow the user to adjust any settings within a demo; therefore it is suggested that the HyperTerminal be used when possible.

⁹ The “on” position is to the left and the “off” position of the switch is to the right.



Figure 7: HyperTerminal Connection Selection

6. The HyperTerminal will then prompt the user for properties of the selected COM port. Ensure the following port settings (as seen in Figure 8 below) are set then click *OK* when complete.
 - Bits per second: 9600
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow control: None

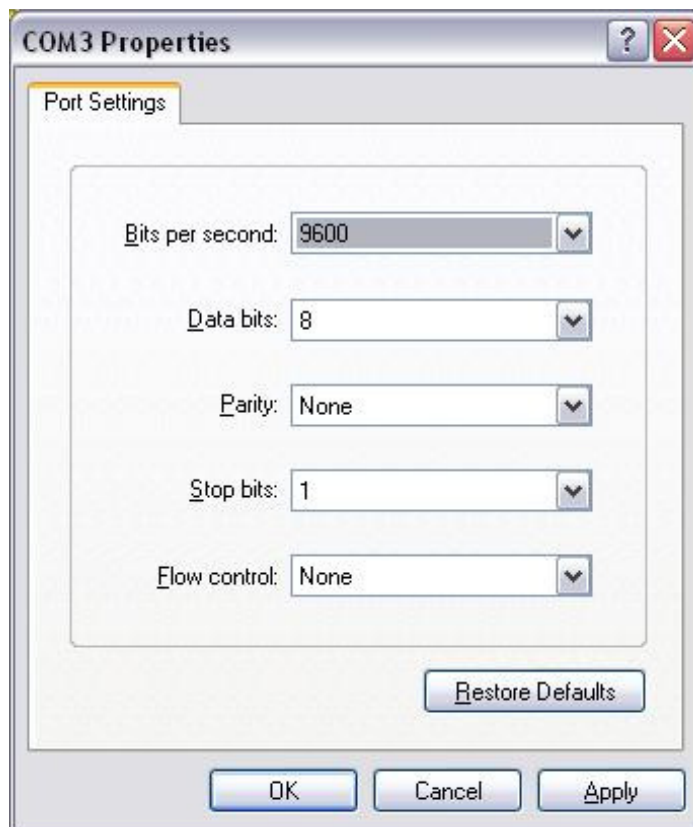


Figure 8: HyperTerminal COM Properties

7. The COM port and HyperTerminal are now configured. Reset the development board by pressing the S9 switch marked "Reset ACE" or by switching the on/off switch to the "off" position then back to the "on" position.
8. The flash will then reload and the HyperTerminal will now display the Bootloader Menu as shown below in Figure 9.

This menu displays the following selections for the user:

	Possible Selection	Description
1	DVI Pass-Through Demo	Captures video from input, then performs real-time image processing on the video stream then displays the processed video. This demo does not manipulate the video stream.
2	DVI Frame Buffer Demo	Captures video stream from a DVI source, the demo then buffers the video stream in external memory, displays the buffered video then reports data on the amount of memory bandwidth used.
3	Camera Frame Buffer Demo	Captures video stream from the camera, then performs various processing on the video which is then buffered into external memory. User is able to

		display the video at various frame rates and is able to select from several configurations made available by the microprocessor to apply to the video.
4	System Generator Bootloader	Bootloader for use with System Generator
5	Reserved	Reserved for user design
6	S-Video Frame Buffer Demo	Captures video from S-Video source, buffers the video in external memory then displays the buffered video
7	Loopback Test	Tests the FMC-Video board interface by generating test patterns on outputs and testing them on inputs

Table 3: Bootloader Menu Selections

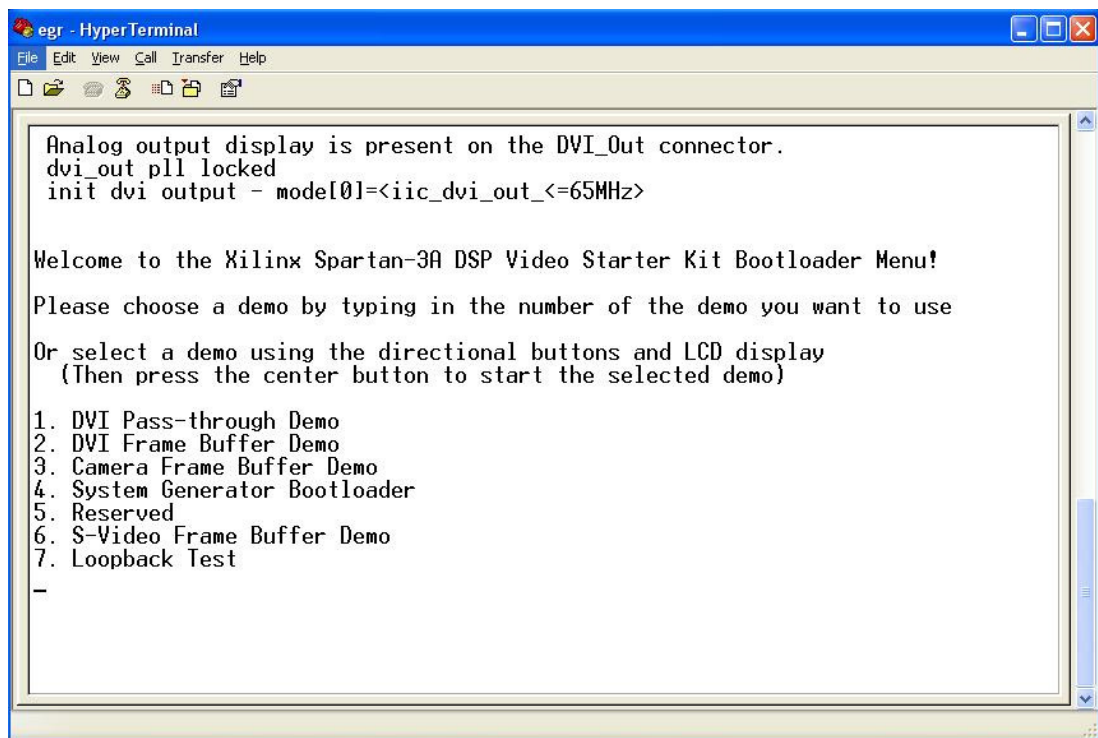


Figure 9: Bootloader Menu

This concludes the step-by-step on how to access the Xilinx provided demos with the Spartan-3A DSP FPGA Video Starter Kit. See Appendix A for further information regarding the Camera Frame Buffer Demo.

Moving Forward

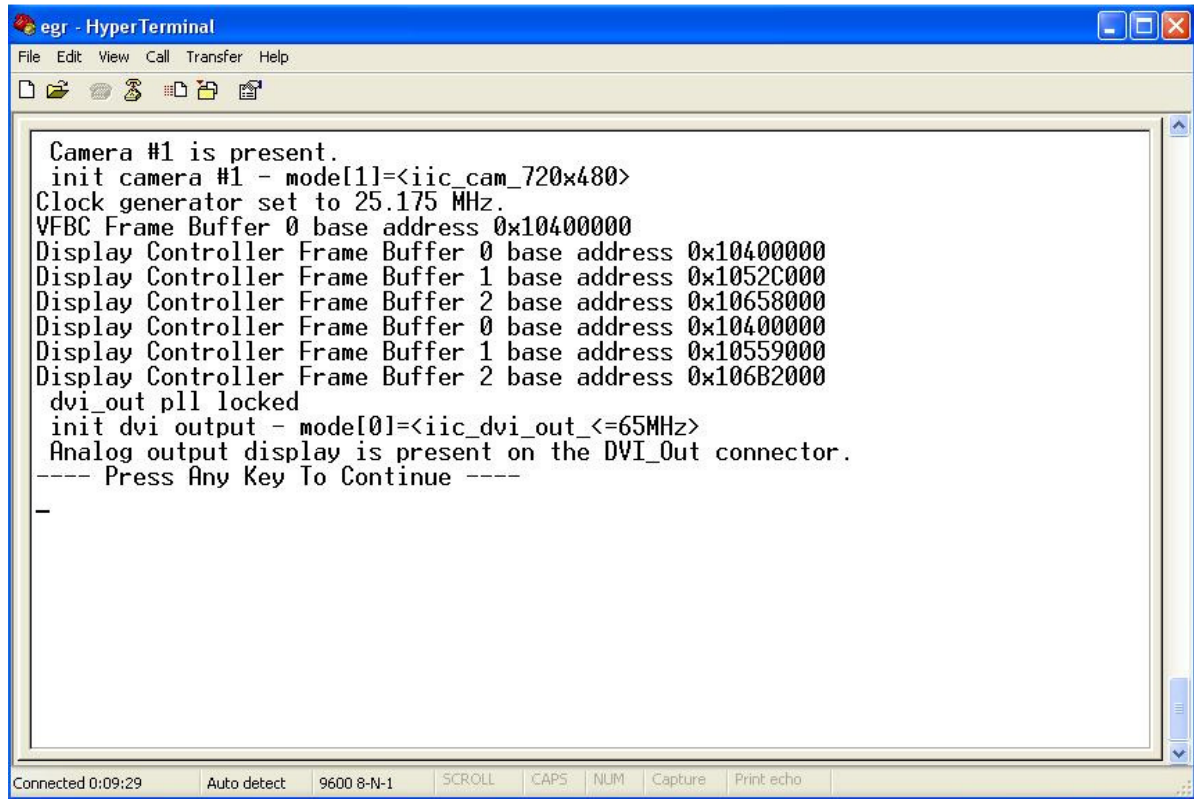
It is suggested after fully understand of the Spartan-3A DSP FPGA Video Starter Kit's demos that the user then read all of the documentation that came with the kit. Once all of the documentation has been read and a higher level of understanding of the system is obtained, refer to the document titled "*Integrating custom logic in camera frame demo*" by Jeffrey Olsen referenced on page 4 of this document. This document will walk a user through how to go about modifying the Xilinx provided demos. The user must learn to modify the provided demos before trying to create an application from scratch.

Remember, there are multiple ways to assemble the VSK depending on the video input and output the user desires as well as various cables and configurations. This is key to note since each document referencing the kit may have a different configuration therefore may not be applicable to the user (without modification).

Appendix A

This appendix illustrates step by step how to use the *Camera Frame Buffer Demo*.

1. To run the Camera Frame Buffer Demo type the number “3” into the HyperTerminal and the demo should automatically begin (see Figure 10 below).



```
egr - HyperTerminal
File Edit View Call Transfer Help

Camera #1 is present.
init camera #1 - mode[1]=<iic_cam_720x480>
Clock generator set to 25.175 MHz.
VFBC Frame Buffer 0 base address 0x10400000
Display Controller Frame Buffer 0 base address 0x10400000
Display Controller Frame Buffer 1 base address 0x1052C000
Display Controller Frame Buffer 2 base address 0x10658000
Display Controller Frame Buffer 0 base address 0x10400000
Display Controller Frame Buffer 1 base address 0x10559000
Display Controller Frame Buffer 2 base address 0x106B2000
dvi_out pll locked
init dvi output - mode[0]=<iic_dvi_out_<=65MHz>
Analog output display is present on the DVI_Out connector.
---- Press Any Key To Continue ----

Connected 0:09:29  Auto detect  9600 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo
```

Figure 10: Camera Frame Buffer Selection

2. Next, hit *Enter* on the keyboard to continue. This begins the Camera Frame Bugger Demo Menu (as shown in Figure 11).

```

egr - HyperTerminal
File Edit View Call Transfer Help

Clock generator set to 25.175 MHz.
VFBC Frame Buffer 0 base address 0x10400000
Display Controller Frame Buffer 0 base address 0x10400000
Display Controller Frame Buffer 1 base address 0x1052C000
Display Controller Frame Buffer 2 base address 0x10658000
Display Controller Frame Buffer 0 base address 0x10400000
Display Controller Frame Buffer 1 base address 0x10559000
Display Controller Frame Buffer 2 base address 0x106B2000
dvi_out pll locked
init dvi output - mode[0]=<iic_dvi_out_<=65MHz>
Analog output display is present on the DVI_Out connector.
---- Press Any Key To Continue ----

--Xilinx Video Starter Kit Camera Frame Buffer Demo --

c Enter Camera configuration menu
p Enter Processing menu
s Enter Storage menu
i Enter the IIC Diagnostics menu
? Print the Top-Level menu Help Screen

>_

```

Connected 0:11:51 Auto detect 9600 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 11: Camera Frame Buffer Demo Top-Level Menu

There are several selections available in the Camera Frame Buffer Demo Menu:

	Possible Selection	Description
c	Camera Configuration Menu	Configure Camera Settings
p	Processing Menu	Change Process Settings
s	Storage Menu	Storing to Compact Flash
I	IIC Diagnostics Menu	VSK Peripherals
?	Top-Level Menu Help Screen	Refresh Menu

Table 4: Camera Frame Buffer Demo Menu

These next steps will walk through using each of these selections.

3. Type "C" to enter the Camera Configuration Menu (as show in Figure 12).

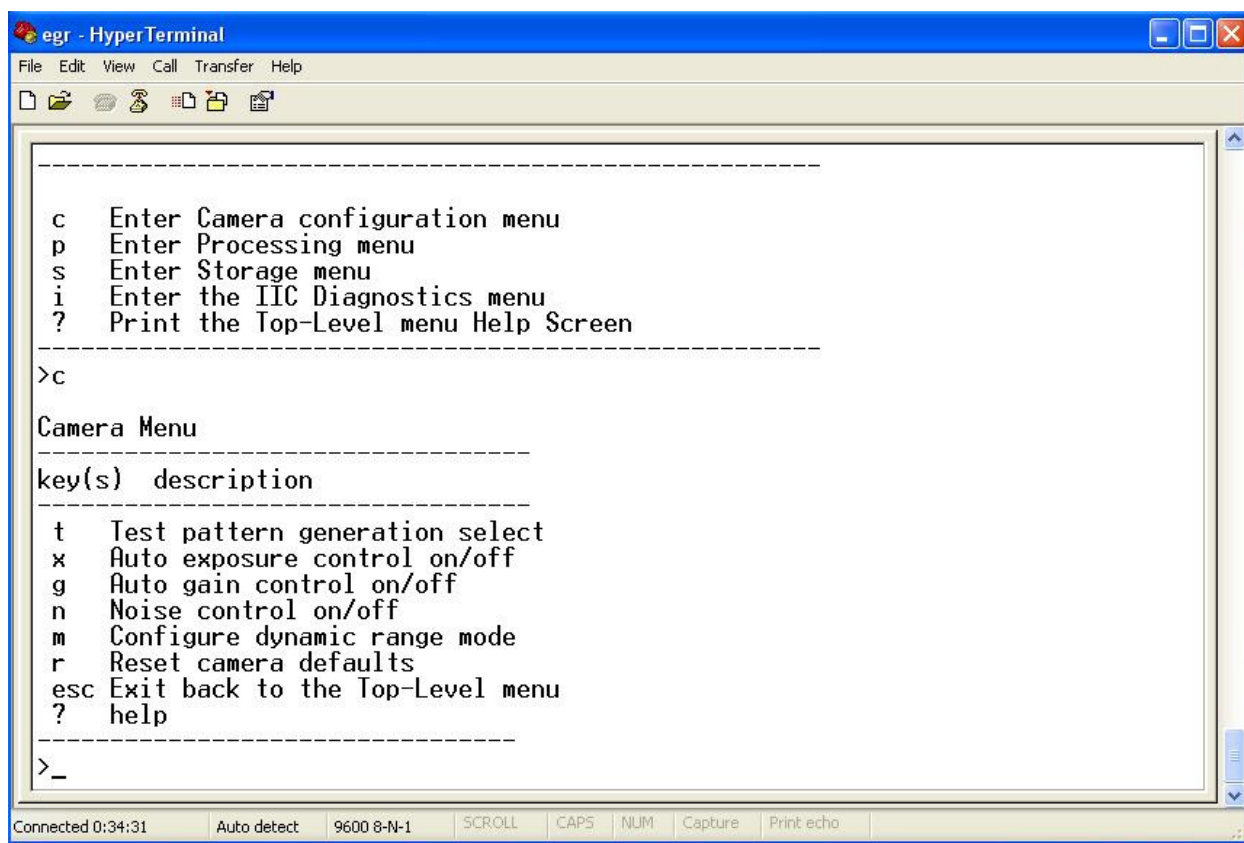


Figure 12: Camera Buffer Demo Configuration Menu

The following table describes the possible configuration selections:

	Possible Selection	Description	How to Use:
t	Test Pattern Generation Select	Displays test patterns on output monitor.	Continue to hit "t" on the keyboard. The output will rotate through 3 test patterns then return to the regular video stream.
x	Auto Exposure Control on/off	Adjusts lens aperture to receive the proper amount of light. Allows more light in dimmer environments and less light in brighter	Continue to hit "x" to toggle the auto exposure between off and on.

		environments.	
g	Auto Gain Control on/off	Increases the amount of amplification in low light level conditions to bring the video signal up to the minimum required level. Also acts well to reduce noise and picture attenuation and the signal to noise ratio is reduced which also provides a higher quality image.	Continue to hit “g” to toggle the auto gain control between off and on.
n	Noise Control on/off	Reduces amount of noise seen in the output.	Continue to hit “n” to toggle the auto noise control between off and on.
m	Configure Dynamic Range Mode	Allows wider range of luminance between the lightest and darkest areas of an image. This allows greater range of intensity levels to be seen.	This setting will turn off auto exposure, auto gain and auto noise if used. Continue to hit “m” to toggle the camera dynamic range mode between off and on.
r	Reset Camera Defaults	Resets camera defaults.	Press “r” to reset the camera to factory settings.
esc	Exit back to the Top-Level Menu	Brings the user to the Camera Frame Buffer Demo Main Menu.	Press “esc” to return to the highest level menu within the Camera Frame Buffer Demo.
?	Help	Re-prints the Camera Buffer Demo Configuration Menu. It does not explain any of the configuration	Press “?” (or “shift” and “/” to input a question mark) to re-print the Configuration

		options.	Menu.
--	--	----------	-------

Table 5: Camera Frame Buffer Demo Configuration Menu

Experiment with each selection to see how the camera is affected for a specific environment. When finished adjusting each configuration, hit “esc” to return back to the Top-Level Menu.

- Next, hit “p” to enter the processing menu (as shown below in Figure 13).

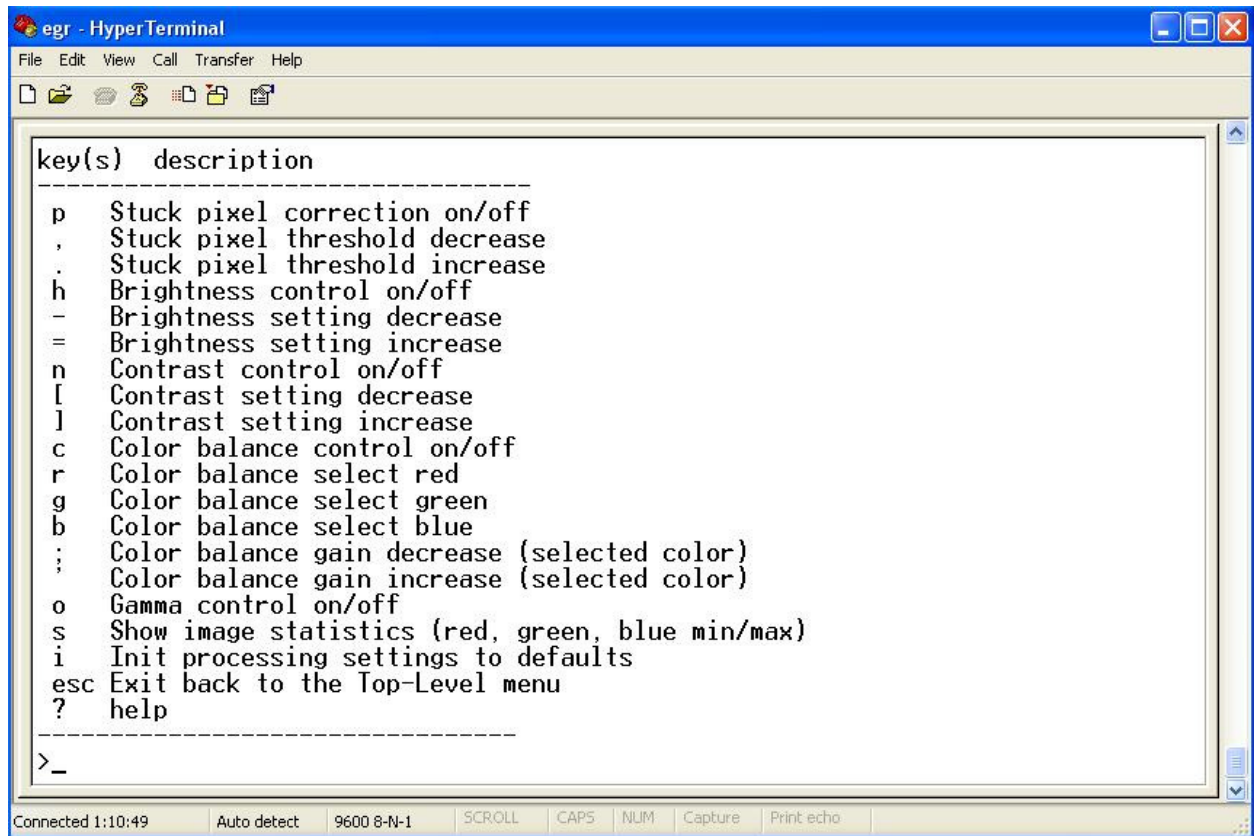


Figure 13: Camera Buffer Demo Processing Menu

The following table describes the possible processing selections:

	Possible Selection	Description	How to Use:
p	Stuck Pixel Correction On/Off	In real-time operation, each pixel within the sensor array is compared to its neighbors. If high differences, then the selected pixel is replaced with an updated value.	Press “p” to toggle the stuck pixel correction between off and on.

,	Stuck Pixel Threshold Decrease	Lower the threshold to determine if a pixel is stuck. This increases the likely number of stuck pixels to be found.	Press “,” decrease the threshold.
.	Stuck Pixel Threshold Increase	Raise the threshold to determine if a pixel is stuck. This decreases the likely number of stuck pixels to be found.	Press “.” To increase the threshold.
h	Brightness Control On/Off	Tool for dimming or brightening the output display. It adds or subtracts an offset into the red, green, and blue signals.	Press “h” to toggle the brightness control between off and on.
-	Brightness Setting Decrease	Decreases the brightness of the output display.	Press “-” to decrease brightness.
=	Brightness Setting Increase	Increases the brightness of the output display.	Press “=” to increase brightness.
n	Contrast Control On/Off	Contrast control applies a scale factor (gain) to the red, green, and blue signals. In essence, contrast control uses a ratio of the difference of light between the brightest white and darkest black.	Press “n” to toggle the contrast control between off and on.
[	Contrast Setting Decrease	Decreases the contrast ratio, therefore there is less difference between white and black.	Press “[” to decrease the contrast ratio.
]	Contrast Setting Increase	Increases the contrast ratio, therefore there is greater difference between white and black.	Press “]” to increase the contrast ratio.
c	Color Balance Control On/Off	Color balance (also known as white balance) helps the camera capture the ‘real’ colors for optimal output display. Can adjust the intensity of the colors to change the overall mixture of colors in an	Press “c” to toggle the color balance control between off and on.

		image.	
r	Color Balance Select Red	Selecting the red channel allows white to contribute more pure red and black to contribute no red, thus in RGB, lack of red results in cyan.	Press “r” to select the red channel.
g	Color Balance Select Green	Selecting the green channel allows white to contribute more pure green and black to contribute no green, thus in RGB, lack of green results in magenta.	Press “g” to select the green channel.
b	Color Balance Select Blue	Selecting the blue channel allows white to contribute more pure blue and black to contribute no blue, thus in RGB, lack of blue results in yellow.	Press “b” to select the blue channel.
;	Color Balance Gain Decrease (Selected Color)	Decreases the gain of the selected channel. Therefore white contributes less of the channel and black contributes more.	Press “;” to decrease the last selected color channel’s gain.
‘	Color Balance Gain Increase (Selected Color)	Increases the gain of the selected channel. Therefore white contributes more of the channel and black contributes less.	Press “’” to increase the last selected color channel’s gain.
o	Gamma Control On/Off	Used to code and decode luminance of the video. There is a non-linear relationship between input voltage and output brightness, therefore an inverse curve (gamma curve) is applied to correct the image.	Press “o” to toggle the gamma control off and on.
s	Show Image Statistics (Red, Green, Blue	Shows the minimum and maximum statistics for	Press “s” to show the image statistics.

	Min/Max)	the red, green, and blue channels.	
i	Init Processing Settings to Defaults	Sets the processing settings to the initial default settings.	Press “i” to reset the processing settings.
esc	Exit Back to the Top-Level Menu	Brings the user to the Camera Frame Buffer Demo Main Menu.	Press “esc” to return to the highest level menu within the Camera Frame Buffer Demo.
?	Help	Re-prints the Camera Buffer Demo Processing Menu. It does not explain any of the processing options.	Press “?” (or “shift” and “/” to input a question mark) to re-print the Processing Menu.

Table 6: Camera Frame Buffer Processing Menu

Experiment with each selection to see how the camera is affected for a specific environment. When finished adjusting each processing option, hit “esc” to return back to the Top-Level Menu.

5. The next several Top-Level Menu options are not as friendly for beginners (see below for corresponding figures). Press “s” to enter the Storage Menu.

The storage menu allows users to ‘save’ any processing settings that were made.

	Possible Selection	Description	How to Use:
s	Store Processing Settings to Flash.	This step will overwrite previous processing settings to the Compact Flash. These will be the new default settings.	Press “s” to store processing settings to the Compact Flash.
r	Read Processing Settings from Flash	Allows user to view the current default settings that are loaded onto the Compact Flash.	Press “r” to view current settings.
w	Write image to flash	Stores a still image as .bmp file to the Compact Flash which later can be viewed using a card reader.	Press “w” to write a still image to flash.
v	Write Video Sequence to Flash	Stores a video sequence to the Compact Flash as individual stills. Need to merge each image together to provide an .avi video file for viewing.	Press “v” to write a video sequence to Compact Flash using many still images.
esc	Exit Back to the Top-Level	Brings the user to the Camera	Press “esc” to return to the

	Menu	Frame Buffer Demo Main Menu.	highest level menu within the Camera Frame Buffer Demo.
?	Help	Re-prints the Camera Buffer Demo Storage Menu. It does not explain any of the storage options.	Press “?” (or “shift” and “/” to input a question mark) to re-print the Storage Menu.

Table 7: Camera Buffer Demo Storage Menu

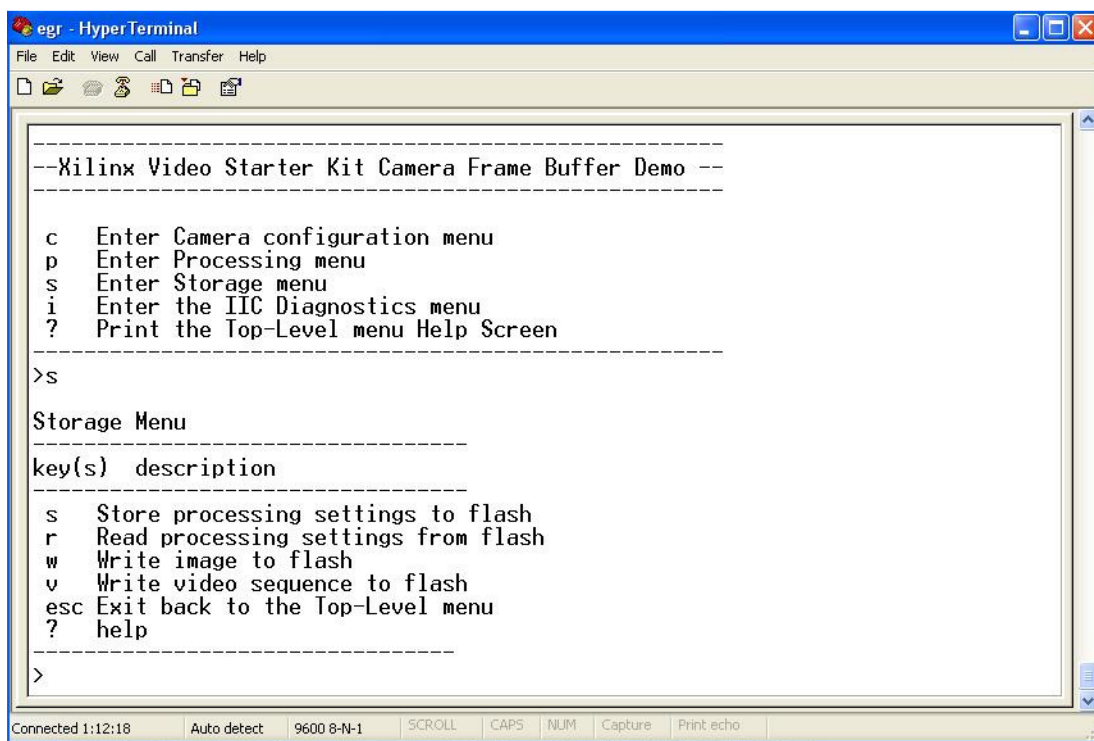


Figure 14: Camera Frame Buffer Storage Menu

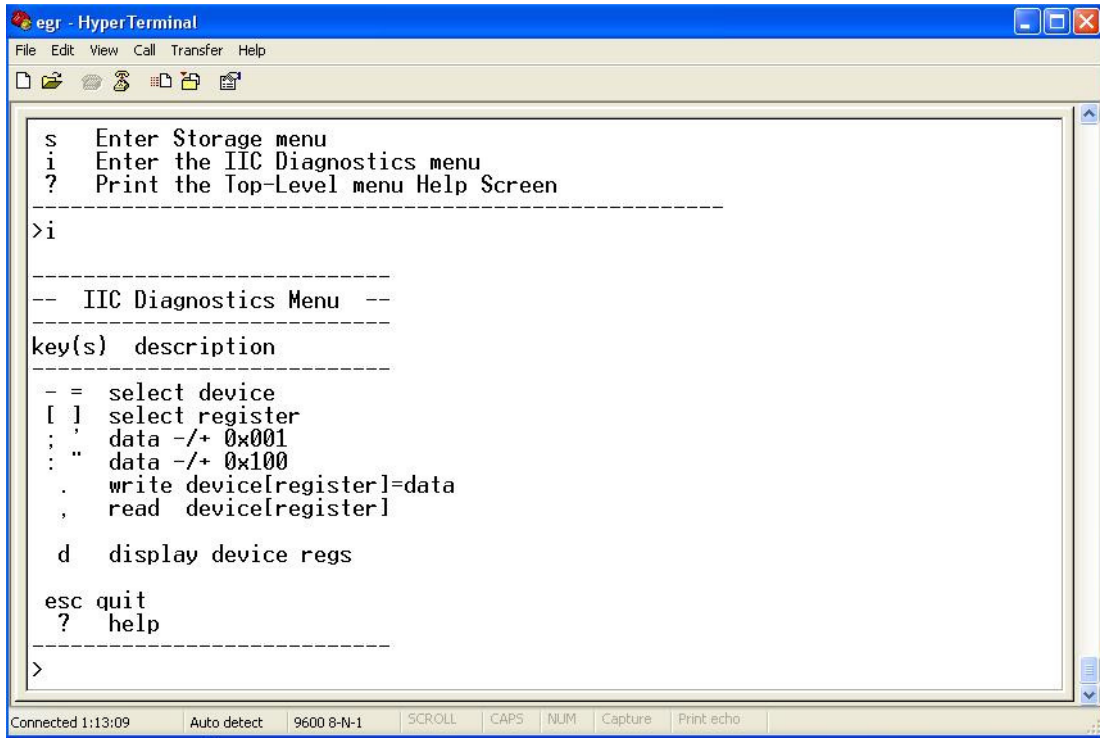
Experiment with each selection but be aware that overwriting previous processing settings is not suggested if the user has limited experience with the VSK. When finished adjusting each configuration, hit “esc” to return back to the Top-Level Menu.

- Next, press “i” to enter into the IIC Diagnostics Menu (as illustrated below in Figure 15). The IIC Diagnostics Menu allows the user to view and change the IIC register settings for peripherals on the VSK. It is not recommended that a beginning user modify any of these selections and therefore request that the user press “esc” to return to the Top-Level Menu.

	Possible Selection	Description	How to Use:
-	Decrement through the List of VSK Peripherals	Further description of these selections is beyond the scope of this document and will not be covered ¹⁰ .	
=	Increment through the List of VSK Peripherals		
[	Decrement the Chip Register Address		
]	Increment the Chip Register Address		
;	Decrement the Data Value by 0x1		
:	Decrement the Data Value by 0x100		
"	Increment the Data Value by 0x100		
'	Increment the Data Value by 0x1		
,	Read the Data (Data = Chip [Register])		
.	Write the Data Value (Chip[Register]=Data)		
esc	Exit Back to the Top-Level Menu	Brings the user to the Camera Frame Buffer Demo Main Menu.	Press "esc" to return to the highest level menu within the Camera Frame Buffer Demo.
?	Help	Re-prints the Camera Buffer Demo IIC Diagnostic Menu. It does not explain any of the IIC Diagnostic options.	Press "?" (or "shift" and "/" to input a question mark) to re-print the IIC Diagnostic Menu.

Table 8: Camera Frame Buffer IIC Diagnostics Menu

¹⁰ This document focuses on "Getting Started" with the Camera Frame Buffer Demo and is intended for beginning users. This subject matter is not suggested to be used by a beginner therefore is not covered.



```

egr - HyperTerminal
File Edit View Call Transfer Help

s  Enter Storage menu
i  Enter the IIC Diagnostics menu
?  Print the Top-Level menu Help Screen
-----
>i
-----
-- IIC Diagnostics Menu --
-----
key(s)  description
-----
- = select device
[ ] select register
; ' data +/- 0x001
: " data +/- 0x100
.  write device[register]=data
,  read device[register]

d  display device regs

esc quit
?  help
-----
>

```

Connected 1:13:09 Auto detect 9600 8-N-1 SCROLL CAPS NUM Capture Print echo

Figure 15: Camera Frame Buffer IIC Diagnostics Menu

7. Quit the Demo by switching the Power On/Off switch on the board to its *off* position. Then the user may shut down the HyperTerminal.
8. Remove all cords and cables and ensure that the Spartan-3A DSP 3400A Development Platform is stored safely in a static bag.

This concludes the Camera Frame Buffer Demo Appendix. It is suggested that the documents referenced on page 4 of this application note are thoroughly read so that the user may completely understand all components of the kit.