

**GLOMATION**



# **GESBC-2440**

## **User's Manual**

Embedded Single Board Computer

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# Chapter 1 – Introducing the GESBC-2440 Single Board Computer

## GESBC-2440 Overview

The GESBC-2440 is a compact sized single board computer based on Samsung S3C2440 processor. With a large peripheral set targeted to a variety of applications, the GESBC-2440 is well suited for:

- Thin Client Computers for Business and Home
- Internet Access Devices
- Industrial Computers
- Industrial Hand Held Devices
- Point of Sale Terminals
- Medical Instrument
- Test and Measurement Equipment

## Advanced Features

The heart of the GESBC-2440 is the S3C2440 which is the one in a series of ARM920T-based processors. The S3C2440 is a high-performance, low-power RISC-based device built around a single ARM920T microprocessor core. The ARM920T on the S3C2440 functions with a maximum operating clock rate of 533MHz. By providing a comprehensive set of common system peripherals, the S3C2440X minimizes the overall system cost and eliminates the need to configure additional components.

- ARM920T core, 0.13um CMOS standard cells and a memory compier
- 16 KB I/D Cache / MMU
- Operating Frequency 400MHz @ 1.3V / 533MHz @ 1.375V
- Independent 2 External memory controller
- LCD controller (up to 4K color STN and 16M color TFT) with LCD dedicated DMA
- 1 port dedicated USB Host (Version 1.1 Compliant)
- 1 port USB Device (Version 1.1 Compliant) / USB Host (Version 1.1 Compliant)
- 6-channel general DMA with external request pins
- CF&ATA I/F
- 4-channel UART with IrDA 1.0 (Including 64-byte FIFO)
- 2-ch SPI
- 1-ch multi-master IIC-BUS
- 1-ch IIS-BUS controller
- 1-ch AC97

- 2-ch SD Host controller/ Multi-Media Card protocol version 4.0(HS MMC) compatible
- 4-channel PWM timers and 1-ch internal timer
- 174 general purpose I/O ports/24-ch external interrupt source
- 10-ch 10-bit ADC and touch screen interface
- Watch dog timer
- RTC with calendar function
- On-chip clock generator with PLL
- CAM I/F with BT 601/656 input



**Figure 1 GESBC-2440 Single Board Computer**

### **S3C2440**

The GESBC-2440 is shipped with the Samsung S3C2440 processor. For more information regarding the S3C2440 processor please see the S3C2440 datasheet.

## **SDRAM**

The GESBC-2440 is shipped with 64MBytes of SDRAM. The user can optionally upgrade the memory to 128MBytes.

## **FLASH**

The GESBC-2440 is shipped with 2MBytes NOR flash and 64Mbytes NAND flash.

## **Real Time Clock**

The GESBC-2440 contains on-chip real time clock with 3.3V backup battery.

## **Video Interface (Raster / LCD interface)**

The Raster / LCD interface provides data and interface signals for a variety of display types.

- LCD Interface
  - The GESBC-2440 is shipped LCD display interface
- Touch Screen
  - The GESBC-2440 is shipped with a 4-wire, touch screen interface

## **USB**

The GESBC-2440 is shipped with one type A USB host port and one type B USB device port.

## **UART 1**

The GESBC-2440 is shipped with a 9-pin modem interface comprised of the following signals:

- Transmit
- Receive
- Clear to Send
- Ready to Send

## **UART 2**

The GESBC-2440 is shipped with a 3 wire UART 2.

## **UART 3**

The GESBC-2440 is shipped with a 3 wire UART 3.

## **Audio Input**

The GESBC-2440 is shipped with a single audio input.

## **Audio Output**

The GESBC-2440 is shipped with a single stereo audio output.

## **IIS Audio**

The GESBC-2440 is shipped with a UDA1341TS audio codec.

## **Ethernet**

The GESBC-2440 is shipped with a 10/100 Mbps Ethernet port.

## **IR Receiver**

The GESBC-2440 is shipped with a complete IR receiver interface on UART 3.

## Chapter 2 – Getting Started

This chapter describes the GESBC-2440 working environment and familiarizes the user with its components and functionality. This chapter contains the following sections:

- Assembly and Connections
  - Describes how to assemble and connect components to the GESBC-2440 Single Board Computer
- Operation
  - Describes how to operate the GESBC-2440 Single Board Computer

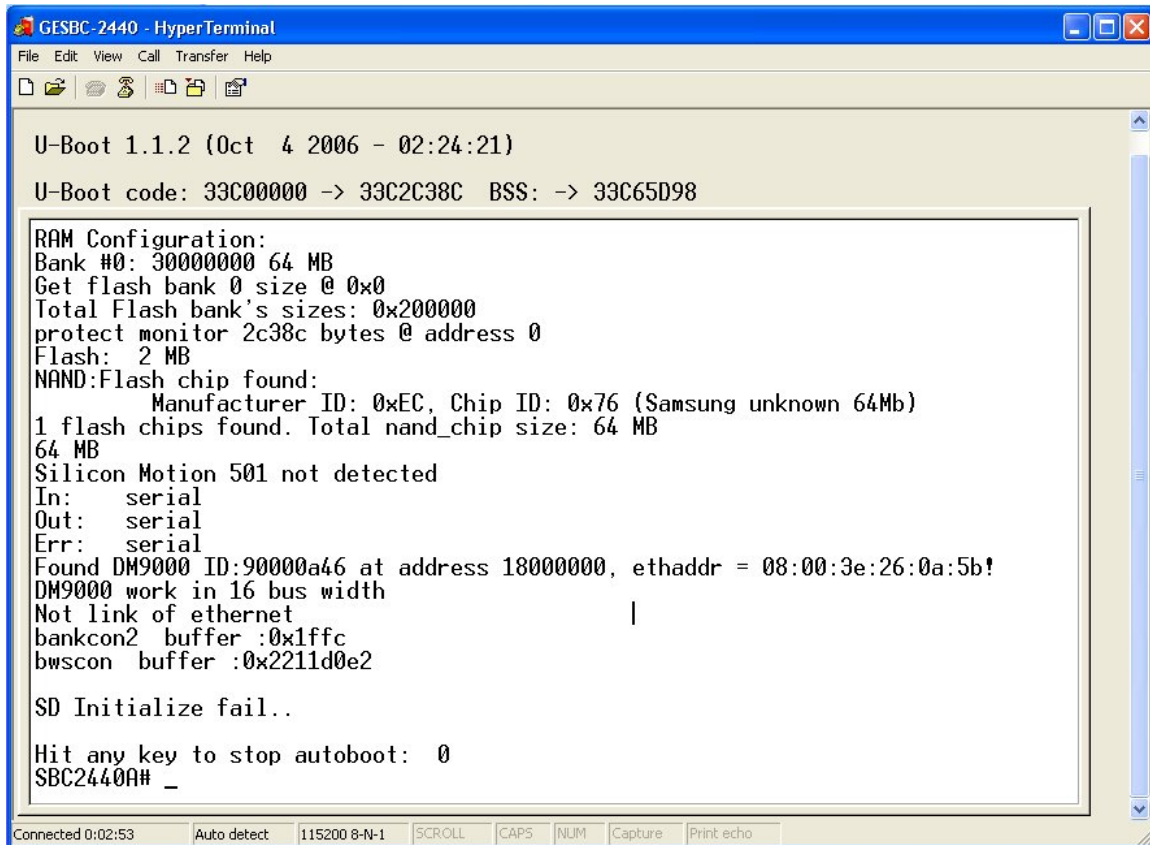
### Assembly and Connections

In order to use the GESBC-2440 the user must first assemble and connect the peripherals to the GESBC-2440, as described in the following procedure.

1. Place the GESBC-2440 on a static free surface.
2. Make sure all of the jumpers are in the factory default position. The unit is shipped in a factory default configuration. If the user is uncertain that the GESBC-2440 has the jumpers in the factory default configuration, please see *Configurations*.
3. Connect power to the board.
4. Connect null modem serial cable between GESBC-2440 UART 1 and PC/terminal serial port.
5. Launch a terminal emulator, such as HyperTerminal, or minicom, on the PC configured to connect to the serial port of the GESBC-2440. Configure the serial port with the following parameters: 115200 bits per second, 8 data bits, no parity, 1 stop bit, no flow control.
6. Connect the board to a local area network (optional)

### Operation

The startup procedure for the GESBC-2440 is straightforward. For boards shipped with Linux operating system, connect the GESBC-2440 to a power source, connect a null modem serial interface cable to the UART1 connector, optionally connect the GESBC-2440 to a network that has Internet access. It is recommended that all cables be tested to determine they are properly seated. A few seconds after applying power to the GESBC-2440, debug information will be displayed on the terminal program. The following figure shows what this should look like.



```
GESBC-2440 - HyperTerminal
File Edit View Call Transfer Help
U-Boot 1.1.2 (Oct 4 2006 - 02:24:21)
U-Boot code: 33C00000 -> 33C2C38C BSS: -> 33C65D98

RAM Configuration:
Bank #0: 30000000 64 MB
Get flash bank 0 size @ 0x0
Total Flash bank's sizes: 0x200000
protect monitor 2c38c bytes @ address 0
Flash: 2 MB
NAND:Flash chip found:
      Manufacturer ID: 0xEC, Chip ID: 0x76 (Samsung unknown 64Mb)
1 flash chips found. Total nand_chip size: 64 MB
64 MB
Silicon Motion 501 not detected
In:  serial
Out: serial
Err:  serial
Found DM9000 ID:90000a46 at address 18000000, ethaddr = 08:00:3e:26:0a:5b!
DM9000 work in 16 bus width
Not link of ethernet
bankcon2 buffer :0x1ffc
bwscon  buffer :0x2211d0e2

SD Initialize fail..

Hit any key to stop autoboot: 0
SBC2440A# _

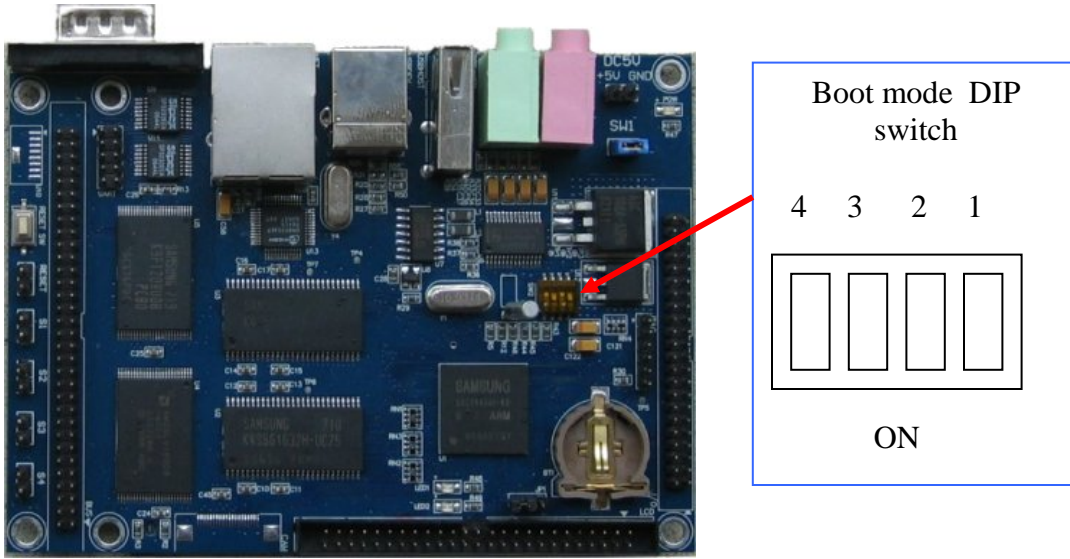
Connected 0:02:53  Auto detect  115200 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo
```

**Figure 2 U-boot boot screen**

For boards shipped with Windows CE evaluation copy, connect the GESBC-2440 to the power source, connect the optional LCD/touch screen module to the LCD port, and optionally connect the GESBC-2440 to a DHCP network. A few seconds after applying power, the Window CE screen should be displayed on the LCD screen.

## Configurations

Four DIP switches are used to configure the GESBC-2440 to operate in different boot mode.

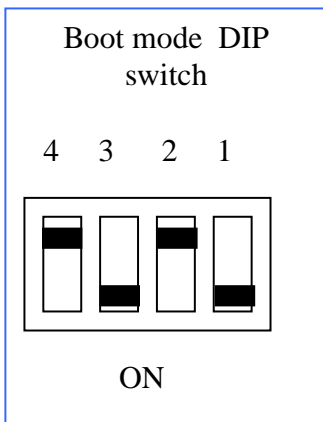


The following table lists all the settings for the switches.

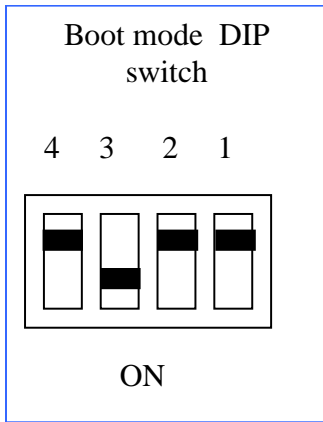
**Table 1 System configuration SW2**

Jumper	Description
1:2	Not installed
0:0	Boot mode: NAND flash boot
1:0	NOR flash 16 bit boot (default setting)
0:1	NOR flash 32 bit boot
1:1	Test mode
3	NAND flash test protect
4	NAND flash configuration

DIP switch setting for NOR FLASH boot



### DIP switch setting for NAND FLASH boot



## Chapter 3 – GESBC-2440 Function Blocks

This chapter provides a detailed description of functional blocks of the GESBC-2440 Single Board Computer.

### **S3C2440**

The GESBC-2440 Single Board Computer uses the Samsung S3C2440 as the core processor on the board. The top-level features of S3C2440 processor are the following:

- ARM920T RISC Core Processor
- 400 MHz Performance
- 16 Kbyte Instruction Cache
- 16 Kbyte Data Cache
- Linux and Windows CE enabled MMU
- 100 MHz System Bus
- 32 bit SDRAM Interface (Up To 4 Banks)
- 32 / 16 bit SRAM / FLASH / ROM Interface
- Serial EEPROM Interface
- 10 / 100 Mbps Ethernet MAC
- Three UARTs
- 1 USB Host Port
- 1 USB Device Port
- IrDA Interface
- LCD / Raster Interface
- Touch Screen Interface With ADC
- SPI Port
- Serial Audio Interface
- JTAG Interface

More detailed information regarding the S3C2440 processor can be found at [www.samsung.com](http://www.samsung.com).

## SDRAM

The S3C2440 features a unified memory address model where all memory devices are accessed over a common address and data bus. The GESBC-2440 supports either a 64 or 128 Mbyte SDRAM density.

## FLASH

The S3C2440 can support either NAND and/or NOR types of non-volatile flash memory for program code storage. The GESBC-2440 is shipped with 2 Mbytes of NOR flash memory and 64MB NAND flash memory

## Real Time Clock

The S3C2440 contains an on-chip real time clock. The GESBC-2440 Single Board Computer is shipped with a 3.3V battery socket for the backup battery to maintain the time information when main power is turned off.

## Video Interface (Raster / LCD interface)

The Video Interface, also known as the Raster/LCD interface, on the S3C2440 provides data and interface signals for a variety of display types. This interface provides programmable video interface timing for non-interlaced flat panel or dual scan displays. Resolutions up to 1280 x 1024 are supported from a unified SDRAM based frame buffer. The LCD interface and touch screen input are brought out by a single 2x25 pin header. The signal designation is shown in the following table.

**Table 2 LCD Connector**

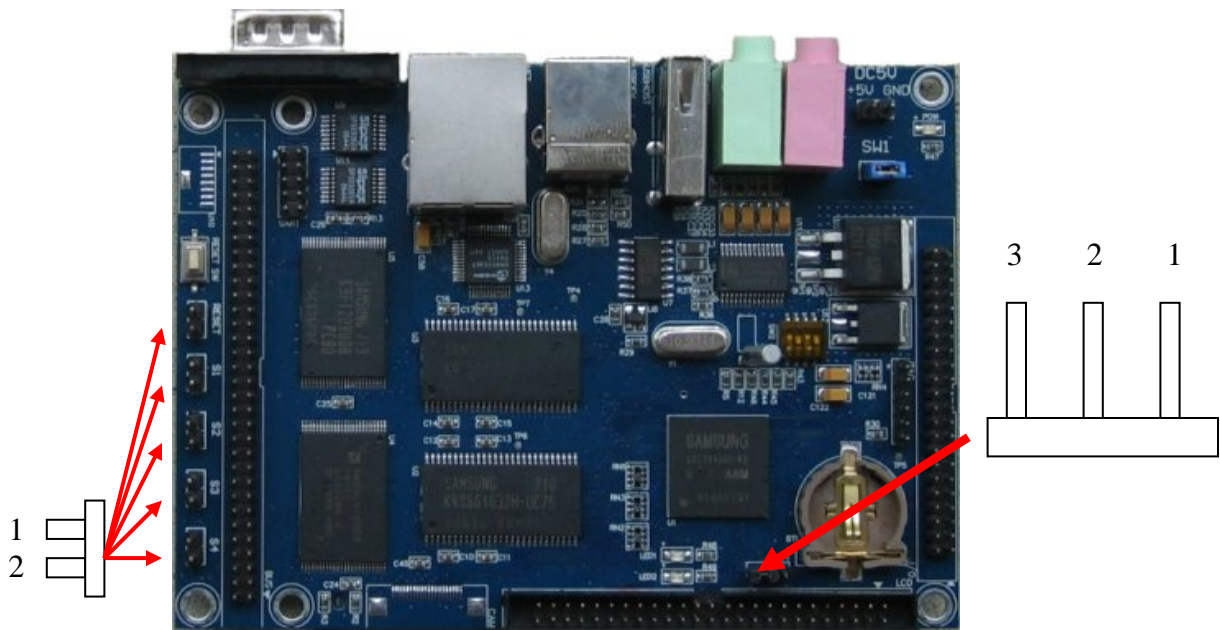
Pin Number	Signal Name	Pin Number	Signal Name
1	VDD	2	VDD
3	VDD	4	GND
5	nRESET	6	LCD0 (B0)
7	LCD1 (B1)	8	LCD2 (B2)
9	LCD3 (B3)	10	LCD4 (B4)
11	LCD5 (B5)	12	LCD6 (B6)
13	LCD7 (B7)	14	LCD8 (G0)
15	LCD9 (G1)	16	LCD10 (G2)
17	LCD11 (G3)	18	GND
19	LCD12 (G4)	20	LCD13 (G5)
21	LCD14 (G6)	22	LCD15 (G7)
23	LCD16 (R0)	24	LCD17 (R1)
25	LCD18 (R2)	26	LCD19 (R3)
27	LCD20 (R4)	28	LCD21 (R5)
29	LCD22 (R6)	30	LCD23 (R7)
31	GND	32	LCD_PWREN
33	LCDVF2	34	LCDVF1

35	LCDVF0	36	VM
37	VFRAME	38	VLINE
39	VCLK	40	LEND
41	LCDDISP	42	GND
43	TSXM	44	TSXP
45	NC	46	GNC
47	TSYM	48	TSYP
49	NC	50	GND

The LCD connection provide voltage selection jumper to connect to LCD modules with different voltage requirement. The pin assignment of the LCD voltage jumper is listed in the following table.

**Table 3 LCD Voltage Selection**

Pin Number	Signal Name
1	5V DC
2	VLCD
3	3.3V DC



## User Input Button

The GESBC-2440 has 4 user input button connections identified on the board as S1, S2, S3, S4 and a connection for external reset switch. The pin 1 is the signal line and pin 2 is the ground. The diagram above shows the pin orientation. The S1, S2, S3 and S4 are connected to S3C2440A CPU line EINT3, EINT4, EINT5, and EINT6 respectively.

## Touch Screen

The GESBC-2440 Single Board Computer is shipped with support for a touch screen panel. The S3C2440 processor performs the sampling, averaging, ADC range checking, and control for a wide variety of analog, resistive touch screens. The GESBC-2440 will support 4-wire touch screen interface. Please refer to LCD interface for the touch screen input connection.

## USB

The GESBC-2440 Single Board Computer provides one type A USB host connections. The GESBC-2440 also supports second USB which can be configured either as host or device.

## UART 1

The GESBC-2440 Single Board Computer is shipped with support for a 9-pin UART interface. The UART interface is provided via a DB9 connector. The signal designation is listed in the following table.

**Table 4 COM UART1 connector**

Pin Number	Signal Name	Pin Number	Signal Name
1	DC	2	RX
3	TX	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI		

## UART 2 and UART 3

The GESBC-2440 Single Board Computer provides two additional RS-232 UART ports via UART connector. The UART interface is provided via a 2x5 2mm header.

**Table 5 UART connector**

Pin Number	Signal Name	Pin Number	Signal Name
1	3.3V	2	GND
3	RX0	4	TX0

5	RX1	6	TX1
7	RX2	8	TX2
9	nCTS0	10	nRTS0

### Audio Input/Output

The GESBC-2440 Single Board Computer is shipped with support for an IIS audio codec interface. The Philips UDA1341TS is used to implement this functionality and interface. The GESBC-2440 Single Board Computer is shipped with support for a single stereo audio input and single stereo audio output. The audio signals are provided via a 2x3 2.54mm header. The signal designation is listed in the following table.

**Table 6 Audio Input/Output**

Pin Number	Signal Name	Pin Number	Signal Name
1	Line out R	2	Line out L
3	GND	4	Line in R
5	Line in L	6	GND

### Ethernet

The GESBC-2440 Single Board Computer is shipped with support for a complete Ethernet interface through DM9000 which is a fully integrated and cost-effective single chip Fast Ethernet MAC controller with a general processor interface, a 10/100M PHY and 4K Dword SRAM. It is designed with the low power and high performance process that support 3.3V with 5V tolerance. The on-board RJ-45 Ethernet connector provides easy connection.

### GPIO

The GESBC-2440 Single Board Computer is shipped with a GPIO port that contains all unused GPIO signals as well as DMA, PWM, IRQ, and TTL level serial port signals. The signal designation is listed in the following table

**Table 7 GPIO**

Pin Number	Signal Name	Pin Number	Signal Name
1	5.0V	2	3.3V
3	TOUT0	4	TOUT1
5	nXDACK0	6	nXDREQ0
7	nXDACK1	8	nXDREQ1
9	GPE12	10	GPE13
11	CLKOUT0	12	CLKOUT1
13	EINT2	14	EINT3

15	EINT4	16	EINT5
17	EINT6	18	EINT8
19	EINT9	20	EINT10
21	EINT11	22	EINT13
23	EINT14	24	EINT15
25	EINT16	26	EINT17
27	EINT19	28	GND
29	AIN0	30	AIN1
31	AIN2	32	AIN3
33	VREF	34	GND
35	nCTS0	36	nRTS0
37	RX0	38	TX0
39	RX1	40	TX1
41	RX2	42	TX2
43	GND	44	GND

### Expansion Bus

The GESBC-2440 Single Board Computer provides a memory expansion bus for connecting to memory mapped peripherals. The signal designation is listed in the following table

**Table 8 Expansion Bus Connector**

Pin Number	Signal Name	Pin Number	Signal Name
1	5.0V	2	3.3V
3	LDATA0	4	LDATA1
5	LDATA2	6	LDATA3
7	LDATA4	8	LDATA5
9	LDATA6	10	LDATA7
11	LDATA8	12	LDATA9
13	LDATA10	14	LDATA11
15	LDATA12	16	LDATA13
17	LDATA14	18	LDATA15
19	LADDR0	20	LADDR1
21	LADDR2	22	LADDR3
23	LADDR4	24	LADDR5
25	LADDR6	26	LADDR7
27	LADDR8	28	LADDR9
29	LADDR10	30	LADDR11
31	LADDR12	32	LADDR13
33	LADDR14	34	LADDR15
35	LADDR16	36	LADDR17
37	LADDR18	38	LADDR19
39	LADDR20	40	LADDR21

41	LADDR22	42	LADDR23
43	LADDR24	44	LADDR25
45	LADDR26	46	nRESET
47	LnOE	48	LnWE
49	nXBACK	50	nXBREQ
51	nGCS1	52	nGCS2
53	nGCS4	54	nGCS5
55	EINT0	56	EINT1
57	LnWBE0	58	LnWBE1
59	LnWBE2	60	LnWBE3
61	nWAIT	2	GND
63	GND	64	GND

### JTAG

The GESBC-2440 Single Board Computer is shipped with a 6 pin JTAG connector. The JTAG provides the user with the ability to program flash in circuit and debug system level programs. The signal designation is listed in the following table.

**Table 9 JTAG connector**

Pin Number	Signal Name	Pin Number	Signal Name
1	VDD3.3	2	TDI
3	TMS	4	TCK
5	TDO	6	GND

### Power Requirement

The GESBC-2440 Single Board Computer requires regulated 5v DC. The input connector signal designation is listed in the table below.

**Table 10 Power supply connector**

Pin Number	Signal Name
1	5V DC
2	GND

A 2 pin header, SW1, is provided to connect to an external switch to control the power to the GESBC-2440.

## Chapter 4 – Linux Software Description

### Overview

This chapter provides information regarding the Linux software that is shipped with the GESBC-2440 Board. The software included with the board is Linux with a few test applications and network utilities. The Linux software provides the user with the ability to test some of the subsystems on the GESBC-2440 board.

### GESBC-2440 Linux Code

The pre-programmed software provides the user with the opportunity to test some of the subsystems on the GESBC-2440 via Linux. This software is programmed into the system FLASH located on the board prior to shipment.

#### *Raster Interface*

Functionality of the raster interface is demonstrated by the QT/Embed user interface. The user interface is configured for 800 x 480, 16 Bit color depth

#### *Serial Port Interface*

The functionality of the serial interface can be demonstrated by looking at the debug messages while the system boot-ups and operates. The setting for the serial interface is described in chapter 2.

#### *Touchscreen Interface*

The functionality of the touchscreen can be supported by user supplied hardware.

#### *USB Interface*

The functionality of the USB interface can be shown by hooking up a user supplied USB device.

#### *Audio Output Interface*

Audio out functionality can be shown by attaching powered speakers (not included) and turning on the power to the GESBC-2440. Running the included MP3 player program and the sound should be heard from the speaker.

#### *Ethernet Interface*

Ethernet is automatically detected by the Linux kernel and a DHCP client will try to lease network address from connected DHCP server.

### UBoot

UBoot provides a simple interface for loading operating systems and

applications onto the GESBC-2440 board. The default serial port setting is 115200,8,N,1. It also supports the built-in Ethernet port and a flash file system and general flash programming.

The board is shipped with UBoot pre-installed. Please refer to documents at <http://www.denx.de/wiki/DULG/Manual> regarding how to use UBoot.

## Loading Linux Kernel and root File System

The UBoot supports several methods to load the image from the host system. Loading through the network connection via TFTP server is one of the easiest methods. The GESBC-2440 should be connected to a network where the host computer is part of or a crossed Ethernet cable can be used to connect the GESBC-2440 single board computer to the host computer directly. The host computer should have TFTP server running and with images files stored in the TFTP server directory.

After power on the GESBC-2440 board and press the space key, the following message should be shown on the terminal console on the host PC connected to the GESBC-2440 board.

```

GESBC-2440 - HyperTerminal
File Edit View Call Transfer Help
U-Boot 1.1.2 (Oct  4 2006 - 02:24:21)
U-Boot code: 33C00000 -> 33C2C38C BSS: -> 33C65D98

RAM Configuration:
Bank #0: 30000000 64 MB
Get flash bank 0 size @ 0x0
Total Flash bank's sizes: 0x200000
protect monitor 2c38c bytes @ address 0
Flash: 2 MB
NAND:Flash chip found:
      Manufacturer ID: 0xEC, Chip ID: 0x76 (Samsung unknown 64Mb)
1 flash chips found. Total nand_chip size: 64 MB
64 MB
Silicon Motion 501 not detected
In:  serial
Out: serial
Err:  serial
Found DM9000 ID:90000a46 at address 18000000, ethaddr = 08:00:3e:26:0a:5b!
DM9000 work in 16 bus width
Not link of ethernet
bankcon2 buffer :0x1ffc
bwscon  buffer :0x2211d0e2

SD Initialize fail..

Hit any key to stop autoboot:  0
SBC2440A# _

```

Connected 0:02:53 | Auto detect | 115200 8-N-1 | SCROLL | CAPS | NUM | Capture | Print echo

The network parameters must be set before the GESBC-2440 can communicate with the host computer.

First the local IP address must be assigned to the GESBC-2440 single board computer. To set the IP address of the GESBC-2440, enter the following command at the UBoot command line,

```
set ipaddr 192.168.1.2101
```

The host computer's IP address should also be set on the GESBC-2440 single board computer in order to load images from the host computer. The following command can be used to set the TFTP server IP address on the GESBC-2440 single board computer,

```
Set serverip 192.168.1.10
```

### *Load Linux Kernel*

The kernel image and root file system are stored in the on board NAND flash memory. The NAND flash memory must be erased before any image is written to. Use the following command to erase the NAND flash,

```
Nand erase clean
```

The kernel image must be loaded into dynamic memory before it can be stored in the on-board FLASH memory. To load Linux kernel, issue the following command at the terminal console connected to the GESBC-2440 board,

```
t 33000000 uImage
```

The above command will load Linux kernel image file into on board SDRAM. To store the image into non-volatile FLASH memory, use the following command,

```
nand write.jffs2 33000000 0 $(filesize)
```

### *Load Root File System*

The default configuration of GESBC-2440 uses part of NAND flash for Linux root file system. The file system image must be loaded into dynamic memory before it can be stored in the on board FLASH memory. After the network parameters have been set on the GESBC-2440 single board computer, the following commands can be used to load the root file system to SDRAM,

```
t 30000000 rootfs.img
```

---

<sup>1</sup> User should set IP address according to his own network setup.

The above command will load the Linux root file system image into on board SDRAM. To store the image into non-volatile FLASH memory, use the following command,

```
nand write.jffs2 30000000 0x200000 $(filesize)
```

## **Set Up Uboot Boot Environment**

The UBoot can set to load and run Linux upon system boot up. The following sequence of commands will set and save the UBoot boot environment,

```
set bootcmd `nand read.jffs2 33000000 0 100000;bootm 33000000`  
set bootargs `root=/dev/mtdblock1 rw rootfstype=jffs2 noinitrd  
init=/linuxrc console=ttySAC0,115200`  
saveenv
```

The system is now ready to run Linux automatically upon start up.

## Chapter 5 – Linux Development Tools

### Overview

This chapter provides a brief introduction to Linux development tools that are available for the S3C2440 System-on-a-Chip processor. The central processing core on the S3C2440 is a 200 MHz ARM920T processor. The ARM920T RISC processing core is supported through various toolsets available from third party suppliers. The typical toolset required for the code development is a compiler, assembler, linker and a source-level code debugger. Code debugging is supported via the on-chip JTAG interface.

### Linux Development Tool Chain

The Linux development tool chain is included in the CD ROM come with the GESBC-2440 board. A host PC running Linux operating system is required to run the development tools. This guide assumes user had basic Linux or Unix application development knowledge.

### Host Computer Requirement

The host PC should run Redhead, SuSe, or other Linux distribution, a RS-232 serial port, at least 500MB free disk space, and a terminal program such as minicom.

### Hardware Connection

A null modem cable is required to connect GESBC-2440 to the host computer.

### Install Linux Development Tool Chain

The ARM Linux Development Tool chain can be installed in any directory on the host system. The following example uses /usr/local/arm as the installing directory for the ARM Linux Development Tool Chain.

1. Create the tool chain directory and untar the tool chain

```
cd /usr/local
mkdir arm
cd arm
tar jxvf /cdrom/cross-3.3.tar.bz
```

Your mounting point of CD-ROM maybe different

## 2. Set up the directory path variable

```
export PATH=/usr/local/arm/3.3/bin:$PATH
```

The above command can be included in the shell resource file so it is executed every time you login. For bash shell, a good place to put is in `.bashrc` in your home directory.

### ***Compile Linux Kernel***

The GESBC-2440 is shipped with Linux kernel version 2.6.18.2.

#### *Prepare Linux Kernel source*

Untar the Linux kernel,

```
tar zxvf linux-2.6.tar.gz
```

#### *Configure Linux Kernel*

The kernel image is pre-patched and pre-configured. If configuration change is need, in the Linux kernel directory, executing the following commands,

```
make menu_config
```

If problem occurs, make sure the default PATH variable is set to the correct tool chain directory

#### *Compile Kernel*

Once Linux kernel has been configured, it can be compiled using following commands

```
make uImage
```

The Linux kernel should compile without error and the image file will be created.

## Chapter 6 – Using Windows CE

### Overview

This chapter provides information regarding how to use Windows CE with the GESBC-2440 Board. The information is only intended to provide a starting point to use the GESBC-2440. For more detailed information regarding Windows CE, please see related Microsoft documents.

### Hardware Requirement

The following tools and hardware are needed to build and download the Windows CE .net image to the GESBC-2440 Board:

- GESBC-2440
- Ethernet Network with a DHCP server
- Null Modem, crossover Cable
- USB device cable
- Optionally USB Keyboard or PS/2 Keyboard
- Optionally USB Mouse or Serial Mouse
- Windows 2000 SP3 or Windows XP
- Windows CE 5 Platform Builder with ARM4I support installed
- DNW.EXE download utility
- TFTP server utility running on development PC

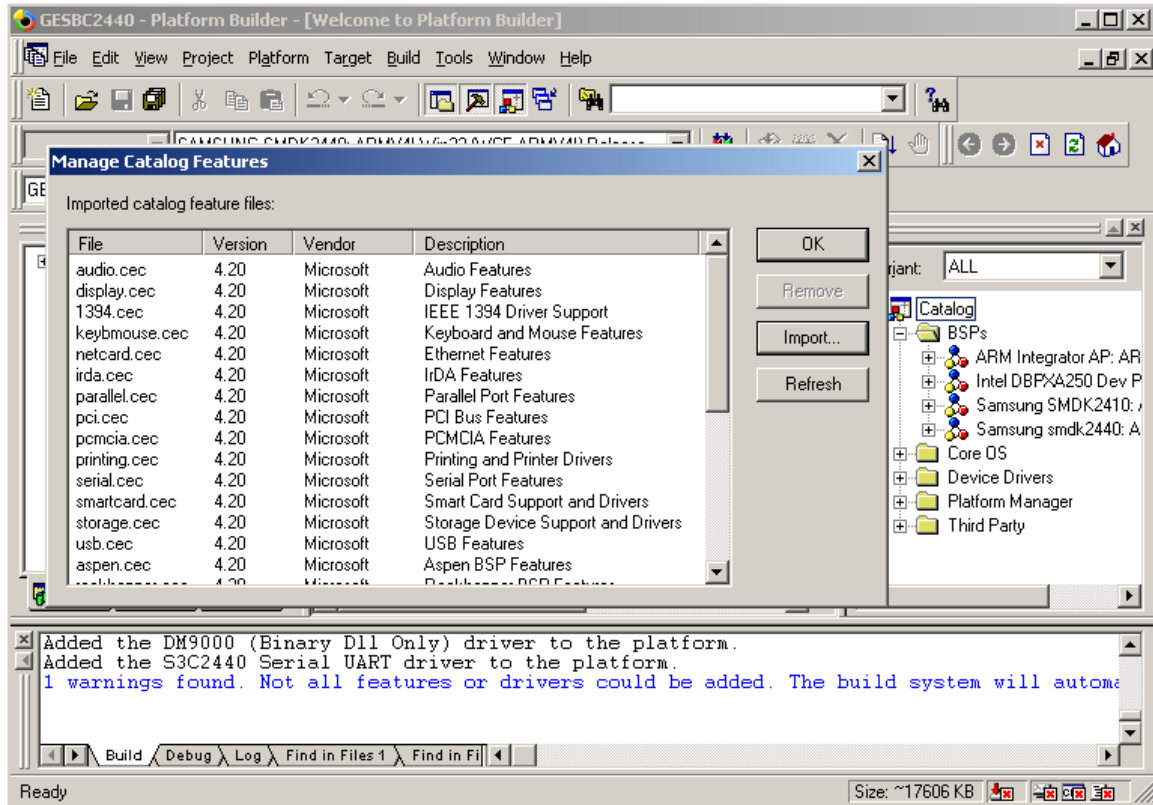
The PC should have the following specification

- 1.6Ghz Processor
- 10 Gig of Free Hard Drive Space before Platform builder is installed
- 256 Meg of RAM (512 MB recommended)
- Windows 2000 SP2 or Windows XP
- Network connection
- Serial port
- USB host port

### Steps to Install GESBC-2440 BSP

The following are the steps to install the BSP for Windows CE 5.0 for GESBC-2440 BSP.

1. Copy the entire folder smdk2440 under wince from the supplied CD-ROM to :\\wince500\\platform directory
2. Run Platform Builder.
3. Go to File->Manage Catalog Features.

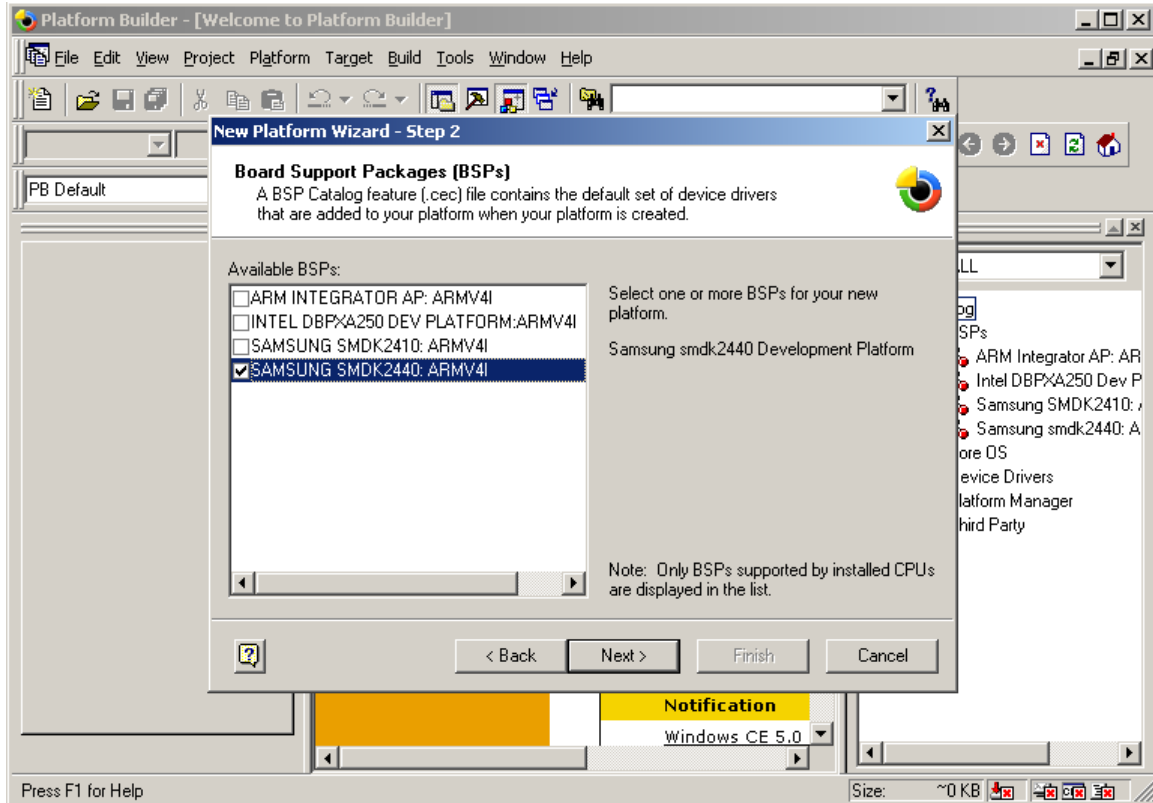


**Figure 3 Manage Platform Builder Components**

4. Click on the Import button.
5. Import the BSP from :\\wince500\\platform\\smdk2440\\smdk2440.cec.
6. Click on Refresh.
7. Close the Manage Catalog Features Window.

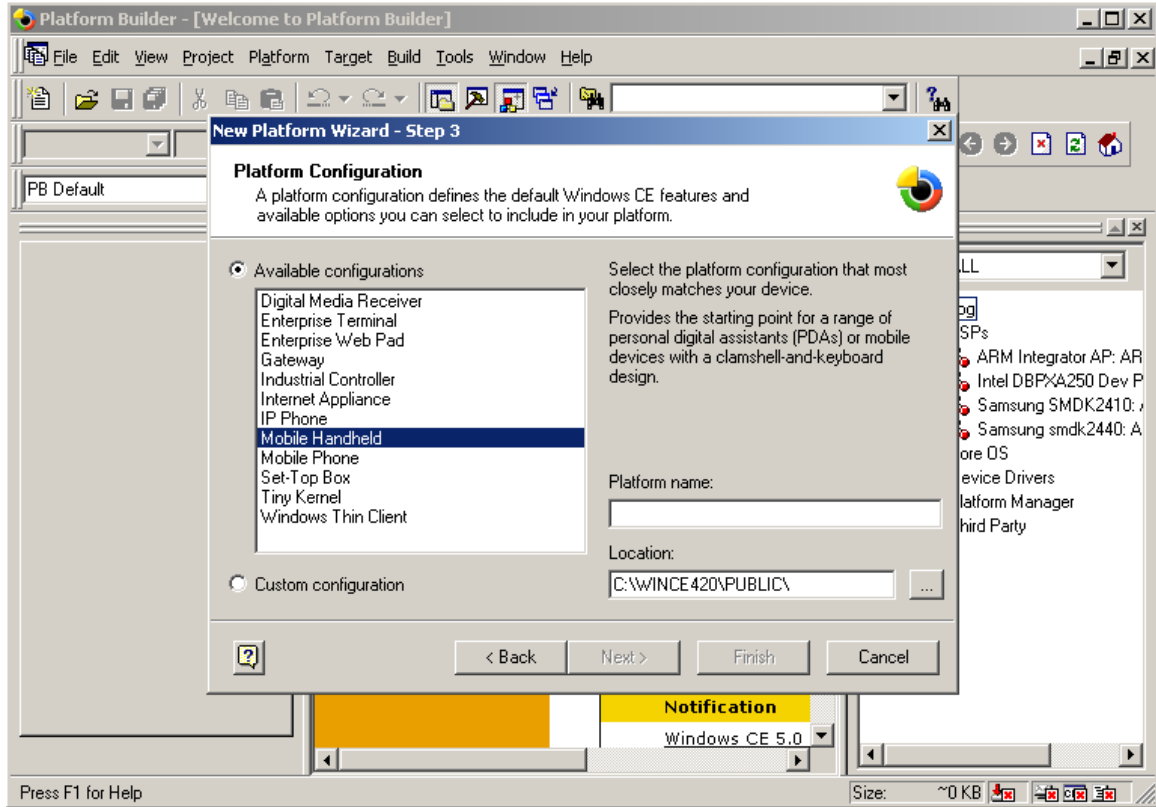
## Setting up Windows CE Build Environment

1. Select File->New Platform.
2. Click Next.



**Figure 4 – Platform Setup (Page 1)**

3. Select the Samsung SMDK2440 Board Support Package (BSP) as shown in Figure 4.
4. Select Mobil Handheld or whatever closely matches your platform and enter the name of your platform as shown in Figure 5.



**Figure 5 – Platform Setup (Page 2)**

5. Then click on the “Finish” Button.
6. In the Catalog Window add and remove device drivers to fit your application. To remove a Device Driver/Feature select the item, and hit the delete key. To add a Device Driver/Feature right click the item in the Catalog Windows, and select "Add to Platform" from the Pop-Up Menu.
7. Select your default language in Platform->Settings->Locale.
8. Select release version as the active configuration.
9. Build the Image. Select Build->Build Platform. This will take some time depending on features selected and development system speed.
10. After the build is performed, check to make sure that no errors have occurred in the Build Window.

## Flashing ATboot

ATboot is a program that resides in Flash memory and boots Windows CE image when. It allows a developer to download a Windows CE Image quickly into memory using USB. Appropriate ATboot must be used for the specific LCD screen resolution. Current supported resolutions are 240x320, 640x480, and 800x480. To program it into flash the following steps are needed.

1. Set the GESBC-2440 boot mode DIP switch to NOR FLASH boot.
2. Start TFTP server and set the server directory to the directory that contains the appropriate ATboot image.

3. Connect UART 1 of GESBC-2440 to the serial port of the PC with a NULL modem cable.
4. Connect the GESBC-2440 to the same network as the PC.
5. Start the DNW.EXE program on the PC and set the communication parameter to 115200,8,N,NONE.
6. Power up board and press any key to stop the UBoot auto execution.
7. Set the local IP address with the following command,  

```
set ipaddr 192.168.1.210
```
8. Set the TFTP server IP address with the following command,  

```
set serverip 192.168.1.xxx
```
9. Erase the NAND flash space for the ATBoot with the following command,  

```
nand erase 0 0x40000
```
10. Download eboot.nb0 from the PC using TFTP with the following command,  

```
t 30000000 ATboot-XX.bin
```

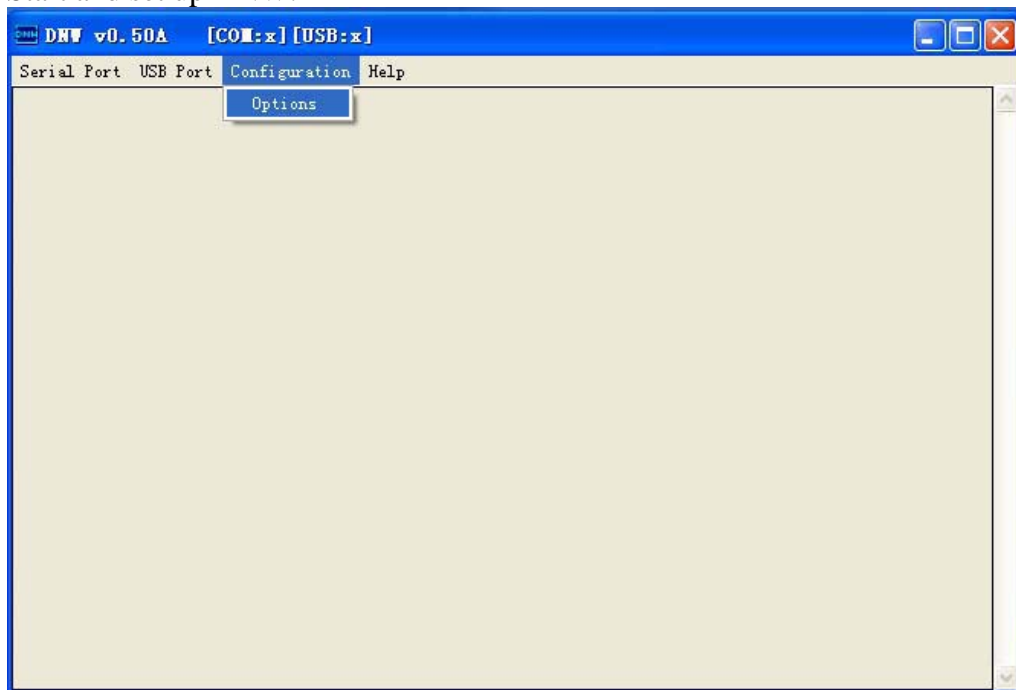
The ATboot-35.bin is for 3.5" LCD with 240x320 resolution and the ATboot-70.bin is for 7" LCD with 800x480 resolution
11. Use the following command to store the appropriate ATBoot in the NANDflash memory,  

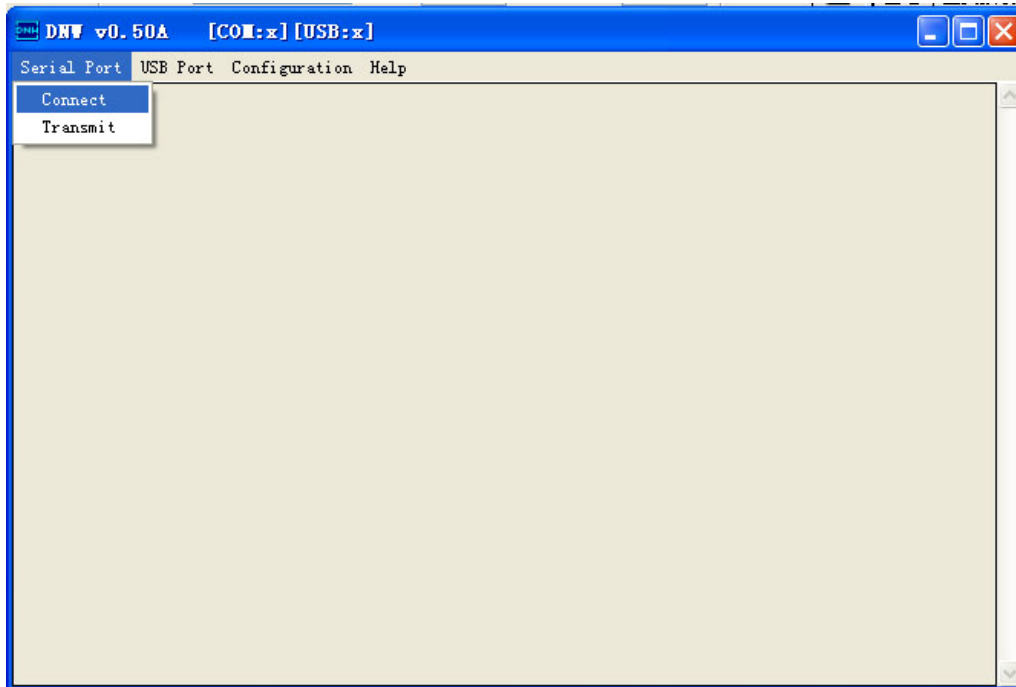
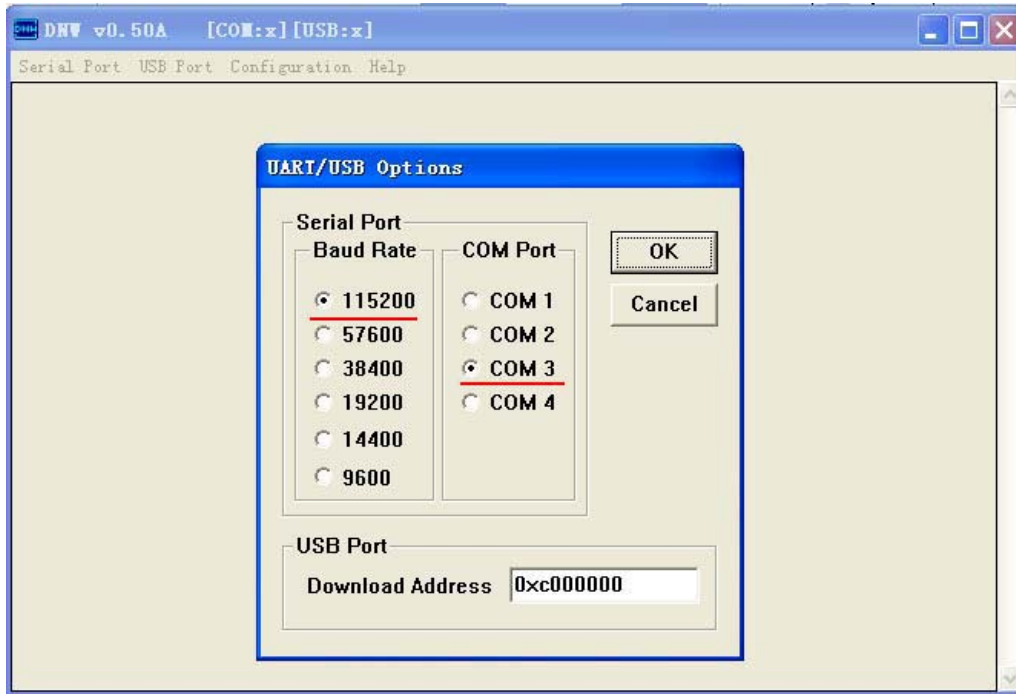
```
nand write 30000000 0 $(filesize)
```

The Appropriate ATBoot is now stored in the NAND FLASH memory. Power down the GESBC-2440 board. Set the boot mode DIP switch to NAND FLASH boot according the section *Configurations*.

## Testing ATboot and Download the Windows CE Image.

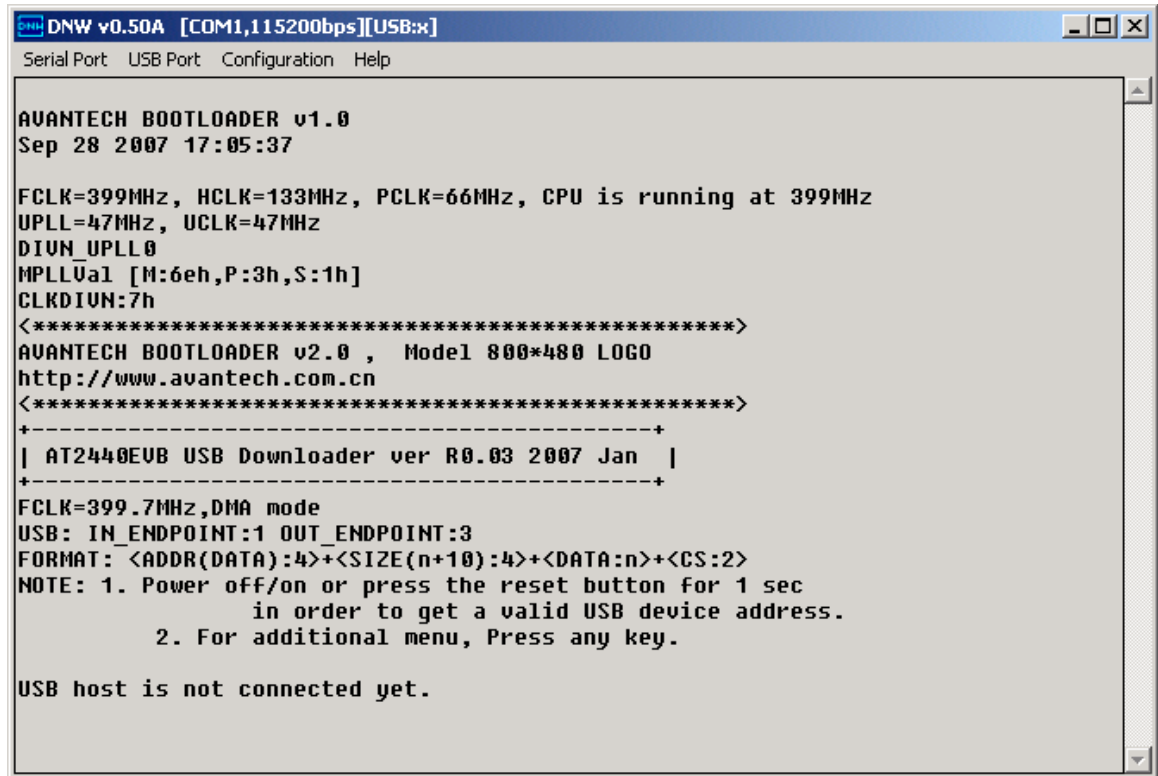
1. Start and set up DNW.EXE





2. Connect the NULL modem cable from UART <sup>2</sup> to the PC's serial port, connect the USB device port of the GESBC-2440 to PC USB host port using a USB device cable. Power on the GESBC-2440 board and press any key to stop ATBoot.

<sup>2</sup> The UART2 is on the 2x5 2mm pitch header. Please refer to Table 5 UART connector for the pin out.



```
DNW v0.50A [COM1,115200bps][USB:x]
Serial Port  USB Port  Configuration  Help

AVANTECH BOOTLOADER v1.0
Sep 28 2007 17:05:37

FCLK=399MHz, HCLK=133MHz, PCLK=66MHz, CPU is running at 399MHz
UPLL=47MHz, UCLK=47MHz
DIUN_UPLL0
MPLL0a1 [M:6eh,P:3h,S:1h]
CLKDIUN:7h
<*****>
AVANTECH BOOTLOADER v2.0 , Model 800*480 LOGO
http://www.avantech.com.cn
<*****>
+-----+
| AT2440EVB USB Downloader ver R0.03 2007 Jan |
+-----+
FCLK=399.7MHz,DMA mode
USB: IN_ENDPOINT:1 OUT_ENDPOINT:3
FORMAT: <ADDR(DATA):4>+<SIZE(n+10):4>+<DATA:n>+<CS:2>
NOTE: 1. Power off/on or press the reset button for 1 sec
       in order to get a valid USB device address.
       2. For additional menu, Press any key.

USB host is not connected yet.
```

If the USB driver for the DNW program has not been installed a new hardware found message will be displayed. Install the driver file following the instructions of the Windows New Hardware Wizard.

7. At the ATboot menu, select option 4 to download and write the WinCE image.

```

DNW v0.50A [COM1,115200bps][USB:x]
Serial Port USB Port Configuration Help
CLKDIUN:7h
<*****>
AVANTECH BOOTLOADER v2.0 , Model 800*480 LOGO
http://www.avantech.com.cn
<*****>
+-----+
| AT2440EVB USB Downloader ver R0.03 2007 Jan |
+-----+
FCLK=399.7MHz,DMA mode
USB: IN_ENDPOINT:1 OUT_ENDPOINT:3
FORMAT: <ADDR(DATA):4>+<SIZE(n+10):4>+<DATA:n>+<CS:2>
NOTE: 1. Power off/on or press the reset button for 1 sec
       in order to get a valid USB device address.
       2. For additional menu, Press any key.

USB host is not connected yet.

##### Select Menu #####
[1] Download Only
[2] Write File to NAND Flash
[3] Erase NAND Flash Partition
[4] Auto Flash
[5] MemoryTest
[6] Config parameters
[7] Start OS
    
```

8. At the next menu selection select option 1 to write to the FLASH memory region for WinCE.

```

DNW v0.50A [COM1,115200bps][USB:x]
Serial Port USB Port Configuration Help
| AT2440EVB USB Downloader ver R0.03 2007 Jan |
+-----+
FCLK=399.7MHz,DMA mode
USB: IN_ENDPOINT:1 OUT_ENDPOINT:3
FORMAT: <ADDR(DATA):4>+<SIZE(n+10):4>+<DATA:n>+<CS:2>
NOTE: 1. Power off/on or press the reset button for 1 sec
       in order to get a valid USB device address.
       2. For additional menu, Press any key.

USB host is not connected yet.

##### Select Menu #####
[1] Download Only
[2] Write File to NAND Flash
[3] Erase NAND Flash Partition
[4] Auto Flash
[5] MemoryTest
[6] Config parameters
[7] Start OS
Read chip id = ec76
Nand flash status = c0
Please select which region to erase : Esc to abort
0 : offset 0x0 , size 0x100000 [ATBOOT]
1 : offset 0x100000 , size 0x2200000 [WINCE]
2 : offset 0x2300000 , size 0x1d00000 [USER]
    
```

9. The ATboot will prompt to erase the NAND FLASH region for the WinCE Image and answer yes at the prompt.
10. After the NAND FLASH region for the WinCE image has been erased, a prompt will be display waiting for file download.
11. Select USB Port->Transmit from the DNW menu and choose the NK.BIN file in the file selection dialog and the download should start. The ATboot will automatically write the NK.BIN to the WinCE memory region once the download is complete. The process takes several minutes to complete. Please wait until the ATboot menu displayed again before turning power off.

### **Booting Windows CE**

After power down the board and power up again, the ATboot should now start WinCE image automatically. To load a new WinCE image simple press any key when ATboot is starting and follow the instructions of the previous section to load the new WinCE image.

## Chapter 7 – Troubleshooting

This chapter provides Troubleshooting information. Search the entries in the Problem column in order to find the item that best describes your situation. Then perform the corrective action in the same row. If the problem persists, contact Glomation.