TOPAS 900/L1 Starter Kit Quick Start Guide

Features:

- ✓ Starter kit contents
- ✓ Hardware installation instructions
- ✓ Software installation instructions
- ✓ Running the example & application note.

Introduction

This quick start guide briefly describes how to install & utilize the TOPAS 900/L1 starter kit.

Inside are instructions on how to install both the hardware & software components associated with the kit, information about the pre-installed example & advice on downloading the application note provided, to the MCU.

For more detailed information please see the User Guide, located on the TOPAS 900/L1 CD-ROM.

Quick Start Guide Category

- ☐ Flash Programmer
- ☐ Debugger/Simulator
- ☑ **Starter Kit**
- ☐ MCU

Toshiba 16-bit Series

- ☑ **TLCS - 900/L1**
- ☐ TLCS - 900/L
- ☐ TLCS - 900/H

TMP91FY12AF
TMP91FY22F
TMP91FY27U
TMP91FY42F

By:
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European LSI Design Eng. Center - **ELDEC**
Support-MCU@tee.toshiba.de

Contents

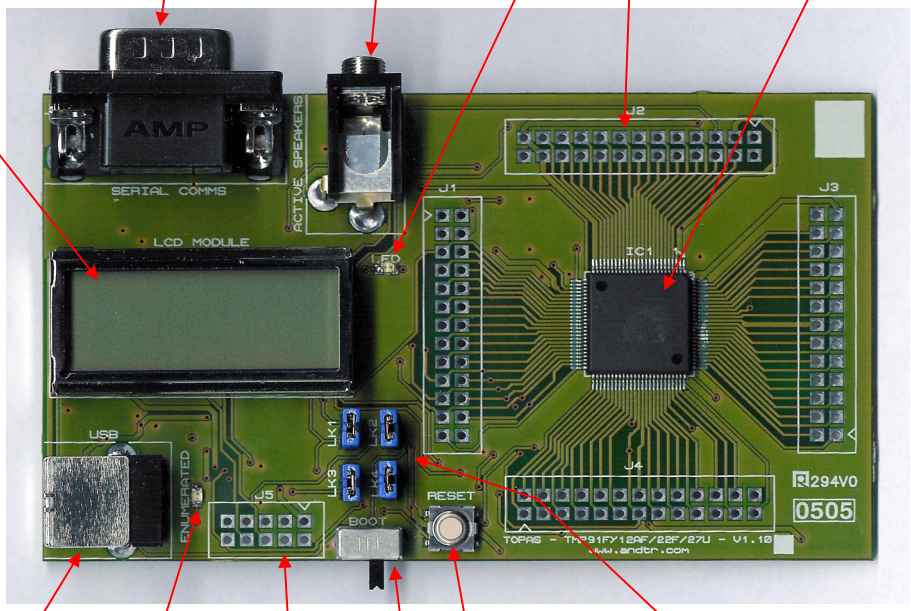
1. Starter Kit Contents

The Toshiba TOPAS 900/L1 Starter Kit contains:

a. TOPAS 900/L1 evaluation board populated with one of the following MCU samples: TMP91FY12AF, TMP91FY22F, TMP91FY27U or the TMP91FY42F.
b. A/B USB cable.
c. 4x 13-way straight double row header on a 0.1 inch pitch.
d. 1x 5-way straight double row header on a 0.1 inch pitch.
e. CD-ROM containing:
   - User guide.
   - Toshiba IDE with an integrated limited version of TLCS-900 compiler (3000 lines of code per file).
   - Flash programming utility (ToshLoad).
   - Data sheets & application notes.
   - Reference manuals for the compiler & simulator software.

If any of the above items are missing from this kit please contact your Toshiba distributor.

1.1. PCB



2x8 LCD Module.

RS232 socket.

3.5mm Mono Jack Socket.

4x 13-way MCU DIL Connectors.

Red LED.

MCU Sample. Either the TMP91FY12AF, TMP91FY22F, TMP91FY27U or the TMP91FY42F

Type-B USB socket.

Enumerated LED.

Off-board Programming Header.

BOOT Switch.
Boot mode - switch under 'B',
Non-boot mode - switch under 'T'

RESET Button.

Links LK1, LK2, LK3 & LK4.
LK1 - Programming RXD, LK2 - BOOT,
LK3 - RESET, LK4 - Programming TXD

2. Ten-Minute-Guide for Experienced Users

Providing that you are familiar with the basic terms of Toshiba's IDE & you have had prior experience of using Toshiba STK's, you can follow this short guide to have the starter kit's DimLED example application running stand-alone in just 10 minutes time. However, if you have had no previous experience of using the Toshiba IDE or prior knowledge of Toshiba Starter Kits, we recommend that you read the subsequent sections of this Quick Start guide below & the User Manual supplied to avoid possible damage to the kit & to aid in your learning.

a. Insert the TOPAS 900/L1 CD-ROM into your drive & plug one end of the supplied USB cable into the starter kit's USB port & the other into a free USB port on the PC.
b. When prompted, install the drivers. *Located on the CD under the following path: ..|Software|USB Driver Installation Utility|TOPAS900L1 USB Driver Files*
c. Once driver installation is complete, select the "Software" option from the TOPAS900L1 window & complete the installations for the:
    i. Toshiba IDE & Compiler
    ii. Flash Programming Utility
    iii. Resources & Example Projects
d. Run the Toshiba IDE.
e. Open the DimLED_[processor].tws file. *Located on hard drive under the following path: ..|Program Files|Toshiba 900L1 STK|Project Examples|DimLED|DimLED_[processor]* *(the drive letter for this location is the same one you specified when installing the Resources & Example Projects option above, by default C:)*

    Important. Your starter kit is supplied with a range of example projects targeted toward three processors, the TMP91FY12AF, the TMP91FY22F, the TMP91FY27U & the TMP91FY42F. Ensure you select the example project folder & file that is associated with the processor you have pre-fitted to your starter kit PCB. E.g. In the case of the DimLED example project, if you have a TMP91FY22F processor fitted to your PCB ensure you use the DimLED_91FY22.tws file from the DimLED_91FY22 folder. Failure to do so could result in the application not running correctly & malfunctioning when trying to download to the microprocessor.

f. Make sure that the link to the compiler engine is set correctly in the IDE Directory dialogue box: Select the Tool option from the main menu & select Option & then Directory..., set the THOME900 directory to point to the T900SK file, by default this file is located "C:\Program Files\Toshiba\IDE\T900SK".
g. Ensure Links LK1 & LK4 are fitted, while LK2 & LK3 are removed.
h. On the PCB move BOOT switch into the non-boot mode position (switch underneath the "T" of BOOT) press the reset button. The red LED will flash at a rate of 1Hz to indicate the pre-installed ROM Monitor is running.
i. Ensure that the MonitorDebug target configuration is selected (see the Description of ROM Monitor section in the User Manual for more information).
j. In the IDE select Build & then Rebuild from the IDE main menu.
k. In the Workspace Window click on the DebugView tab, then inside that window right-click once on the mouse & select the Create new Debug Profile option. *Alternatively, select Debug & then Start Debugging from the main menu.* Select: DTE Speed: 115200 bps, Data Bits: 8, Parity: No, Stop Bits: 1 & Flow Control: No (see the ROM MONITOR DEBUGGING section in the User Manual on how to create a debugging profile correctly).
l. Click the Finish button.
m. After an initial build process, the integrated debugger will then automatically download the project executable into the RAM area of the Toshiba 900/L1 starter kit device, ready for ROM monitor debugging by the user. The software runs in real-time on your hardware with the main task to manipulate periodically the brightness of the red LED.
n. To stop the debugger simple select Debug & then Stop Debugging from the main menu in the Toshiba IDE. For further investigations of MCU hard/software status several additional windows can be displayed like memory, stack, registers, disassembler and more. Additionally breakpoints can be set on every code addresses of interest.
o. To produce a stand-alone version of the program set the target configuration to Release.
p. Select Build & then Rebuild from the IDE main menu.
q. Close the Toshiba IDE application or stop debugging (Debug & then Stop Debugging from the main menu) to get the COM port free for flash programming purposes.

r. Open the flash programming software ToshLoad.
s. Click on the Target tab. Select Device: *either the TMP91FY12A, TMP91FY22, TMP91FY27 or the TMP91FY42F*, Select Block: All, Baudrate: 38400, Com-Port: *port number assigned to kit*, Count Address: FFDFF0, Compare Start Address: FFDFF1 & Password: 12345678

Important.
Ensure that the Count Address, Compare Start Address & Password data is all entered correctly, as invalid information could render the microcontroller useless once programmed.

t. Move the BOOT switch on the Toshiba 900/L1 starter kit PCB into the boot mode position (switch underneath the 'B' of BOOT).
u. From the ToshLoad main menu select Target & then select Erase Chip.
v. Select Target again from the ToshLoad main menu, but this time select Program.
w. Move the BOOT switch back into non-boot mode position (switch underneath the 'T' of BOOT)
x. After programming press function key F2 in ToshLoad or RESET switch on the TOPAS 900/L1 PCB to reset and start the MCU. The LED should be dimmed like in the debugging session before. However, this time the program is running in stand-alone form.
y. Reprogram the ROM Monitor for internal debugging using ToshLoad**.** Select File & then Open from the Main Menu, locate the Program Files folder on your hard drive & find the Toshiba 900L1 STK folder, double-click to open it. Finally, locate the relevant processor Monitor sub-folder & open then that.

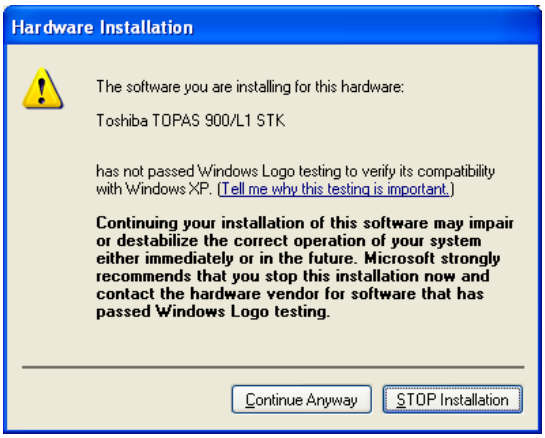
3. Hardware Installation

The Toshiba TOPAS 900/L1 Starter Kit connects to the PC via USB connection; therefore an appropriate driver installation process will need to take place in order for the computer to communicate with the kit.

To begin the USB driver installation process, insert the TOPAS 900/L1 CD-ROM into your drive. The CD should autorun & load up an introduction screen. Plug one end of the supplied USB cable into the starter kit's USB port & the other into a free USB port on the PC.

3.1. WINDOWS 2000/ME

a. This should bring up the "Found New Hardware Wizard", click the "Next" button. The new window will ask you "What do you want the wizard to do?" Select the "Search for a suitable driver for my device (recommended)" option & click the "Next" button.
b. The subsequent window will ask you to "Locate Driver files". Select the "CD-ROM drives" option & click the "Next" button.
c. The wizard should automatically find the driver for device, click "Next" to install. *If the wizard does not detect the driver files, they are located on the CD under the following path: ..|Software|USB Driver Installation Utility|TOPAS900L1 USB Driver Files*
d. A Hardware Installation warning window will appear, alerting you that the Toshiba 900/L1 STK has not passed Windows Logo testing to verify its compatibility with Windows 2000/ME.



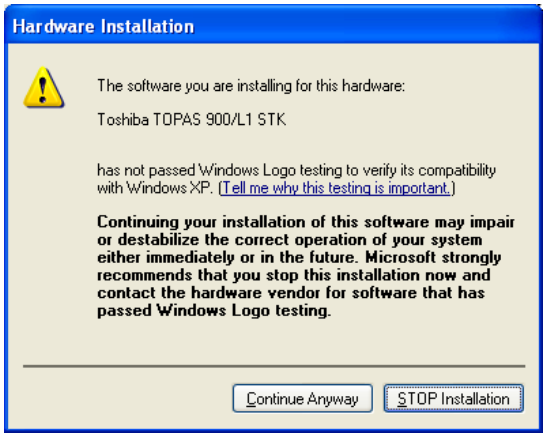
After reading the warning, click the Continue Anyway button.

e. Click the "Finish" button, this completes the first part of installation during which the USB to serial converter is installed. The second part involves the installation of a serial port. This should follow on automatically once the converter installation is complete.
f. To install the serial port part repeat steps b, c, d, & e. The driver files for the serial port are located in the same place as those just used to install the USB communication. Upon clicking the "Finish" button at stage e, all driver file installation will be complete. The Starter Kit will now be able to communicate with the PC.

3.2. WINDOWS XP

a. A "Found New Hardware, Toshiba TOPAS 900/L1 STK" bubble will appear above the notification area on the Taskbar.
b. If running Windows XP with Service Pack 2 (SP2) installed proceed onto step c, otherwise jump to step d.
c. This should bring up the "Welcome to the Hardware Update Wizard" window, it will then ask you whether Windows can connect to Windows Update to search for software. Select the "No, not this time" option & click the Next button.
d. The "Found New Hardware Wizard" window will activate. Select the "Install from a list or specific location (Advanced)" option & then click the Next button.
e. Select the "Search removable media (floppy, CD-ROM…) option & click the "Next" button. The wizard should automatically find the driver for the device. *If the wizard does not detect the driver files, they are located on the CD under the following path: ..|Software|USB Driver Installation Utility|TOPAS900L1 USB Driver*

f. A Hardware Installation warning window will appear, alerting you that the Toshiba 900/L1 STK has not passed Windows Logo testing to verify its compatibility with Windows XP.



After reading the warning, click the Continue Anyway button.

g. Click the "Finish" button, this completes the first part of installation during which the USB to serial converter is installed. The second part involves the installation of a serial port. This should follow on automatically once the converter installation is complete.

h. To install the serial port part repeat steps d, e, f & g. The driver files for the serial port are located in the same place as those just used to install the USB communication. Upon clicking the "Finish" button at stage g, all driver file installation will be complete. The Starter Kit will now be able to communicate with the PC.

3.3. WINDOWS XP - AUTOMATICALLY INSTALLED DRIVERS

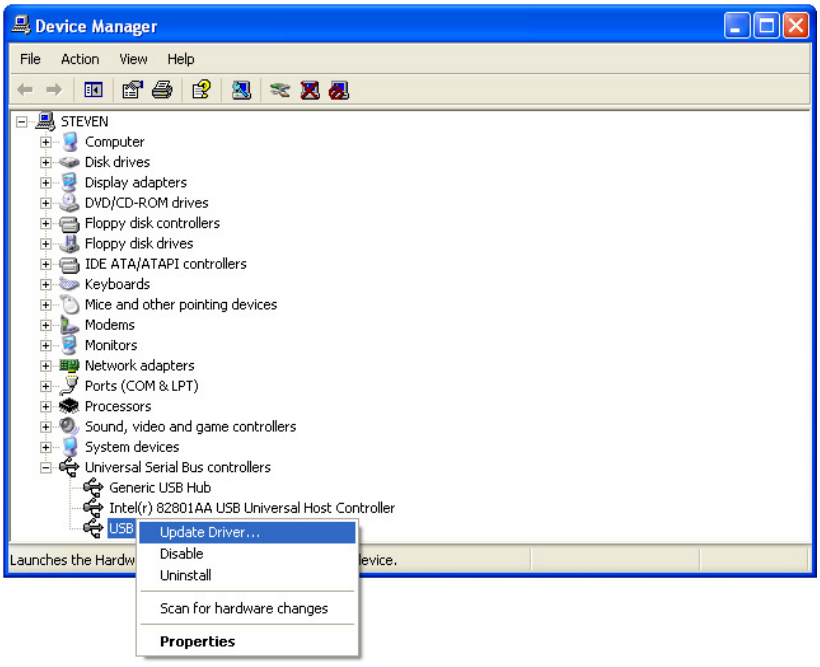
a. Occasionally Windows XP will automatically recognise the starter kit & install it own pre-installed driver files to enable communication between the board & PC. However, we recommend using the manufacturer's driver files which are located on the CD (..\Software\USB Driver Installation Utility\TOPAS900L1 USB Driver Files).

b. Keep the starter kit connected to the PC.

c. From the Window XP Control Panel double click the "System" icon.

d. Select the Hardware tab, & then click the "Device Manager" button.

e. Expand both the Ports (COM & LPT) & Universal Serial Bus controllers headings.



f. For the USB Serial Converter (located under the Universal Serial Bus controllers heading) right click & select the "Update driver…" option.
g. This should bring up the Hardware Update Wizard. Select the "Install from a list or specific location (Advanced) option" & click the Next button.
h. The next window will ask you to Locate Driver files. Select the "Search for the best driver in these locations" option. Depending on whether you decided to install the USB driver files to your Hard Disk drive or not affects which step to proceed with next.
    i. **Installed driver files onto Hard Disk drive** - Select the "Include this location in the search" option & click the Browse button. On the next screen select the directory into which you copied the USB driver files & click ok. The wizard should find the driver for device, click Next to install.
    ii. **Did NOT install USB driver files onto Hard Disk drive -** Select the "Search removable media (floppy, CD-ROM…)" option (ensure the TOPAS 900/L1 CD-ROM is in the drive) and click the Next button. The wizard should automatically find the driver for device, click Next to install. *If the wizard does not detect the driver files, they are located on the CD under the following path: ..|Software|USB Driver Installation Utility|TOPAS900L1 USB Driver Files*
i. Click the finish button; updating of the USB Serial Converter driver will be complete.
j. Carry out steps f, g, h & i except this time for the USB Serial Port (located under the Ports (COM & LPT heading). Upon clicking the Finish button at stage i, updating of necessary driver files will be complete.

3.4. JUMPER SETTINGS

LK1, LK2, LK3 & LK4, when connected, routes signals to the processor. Disconnecting these links disables the communications to the processor. Each link controls an associated signal:

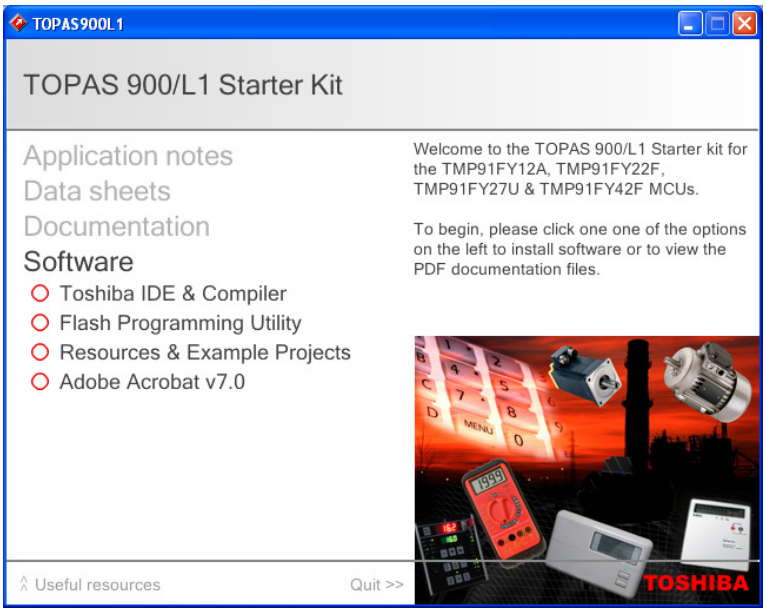
LK1 - Programming RXD
LK2 - $\overline{\text{BOOT}}$
LK3 - $\overline{\text{RESET}}$
LK4 - Programming TXD

By default, your starter kit PCB will be shipped with LK1 & LK4 fitted while LK2 & LK3 are not fitted. Please ensure this setting when debugging any applications or project examples.

4. Software Installation

If you have removed the TOPAS 900/L1 CD from your machine since installing the hardware, re-insert the disk. It should autorun the installation utility. If it does not:

a. Start Windows Explorer.
b. Locate and open the CD drive (usually D:).
c. Double-click the "TOPAS900L1.exe" icon to run the program.



Once the Installation Utility is running select the "Software" option & complete the installations for:

a. Toshiba IDE & Compiler
b. Flash Programming Utility
c. *Resources & Example Projects (optional)*
d. *Adobe Acrobat v7.0 (optional)*

4.1. TOSHIBA IDE & COMPILER

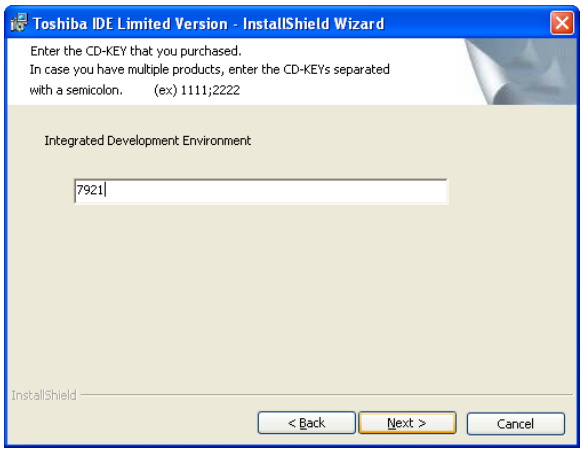
The Toshiba IDE is a complete embedded application development environment for the TOPAS 900/L1 Starter kit, offering project management, compiling, editing & debugging features.

Important points to note BEFORE installing the Toshiba IDE

a. Ensure you are logged in to the "Administrator" account on the PC.
b. If your PC already has the "TLCS-900 Family C Compiler Limited Version", or the "TLCS-900 Family IDE Limited Version" installed, please uninstall it before installing this version.
c. If your PC already has the "TLCS-900 Family Integrated Development Environment" (normal version) installed, please beware that installation of the Toshiba IDE contained on the TOPAS 900/L1 CD-ROM will cause your normal version to be overwritten with the limited version contained on the CD.

To install the code limited version of the Toshiba IDE included with this kit, choose the Toshiba IDE & Compiler sub-option. Following your selection the Toshiba IDE InstallShield Wizard will begin.

a. Click the "Next" button.
b. Read the License agreement & select the "I accept the terms in the license agreement" option (providing you do accept the terms). Click the "Next" button.
c. This screen requires you to enter the CD-KEY, which for the TOPAS 900/L1 starter kit is: 7921.



Type in the number & then click the "Next" button.

d. This screen shows that you have chosen to install the TLCS-900 Family Software Set for Starter Kit, click the "Next" button.
e. Type in a User Name & Organisation & click the "Next" button.
f. Choose the destination folder you would like the IDE to install into. *We recommend that you use the default setting.* Click the "Next" button.
g. Finally click the "Install" button.

On completing these steps the limited version of the Toshiba IDE will be installed, ready for use.

4.2. FLASH PROGRAMMING SOFTWARE (ToshLoad)

ToshLoad is a software application that allows you to program the internal flash memory of the TOPAS 900/L1 starter kit's microcontroller.

To install the ToshLoad software included with this kit, choose the Flash Programming Utility sub-option. Following your selection the ToshLoad Wise Solutions Installation Wizard will begin.

a. Read the License agreement & agree to the terms by pressing the "Yes" button (providing you do accept the terms).
b. Click the "Next" button.
c. Choose the destination folder you would like ToshLoad to install into. *We recommend that you use the default setting.* Click the "Next" button.
d. Decide which shortcut options you require. *We recommend that you use the default setting.* Click the "Next" button.
e. Finally click the "Install" button.

On completing these steps the ToshLoad software will be installed, ready for use.

4.3. *RESOURCES & EXAMPLE PROJECTS (OPTIONAL)*

The Resources & Example Projects sub-heading is optional to install. Clicking this heading will launch a small utility, which will begin to install all the documentation & example project code from the CD onto your hard drive, adding convenient links to the Microsoft Windows Start Bar at the same time. By choosing this option, you no longer need to insert the CD into the CD-ROM drive every time you wish to access crucial documentation or example code.

To install the resources & example projects supplied with this kit, choose the Resources & Example Projects sub-option. Following your selection the Toshiba 900/L1 STK Documentation Setup will begin.

a. Click the "Next >" button.
b. Read the License agreement & agree to the terms by selecting the "I accept the agreement" option (providing you do accept the terms).
c. Click the "Next >" button.

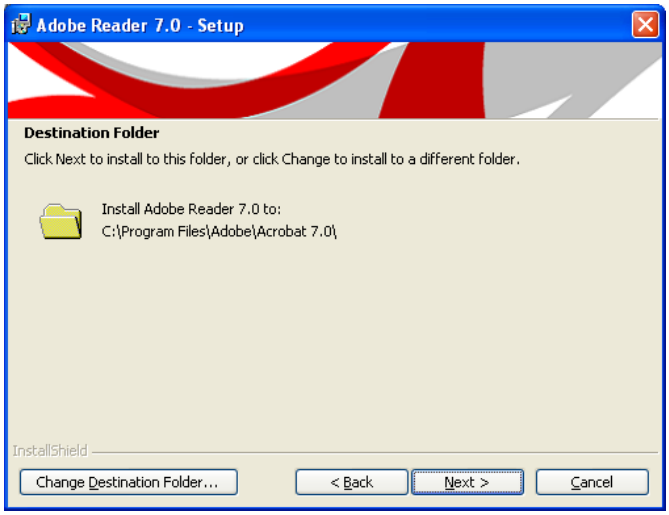
d. Enter your User Name & Organisation (if applicable) into the User Information Screen & the click the "Next >" button.
e. Choose the destination folder you would like Toshiba 900/L1 starter kit resources to be install to. *We recommend that you use the default setting.* Click the "Next >" button.
f. Choose the name & location of the Start Menu folder that will contain the shortcuts to the various Toshiba 900/L1 starter kit resources. *We recommend that you use the default setting.* Also decide whether you would like any icons to be added to the desktop by de-selecting or selecting the "Don't create any icons" tick-box. *We recommend that you use the default setting.*
g. Click the "Next >" button.
h. Review the installation information. If you are unhappy with any of the options, choose the "< Back" button to amend your choices, otherwise click the "Install" button to install the starter kit resources.

4.4. *ADOBE ACROBAT V7.0 (OPTIONAL)*

All the documentation supplied with the Toshiba 900/L1 starter kit is in PDF format. You are not required to install Adobe Acrobat® Reader® in order to access the PDF documents from the Installation Utility, as the utility will automatically run a copy from your machine. However, if you do not have Adobe Acrobat® Reader® installed you will need to install it in order to view the documentation.

To install Adobe Acrobat® Reader® v7.0 supplied with this kit, choose the Adobe Acrobat v7.0 sub-option. Following your selection the Adobe Reader InstallShield Wizard will begin.

a. Click the "Next >" button on the Welcome screen.
b. Click the "Next >" button on the copyright warning screen.
c. Choose a destination folder to install the reader software to. *We recommend that you use the default setting.* Once happy with your choice, chick the "Next >" button.



d. Finally, to complete the installation process, click the "Install" button.

5. DimLED Example

A range of example projects are supplied with the Toshiba 900/L1 starter kit in order to demonstrate some of the many features available from the chip set & to aid in your learning.

Each starter kit PCB is pre-loaded with a ROM Monitor, so that when you run an example project for the first time you are provided with instant visibility to the code & are able to debug the source in real-time with multiple debugging facilities.

As an introduction to the Toshiba 900/L1 starter kit we recommend that you run the DimLED example project - a simple application that periodically manipulates the brightness of the red LED. To run simply:

a. Connect one end of the supplied USB cable to the Type-B USB socket mounted on the starter kit PCB & the other to a PC.
b. Ensure Links LK1 & LK4 are fitted, while LK2 & LK3 are removed.
c. On the PCB move BOOT switch into the non-boot mode position (switch underneath the "T" of BOOT) press the reset button. The red LED will flash at a rate of 1Hz to indicate the pre-installed ROM Monitor is running.
d. Run the Toshiba IDE.
e. Open the DimLED_[processor].tws file. *Located on hard drive under the following path: ..|Program Files|Toshiba 900L1 STK|Project Examples|DimLED|DimLED_[processor]* *(the drive letter for this location is the same one you specified when installing the Resources & Example Projects option above, by default C:)*

   Important. Your starter kit is supplied with a range of example projects targeted toward three processors, the TMP91FY12AF, the TMP91FY22F, the TMP91FY27U & the TMP91FY42F. Ensure you select the example project folder & file that is associated with the processor you have pre-fitted to your starter kit PCB. E.g. In the case of the DimLED example project, if you have a TMP91FY22F processor fitted to your PCB ensure you use the DimLED_91FY22.tws file from the DimLED_91FY22 folder. Failure to do so could result in the application not running correctly & malfunctioning when trying to download to the microprocessor.

f. Ensure that the MonitorDebug target configuration is selected (see the Description of ROM Monitor section in the User Manual for more information).
g. In the IDE select Build & then Rebuild from the IDE main menu.
h. In the Workspace Window click on the DebugView tab, then inside that window right-click once on the mouse & select the Create new Debug Profile option. *Alternatively, select Debug & then Start Debugging from the main menu.* Select: DTE Speed: 115200 bps, Data Bits: 8, Parity: No, Stop Bits: 1 & Flow Control: No (see the ROM MONITOR DEBUGGING section in the User Manual on how to create a debugging profile correctly).
i. Click the Finish button.
j. After an initial build process, the integrated debugger will then automatically download the project executable into the RAM area of the Toshiba 900/L1 starter kit device, ready for ROM monitor debugging by the user.
k. To stop the debugger simple select Debug & then Stop Debugging from the main menu in the Toshiba IDE.

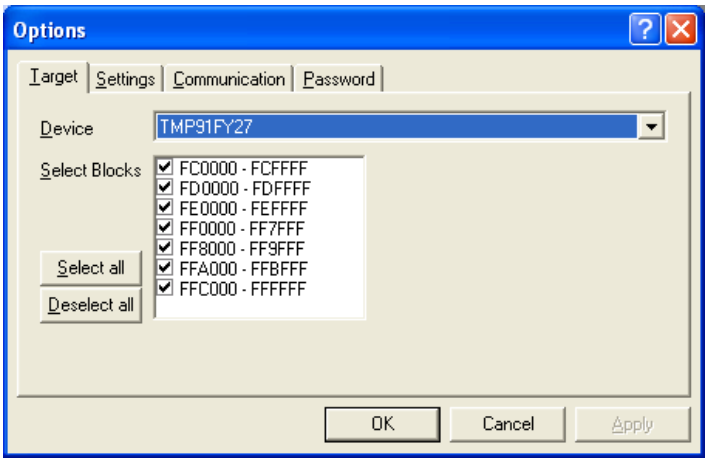
6. Programming the MCU via ToshLoad

To flash programme the memory of the microcontroller fitted to the Toshiba 900/L1 starter kit PCB we need to use the ToshLoad utility.

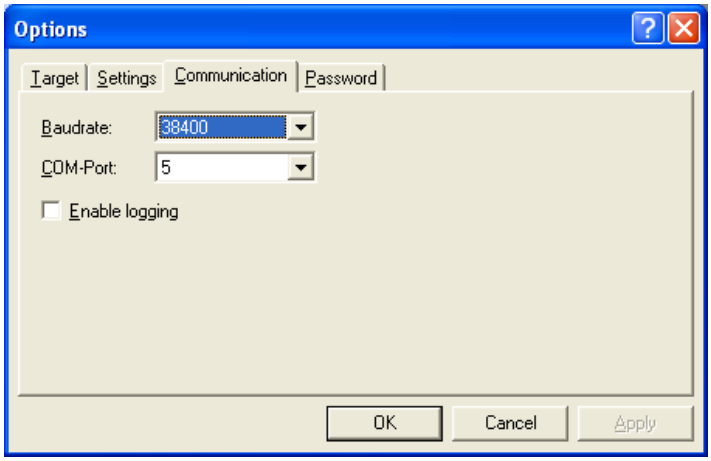
To begin, connect the TOPAS 900/L1 PCB to the PC via the supplied USB cable. Launch the ToshLoad program by proceeding to the Start button on the Microsoft Windows Task Bar, locate the Segger folder & click on the ToshLoad program title.

Before we can begin to download a file into the Flash memory of the MCU, we need to check/change some of the ToshLoad default settings.

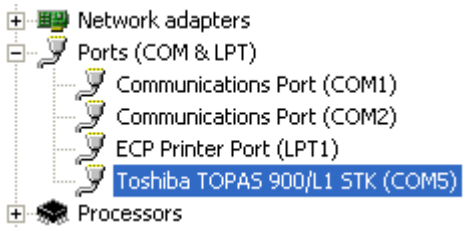
a. Select Options from the Main Menu in ToshLoad.
b. Click on the Target tab & select a device from the drop-down box that corresponds to the device fitted to the Toshiba 900/L1 starter kit, either the TMP91FY12A, TMP91FY22, TMP91FY27 or the TMP91FY42F. Ensure all the Select Block options are selected for the target device.



c. Click on the Settings tab. Ensure that the User should not be asked to press reset tick-box is selected.
d. Click on the Communications tab. Set the Baudrate to **38400** & ensure the Com-Port is set to the port number the starter kit has been installed & assigned to.

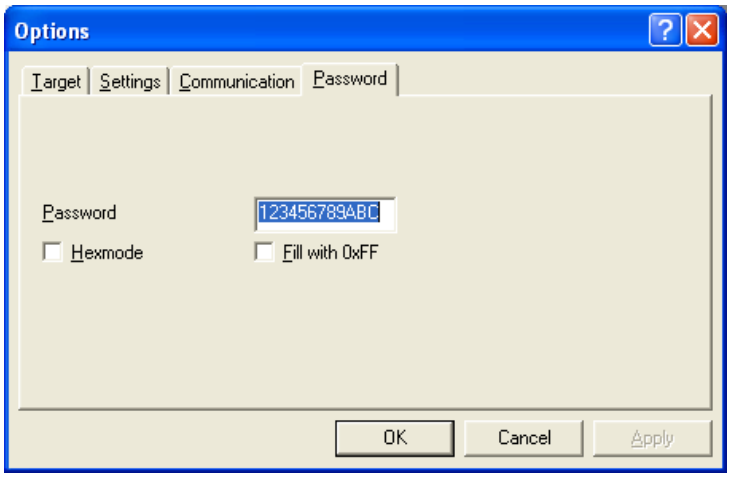


If you are unsure as to which COM port the Toshiba 900/L1 starter kit has been assigned to, load up the Microsoft Windows Control Panel, double-click the System icon & under the Hardware tab select the Device Manager. Locate the Ports (COM & LPT) heading & expand the tree associated with it. Within this sub-heading there will be a Toshiba TOPAS 900/L1 STK (COM?) heading. The COM number specified in the heading is the COM port the Toshiba 900/L1 starter kit has been assigned to.



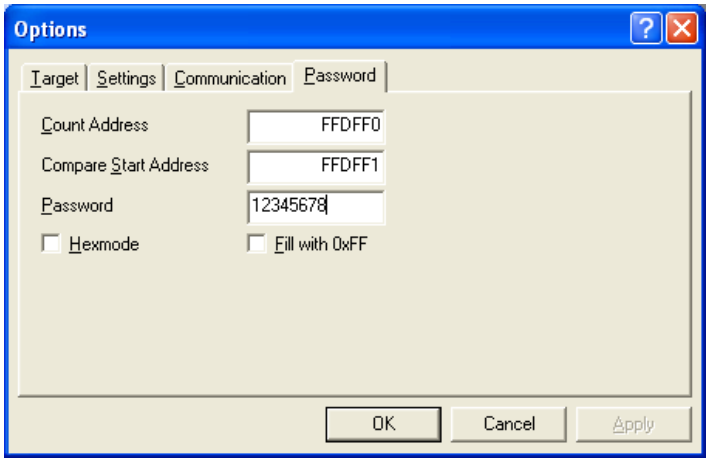
e. Finally, click on the Password tab:
   i. **If you have selected the TMP91FY42F as the target device -** Type in a Password of **123456789ABC.** Ensure the Hexmode & Fill with 0xFF tick-boxes are left blank.

Important.
Ensure that the Password is entered correctly, as invalid information could render the microcontroller useless once programmed.



ii. **If you have selected the TMP91FY12A, TMP91FY22 or TMP91FY27 as the target device -** Type in a Count Address of **FFDFF0**, a Compare Start Address of **FFDFF1** & a Password of **12345678.** Ensure the Hexmode & Fill with 0xFF tick-boxes are left blank.

Important.
Ensure that the Count Address, Compare Start Address & Password data is all entered correctly, as invalid information could render the microcontroller useless once programmed.



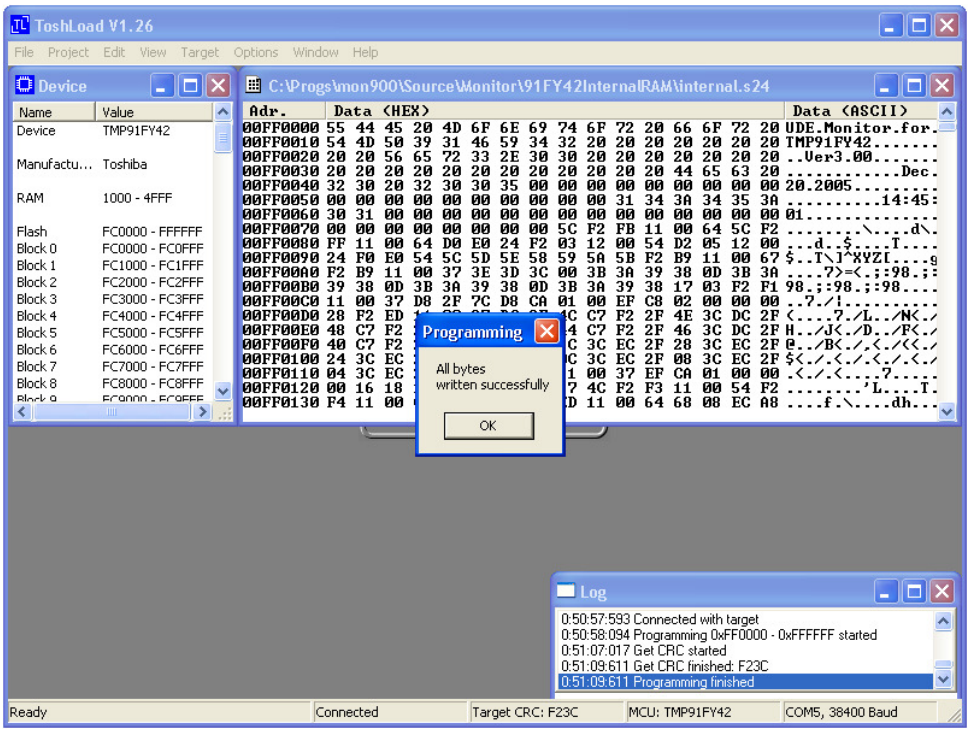
f. Click the OK button.

With the correct ToshLoad settings set (these will be retained even if ToshLoad is closed down), we can now begin the process of programming the Flash memory of the target microcontroller.

a. Select File & then Open from the Main Menu in ToshLoad.
b. Locate the Motorola S-32 or S-24 (.s32 or s.24) format file you wish to download to the target microcontroller & click open. The file has will then be loaded into ToshLoad ready to be programmed into the MCUs Flash memory.
c. Ensure the BOOT switch is in boot mode position (switch underneath the "B" of BOOT).
d. It is good practise to ensure memory on a device is erased before downloading new code to it so, select Target from the ToshLoad main menu & then select Erase Chip.

e. Once the process of erasing the chip has completed select Target again from the main menu, but this time select Program. This command will download the file into the flash memory of the microcontroller fitted to the starter kit PCB.
f. Once programming has finished successfully, click the ok button.
g. On the PCB move BOOT switch into the non-boot mode position (switch underneath the "T" of BOOT).

To execute the program you have just downloaded into the flash memory you can either press the RESET button on the PCB or perform a software reset by selecting Target & then Start Application from the ToshLoad main menu.



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