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GLOSSARY

Abbreviations

LED	Light Emitting Diode
FLASH	A Non-volatile memory for holding executable code and data within small computer systems
PCB	Printed Circuit Board

Software and files

FDT	Renesas's Flash Development Toolkit.
*.MOT	Flash program (firmware) for the target board
HyperTerminal	A terminal emulation program supplied in the Windows communications package

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1. INTRODUCTION

The ANV remote uses a microcontroller at the heart of the design and this device must be programmed before the electronics will function. The program (firmware) for the microcontroller (Renesas H8/3672) is supplied in the form of a 'mot' file, which must be downloaded its memory. The H8/3672 uses a non-volatile storage technology called 'FLASH' in which the program is stored and the act of downloading the firmware is referred to as flash programming. The software used to perform this operation is called Flash Development Tool Kit, which is free to download from the Renesas web site: http://www2.eu.renesas.com/products/mpumcu/tool/cgi_bin/fdtreq.cgi. Flash Development Tool Kit Version 3.1 is supplied on the delivery CD along with all of the ANSI C source code, documentation and the program itself, attached to this document.

To flash program the microcontroller the following 5 items are required:

1. The delivery CD containing the program and programming tools
2. A power supply capable of producing +7V @100mA
3. A Windows XP PC with a 9 way RS232 serial port on the motherboard and at least 40MB of free hard disk
4. A programming cable
5. A two pin 0.1" jumper

It is important that person that sets up the programming software is competent with the Windows operating system, this is covered in Section 2 of this document. Sections 3, 4 and 5 describe the programming and testing procedures. It is recommended that the programming procedure be immediately followed by the testing procedure to verify the programming process.

2. SETTING UP THE SOFTWARE

FDT 3.1 should be installed on the PC by double clicking the FDT3_1.exe file in the root directory of the delivery CD. Follow the prompts and don't deselect any options. The ANVRemote folder needs to be copied to the hard disk and the read-only attribute removed. This attribute must be changed after the folder has been copied to the hard disk by right clicking on the folder and left clicking properties. Then uncheck the read-only attribute check box as indicated in Figure 1.

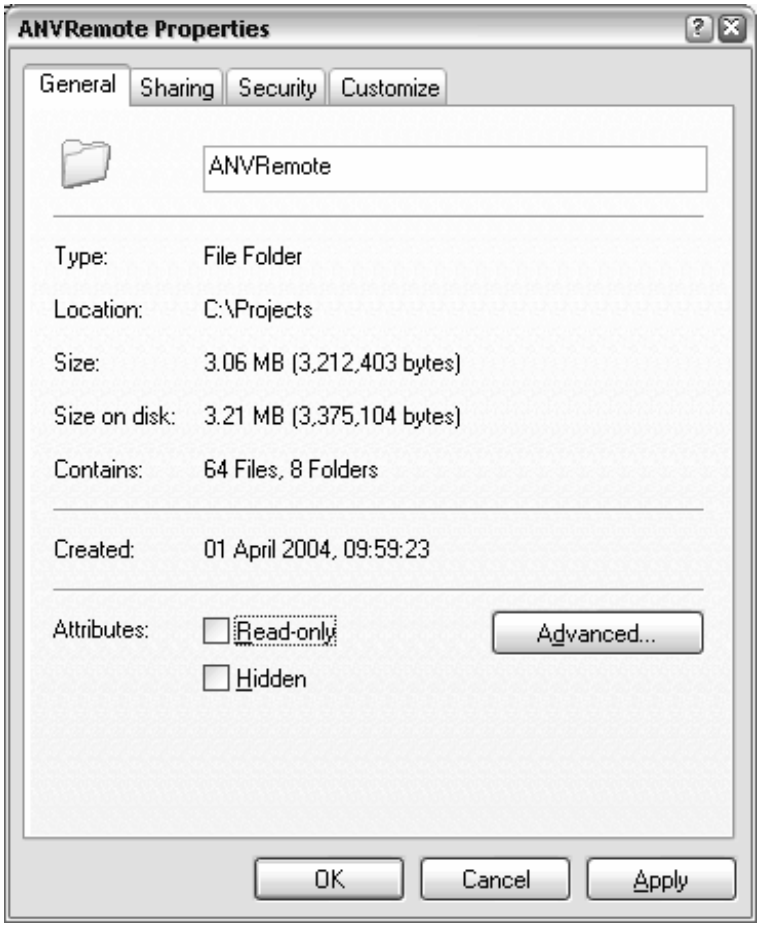


Figure 1 The ANVRemote folder properties dialog box

Click the OK button. Another dialog box will ask for confirmation of the attribute changes. Check the "Apply changes to this folder, subfolders and files" option and then click OK as indicated in Figure 2.

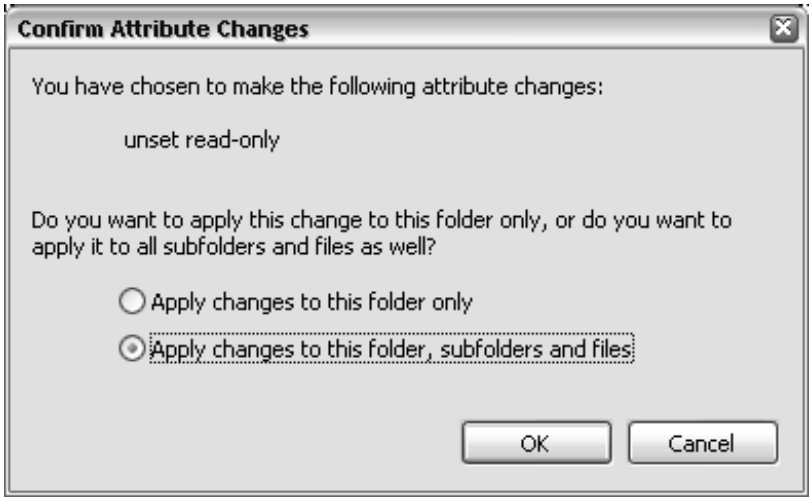


Figure 2 The Confirm Attribute Changes dialog box

2.1. CONFIGURING FDT

Open FDT 3.1. The first time that you do this a welcome dialog box will appear. Select the "Browse to another project workspace" option and click OK. This launches the Open Workspace dialog select the ANVRemote\Flash folder as illustrated in Figure 3. If you fail to do this then this dialog is available from the File->Open Workspace menu.

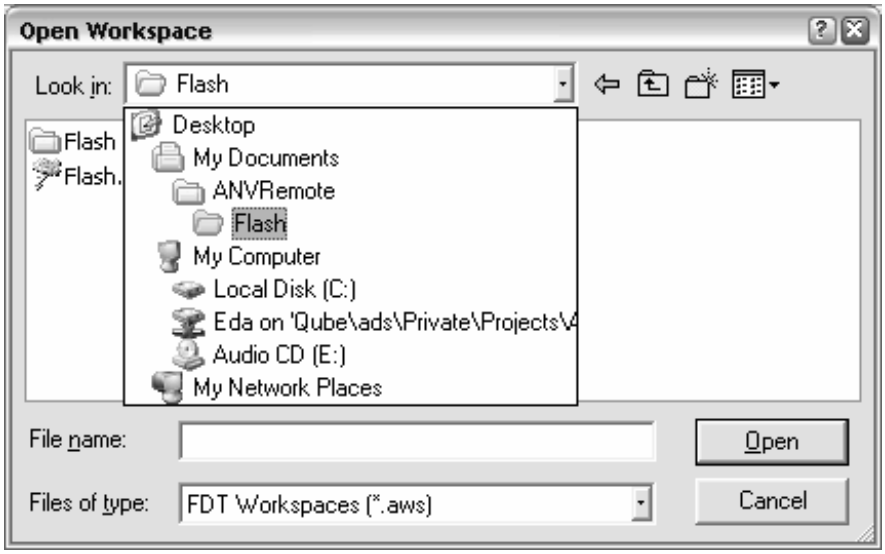


Figure 3 Open Workspace dialog box

Select the Flash.aws file (indicated by the thunder cloud icon) and click OK. A warning dialog will now appear informing you that the workspace has been moved, click the "Yes" button. To prevent the welcome dialog box from opening each time you open FDT click Tools->Options and check the box "Open last workspace at start-up" as shown in Figure 4 and click the "OK" button.

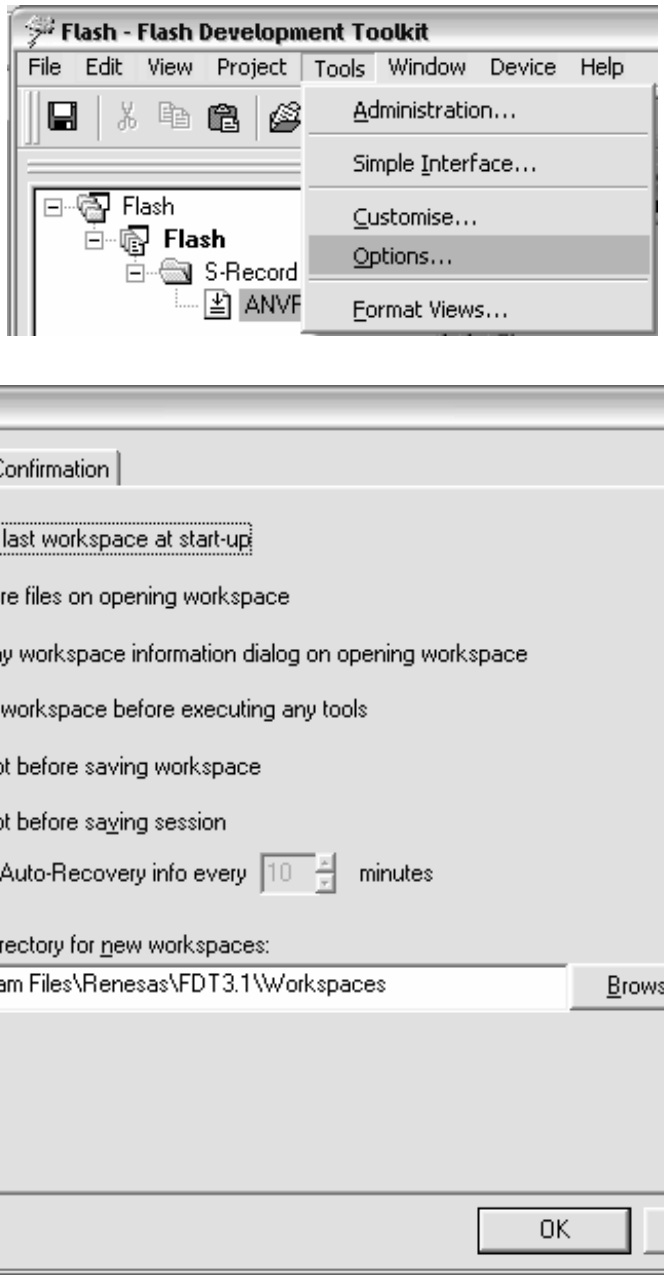


Figure 4 Switching off the welcome dialog box

The workspace has been configured to use COM1 to program the device. If COM1 is not available, or you wish to use another port then you should change this now. To change the COM port select Device->Configure Flash Project or click the magic wand icon on the tool-bar as illustrated by Figure 5. In the bottom left hand corner of the workspace a docked configuration window should appear. At the bottom of this are five tabs with illegible labels, click the second tab in from the left hand side, as illustrated in Figure 6.

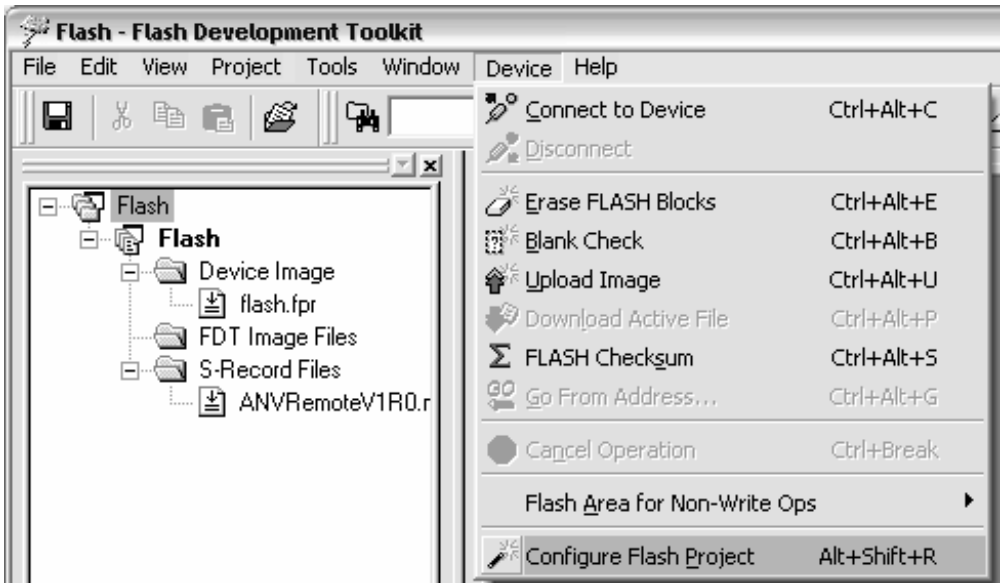


Figure 5 Workspace Device Configurations selection procedure

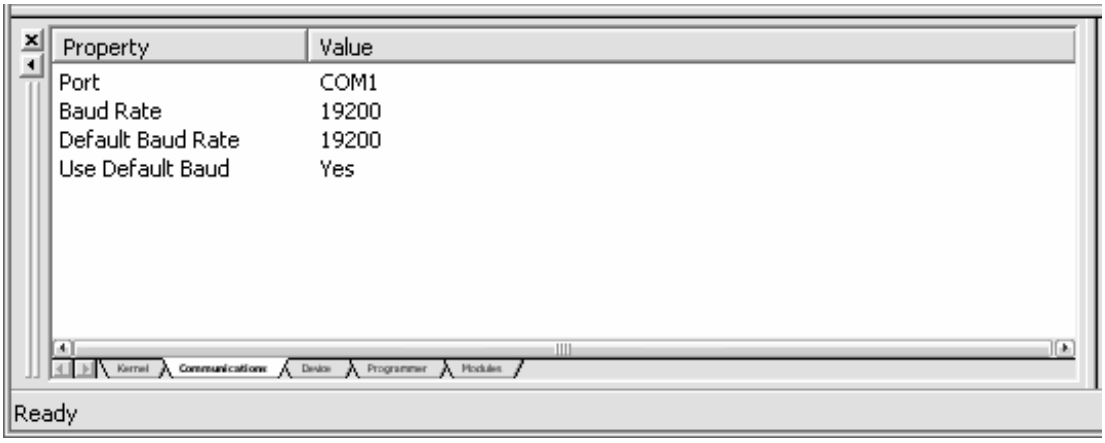


Figure 6 Illegible "Communications" tab

By double clicking on the COM1 value an oversized COM port selection dialog should appear. Select the desired COM port from the drop-down list box as shown in Figure 7.

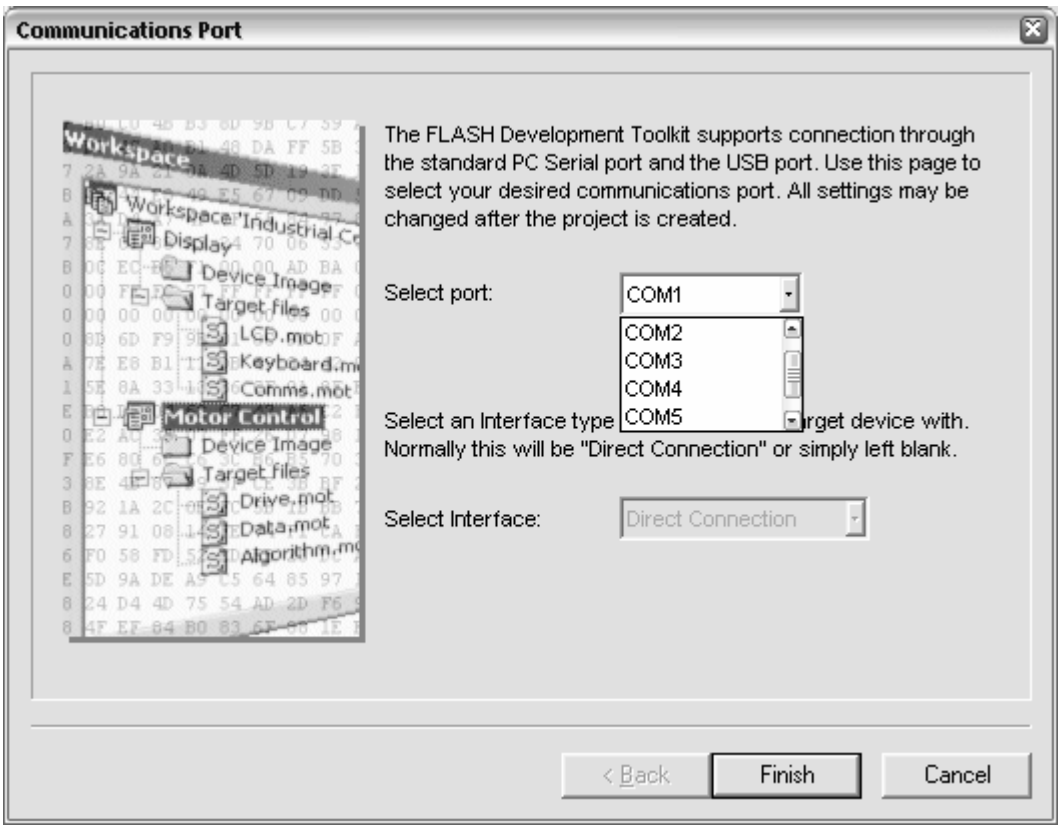


Figure 7 Communications Port selection dialog box

Because FDT can program many devices, the user interface is unnecessarily complicated for the flash programming function required. The workspace that you have just opened has been pre-configured and a simple interface can be used to program the device from this point forward. Select the simple interface option from the Tools menu as illustrated in Figure 8.

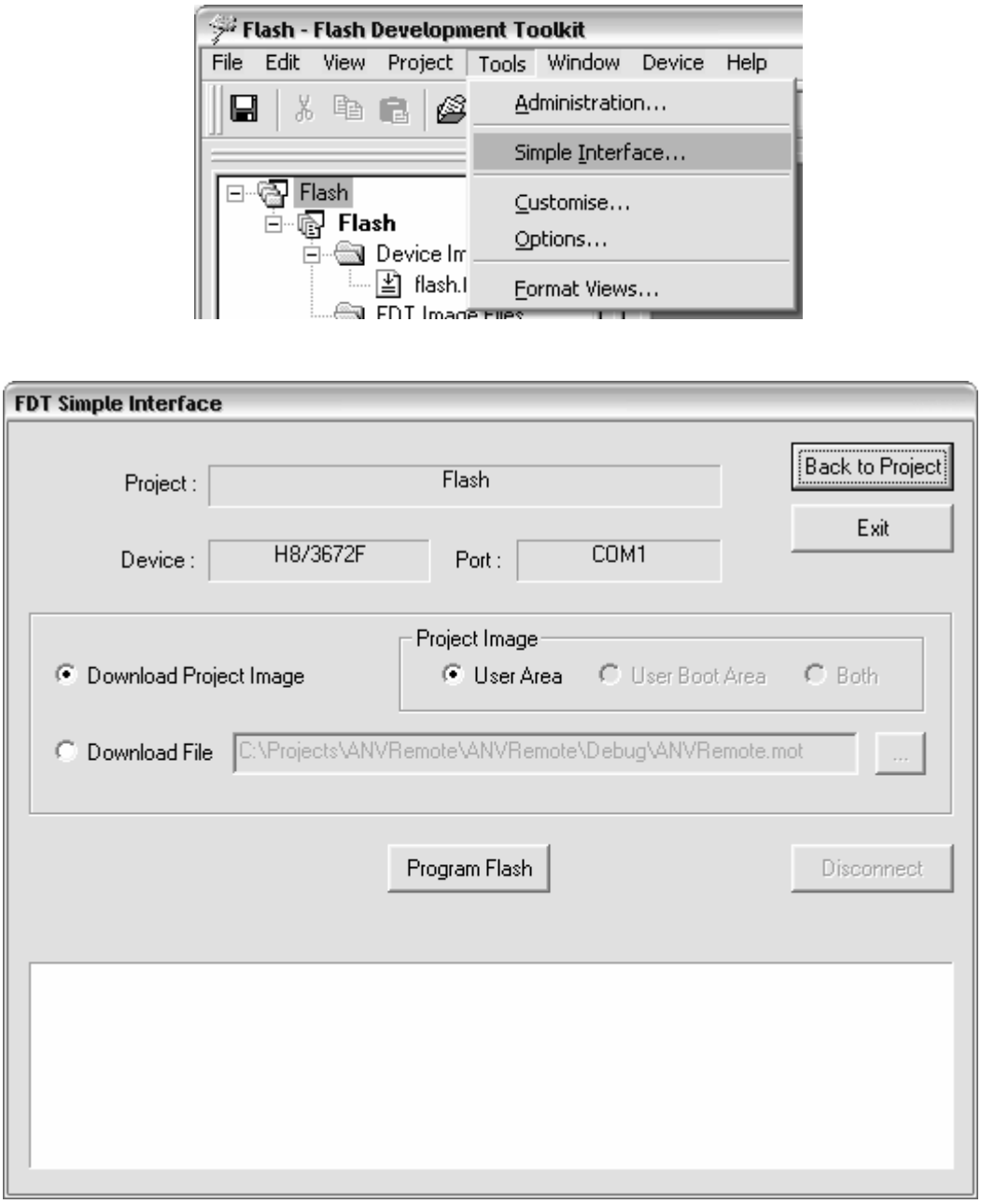
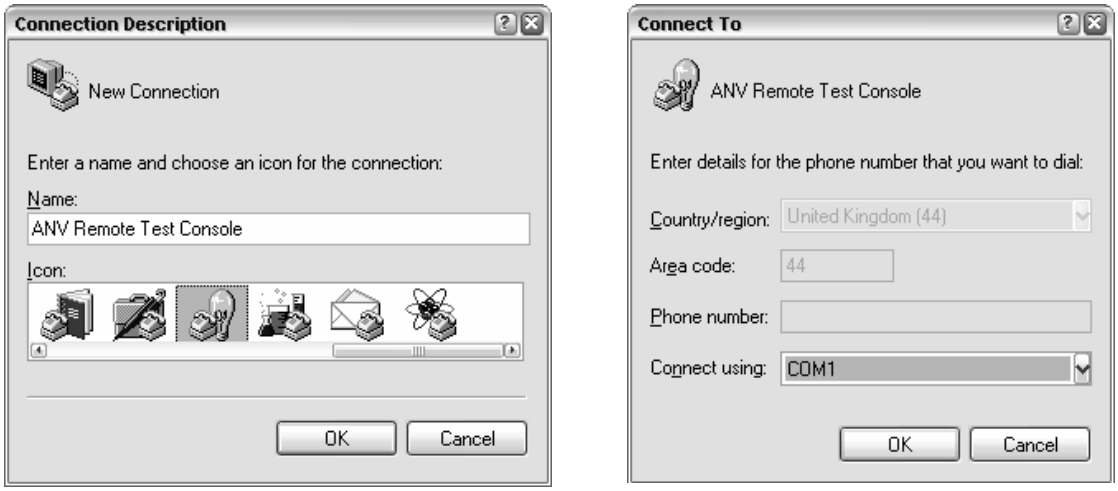


Figure 8 Selection of the simple interface

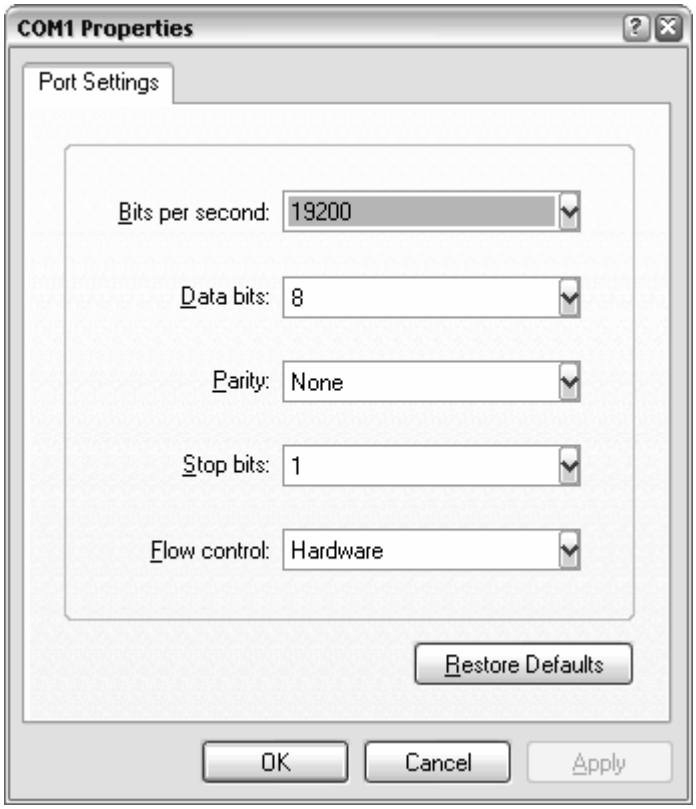
Click the Exit button to finish the set-up.

2.2. CONFIGURING HYPERTERMINAL

HyperTerminal is usually pre-installed on your PC. If it is not then you should insert the operating system CD and add the communication components. The HyperTerminal program can usually be found in the start menu through Programs->Accessories->Communications. Figure 9 illustrates the set-up procedure.



1) Enter a name and select an icon & click “OK, select the desired COM port & click “OK”.



2) Select the baud rate, data bits, parity, stop bits and flow control settings as above,

Click “OK” and then File->Save As to the desktop or start menu.

Figure 9 HyperTerminal session configuration dialogs

If you have problems configuring and saving a HyperTerminal session please read the on-line help.

3. FLASH PROGRAMMING

3.1. CONNECTING

The programming cable should be connected from CN5 on the remote PCB to the COM1 port on the PC via a 9 way female D connector. Figure 10 shows how this cable should be wired.

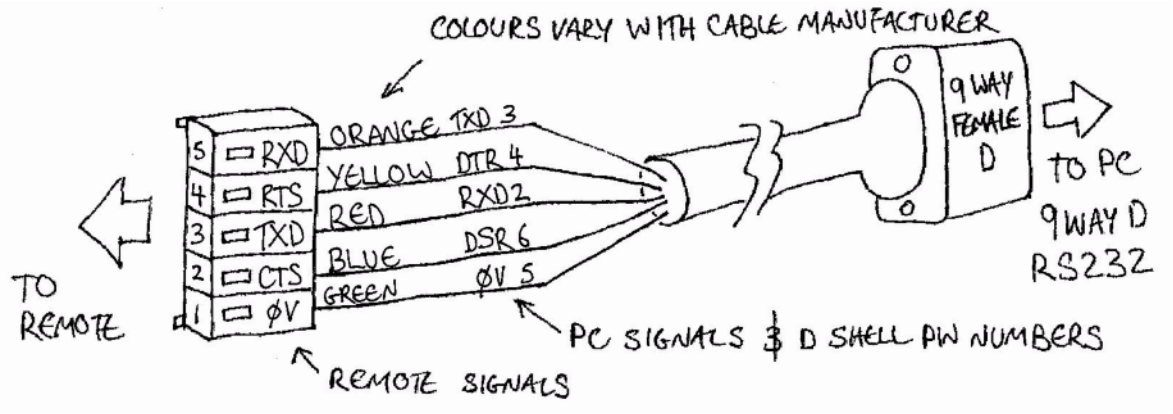


Figure 10 RS232 Debug & flash programming connection

The power supply should be connected to CN4 on the PCB as per the legend.

3.2. FLASH PROGRAMMING

Open FDT, if the program does not look like the illustration in Figure 11 then follow the instructions for configuring FDT in the previous section.

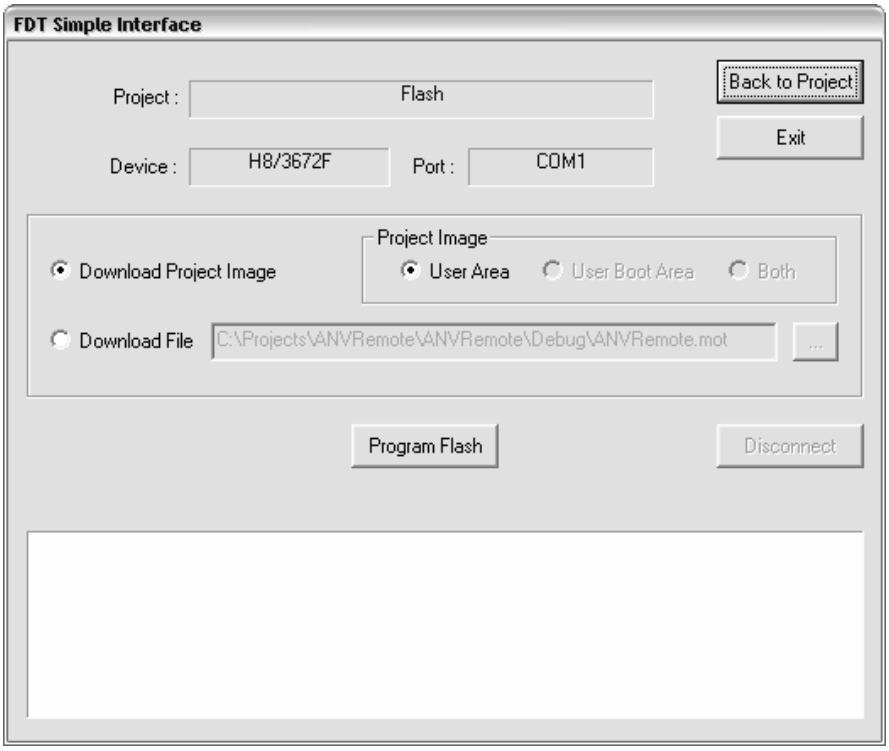


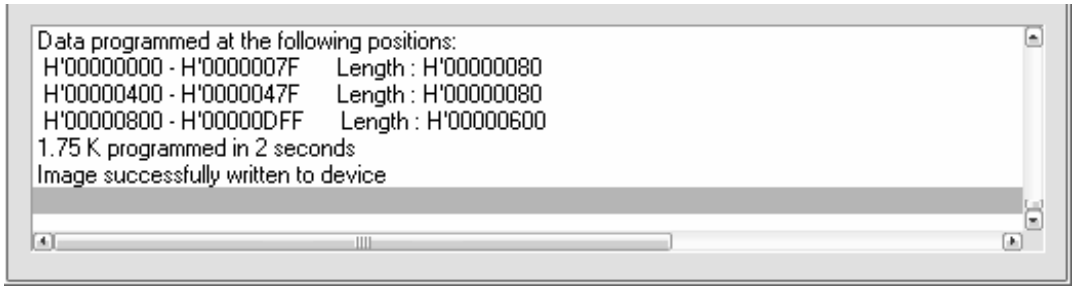
Figure 11 FDT Simple Interface

The following instructions must be followed precisely to program the H8/3672 device.

1. Insert the 0.1" jumper on JP3 on the PCB (labelled FLASH)
2. Switch ON the power supply to the board
3. Click the Program Flash button on the PC
4. When the text "Image successfully written to device" appears in the output box click the disconnect button
5. Switch OFF the power supply
6. Remove the 0.1" jumper on JP3.

The board is now ready for testing. Figure 12 illustrates the type of messages to expect on success and failure.

Success! – Now click the disconnect button.



Failure! Error No. 15024 means that FDT could not find the device. JP3 MUST be inserted BEFORE the power is switched ON. The RS232 lead MUST be connected to the PCB and the correct COM port selected.

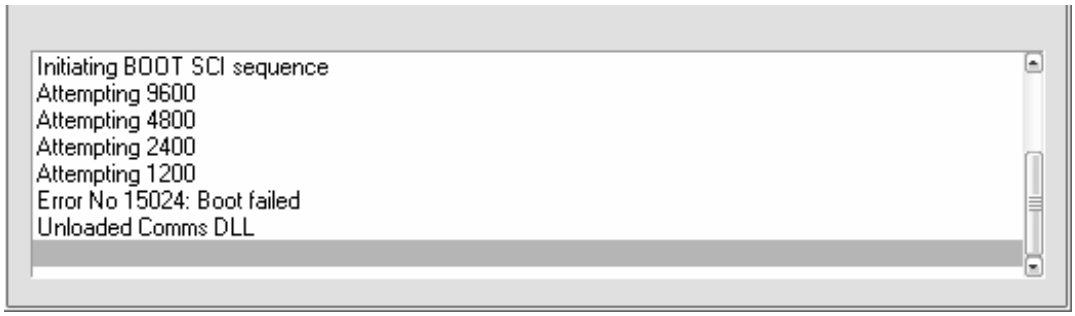


Figure 12 Common flash programming results

4. TESTING

The following steps should be followed to test the device.

1. Ensure that the power supply is OFF and there are no jumpers on JP2 or JP3
2. Ensure that HyperTerminal and FDT are closed (do not have the COM port open)
3. Switch ON the power supply to the board
4. Press the GREEN button. The GREEN LED should flash four times indicating communications failure
5. Press the RED button. The RED LED should flash four times indicating communications failure
6. Open the HyperTerminal session configured for this device
7. Press the GREEN button. The GREEN LED should flash four times indicating communications failure
8. Press the RED button. The RED LED should illuminate for two seconds indicating successful communications
9. Check that the text in the HyperTerminal window reads as indicated in Figure 13. For firmware version 1.3 the characters transmitted by the remote should be CSRS1 and CSRS0 respectively and not as illustrated.
10. Click the disconnect icon on the HyperTerminal tool bar to close the comm port. The HyperTerminal application may now remain open while further devices are programmed with FDT.

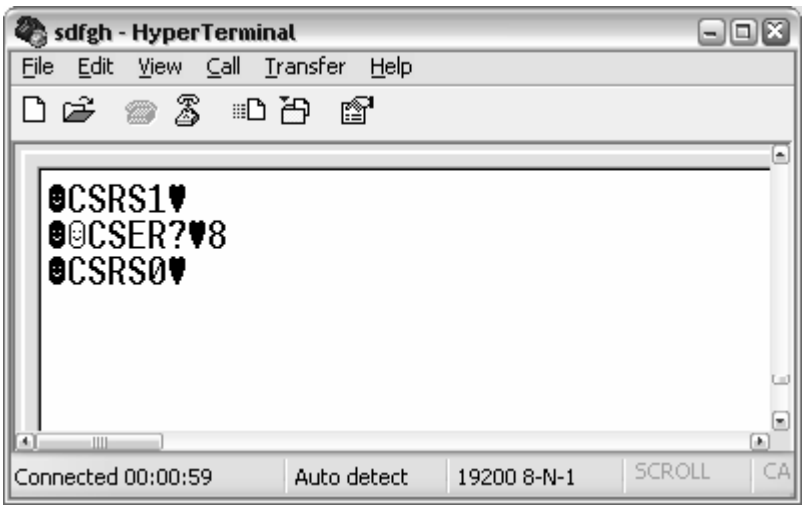


Figure 13 HyperTerminal window view after valid command reception

Testing of the system is now complete.

5. PROGRAMMING DIFFERENT VERSIONS OF CODE

The addition of hard-coded time delays to the firmware means that different firmware may need to be programmed depending on the desired operation. The table in Figure 14 shows the Motorola hex format file names supplied on the delivery CD and the programmed time delay. The files can be found in the ANVRemote\Bin directory of the delivery CD.

Time Delay in minutes	Time delay in 1.0069mS system clocks	Configuration output file name
NONE	N/A	ANVRIT.MOT
5	297944	ANVR5M.MOT
10	595888	ANVR10M.MOT
15	893832	ANVR15M.MOT
20	1191776	ANVR20M.MOT
30	1787665	ANVR30M.MOT

Figure 14 Firmware file names and delay constants

FDT may be used to program different versions only through the project interface. If you are in the simple interface click the back to project button. From the Project menu select the Add files option and the dialog shown in Figure 15 will allow the selection of the files detailed in Figure 14.

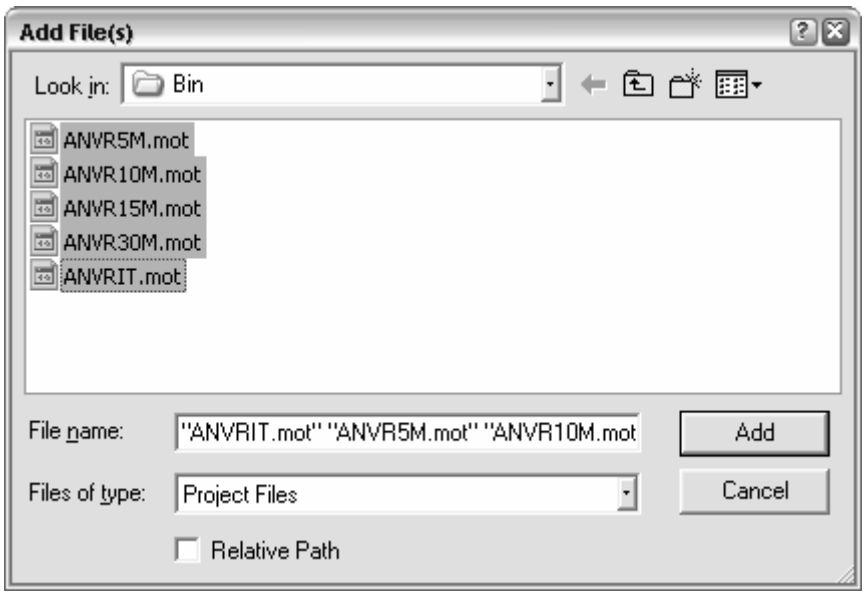


Figure 15 FDT add files dialog

Once the files have been added to the project they can be programmed by right clicking on the desired file and then left clicking download as shown in Figure 16. The programming process is similar to the simple interface but once the image has been successfully programmed the comm port must be closed by selecting Disconnect from the Device menu.

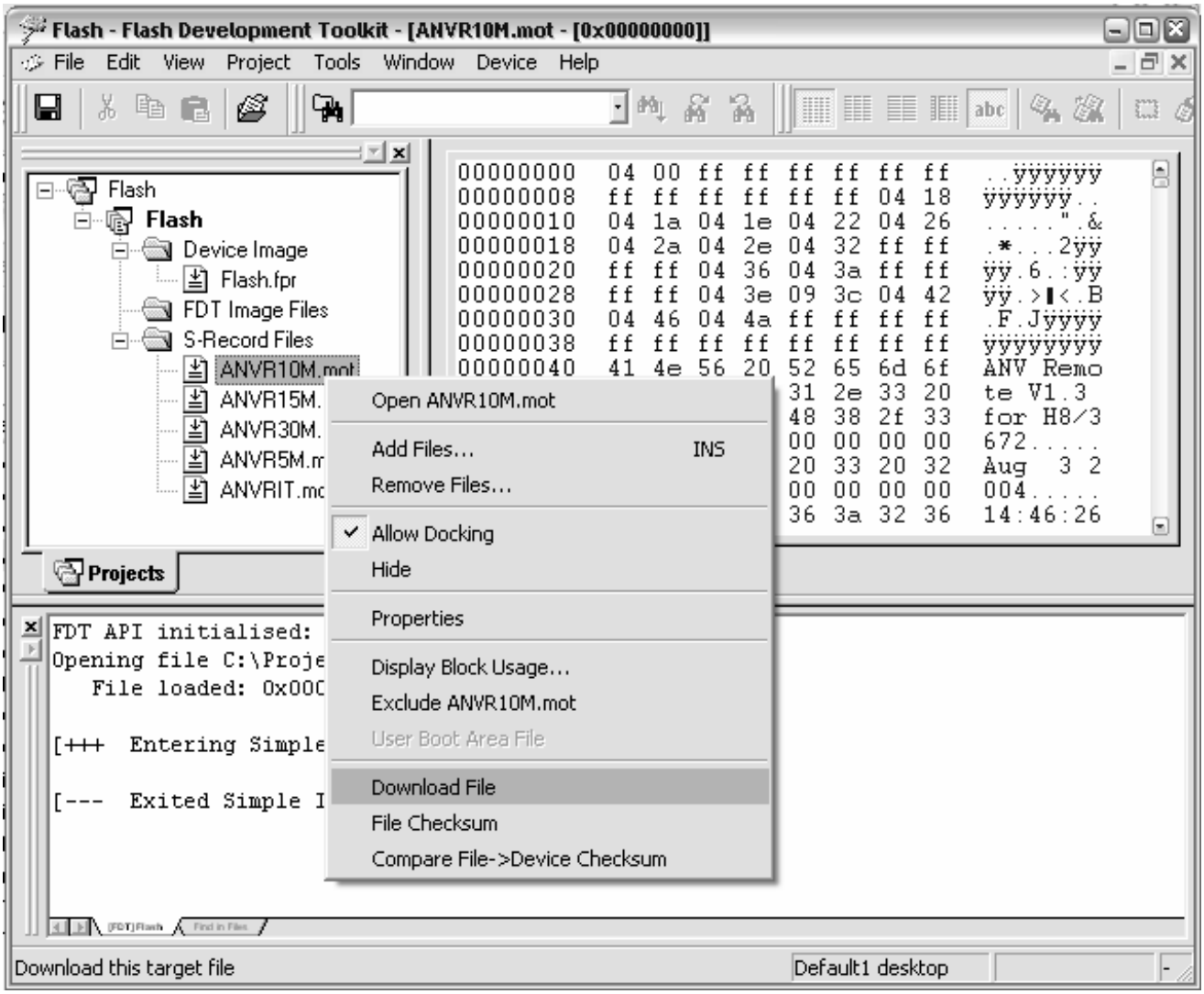


Figure 16 Downloading a specific file

6. USER OPERATION INFORMATION

If the green LED flashes slowly when the button is pressed it indicates that the instrument is not configured correctly (in Auto store 2 and audio trigger threshold set to 130dB).

If the red LED flashes slowly when the button is pressed it indicates that the instrument is not connected or switched on.