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Depending on what operations have recently been performed and on what is selected the menus and Toolbar will offer different commands. The complete set of menu options and associated buttons are:

Undo 

TS Editor keeps a list of recent changes. Each **Undo** command backs out the most recent change from the list. That change is moved to the Redo list in case it needs to be re-instated. As each change is undone the cursor moves to the appropriate field (in the Hex or Header Editors) and restores the previous value.

Redo 

Re-instates the most recently undone operation. When a new edit is made the Redo list is cleared.

Copy 

Copies the currently selected bytes to the clipboard. From there they may be pasted in to other packets or used by other applications.

Copy Packet 

Copies the entire contents of the current packet to the clipboard. From there it may be pasted in to other packets or used by other applications.

Paste 

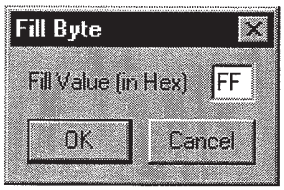
Pastes packet contents held on the clipboard into the current packet, starting at the current cursor position.

Select Packet

Selects the entire packet. This is a quick alternative to selecting all the packets with the mouse or keyboard.

Fill...

Fills all the selected bytes with a hexadecimal value.



This option opens the Fill Byte dialog. Enter the fill value then select the OK button. The Cancel button abandons the operation leaving the bytes in their original state.

There are no Toolbar buttons for the Select Packet and Fill commands.

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Header Editor

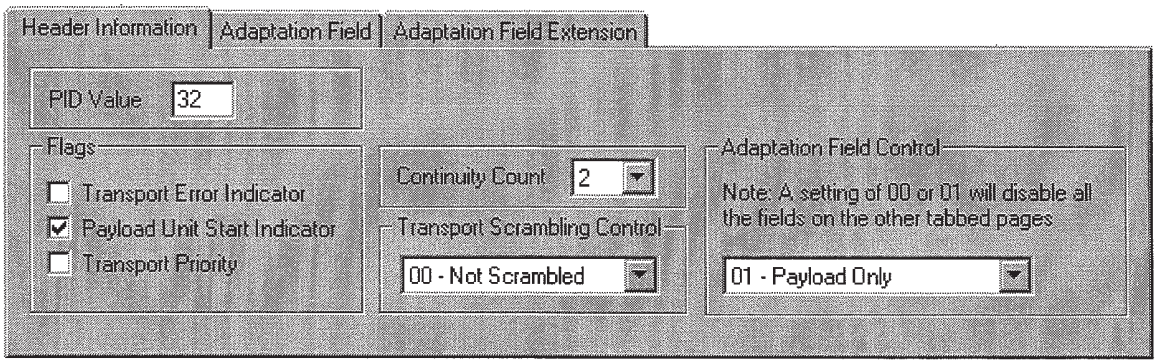
The Header Editor has three 'tabs'. These show and allow editing of the basic header, adaptation field and the adaptation field extension contents. The Hex editor is immediately updated to show the new values when changes are made in the Header Editor.

Binary flags are shown with check boxes whose state may be changed by clicking in the box with the mouse pointer. Multi-bit fields may be edited by typing in the new values or selecting a value from a drop down list.

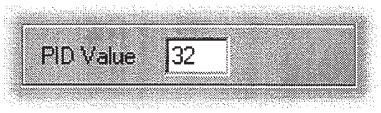


It is important to remember that changing a flag or field often alters the structure of the header. The other flags and fields will be re-interpreted according to the data underlying their new position in the structure.

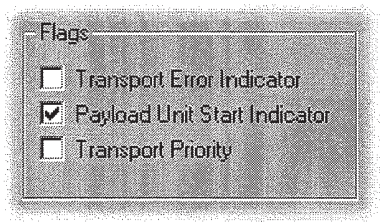
Header Information Tab



The Header Information Tab interprets the contents of the Packet Header (shown in magenta text in the Hex Editor) for ease of understanding and editing.



Displays, and allows editing of, the 13 bit PID as a decimal value. (The PID is packed into a pair of bytes with the Flags shown below.)

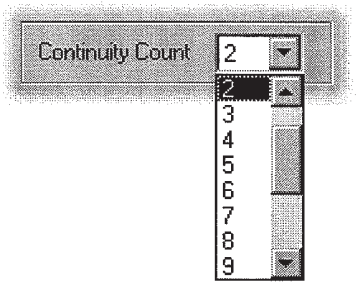


Displays the state of each binary flag in a check box:

☐ = 0 or false

☑ = 1 or true

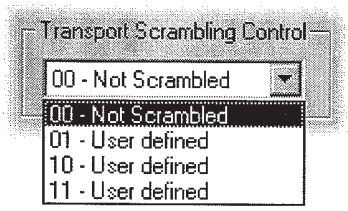
Click in the box to toggle the state of a flag.



Displays the value of the 4 bit Continuity Count field in decimal.

To avoid any typing errors the drop down list allows selection of a different value.

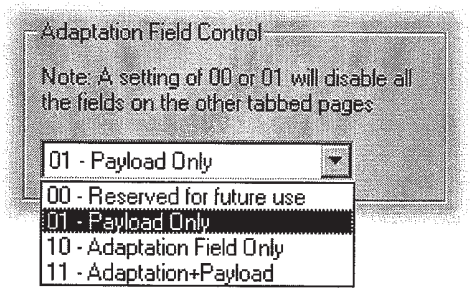
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Displays the 2 bit Transport Scrambling Control field as a binary bit pattern, with a text description.

Use the drop down list to select a different value.

The text gives the interpretation for the bit pattern according to the standard which is currently selected: **MPEG2**, **DVB** or **ATSC**. Use the **View** menu to select the required option. The example on the left shows the **MPEG2** interpretation.

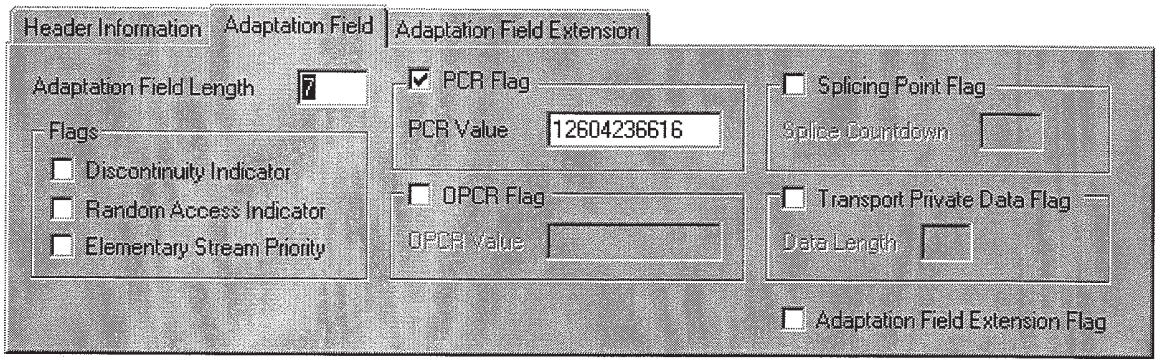


Displays the 2 bit Adaptation Field Control as a binary bit pattern, with a text description.

Use the drop down list to select a different value.

The Adaptation Field and Adaptation Field Extension Tabs will be empty (greyed out) when the **01 - Payload Only** or **00 -- Reserved** values are selected.

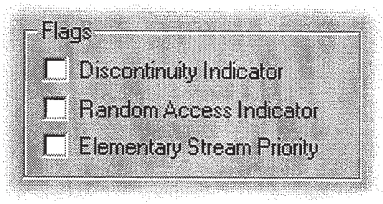
Adaptation Field Tab



The Adaptation Field Tab interprets the contents of the Adaptation field (shown in blue text in the Hex Editor) if one is present in the packet. To be able to edit an Adaptation Field the **Adaptation Field Control** value in the Header Information Tab must indicate that an adaptation field is present.



Shows the length of the Adaptation Field in bytes and allows it to be edited in decimal.



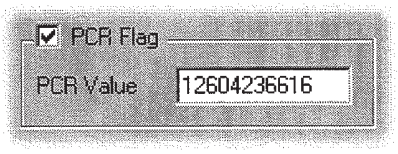
Displays the state of the binary flags in check boxes:

☐ = 0 or false

☑ = 1 or true

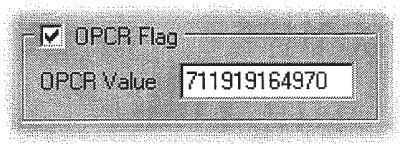
Click in the box to toggle the state of a flag.

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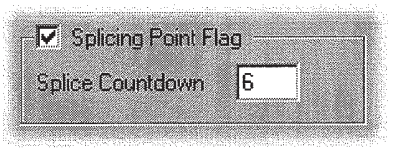
Displays the state of the binary PCR Flag in a check boxes: ☐ = 0 or false and ☑ = 1 or true.

When the flag is true the PCR Value is shown and may be edited in decimal.



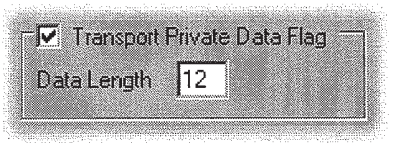
Displays the state of the binary OPCR Flag in a check boxes: ☐ = 0 or false and ☑ = 1 or true.

When the flag is true the OPCR Value is shown and may be edited in decimal.



Displays the state of the Splicing Point Flag in a check boxes: ☐ = 0 or false and ☑ = 1 or true.

When the flag is true the Splice Countdown value is shown and may be edited in decimal.



Displays the state of the Transport Private Data Flag: ☐ = 0 or false and ☑ = 1 or true.

When the flag is true the Data Length is shown in bytes and may be edited in decimal.



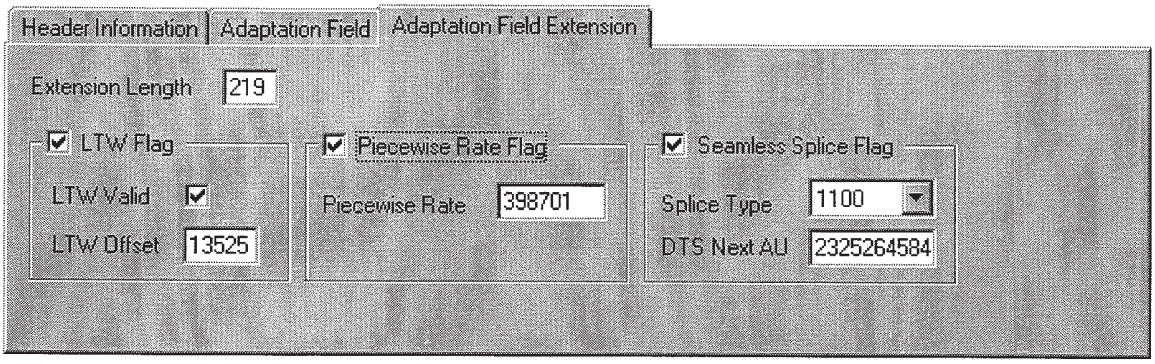
Indicates the state of the binary Adaptation Field Extension flag.

☐ = 0, no Adaptation Field Extension.
The Adaptation Field Extension Tab may be viewed but all of the fields will be greyed out.

☑ = 1, Adaptation Field Extension present.
The Adaptation Field Extension Tab will show and enable editing of the information contained in the Adaptation Field Extension.

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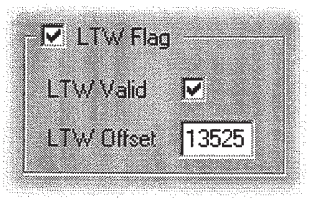
Adaptation Field Extension Tab



The Adaptation Field Extension Tab interprets the contents of the Adaptation Field Extension if one is present in the packet. To be able to edit an Adaptation Field Extension the Adaptation Field Extension flag must be set to 1 (i.e. the box must be checked) in the Adaptation Field Tab.



Shows the length of the Adaptation Field Extension in bytes and allows it to be edited in decimal.



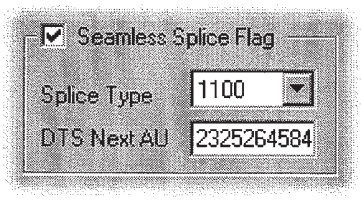
Displays the state of the LTW Flag:
☐ = 0 or false and ☑ = 1 or true.

When LTW is true the state of the LTW Valid flag and value of the LTW Offset are shown. The Valid flag may be toggled and new Offsets can be typed in decimal.



Displays the state of the Piecewise Rate Flag:
☐ = 0 or false and ☑ = 1 or true.

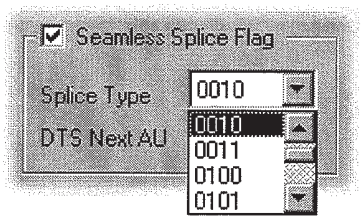
When the flag is true the Rate is shown and may be edited in decimal.



Displays the state of the Seamless Splice Flag:
☐ = 0 or false and ☑ = 1 or true.

When the DTS Next AU value is shown and may be edited in decimal.

The 4 bit Splice Type is shown as a bit pattern.



It has a drop down list containing all 16 possible bit patterns.

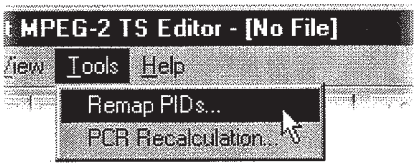
Use the list to select a different value.

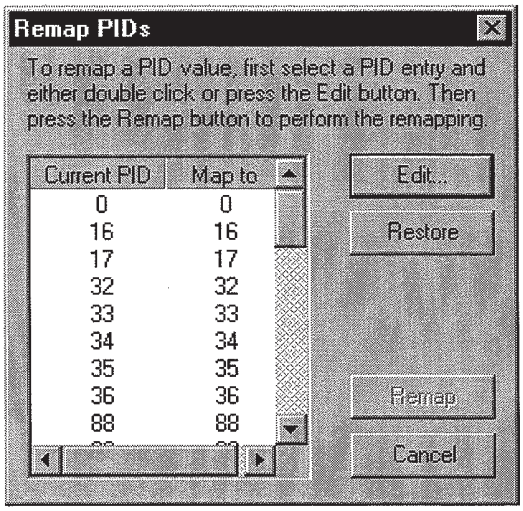
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PID Remapping

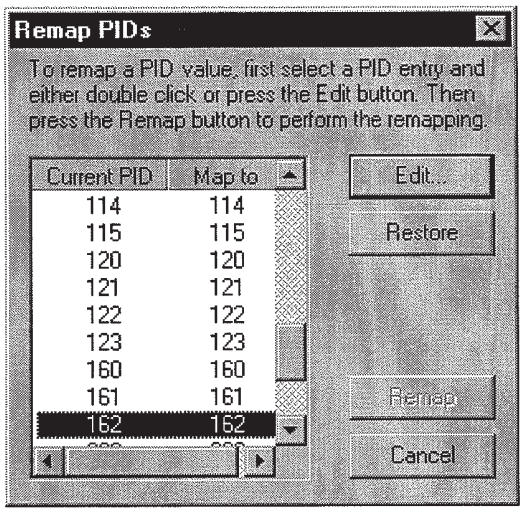
The packets of one or more PIDS may be remapped, i.e. moved to different PIDs. Only the PID in the packet headers is changed. Any packet payload contents such as SI and PSI tables are unaffected. Hence remapping can break the references from tables to PIDs, or be used as an investigation to correct broken references.

To remap packets from one or more PIDs select the **Remap PIDs...** option from the **Tools** menu.

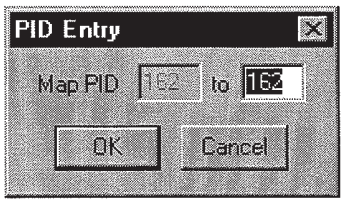




The program scans the file to build a list of PIDs, displaying the Hourglass mouse pointer while it is busy. It then opens the Remap PIDs dialog:

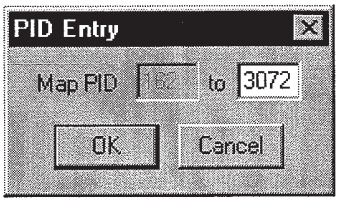


To specify a mapping from a current PID to a new PID select the current PID entry from the list, by clicking on it.



Now select the **Edit...** button, which opens the PID Entry dialog. (Alternatively double click on the required entry in the list.)

Type in the value for the new PID to map to and select **OK**.

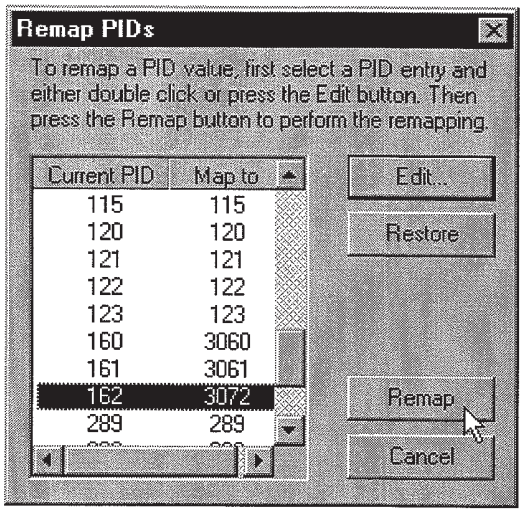


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Repeat this process for each PID that is to be remapped.

The **Restore** button will change the value of the selected **Map to** PID back to that of the **Current PID** without having to open the PID Entry dialog.

When all the mappings are specified select the **Remap** button. (The Remap button is not enabled unless one or more mappings has been specified.)



The hourglass mouse pointer is displayed while the program performs the remapping. On completion the dialog closes and control is returned to the main window.

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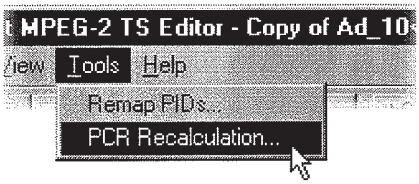
PCR Recalculation

The Program Clock References of one or all Programs may be changed. The rate may be changed and/or any one of six types of jitter added. Uses of PCR Recalculation include:

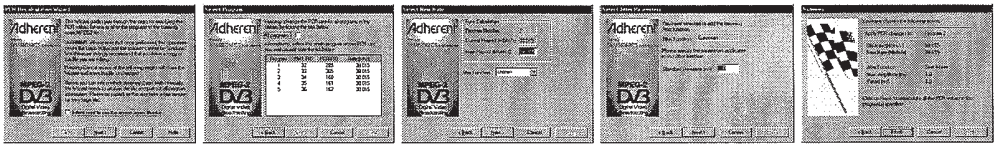
- Recalculating the rate at the correct value, without adding jitter, on a recording of a faulty stream may be used to remove suspected PCR problems. If the recalculated stream works correctly the problem is in the PCR.
- Creating test data with known deviations in rate for exercising other equipment.

Do not perform PCR Recalculation on an original recording. This operation is not reversible so it is strongly recommended that a copy of the original file is used.

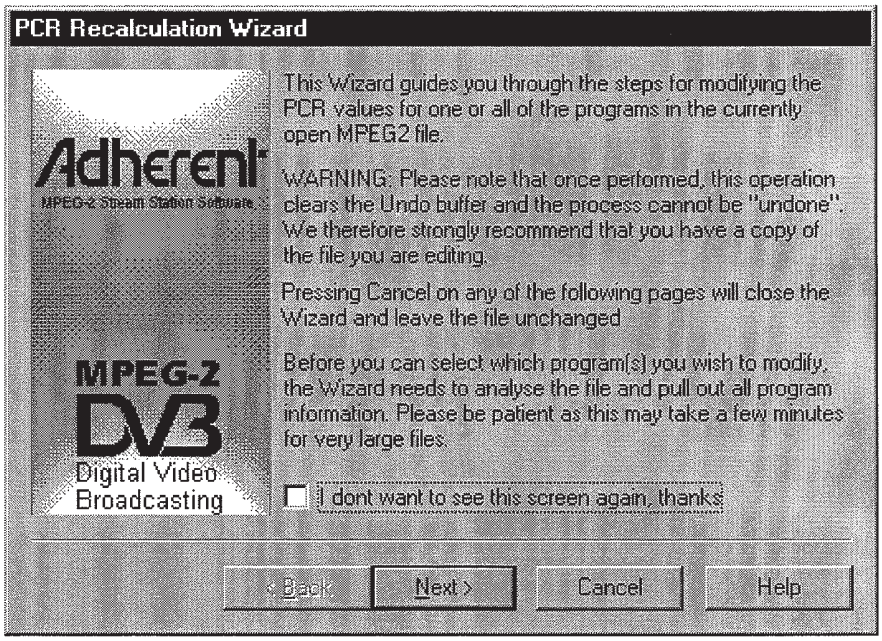
To modify the PCR select the **PCR Recalculation...** option from the **Tools** menu.



This is runs a wizard to analyse the program structure, guide the user through the available options and then recalculate the PCR values.. The wizard presents 3, 4 or 5 pages depending upon the options chosen:



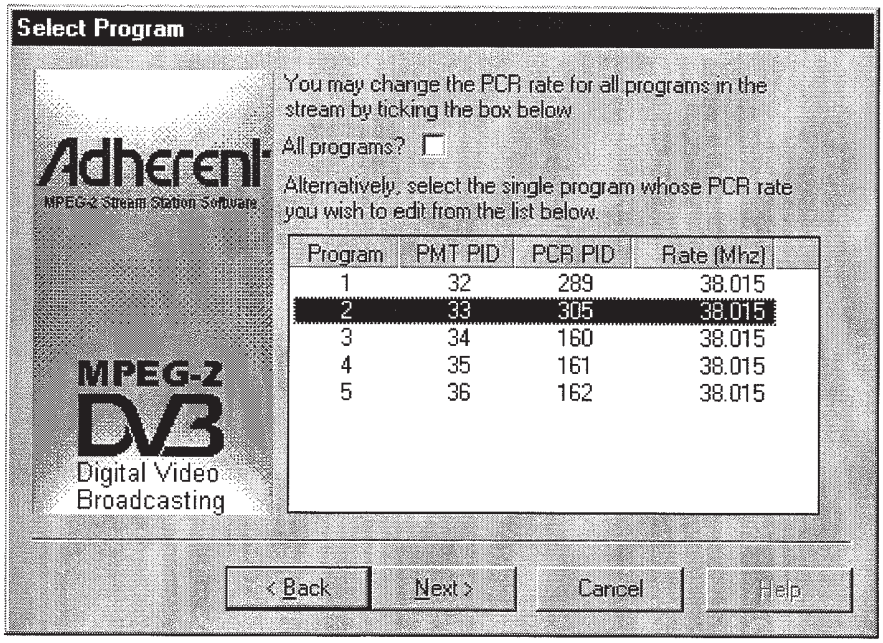
By default the wizard will display this Introduction first.



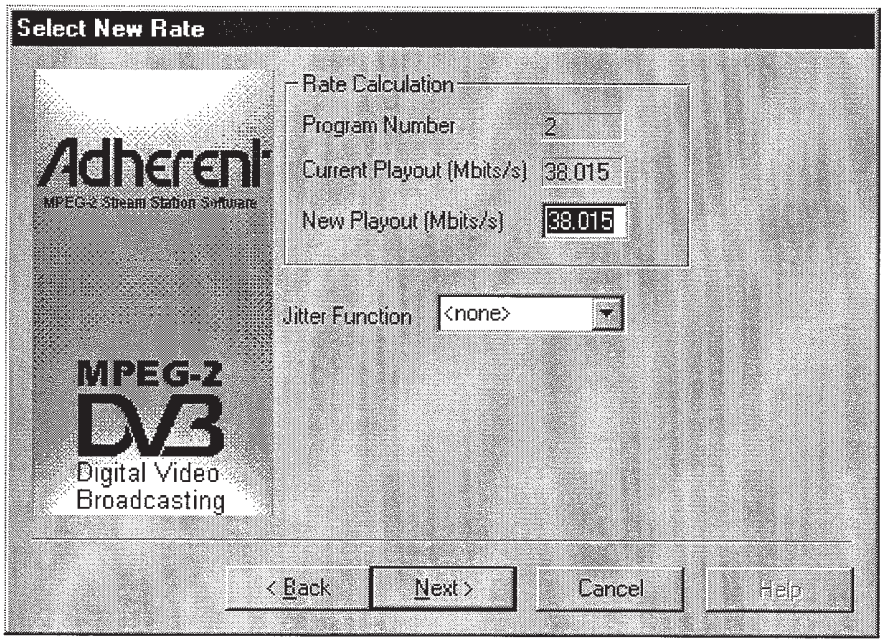
It may be disabled for future recalculations by selecting the check box option at the bottom of the introductory text. Selecting the Next button moves on to the Select Program page.

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The wizard has to analyse the file to extract the relevant Program Information, which may take a while. When analysis is complete the Select Program page shows a list of the programs whose PCR values may be changed:



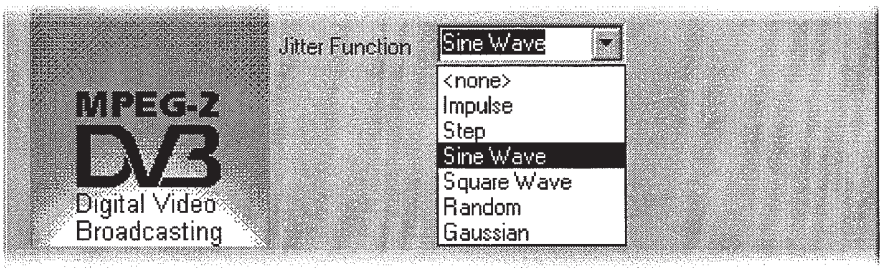
To recalculate the PCR rate for all the programs check the **All programs ?** option. Otherwise select one of the programs from the list. Then select **Next** to move on to the Select New Rate page. The **Back** button moves back to the Introductory Page.



Keeping the rate as New Playout = Current Playout and selecting **Jitter Function** of **<none>**, will recalculate the PCR based on the current rate. This could be used, For example, to investigate a suspected problem with the PCR by playing the original and recalculated versions to see if there is a difference.

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A new playout rate may be specified and/or a Jitter Function applied to the rate. There are seven Jitter Functions available including **<none>**. The available options are:

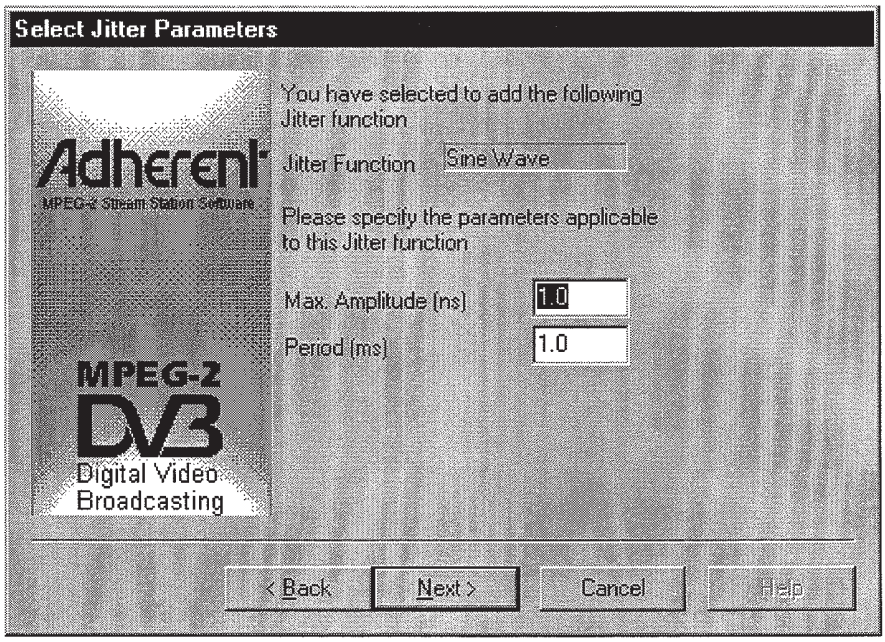


Each of the jitter functions is described in more detail at the end of this sub-section.

If a Jitter Function is required choose one of the six functions from the drop down list otherwise leave it set to **<none>**. Specify any change in the **New Playout** rate and select the **Next** button. Selecting **Back** returns to the Select program page.

When no Jitter function, i.e. **<none>**, was selected the Select Jitter Parameters page will not appear. Go on to the Summary page, which shows a picture of a chequered flag.

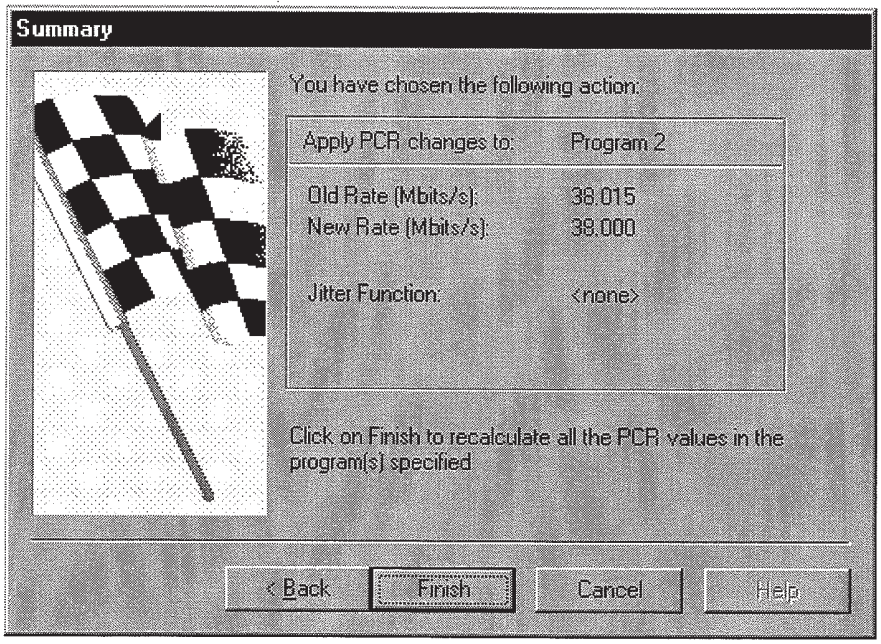
With a Jitter Function selected the next page will be Select Jitter Parameters. This asks for additional information specific to the chosen Jitter Function. For example the **Sine Wave** function requires these parameters.



Specify the required parameters and select **Next** to move on to the Summary page. Use the **Back** button to return to the Select New rate page.

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The Summary page displays a short list of the specified PCR rate changes,



Select **Finish** to recalculate the PCR values. Remember once **Finish** has been selected there is no going back.

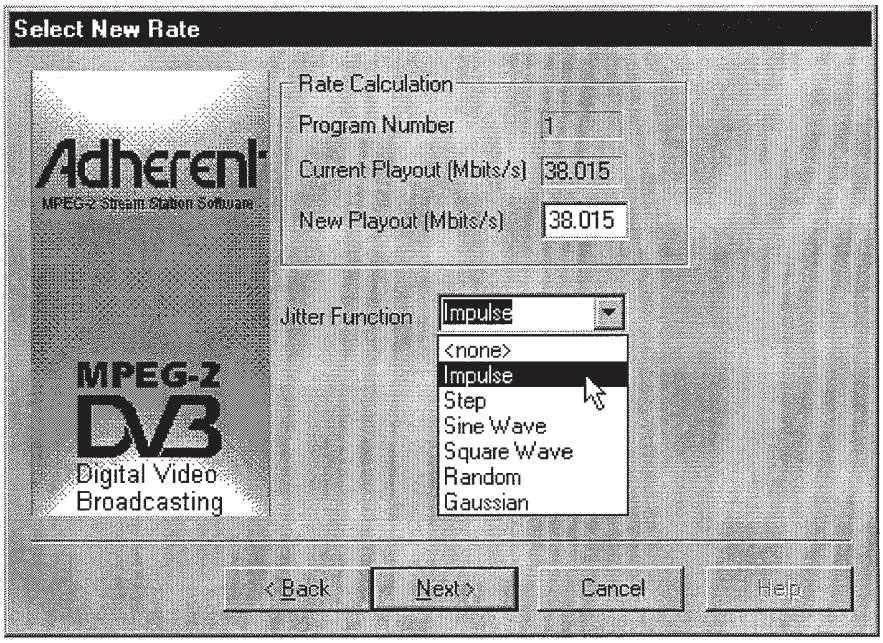
Use the **Back** button to return to the previous pages to make any changes.

The program may take a while to perform the recalculations. The Summary page will stay on screen and the Hourglass mouse pointer be displayed while the wizard is processing. When the summary page disappears the calculation is complete and the file may be closed or more edits carried out.

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Jitter Functions

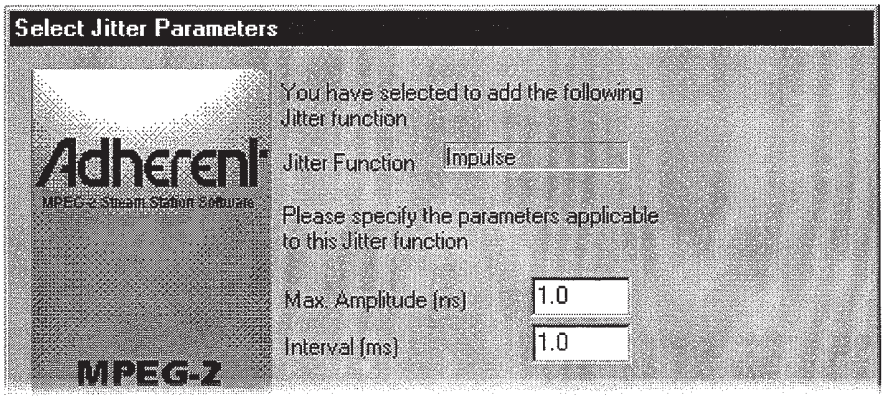
Select the required Jitter Function from the Select New rate page…



… then select **Next** to move on to the Select Jitter Parameters page to specify the parameters for the selected Jitter Function. The effect of and the parameters for each function are:

Impulse

The Impulse Jitter function adds a positive or negative value to a single PCR.



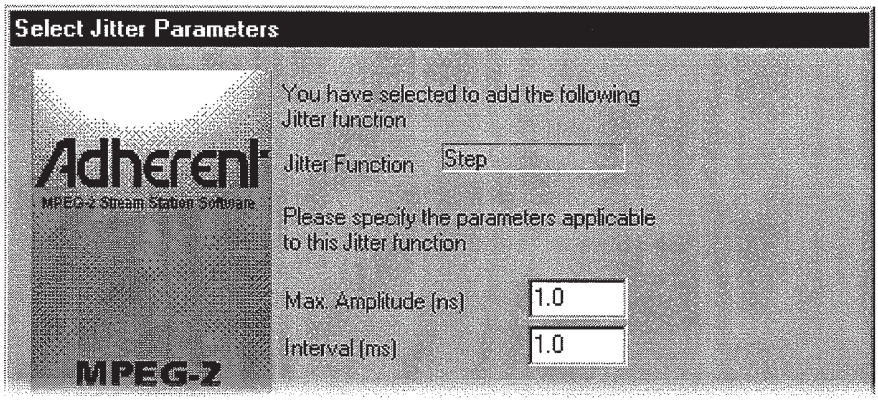
Max Amplitude specifies the size of the impulse in nano-seconds. Type a minus sign in front of the value for a negative impulse.

Interval specifies the time taken from the start of the file at which the Impulse is to be applied.

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Step

The Step Jitter Function adds a positive or negative offset to the ideal PCR values after a specified time. The offset will be the same for all PCRs.

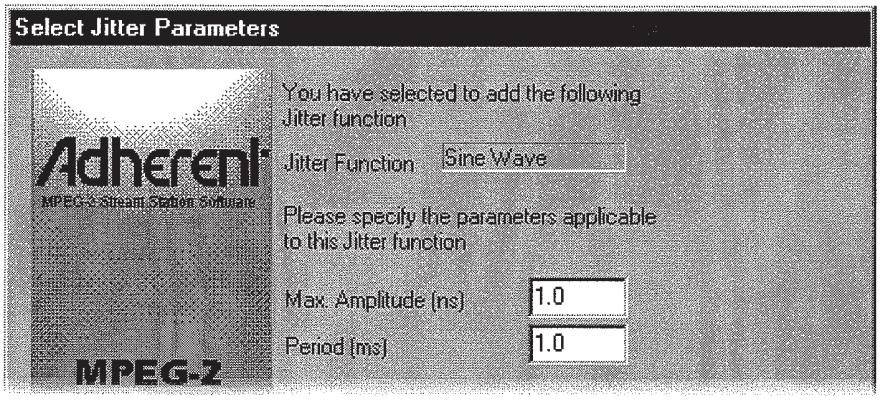


Max Amplitude specifies the size of the offset in nano-seconds. Place a minus sign in front of the value for a negative offset.

Interval specifies the time taken from the start of the file of the first PCR to which the offset is to be applied.

Sine Wave

An offset which varies according to a sine function is applied to the ideal PCR value for each PCR.



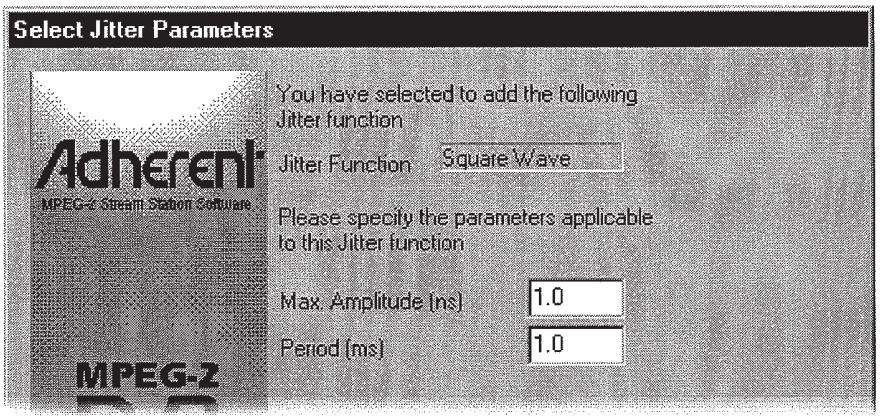
Max Amplitude specifies the amplitude of the sine wave in nano-seconds.

Period specifies the period of the sine wave in milli-seconds.

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Square Wave

An offset which varies according to a square wave function is applied to the ideal PCR value for each PCR. The square wave has an equal mark/space ratio.

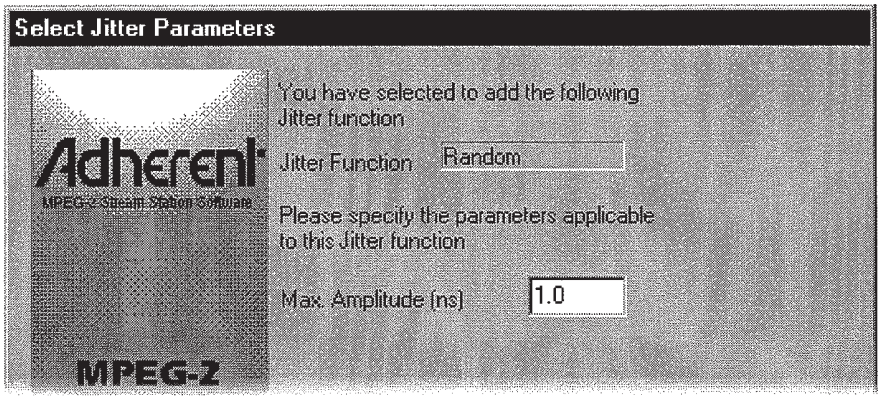


Max Amplitude specifies the amplitude of the square wave in nano-seconds.

Period specifies the period of the square wave in milli-seconds.

Random

The PCR jitter applies offsets of a uniform random distribution to the ideal values of the PCRs. Each offset will be within the range of ± the specified amplitude.

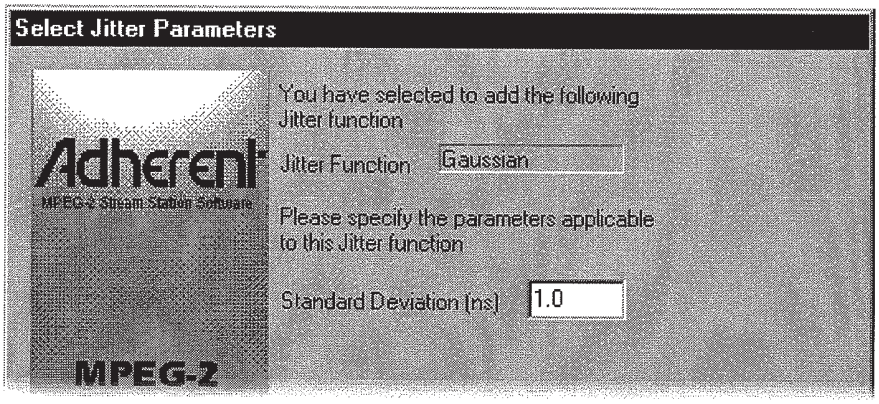


Max Amplitude specifies the maximum amplitude of the jitter, relative to the ideal value, which may be added to any PCR. Only a positive value can be entered. The amplitude is always from **-Max. Amplitude** to **+Max. Amplitude** centred on the ideal PCR value.

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Gaussian

The offsets are applied to the ideal PCR values following a Gaussian distribution according to the specified standard deviation.



Standard Deviation specifies the standard deviation to be used by the jitter function in deriving the offset for each PCR, relative to the ideal PCR value. Only a positive value can be entered for standard deviation.

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Adherent Stream Source

Make Seamless Wizard

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AD991 Stream Source Product - Make Seamless Wizard

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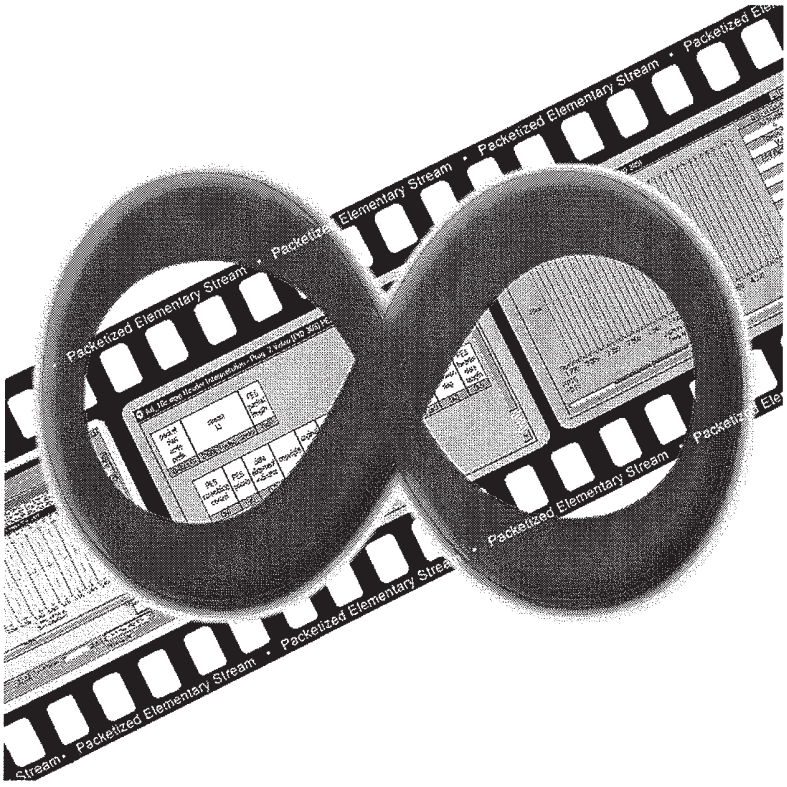
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Select a Program to Make Seamless.....8
Selecting a Multiplex Output File.....10

Introduction

This Wizard guides the user through the process of creating an MPEG-2 file for use by Stream Player in continuously looped operation.

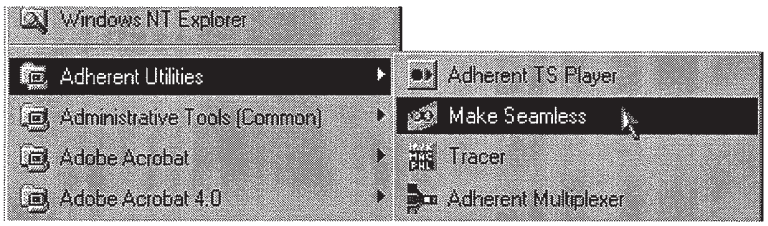
The Wizard is largely self-explanatory relying as it does on intuition and text based instructions. The notes in this section of the user guide provide a slightly more detailed explanation of the Wizard and the necessary user responses.

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Using the Make Seamless Wizard

Starting the Wizard

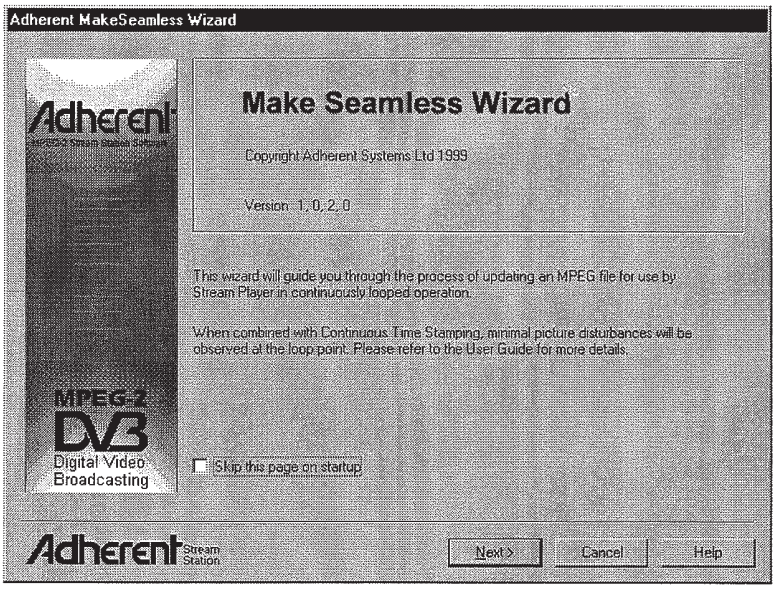
The wizard may be started by selecting the **Make Seamless** option from the **Adherent Utilities** sub-menu of the **Start → Programs** menu (left). Alternatively, double-click on the **Make Seamless** shortcut on the desktop (right).



or



The opening window is displayed:



This first page gives a short explanation of the Wizard's activities and offers the opportunity to skip the page in future.

Select **Next** to move to the next screen and specify the input file.

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Progress & Information Log

The Progress & Information log displays messages during the operation of the wizard. Three types of message can be displayed:

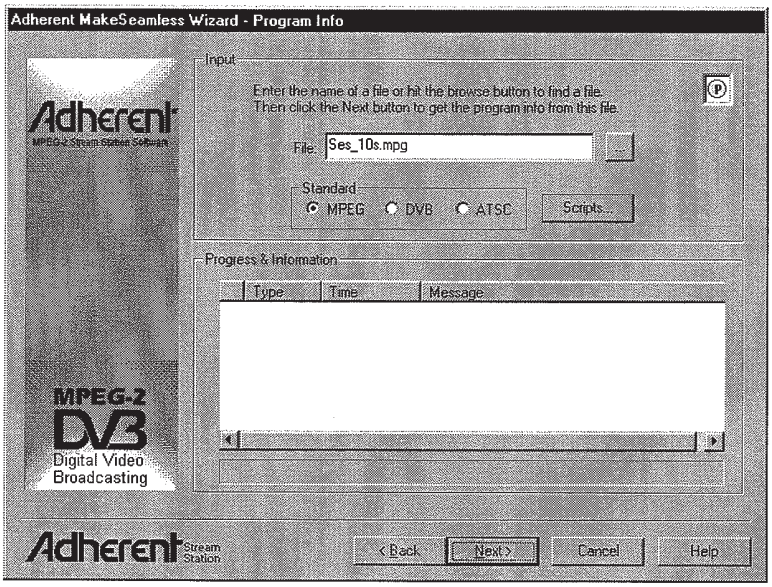
INFO	General processing information.
WARNING	Messages which may mean that the output stream will contain errors.
ERROR	Messages indicating catastrophic information which will cause the wizard to disable the Next button and prevent further progress.

An icon is displayed in the top right-hand corner of the window and as a prefix to any messages displayed in the Progress & Information log. The icons are used to indicate the current processing phase of the Make Seamless Wizard:

Program Ⓟ Analysis Ⓐ Multiplex Ⓜ

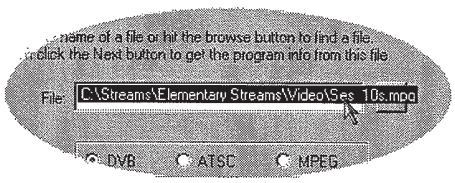
Selecting an Input File

The first action is to identify the input or source transport stream.



Enter the filename in the **File:** field. The browse button (**...**) can be used to open a standard Windows Open dialog and locate files.

Note that only the filename will be shown, but that by resting the cursor over the filename, the full path is shown for a short time.



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SI Scripts

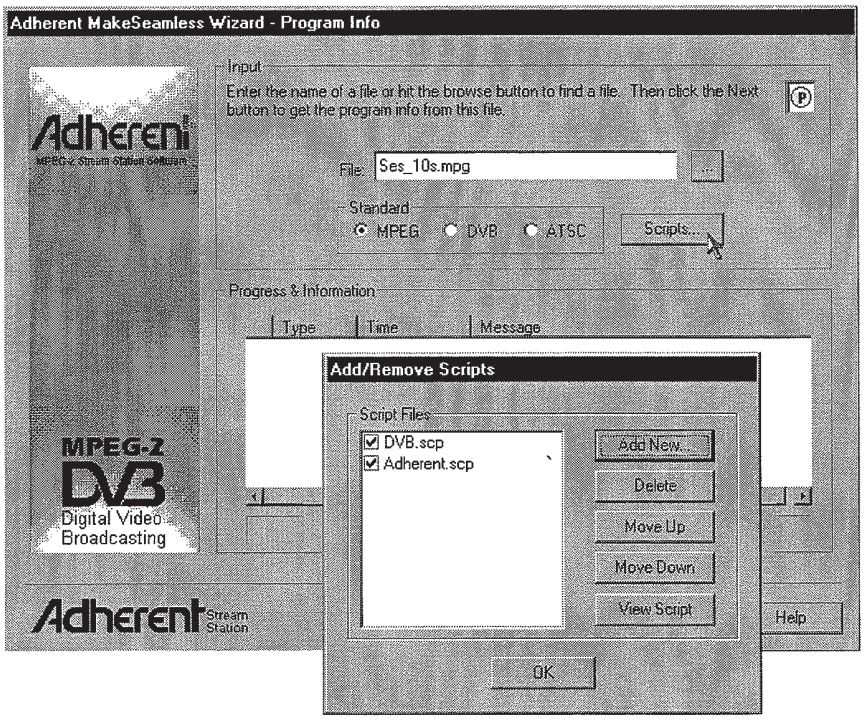
Customised SI scripts are available to the Make Seamless Wizard to enable custom SI table and descriptor data to be processed successfully. Basic processing of the Standards does not require additional scripts.

If a suitably configured script is selected and enabled before a stream is analysed, custom data will be analysed when the stream is opened. If the script is not selected or enabled the stream will not fail to be analysed, but any custom data will either be ignored or reported as an error in the stream configuration.

(The principles underlying *Custom SI Scripting* are described in greater detail in the *Multiplexer section, Appendix A* of this user guide.)

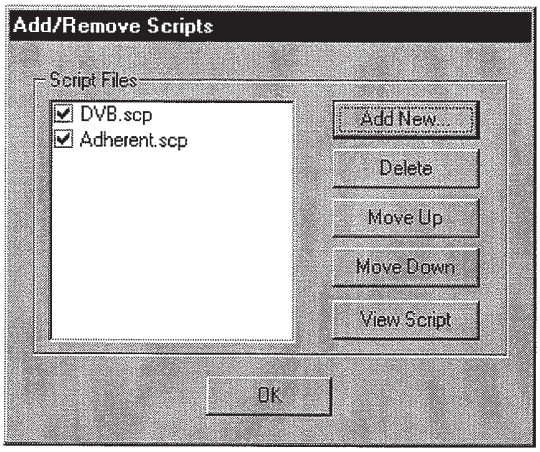
Handling Script files

To handle SI Scripts, select the general **Standard** required by enabling the appropriate radio button and select the **Scripts...** button.



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The Script Add/Remove dialog is displayed as shown below:



The Script dialog displays the scripts currently associated with each standard and allows them to be added, removed, viewed and manipulated.

There is, in effect, one Script File list associated with each mode; script files can be listed in one or more Script file lists. Script files are designated as MPEG, DVB or ATSC when they are added to the Script File list. Each mode will display only those script files associated with that mode. Further script files can be added as required using the **Add New...** button.

Note that a script file will not be used for analysis until:

- it is added to the Script File list in the appropriate mode
- it is enabled; that is it displays a check mark '✓' in the Script File list.

Adding a Script file

1. In the Script dialog, select the **Mode** to which the script is to be added; e.g. DVB.
2. Select the **Add New...** button. A standard Windows file selection dialog is opened. The default file extension is .scp. Select the required file

Note that the selected script file is now listed in the script file list but is *not* enabled; that is it will not be used for any analysis.

Enabling a Script file

A check mark ✓ adjacent to the required script file indicates that it is enabled; that is, it is available for analysis. The check mark has a toggle action; simply place the mouse pointer over the check mark box and click the left-hand button.

Moving a Script file

Script files are applied to analysis in the order that they are listed; in some circumstances this may be important. To move a file in a list, highlight the file name and select the **Move Up** or **Move Down** button as required. Each press of the button will move the file up or down one place in the list until it reaches the top or the bottom.

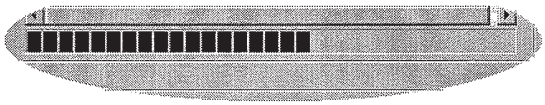
Viewing a Script file

Script files can be viewed and edited in a text editor (provided that the scp extension has been associated correctly in Windows Explorer). To edit a script, highlight the script name and select **View**. This will open the script in Notepad or its equivalent. The required edits can then be made and the script saved.

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When the filename is satisfactory and any scripting actions have been performed, select **Next** to analyse the file.

Progress is indicated by the progress bar and the appearance of messages in the Progress & Information log.

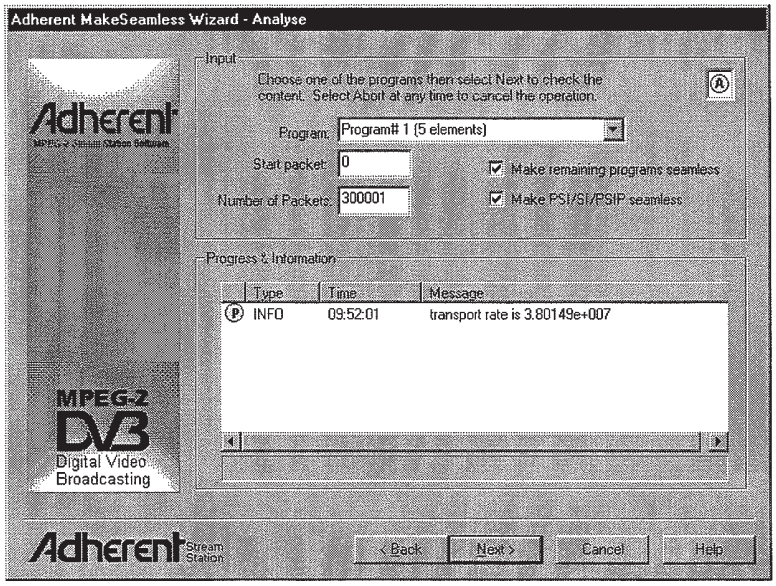


Select a Program to Make Seamless

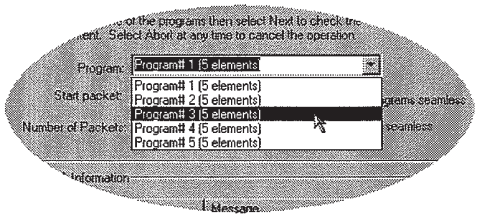
During the input file's analysis the selected transport stream is analysed to determine it's program content. If analysis is unsuccessful in determining program content, the stream will not be opened and an appropriate message will be displayed in the Progress & Information log.

Each program found is displayed in the drop-down list (**Program:**) accompanied by an indication of the number of program elements (video, audio, etc.).

At this stage a priority program must be selected in order for it to be analysed and tested for suitability for the 'make seamless' treatment.



Program: Highlight the program required from the drop-down list.



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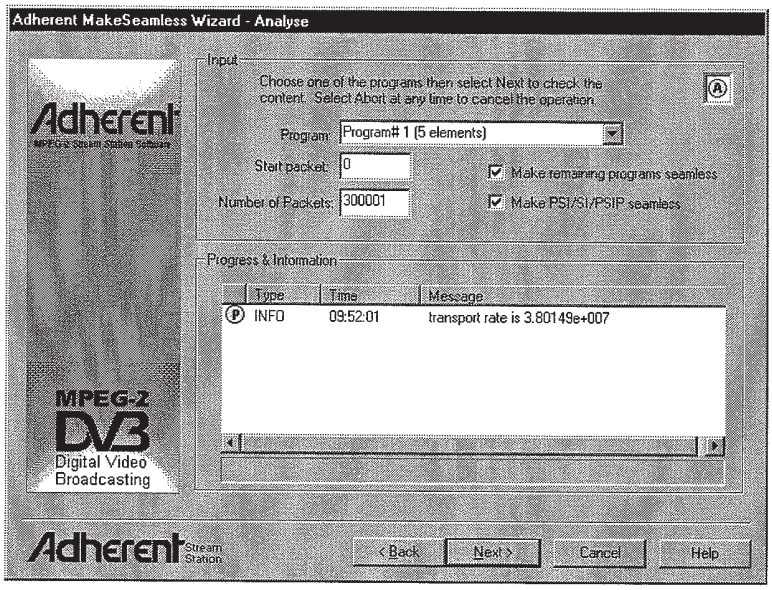
Start packet: This value determines from where the primary program is to be analysed. Indicates the offset from the original transport stream start point to start looking for a loop start point.

Number of Packets: Initially this value is set to the total number of packets in the transport stream. It indicates the maximum number of packets (up to the end of the stream) from the **Start packet** point that may be included in the loop.

Make remaining programs seamless If enabled, the remaining programs are made seamless but are constrained by limits defined by the priority program. This may lead to these remaining programs having a gap at the beginning and end of the file.

Make PSI/SI/PSIP seamless The service information contained in the transport stream is processed to make it seamless.

If this checkbox is not enabled, the SI is not processed but simply copied to the output transport stream.



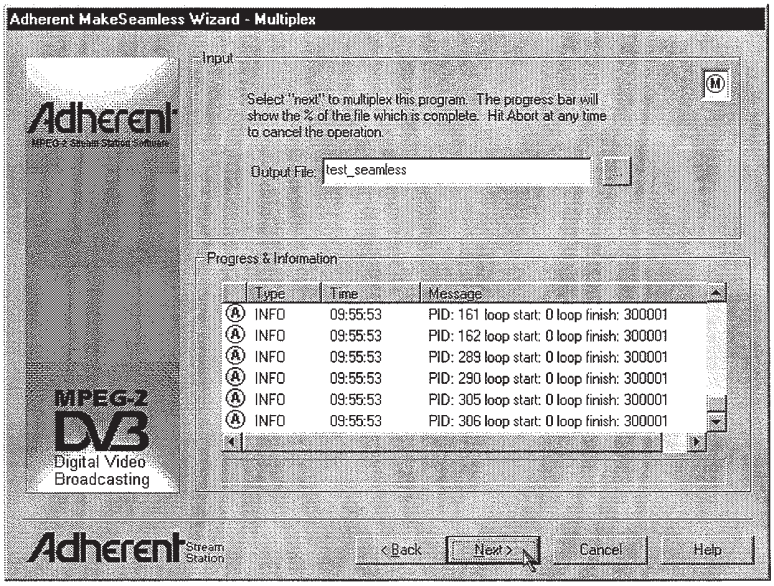
Select **Next**. Once again the progress bar will indicate progress. While the stream is being analysed, selecting the **Abort** button will stop the process and allow the program to be reselected (Note that the **Abort** button, which replaces the **Cancel** button, is only displayed during processing).

When the file has been analysed, a number of messages will have been posted in the Progress & Information log.

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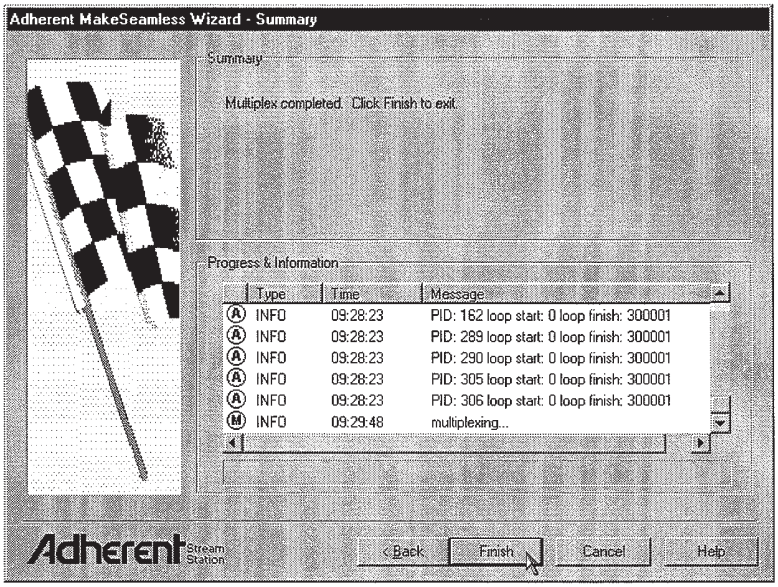
Selecting a Multiplex Output File

When a file has been analysed and found suitable for making seamless, an output file must be named.



A new filename can be typed or an existing file selected using the Browse button (...), in which case confirmation of the replacement will be required. Select **Next** to create the multiplexed output file.

The screen shown below is displayed upon completion of the process.



The output file will contain a program which when played out and looped with the Continuous Time Stamping option enabled will demonstrate minimal picture disturbances at the loop point.

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Adherent Stream Source

Transport Stream Cutter

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AD991 Stream Source Product - Transport Stream Cutter

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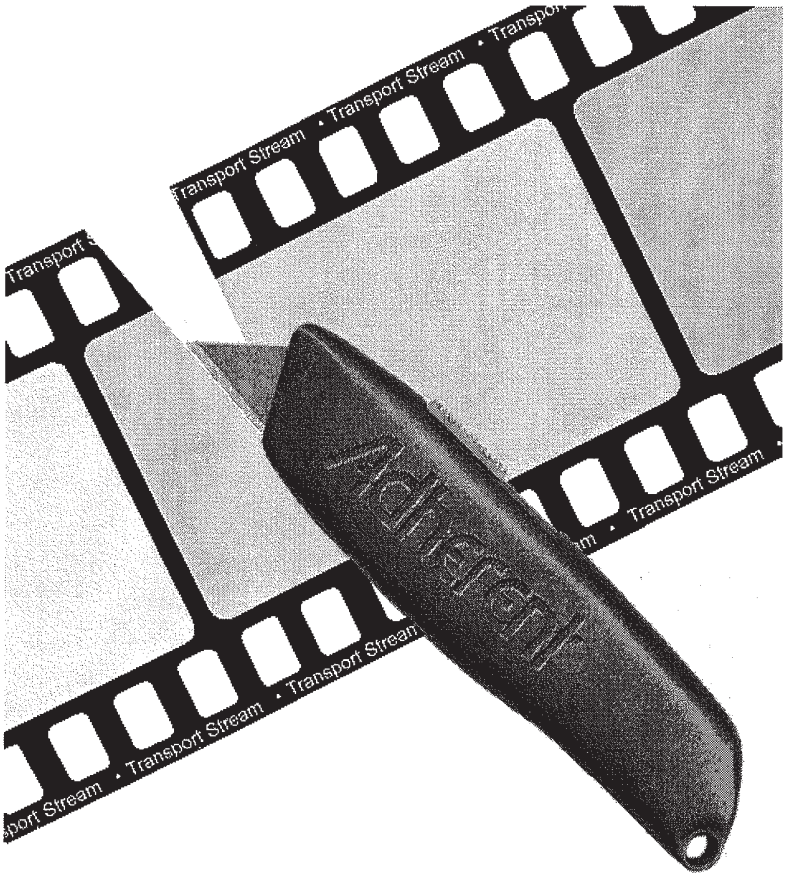
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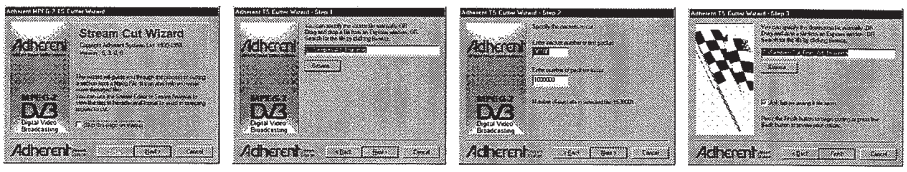
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Introduction

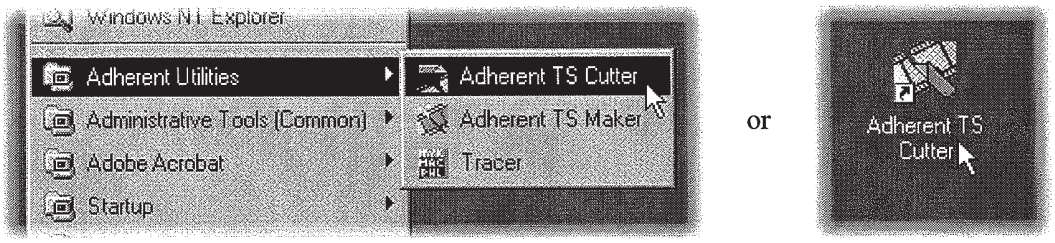
This is a Wizard which creates a new file from a slice of an existing file. It may is run from the Windows™ desktop. There are 4 pages including the optional introduction page:



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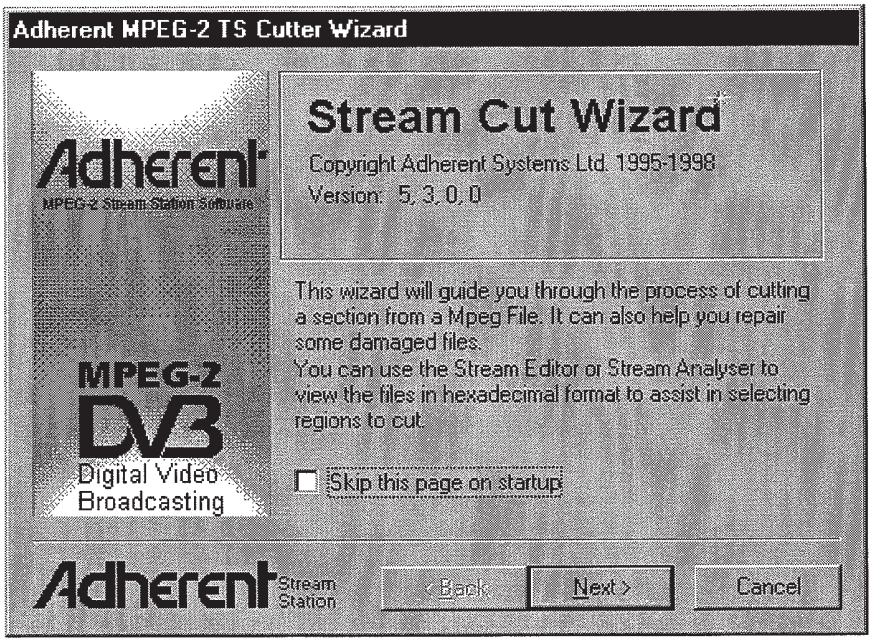
Starting the Wizard

The wizard may be started by selecting the **Adherent TS Cutter** option from the **Adherent Utilities** sub-menu of the **Start -> Programs** menu (left). Alternatively double click on the **Adherent TS Cutter** Shortcut on the desktop (right).



Cutting a File

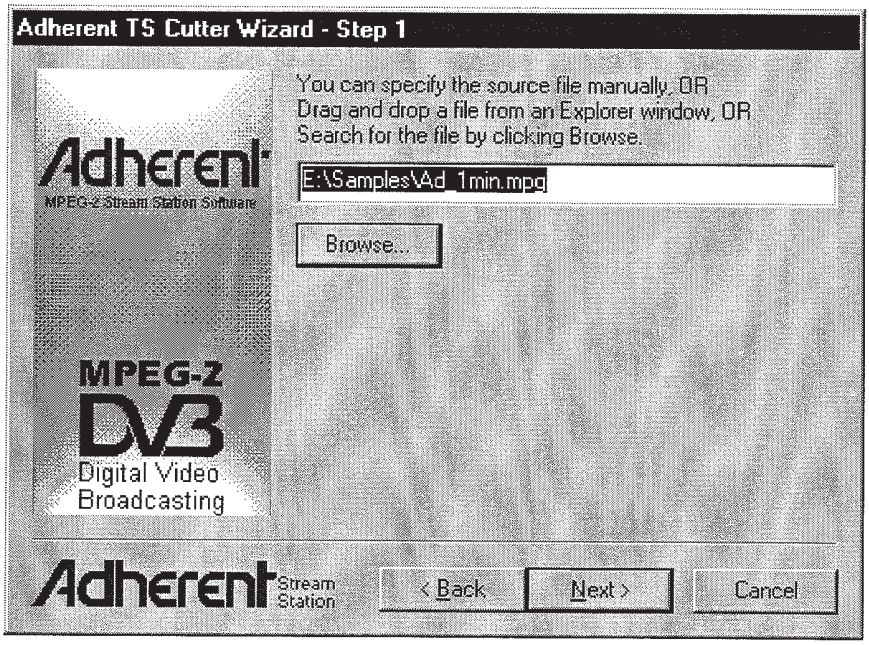
By default the wizard will display this Introduction first.



It may be disabled by checking the **Skip this page on startup** option. Select the **Next** button to move on to Step 1.

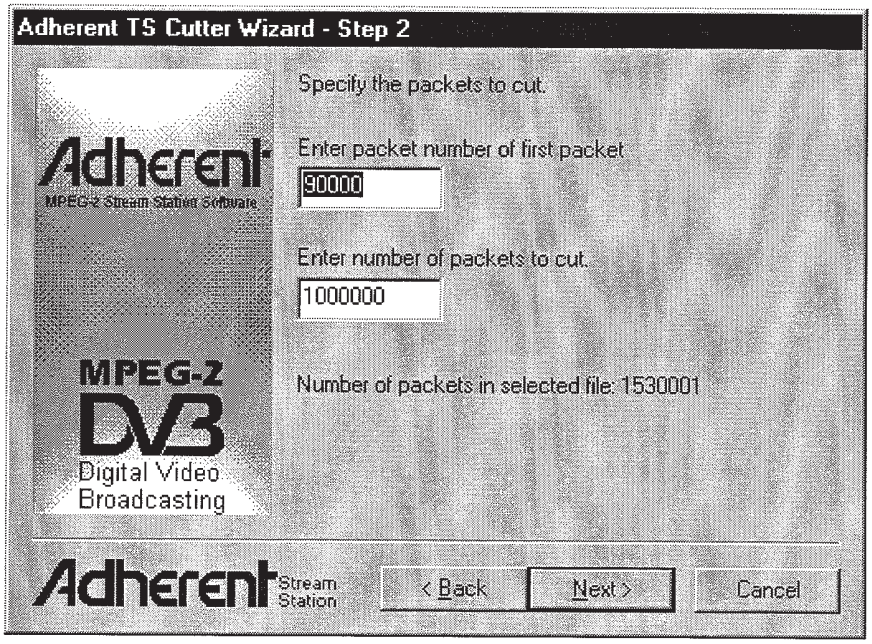
Step 1 - Specify the name and location of the source file to copy a slice from:

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Select the **Browse...** button to open a standard file browser window to look for and choose the required file. Then select the **Next** button to move on to Step 2.

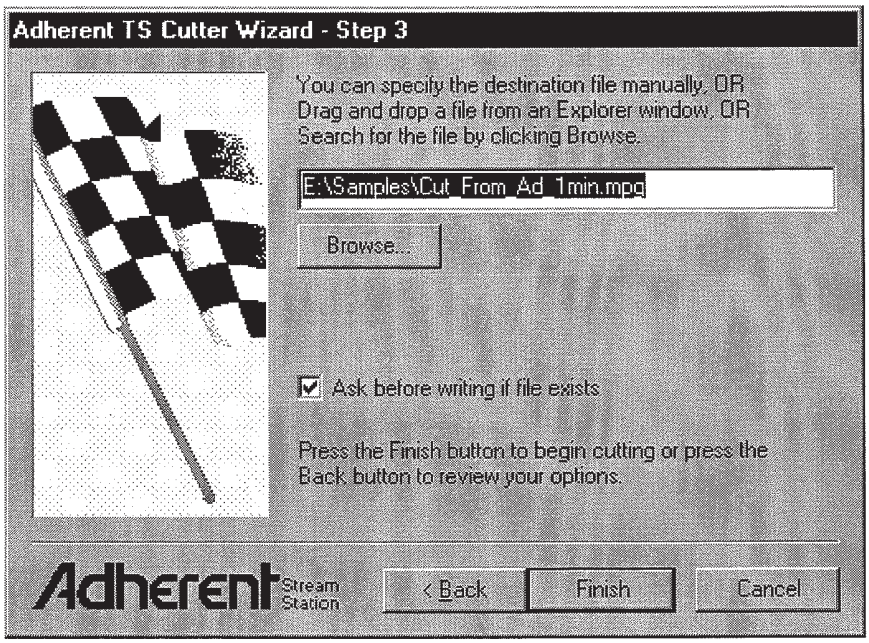
In step 2 the slice is specified by typing in the first and last packet to copy. The defaults values are the first and last packet numbers in the source file. In this example they would have been 0 and 1530001.



Selecting the **Back** button will return to Step 1 so that the source file name and location may be changed.

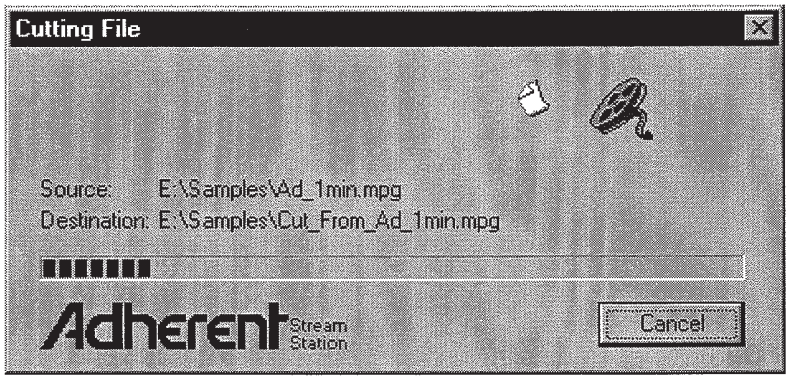
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Step 3 is the last. Specify the name and location for the new file



Select **Finish** to create the file and copy over the required slice of data. Select **Back** to go back to change the source file, start and end packet numbers.

The wizard now creates the new file and copies over the selected data as specified. While it is working this dialog is displayed to indicate progress.



When the blue progress indicator reaches the right hand side the dialog disappears and the file is ready to use.

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Adherent Stream Source

Transport Stream Maker

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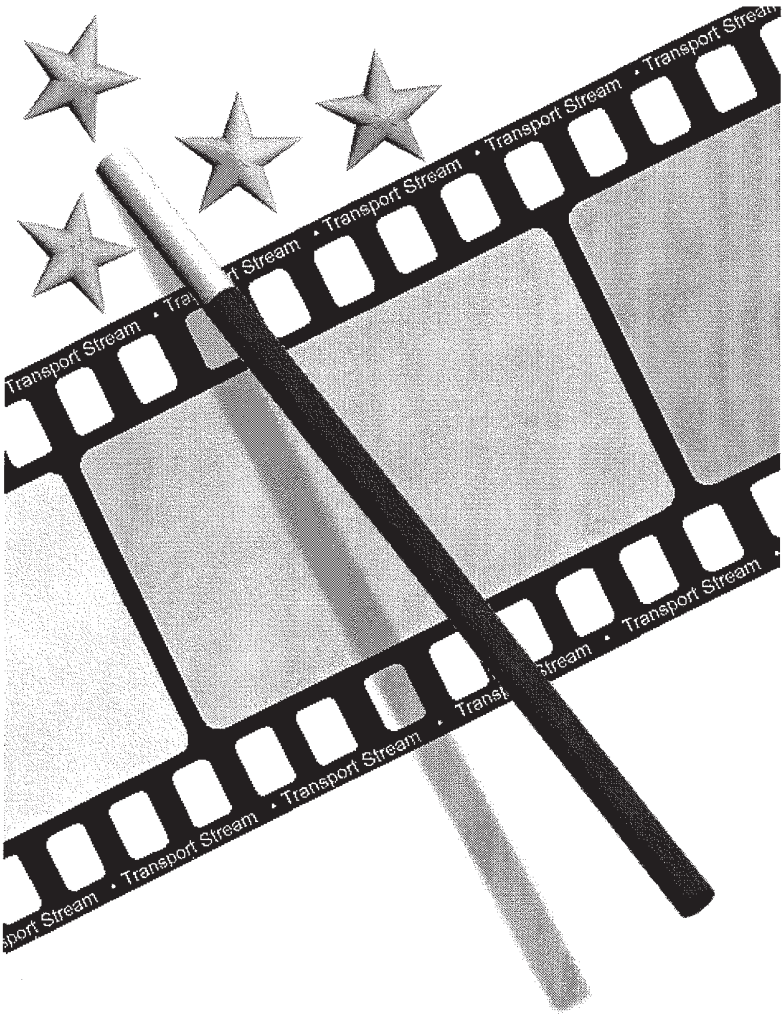
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E-mail - Technical Support: support@adherent.com

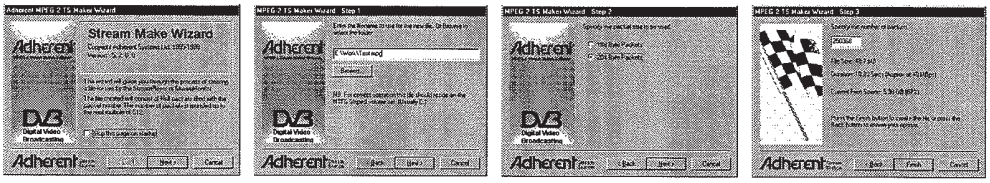
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Introduction

This Wizard creates and initialises a new, empty file for recording transport streams in. The file is not a valid MPEG-2 stream until a complete recording has been made to it by TS Player or Monitor/Recorder. TS Maker may be run from the desktop, TS Player and TS Monitor/Recorder. There are 4 pages including the optional introduction page:



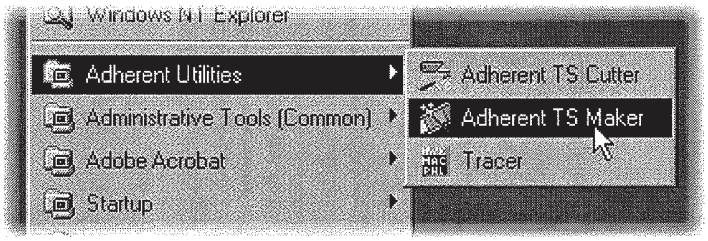
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Starting the Wizard

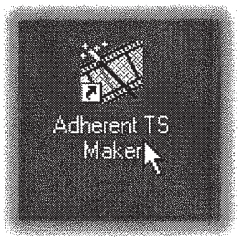
Transport Stream Maker may be run from the Windows™ desktop or from one of the programs which can record streams.

From the Desktop

The wizard may be started by selecting the **Adherent TS Maker** option from the **Adherent Utilities** sub-menu of the **Start -> Programs** menu (left). Alternatively double click on the **Adherent TS Maker** Shortcut on the desktop (right).

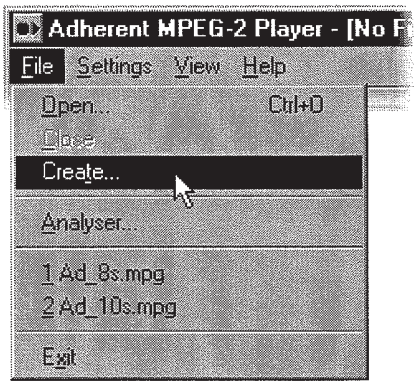


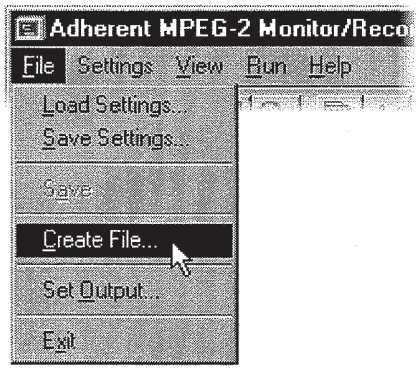
or



From Another Program

A menu option to create a new file, using this wizard, is available from both the TS Monitor/Recorder and TS Player programs. Select the **Create...** option from the **File** menu of either program:

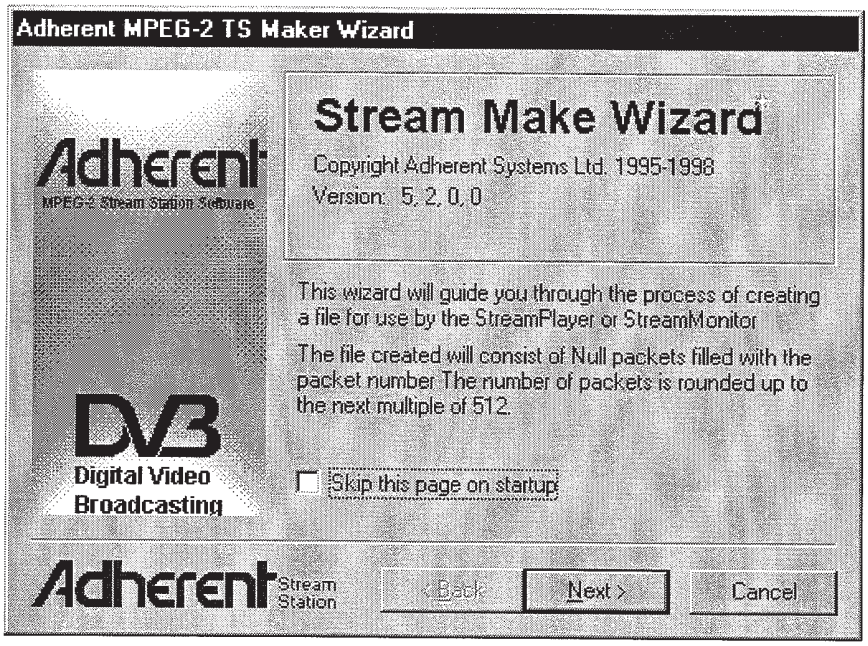




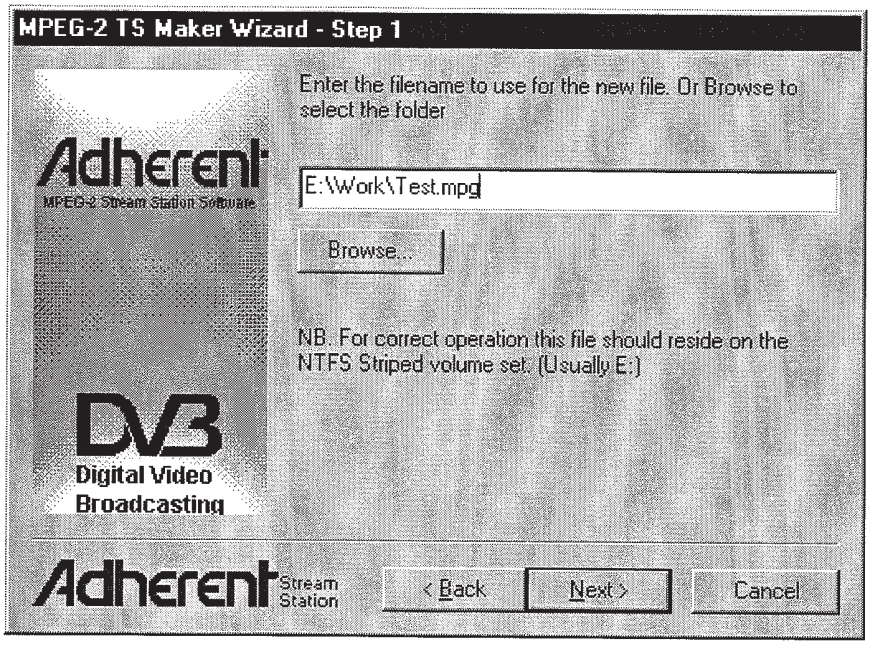
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Making a File

By default the wizard will display this Introduction first.



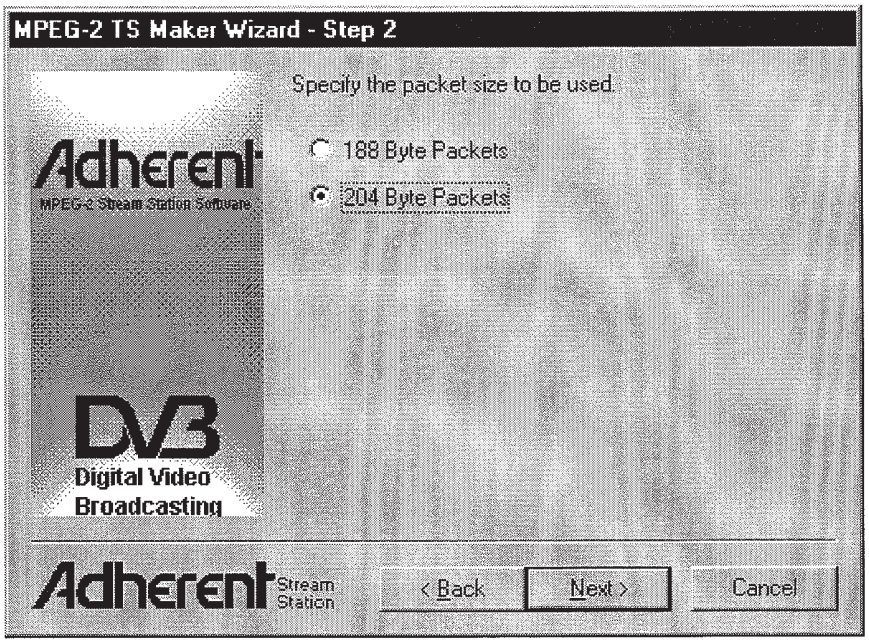
It may be disabled by checking the **Skip this page on startup** option. Selecting the **Next** button moves on to Step 1 - Specifying the name and location for the new file:



Select the **Browse...** button to open a standard file browser window for choosing a directory and naming the file. Then select the **Next** button to move on to Step 2.

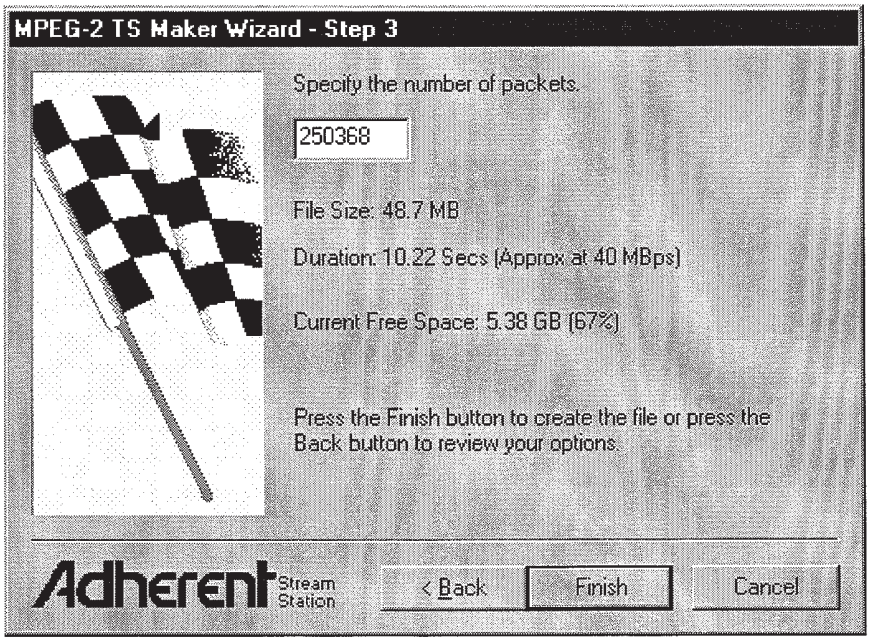
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In step 2 the packet size is specified.



Choose 188 byte or 204 byte as required and then select the **Next** button. Clicking on the **Back** button will return to Step 1 so that the file name and location may be changed.

Step 3 is the last. Specify the size of the file by the number of packets it will hold. Select the text box and edit the number as required.

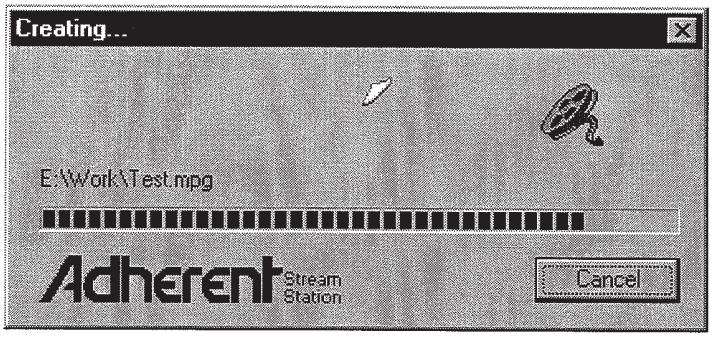


The size of the file that will be made is shown in bytes. An estimate of file size in run time is also displayed assuming a data rate of 40.0Mbit s^{-1}. Both of these sizes are updated to reflect changes in the number of packets as new values are typed in.

Select **Finish** to make the file or **Back** to change the packet size, file name or location.

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The wizard now creates the new file as specified. While it is working this dialog is displayed to indicate progress.



When the blue progress indicator reaches the right hand side the dialog disappears and the file is ready for recording to.

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Adherent Stream Source

BS Digital Multiplexer

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Stream Source Product Family - BS Digital Multiplexer

Adherent Document: SI287v10 Issue 1.0a

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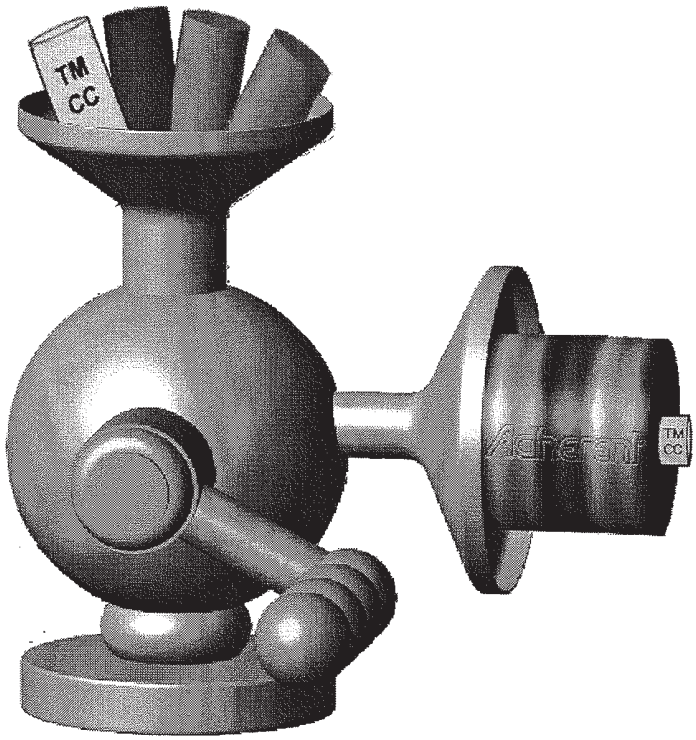
Source Document: SI201v11b.doc

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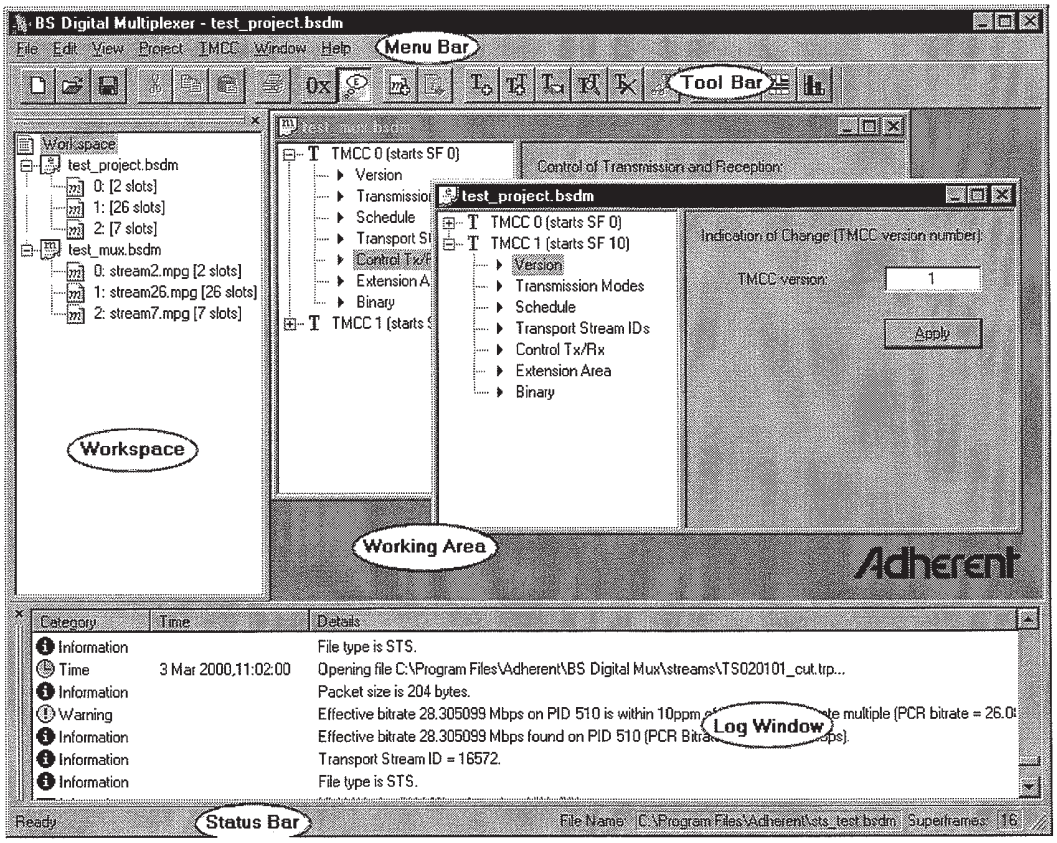
BS Digital Multiplexer

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Introduction

Adherent's Broadcast Satellite Digital Multiplexer (BSDM) provides off-line multiplexing of existing transport streams and TMCC information in order to produce ISDB-S transport streams. It can also be used to demultiplex existing ISDB-S transport streams and allow the TMCC information to be edited.

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BSDM is a complete multiplexer, demultiplexer, editing and analysis tool for ISDB-S transport streams. The application enables the following activities:

- Creation of ISDB-S transport streams comprising one or more MPEG or STS files and TMCC information.
- Analysis of ISDB-S transport streams, showing constituent TMCCs, transport streams and continuity information; a number of conformance checks are also performed.
- Extraction of one or more MPEG or STS transport streams from an ISDB-S multiplex.
- Creation of hierarchical STS transport streams.
- Editing of ISDB-S transport streams, including addition and removal of MPEG and STS files and modification of TMCC information (including schedule and modulation modes).

STS (Special Transport Stream) files are MPEG files that contain ARIB SI and TMCC information.

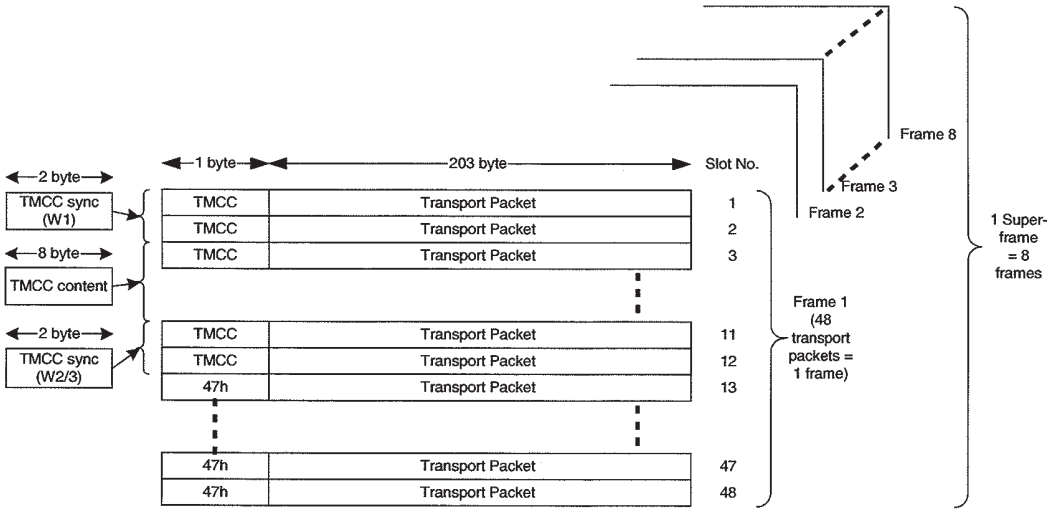
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ISDB-S Overview

Up to eight transport streams can be multiplexed together to form an Integrated Services Digital Broadcasting – Satellite (ISDB-S) transport stream. The information describing the multiplexing and other information, such as modulation type, are described in the Transmission and Multiplexing Configuration Control (TMCC) information. The TMCC information is carried in the sync bytes of the transport stream packets.

Each TMCC signal is 64 bytes long, i.e. 48 bytes of TMCC information plus 16 bytes of outer coding (parity, etc.). A frame comprises 48 transport stream slots each of 204 bytes. Eight bytes of TMCC are transmitted in the first 12 bytes of each frame, with four bytes of markers (W1, W2 and W3). A super-frame comprises eight frames. Therefore, a complete TMCC is transmitted in each super-frame.

The ISDB-S specification refers to a transport packet as a slot. This convention is used in this section of the manual.



TMCC information is assembled and transmitted two super-frames before the information to which it refers becomes active.

TMCC Information Content

Each 48 byte block of TMCC information comprises the following information:

Content Change (5 bits)	Transmission Mode and Slot Allocations (40 bits)	Relative TS and Slot Allocation (144 bits)	Relative TS and TS ID (128 bits)	Control Tx/Rx (5 bits)	Extension Area (62 bits)

Content Change
is incremented every time the TMCC contents change.

Transmission Mode and Slot Allocation
indicates the transmission mode and the number of slots that will be required in each frame.

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Relative Transport Stream and Slot Allocation
indicates the relative transport stream number. Range: 0 to 7.

Relative Transport Stream and Transport Stream Identity
indicates the identifier for each relative transport stream number.

Control Tx/Rx
Reception and transmission control.

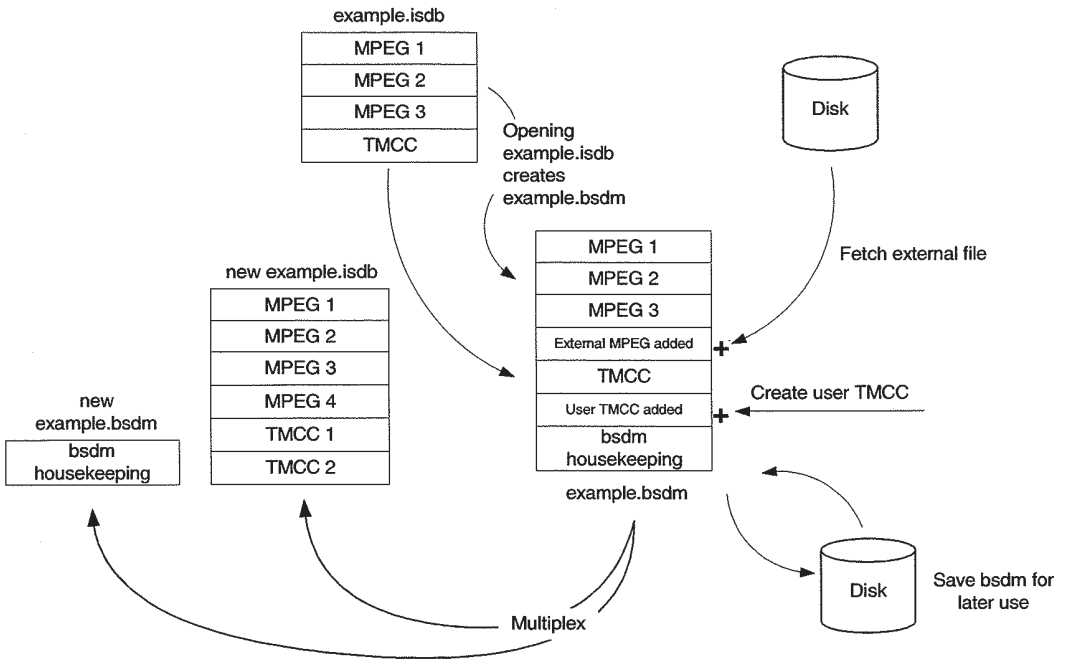
Extension Area
extends the content of the TMCC when required.

Note that the above is given only for information. The correlation between the prescribed TMCC information (given here) and the on-screen presentation (described below) is not exact, since the on-screen information combines some fields *and* provides extra information to make editing easier and more logical.

Refer to *ARIB STD-B20 Digital Broadcasting System and Related Optional Guidelines for Broadcasting Satellites* [1].

Project File

The ISDB-S streams are compiled by the BS Digital Multiplexer with the aid of a project properties file (*.bsdm). The project file contains all the information needed to generate ISDB-S stream file. This includes references to input MPEG and STS files, TMCC information and an output filename (e.g. *.isdb). A project file is automatically created when a new ISDB-S stream is created from constituent files.



If an ISDB-S stream is analysed and no project file exists, a new project file is generated. In this instance, there are some restrictions on the extent of further editing.

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When the stream is finally multiplexed, the information held in the project properties file is integrated into the output stream. Only housekeeping information is retained in the properties file.

STS Files

This section is provided for guidance in handling STS files.

Because the STS files contain TMCC which may conflict with the TMCC already existing in a project, there are certain rules which are applied to determine if an STS stream can be added and then whether it can be allocated space in the schedule.

Adding STS Files

If the TMCC for the STS file is inconsistent or contains irregularities, including:

- If PIDs appear under two different modulation modes within the same TMCC
- Changes in TMCC which are less than two superframes apart
- Duplicate modulation modes in the same TMCC (each modulation mode should only appear once per TMCC)
- Invalid values in TMCC
- More than 48 slots allocated in total.

...the STS file will be rejected.

Allocating STS Files

Once an STS file has been added to a project it can be allocated space in the schedule. The system will attempt to merge the TMCC information from the STS with the existing TMCCs which the user has added (there must be at least one).

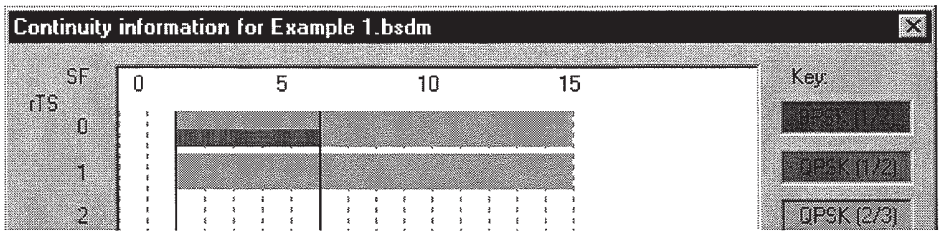
The position of each TMCC is calculated and either the STS TMCC information is added to the existing TMCC or a new TMCC is created to represent the STS TMCC at this point in the output stream.

If the system adds a TMCC it will be fixed and read-only. The user has no need to edit these TMCC as they are removed (and possibly replaced) each time the allocation of rTS streams is changed. Any allocation of other streams is copied into the new TMCC by the system. For example in the partial continuity dialog shown below, an STS has been allocated for which the system adds a TMCC at Superframe 7. The allocation of rTS 1 (QPSK(2/3) is carried over into the new TMCC.

If the user removes a file then any TMCC that has been added for that file is removed.

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If a TMCC does not allocate an STS but a following one does the TMCC information in the STS file is effectively delayed. Any TMCCs added for the STS will reflect this delay. For example:



- The above extract from the continuity dialog shows a delay of two superframes on the STS stream. The second TMCC which appears at Superframe 5 in the STS file now appears at Superframe 7 in the output file.

The following rules must not be broken:

- Any TMCC added for an STS must have a separation of two superframes from all other TMCCs in the project.
- Adding the TMCC would not cause the total allocation to be greater than 48 packets.
- Adding the TMCC would not cause more than four distinct modulation modes to be present in any TMCC.

…if they are the allocation is not permitted and all changes are removed.

Multiplexing STS Files

When multiplexing files the system automatically loops MPEG files. To be consistent the system also automatically loops STS files. However, in order to maintain consistency of the generated output, the following conditions apply:

- An STS file that contains more than one TMCC can not be looped (and therefore the project cannot be multiplexed).
- Only a whole number of superframes is multiplexed.
- Only packets beginning at the first superframe of the STS are multiplexed (other packets before the first packet that indicates a superframe start, are dropped).

Analysis of ISDB Files

ISDB-S files may have been created using STS streams, MPEG streams or a mixture of the both.

The STS allocations within an ISDB file can not be changed, unlike the MPEG components that can be have their modulation modes changed before remultiplexing the ISDB stream. This is because changing the allocation of an STS file often results in the removal or addition of a TMCC – but the TMCCs in an ISDB file are fixed and cannot be moved or deleted.

To work around this limitation, the STS file (and any other internal MPEG files required) can be exported and imported into a new project. The necessary allocations can then be made before multiplexing to a new ISDB file.

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Extraction of STS Files

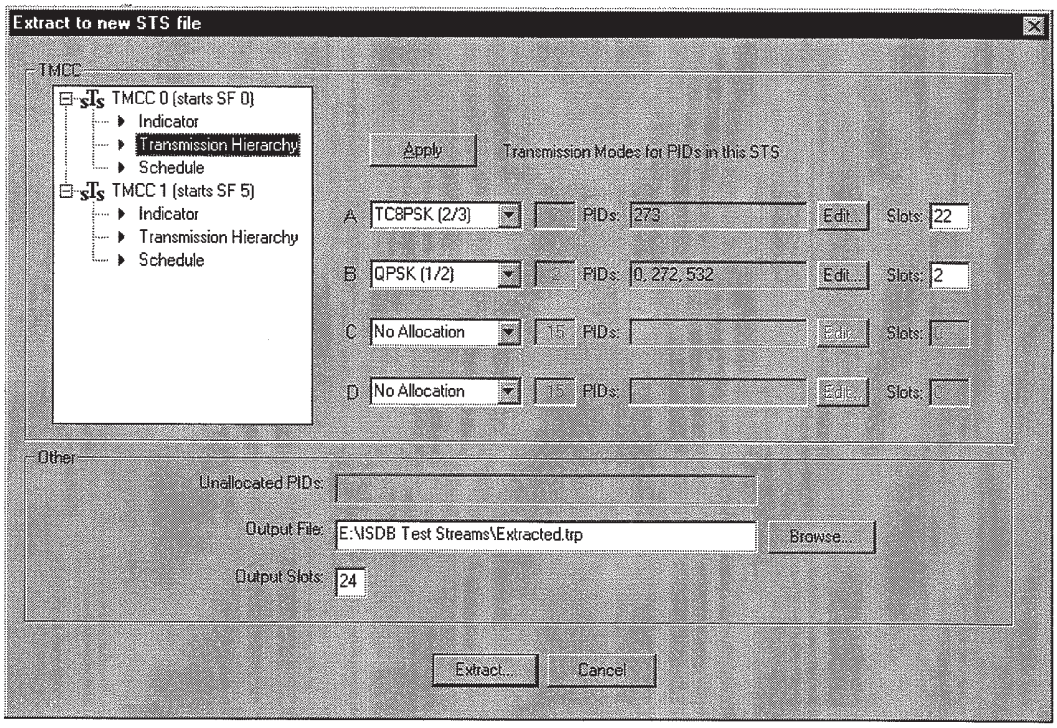
STS files can be extracted from an edit project (as can MPEG files). In addition to simply extracting the file the user can make changes to the file. The changes that can be made include the following:

- Change the modulation mode and slot allocation.
- Change the bitrate of the file.
- Add a new modulation thereby allowing creation of hierarchical STS streams.
- Move individual PIDs to a different modulation mode.
- Add or remove TMCC from the stream.

These changes only affect the new stream that is created as part of the extraction process and have no effect on the original data.

Because this process effectively produces a new stream it can be done on files in both 'edit' and 'mux' projects. In addition, a new STS stream can be created from an MPEG stream in an 'edit' project.

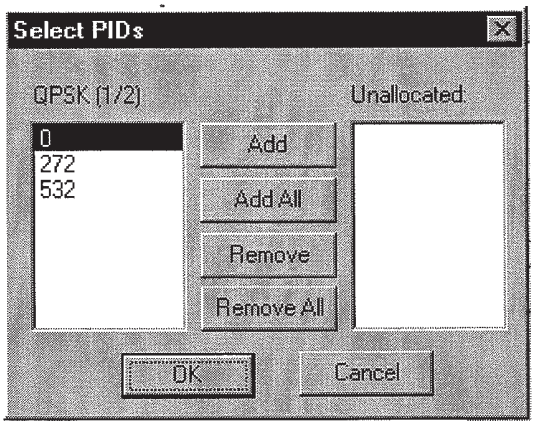
The following dialog is used to create the new STS stream:



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Adjacent to each transmission mode is a list of the PIDs allocated to the mode. These can be re-arranged by selecting **Edit...** which displays the following dialog.

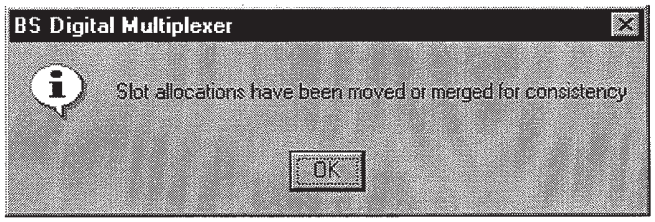
PIDs allocated to the selected transmission mode are listed in the left-hand panel. Any unallocated PIDs in the stream are shown in the right-hand panel.



PIDs can be moved between the two panels either by highlighting individual PIDs and using **Add** or **Remove** or by using **Add All** and **Remove All**. To allocate newly unallocated PIDs to another mode, select **Edit...** for the appropriate transmission mode and move the required PIDs.

Notes:

- The TMCCs initially presented to the user are those from the STS file (not from the ISDB file).
- In the case of extracting an MPEG file as an STS file, a single TMCC is initially created which has one modulation mode (i.e. TC8PSK(2/3)) for all the PIDs.
- The output slots must equal the total number of slots allocated for the different modes (this applies to each TMCC).
- All PIDs *must* be allocated to a mode.
- The allocation modes can appear in any order *but* after pressing the apply button these modes will be reordered according to decreasing modulation mode (STS TMCC must be ordered in this way). The following warning will appear if this has happened:



  This message will also appear if the same allocation mode is used more than for a TMCC. In this case, the slot allocations will be merged into a single allocation.

- The number of slots allocated to each mode must be a multiple of the total number of slots that mode requires.

When the user selects **Apply** (or **Extract**) the system checks that the new allocation will fit within the output file. In any one frame, if the number of packets required (taking into account the dummy packets which will be inserted according to the modulation modes) exceeds the maximum number of packets per frame, an error will be issued. Errors are reported in the log, for example:

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Category	Time	Details
Time	17 Feb 2000,09:59:03	Starting hiearchical modulation check of STS (rTS 0)...
Error		Allocation exceeded at SF 0:0 - 15 slots required, 8 slots allocated (mode is TC8PSK (2/3))
Error		Allocation exceeded at SF 0:1 - 15 slots required, 8 slots allocated (mode is TC8PSK (2/3))
Error		Allocation exceeded at SF 0:2 - 15 slots required, 8 slots allocated (mode is TC8PSK (2/3))
Error		Allocation exceeded at SF 0:3 - 15 slots required, 8 slots allocated (mode is TC8PSK (2/3))
Error		Allocation exceeded at SF 0:4 - 15 slots required, 8 slots allocated (mode is TC8PSK (2/3))
Information		Limit of 5 allocation errors detected - stopping analysis
Time	17 Feb 2000,09:59:03	Analysis failed... extraction will not proceed

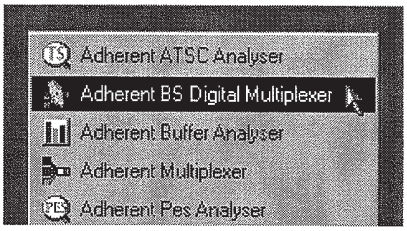
The error message indicates the superframe and frame position of error. For instance in the above example the first frame there are 15 packets for PIDs allocated to mode TC8PSK but only eight slots have been allocated.

Any error means that the file extraction will not proceed; it is not allowable to exclude the packets which can not be accommodated. However, although a single error stops extraction the system will carry on checking the allocation of packets (until a user defined maximum limit is reached – five in the above example. This limit can be set in the Options dialog). This helps the user to see other allocation errors that will occur rather than fixing one only to find another similar problem a few superframes later.

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Starting the Program

The program can be started by selecting the **Adherent BS Digital Multiplexer** option from the **Start** > **Programs** menu.

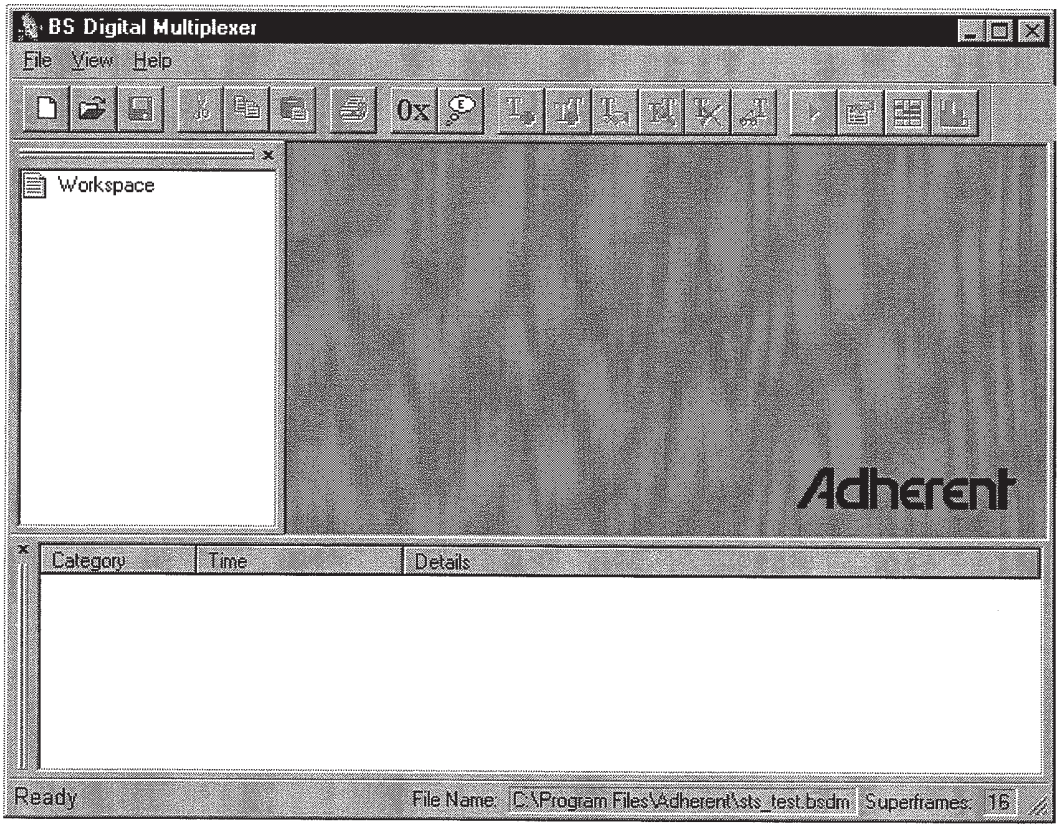


or by double-clicking on the **Adherent BS Digital Multiplexer** shortcut on the desktop.



Initial Appearance

Once the program has started and is ready for use, it will open a window similar to that shown below.



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Initial Menu Options

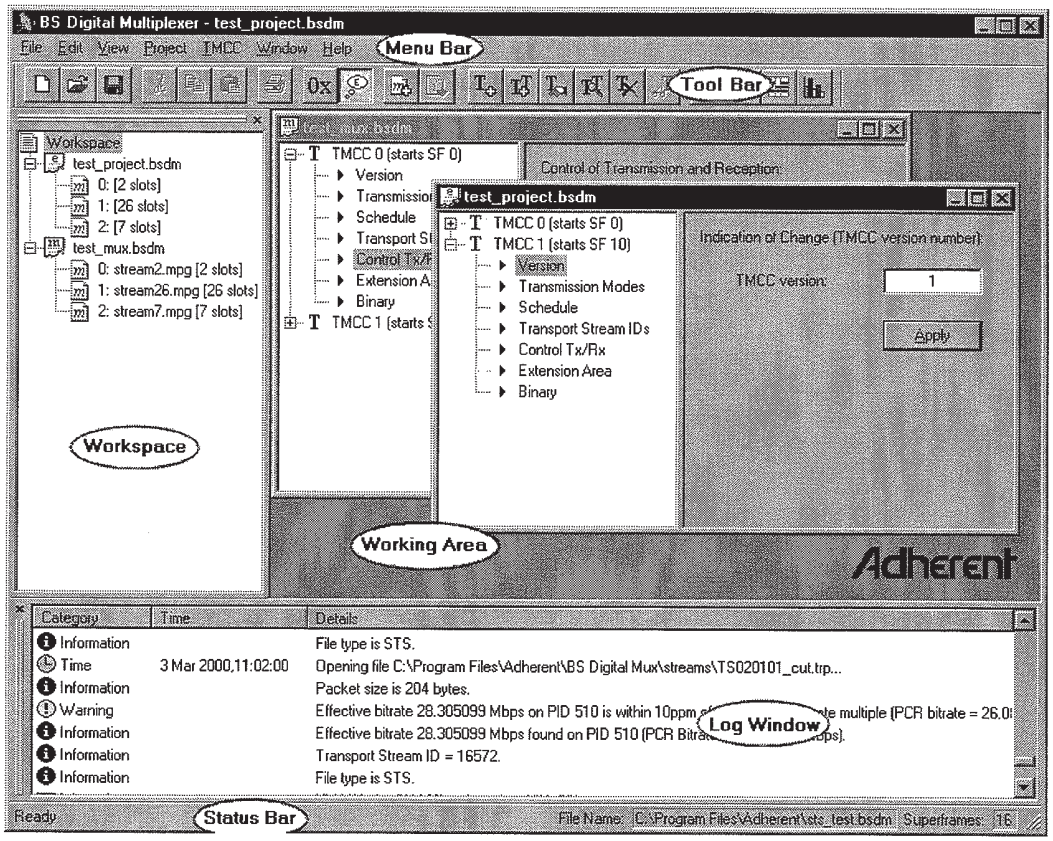
Initially, before any file is opened, BSDM presents only the File, View and Help menus (described in *Menus and Options*, page 14).

Opening an ISDB-S File

When opening an ISDB-S transport stream the following rules apply:

- If a project file (*.bsdm) of the same name exists, then the information subsequently displayed will have been extracted from the project file.
- If no project file of the same name exists, then the transport stream is analysed and a project file (of the same name) created.

Main Window



The main window comprises the following items:

- Menu Bar
- Toolbar
- Workspace window
- Working area
- Log window
- Status Bar

By default, the Workspace and Log windows are displayed; subsequent display selections may change the initial layout. The remainder of the main window (Working Area) remains blank until a project is opened.

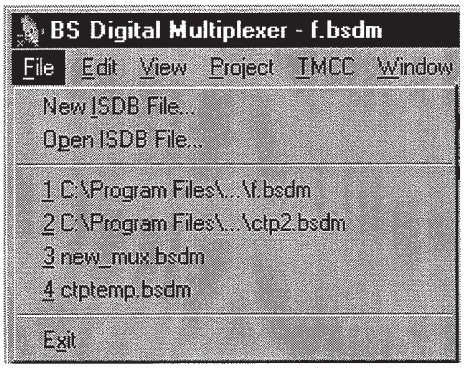
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Most commands are available via three routes: as a menu option, using a toolbar button or from a context-sensitive right-click menu. All commands are available from the Menu Bar. In describing activities, the following descriptions favour the right-click menu method, but the final choice of working practice rests with the user.

Menus and Options

This section outlines the menu options available. Where a command is available via a keyboard shortcut or a toolbar button, these are also given.

File Menu Options



New ISDB File...
Creates a new ISDB file.

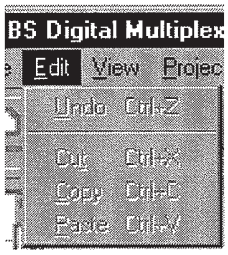
Open ISDB File...
Opens (and analyses) an existing ISDB file.

1 <filename>
A list (up to four) of the most recently used files. Selecting a filename opens that file for use.

Exit
Closes the BSDM application.

Edit Menu Options

(None of the Edit options are implemented; they are described for information only.)



Undo — Undoes the last action.

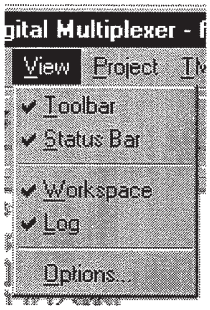
Cut — Cuts the active ISDB file. It is stored temporarily on the Windows clipboard.

Copy — Copies the active ISDB file to the Windows clipboard.

Paste — Pastes the ISDB file currently held on the Windows clipboard to the workspace.

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View Menu Options



Toolbar — Toggles the toolbar between being displayed or not. Select the option to change the state.

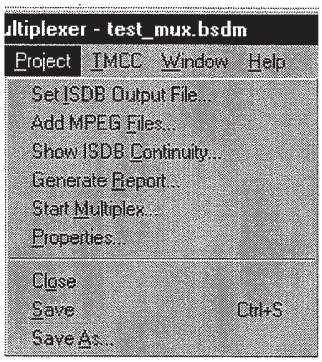
Status Bar — Toggles the status bar between being displayed or not.

Workspace — Toggles the window in which the workspace information is displayed.

Log — Toggles the window in which the log file is displayed.

Options... — Opens the Options dialog (see Options…, page 39).

Project Menu Options



Set ISDB Output File...
Allows the current ISDB stream in a Mux project to be (re)named.

Add MPEG Files...
Adds MPEG files to the current project.

Show ISDB Continuity...
Displays TMCC continuity graphically.

Generate Report...
Displays a text-based report of all project properties and parameters.

Start Multiplex...
Starts the multiplex engine to create a TMCC transport stream.

Properties...
Opens the project properties dialog of the currently highlighted project.

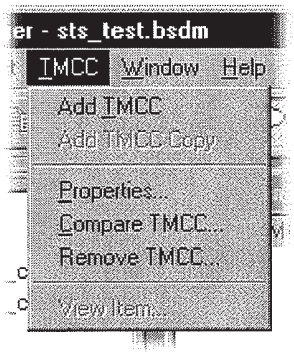
Close
Closes currently selected project.

Save **Ctrl+S**
Saves currently selected project.

Save As...
Saves currently selected project under a new/ different name.

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TMCC Menu Options



Add TMCC
Adds a TMCC to the currently highlighted project.

Add TMCC Copy
Copies the currently highlighted TMCC within the project.

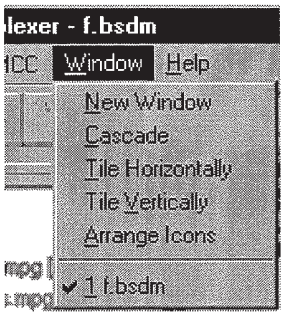
Properties...
Opens the properties dialog of the currently highlighted TMCC.

Compare TMCC...
Opens the Compare dialog which allows two TMCCs to be compared.

Remove TMCC...
Removes the currently highlighted TMCC.

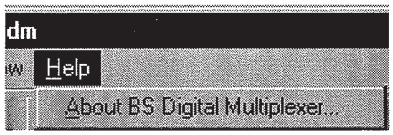
View Item...
View the currently highlighted TMCC parameter.

Window Menu Options



New Window	Opens a new TMCC window containing a copy of the current TMCC.
Cascade	Cascades all the open TMCC windows in the workspace.
Tile Horizontally	Tiles all the open TMCC windows horizontally in the workspace.
Tile Vertically	Tiles all the open TMCC windows vertically in the workspace.
Arrange Icons	Aligns icons of any minimised TMCC windows at the bottom of the workspace window.
1 <window title>	Makes the named TMCC window active, bringing it to the front of any windows that may have been hiding all or part of it.

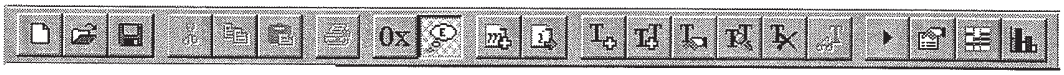
Help Menu Options



About BS Digital Multiplexer...
Opens the About dialog which gives details of the application's serial number and software version.

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Toolbar



The Toolbar provides a set of convenient shortcuts for the more frequently used menu options. Buttons will be greyed out in line with their availability. A tooltip will be displayed briefly if the mouse is rested over a button.

Most of the toolbar buttons are identified in the foregoing section as shortcuts to menu options. In addition, the following two buttons provide shortcuts to the BSDM Options (**File ➔ Options...**).

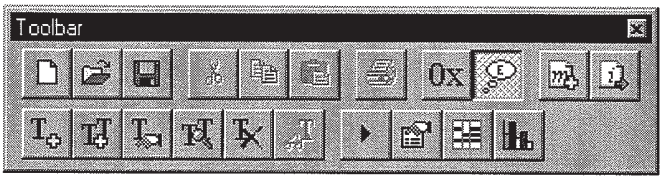


Toggles the display of hexadecimal and decimal values throughout the application.



Toggles Expert mode on and off. Expert mode allows some TMCC values, such as **Version**, to be edited.

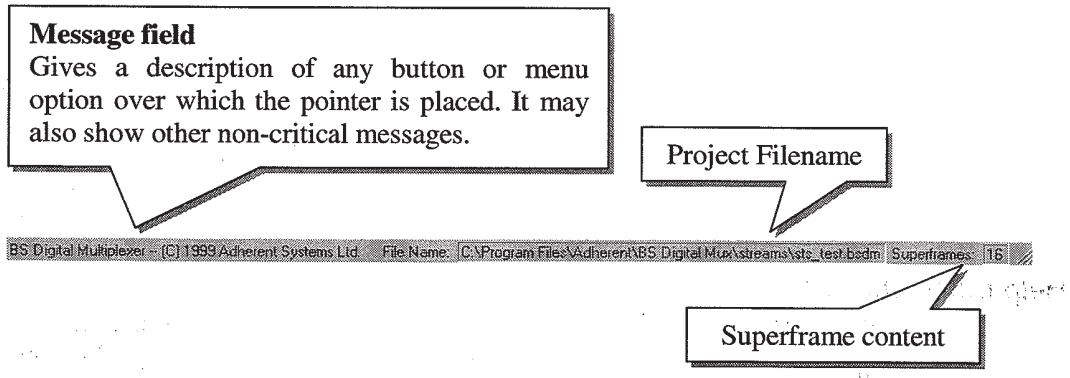
The Toolbar can be dragged off the edge of the main window to create a floating pallet. To do this place the mouse pointer on the background of the Toolbar, i.e. not on one of the buttons, hold the left mouse button down and drag the outline where required. The result will be the Toolbar in a self-contained window, thus:



To re-integrate the Toolbar with the window border, drag the outline over the border until the outline changes shape and then release it. The Toolbar can be placed on any of the four edges.

Status Bar

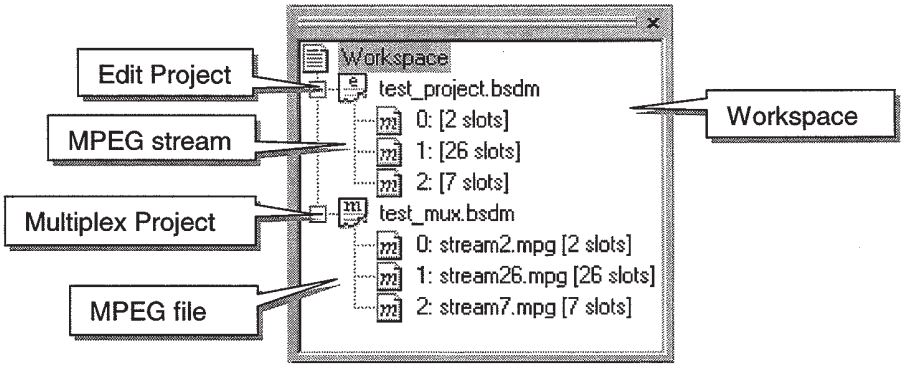
The Status Bar may be hidden from view, but when visible is always at the bottom of the main window.



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Workspace Window

The Workspace window shows the MPEG files and/or ISDB-S files contained in each project. Multiple projects can be loaded into the workspace at any one time, as illustrated by the screenshot below.



The screenshot shows the two different project types, namely Multiplex and Edit.

A Multiplex project ( ) (red icon) is one in which the project file was created at the same time as the ISDB-S file was first multiplexed; that is, the project file references the constituent MPEG files ( ) (blue icon).

An Edit project ( ) (red icon) is one where the project file is created from an existing ISDB-S file; therefore the BSDM can only perform further edits; more MPEG files( ) can be added to an Edit project.

The restrictions placed upon an Edit project are:

- The overall ISDB-S file length may not be altered.
- The TMCC super-frame start number cannot be edited.
- A TMCC version cannot be removed.

Workspace Icons

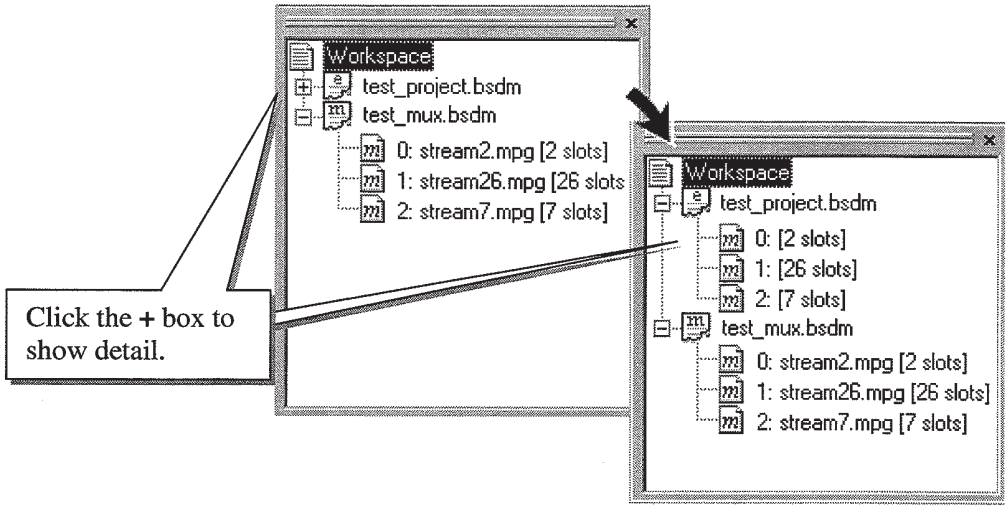
The following icons are used in the workspace.

Project Icons		Colour Coding
Multiplex		Red
Edit		Red
File Icons		
MPEG		Blue – external file Green – internal file
STS		Blue – external file Green – internal file

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Workspace Control

Projects are represented by a tree structure diagram, with the 'root node' or highest level being the Workspace. Components that contain more information beneath them in the structure are indicated by a square box (⊞ / ⊟).



Clicking on a box does not select that node, it only shows or hides the level of detail under that node.

If the node has a minus sign (⊟) in the box, the level of detail below it is currently displayed. Clicking on the box will hide the detail.

If the box contains a plus sign (⊞), there is a hidden level of detail. Clicking on the box will show the detail.

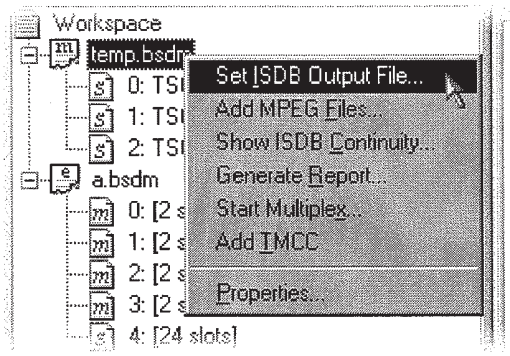
Components which are directly connected to the tree (with out a ⊞ or ⊟ box) are leaf nodes, below which there is no further detail. These correspond to MPEG files or information nodes.

The number preceding the colon before each MPEG file is the relative transport stream identity (rTS). The number after the filename (in square brackets) is the bitrate of the MPEG file in terms of slots per frame.

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Multiplex Project Activities

With a project highlighted in the workspace, the right-click menu is as shown:



Set ISDB Output File...

This command is only enabled for Multiplexed projects.

During the creation of a mux project, the ISDB output file must be named. Note that until the project is multiplexed, the ISDB output file will not be fixed (When the file is multiplexed, an ISDB output file of the same name will be created).

Select **Set ISDB Output File...** from the right-click menu. A standard Windows Save dialog is displayed. Enter the required name of the ISDB file and select the destination.

Add MPEG Files...

MPEG files can be added to Multiplex and Edit projects.

Select **Add MPEG Files...** from the right-click menu. In the dialog displayed highlight one or more MPEG files and select OK. The files will be added to the project (blue icon - m); Relative transport stream identity numbers will allocated automatically but can be changed manually.

The bitrate of any MPEG file selected must a multiple of 56.61Mbit/s divided by 48. The file can be either 188 or 204 byte slots (packets). The value 56.61Mbit/s assumes 204 byte slots.

188 byte packets must be a multiple of 52.17Mbit/s divided by 48.

Show ISDB Continuity...

The Continuity screen provides a graphic illustration of the continuity of the MPEG files in a project.

Select **Show ISDB Continuity...** from the right-click menu. The subsequent display is shown on page 38.

Generate Report...

Project reporting displays all of the project properties and parameters.

Select **Generate Report...** from the right-click menu. A text-based report window is opened containing all the project information.

(See Project Reports, page 38)

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Start Multiplex...

Starts the multiplex activity using the accumulated project information (MPEG files, and TMCCs) to create an ISDB file.

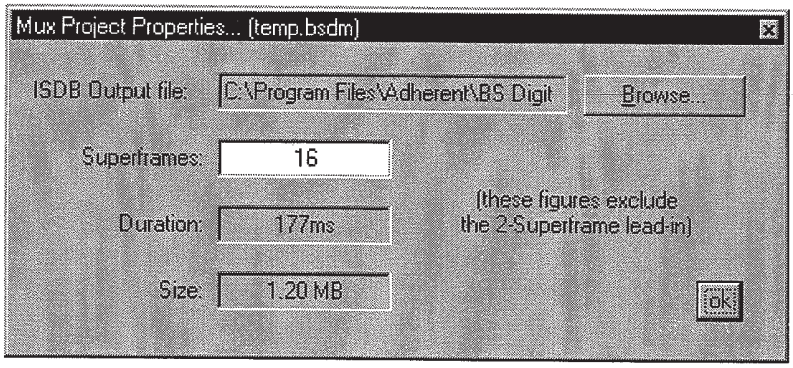
Select **Start Multiplexing...** from the right-click menu. The activity is reported in the Log window.

Add TMCC

(See Adding TMCCs, page 33)

Project Properties

The properties of an ISDB output file in a Multiplex project are displayed by selecting **Properties...** from the right-click menu. Select **OK** to close the dialog.



ISDB Output file: The ISDB output file name.

Superframes: The number of super-frames that the ISDB file is to occupy.
This number can be edited. Unless the TMCC information dictates otherwise, the constituent MPEG files will be looped to fill the specified number of super-frames where necessary.
Min: 1 Max:10^6

Duration: The length of the multiplexed ISDB file in milliseconds.

Size: The size of the multiplexed ISDB file in megabytes.

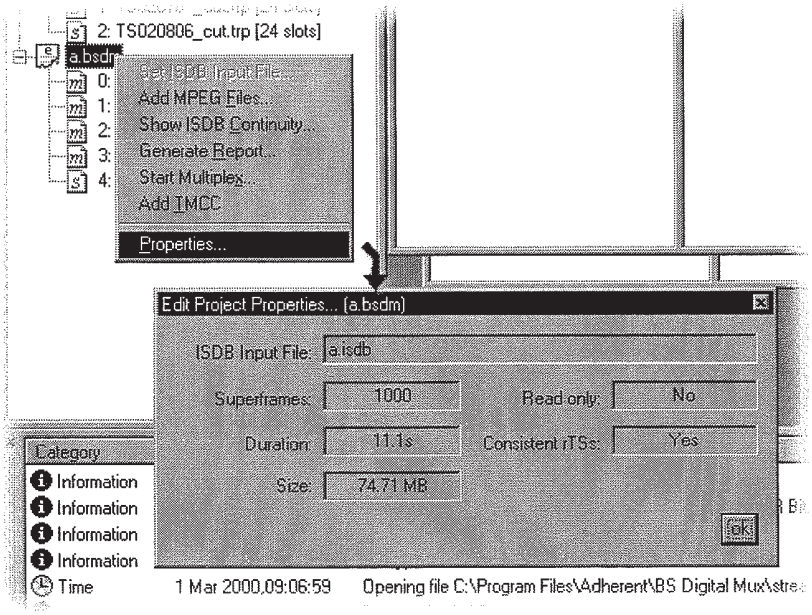
Note that the size of the file displayed in Windows Explorer will not correspond exactly to this value since it excludes the two-super-frame lead-in.

A useful approximation when estimating the size of an ISDB file is to allow 11ms and 76kbyte per super-frame.

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ISDB Project File Properties

The properties of the ISDB project file can be displayed by right clicking the filename and selecting **Properties**.



ISDB Input file: Project file name.

Superframes: Number of superframes.

Read only: Read/Write status of project file.

Duration: Duration of project.

Consistent rTSs: Consistency of relative transport stream identities; that is mapping between the relative transport stream identity and the slots/transport stream identity remains consistent throughout the file.

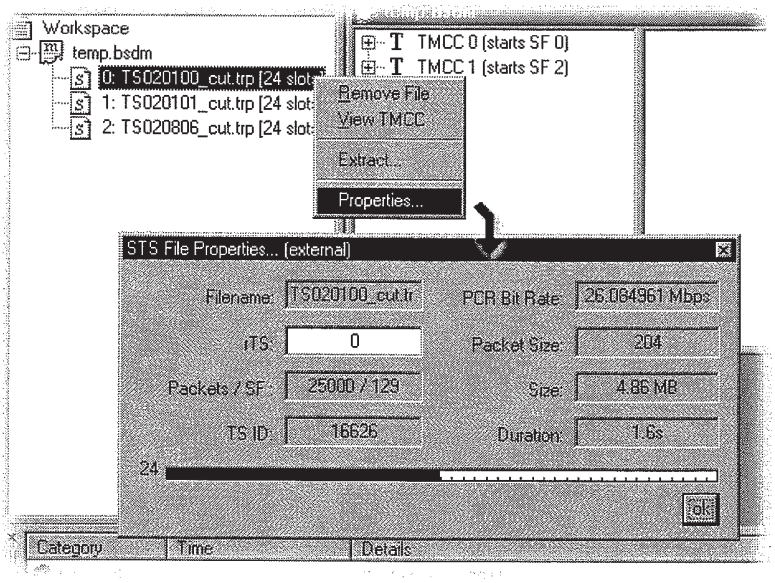
Size: Project file size.

All fields are read-only. Select **OK** to close the dialog.

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External File Properties

The properties of an external MPEG file can be displayed by right clicking on the file name and selecting Properties. The **MPEG File Properties... (external)** dialog is displayed (shown below). The information shown is derived from the stream.



Filename:	MPEG or STS filename.
PCR Bit Rate:	The bitrate of the MPEG or STS stream.
rTS:	Relative Transport Stream – a unique identity for this stream in the overall ISDB-S stream (range: 0 to 7). This field can be edited as required.
Packet Size:	188 / 204
Packets / SF:	The number of packets/superframes (for STS files) in the stream.
Size:	File size.
TS ID:	Transport Stream Identifier.
Duration:	Duration of the file (Size / Bit Rate).

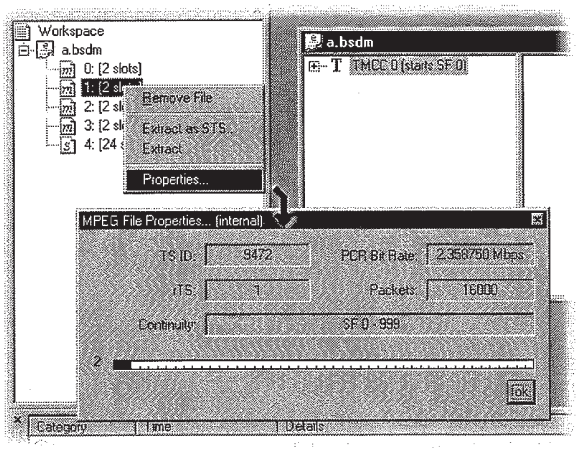
The **Slot Allocation Indicator** at the bottom of the dialog provides a guide as to the number of slots (i.e. 2 in the screenshot above) occupied by the MPEG stream in each packet.

All fields, with the exception of **rTS** are read-only. Select **OK** to close the dialog.

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Internal File Properties

Internal file (MPEG stream) properties can be displayed by right clicking on the file name and selecting Properties. The **MPEG File Properties... (internal)** dialog is displayed (shown below). The information shown is derived from the stream. The stream can be extracted (exported) and saved if required.



TS ID: Transport Stream Identifier.

PCR Bit Rate: The bitrate of the MPEG stream.

rTS: Relative Transport Stream – a unique identity for this stream in the overall ISDB-S stream (range: 0 to 7).

Packets: The number of packets in the MPEG stream.

Continuity: Shows the range of super-frames occupied by the MPEG stream.

The **Slot Allocation Indicator** at the bottom of the dialog provides a guide as to the number of slots (i.e. 26 in the screenshot above) occupied by the MPEG stream in each packet.

All fields are read-only. Select **OK** to close the dialog.

Extracting the File

An MPEG stream can be saved (or extracted) as an individual stream file.

Highlight the file to be extracted and select **Extract** from the right-click menu. In the dialog box displayed, allocate the location and filename of the stream to be saved. Select OK. The progress of the save action is indicated by a new dialog containing a progress bar.

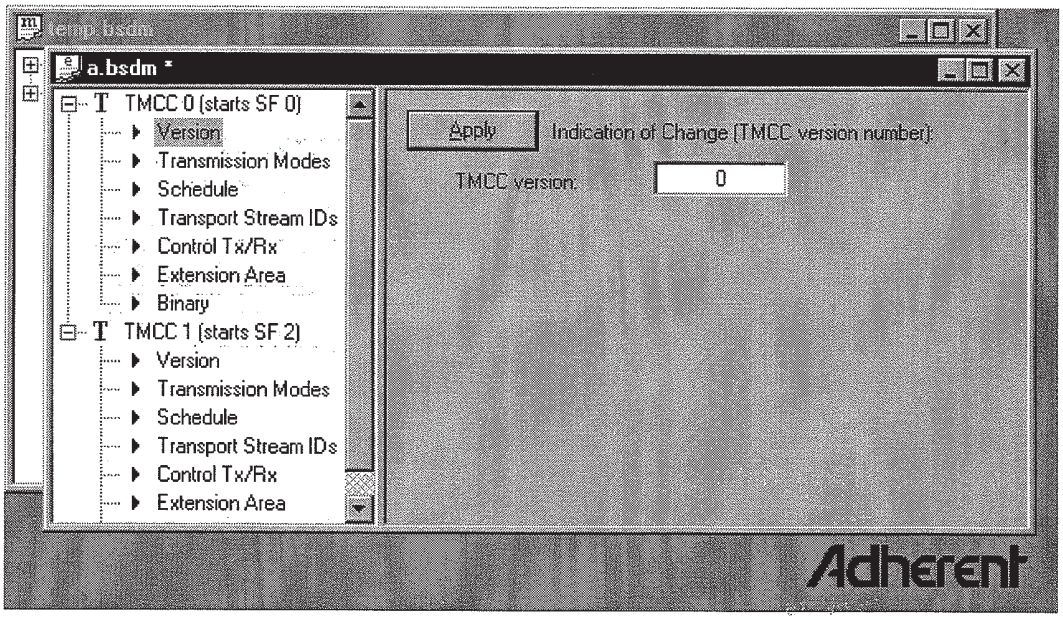
Extracting STS files is described elsewhere – see Extraction of STS Files, page 9 et seq.

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TMCC Window

The area of the main screen not occupied by the Workspace and Log is given over to TMCC window(s). Each project has a resizable TMCC window associated with it. The active project TMCC window is displayed on top.

Note that the project file in the workspace is not necessarily highlighted when a different TMCC window is selected; conversely, when a different project is selected in the workspace, the corresponding TMCC window *is* activated and brought to the top.

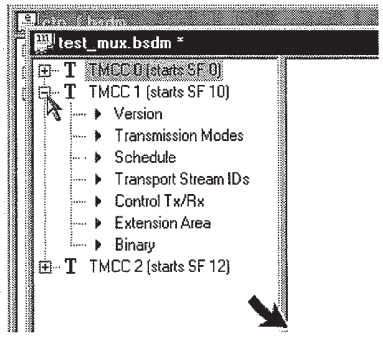


Each TMCC in a project is represented as a tree structure and headed with a **T** icon, the TMCC number and the superframe number in which the TMCC becomes active. The colour of the TMCC (**T**) icons also has significance. A blue **T** icon indicates that the TMCC was added during this session and therefore is not integrated into the project, whilst a green **T** icon indicates that it is part of (or internal to) an edit project and is therefore fixed and cannot be moved. The TMCC number is simply a sequential number allocated when the TMCC is created.

Each TMCC comprises seven parameters; clicking the **+** to the left of the T icon will display a list of the parameter names. Double-clicking a parameter name (or highlighting the parameter name and selecting **View item...** from the right-click menu or selecting from the toolbar) displays the parameter's properties in the right hand pane of the TMCC window. Most of the property windows have an **Apply** button. Where changes are made to the parameter, the **Apply** button must be selected before the change becomes available for use by the multiplex. Simply closing the TMCC window or selecting another parameter will discard any changes.

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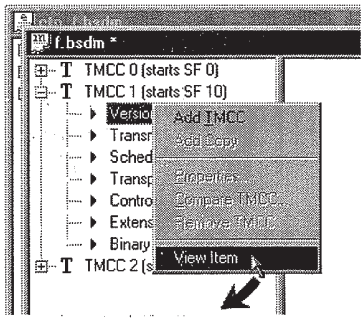
Viewing TMCC Parameters



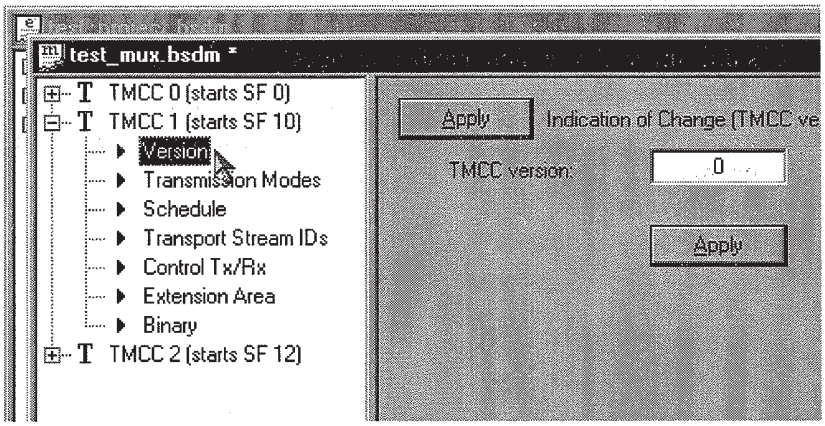
To view the list of parameters for a TMCC, highlight the TMCC label in the TMCC window and select the ⊞ symbol to it's left (or double-click the label).

The list of parameters for the selected TMCC is expanded.

Highlight the parameter to be viewed and select **View Item...** from the right-click menu (or double-click the parameter name).



Details of the selected parameter are displayed in the right-hand pane of the TMCC window.



Note that simply highlighting the parameter name is not sufficient to display the details; **View Item...** (or a double-click) must be used to view the details.

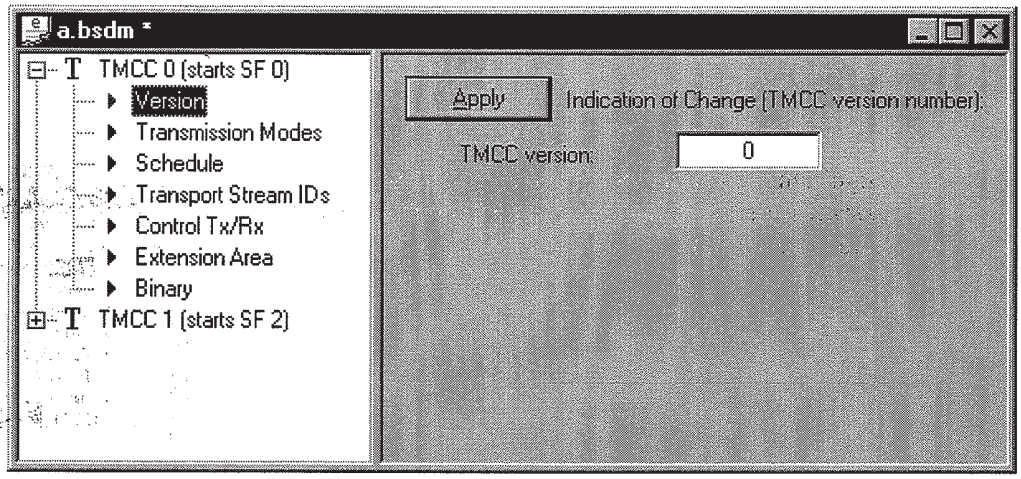
Note also, that when an **Apply** button is enabled, changes to parameter details will only be implemented when the button is selected; simply selecting another parameter to view will discard any changes.

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TMCC Parameters

TMCCs are labelled with a sequential number and the superframe (SF) number in which the TMCC parameters are to take effect.

Version



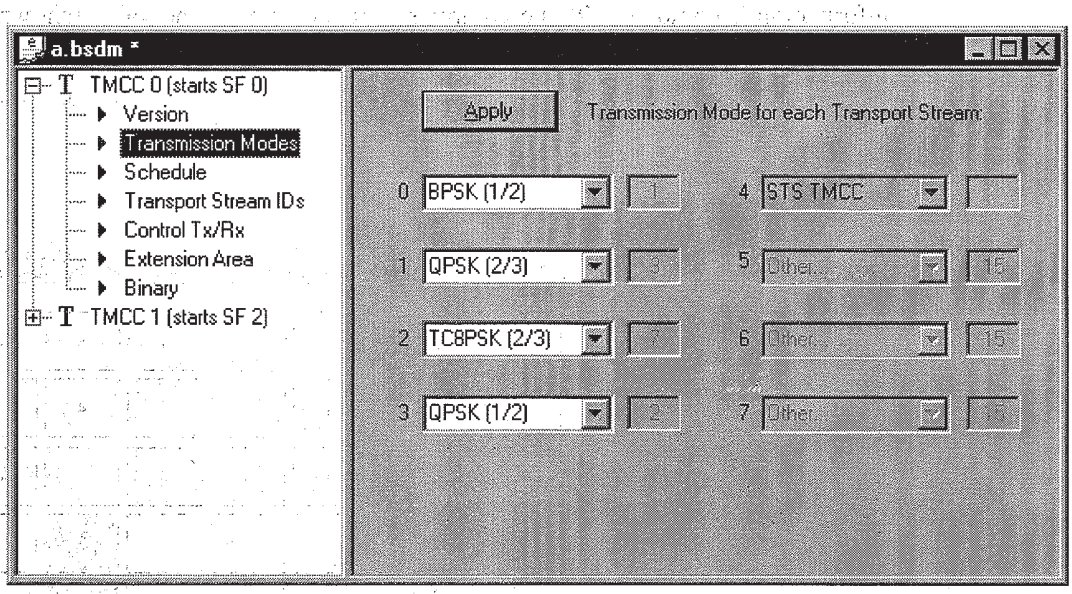
The TMCC version indicates the version of the TMCC. In practical terms the remainder of the TMCC parameters (after the first encounter) are ignored and assumed to remain the same unless the version number changes.

Version numbers are allocated sequentially to each TMCC. A change in version number from one TMCC instance to another is necessary to ensure that the decoder can detect changes in the TMCC.

The Version number cannot be edited unless the Expert mode is enabled.

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Transmission Modes



This parameter indicates the transmission mode that is used to carry each of the MPEG files in the project. Each transmission mode selection is prefixed with the relative transport stream number allocated when an MPEG file is added.

The following transmission modes are available:

BPSK 1/2 (1/4)	**QPSK 1/2 (1/2)**	**QPSK 2/3 (2/3)**
QPSK 3/4 (3/4)	**QPSK 5/6 (5/6)**	**QPSK 7/8 (7/8)**
TC8PSK 2/3 (1/1)	**No Allocation**	**Other...**
STS TMCC		

where:
BPSK – Biphase Shift Keying;
QPSK – Quadrature Phase Shift Keying;
TC8PSK – Trellis Coding Eight Phase Shift Keying
STS-TMCC – used when the rTS is an STS file. (To see details select View TMCC for the appropriate STS file.)

The ratios given *in parenthesis* in the table above are of valid MPEG data to unit size; the difference is the amount of error-checking data. For example, if QPSK 7/8 transmission mode is selected, seven packets of MPEG data are transmitted for each single packet of error-checking data giving a unit size of eight.

If **No allocation** is selected the MPEG file will not be included in the multiplex for the region specified by the TMCC.

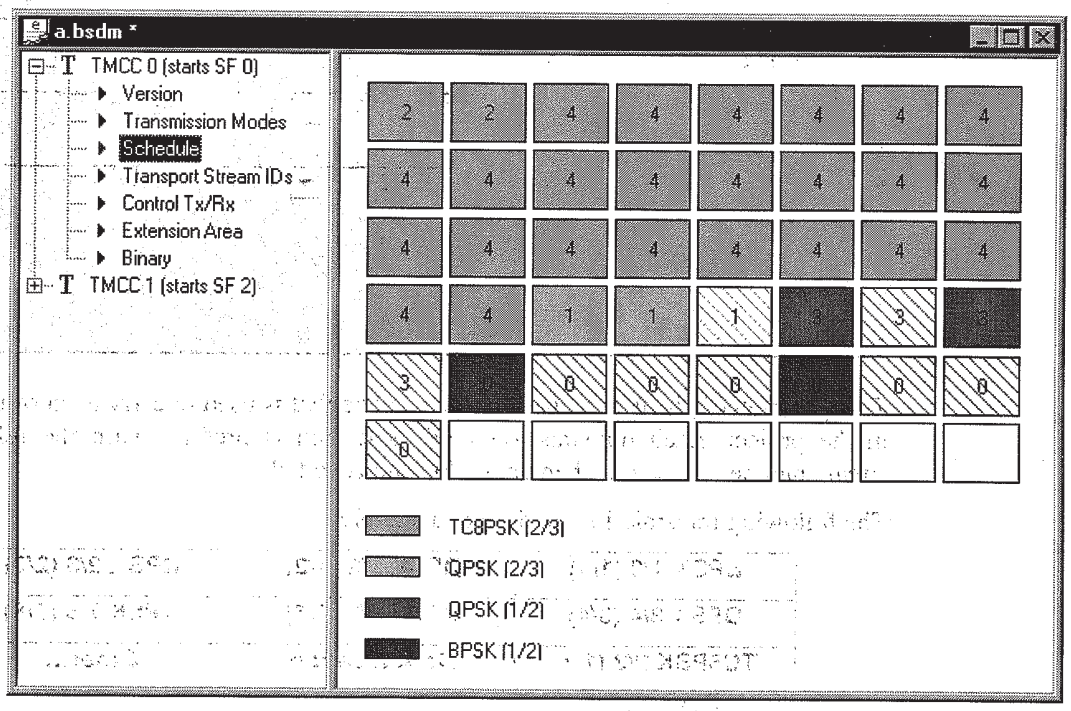
The field immediately to the right of each transmission mode field represents the value that is encoded into the TMCC. This value is fixed (and therefore disabled) for all known modulation modes. The exception is **Other...** for which the field becomes editable and any value up to 15 can be entered. If **Other...** fails the subsequent integrity check, the transmission mode will default to **No Allocation**.

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When the **Apply** button is selected, integrity checking will ensure that the TMCC information is compliant. To be compliant, the slots per frame value (shown in parenthesis with the MPEG filename) must be divisible by the valid MPEG data value.

The following parameter, **Schedule**, illustrates the transmission mode allocation graphically.

Schedule



The transmission mode selected for each MPEG file dictates the allocation and distribution of slots in the 48 available in each frame. The schedule parameter display shows graphically the slot layout for a single frame.

The applicable relative transport stream (rTS) number is displayed within each slot. In the example above, the transmission mode selected for rTS 1 is TC8PSK which has an MPEG data to unit size ratio of 1/1 (it has no error-checking data). The transmission mode for rTS2 is QPSK 7/8 which has an MPEG data to unit size ratio of 7/8 (that is seven packets of MPEG data to one packet of error-checking data).

The colour coding is not universal; in the example above, the colour used for transport stream one and therefore TC8PSK transmission mode may be used for a different transmission mode in the next TMCC.

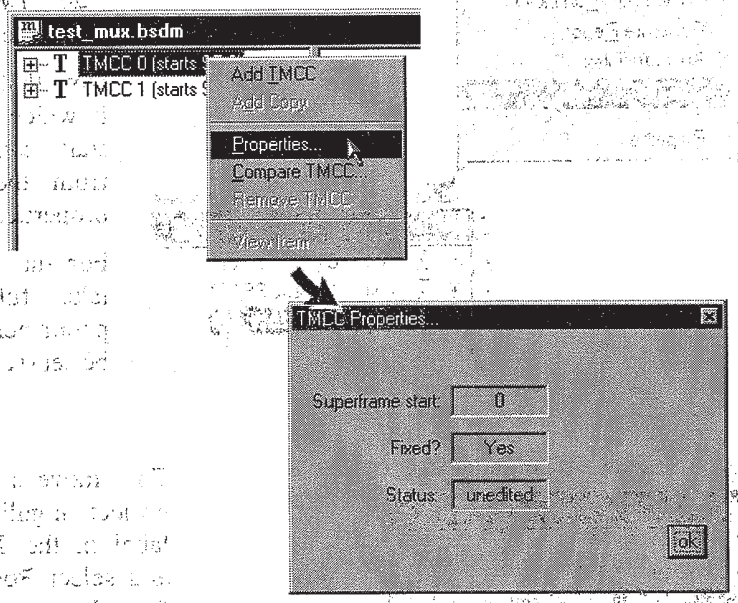
Valid MPEG data is shown in solid colour. Error-checking data is shown as hashed lines. STS files are shown in a similar way except that letters correspond to the transmission mode.

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TMCC Activities

Viewing TMCC Properties

Each TMCC has an associated properties dialog that shows in which super-frame the TMCC takes effect and the edit status of the TMCC information.



To open the properties dialog, highlight the TMCC label in the TMCC window and select **Properties...** from the right-click menu.

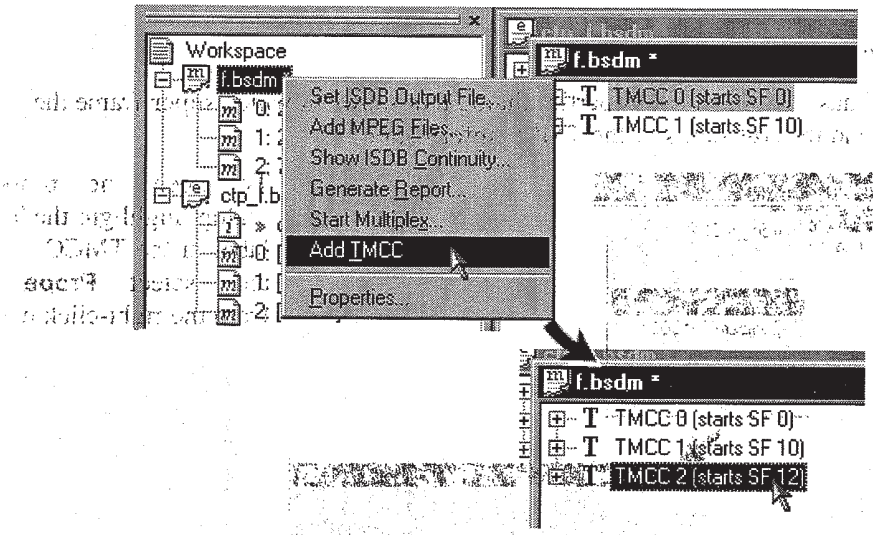
Superframe start: Specifies in which superframe the TMCC is to take effect. This field can only be edited for Mux projects.

Fixed? (green) **Yes** indicates that the TMCC information is internal to the stream; that is it is derived from the multiplexed information and not extracted from the project file.
(blue) **No** indicates that the TMCC information was added by the user and therefore is stored in the project file.

Status: **Added** indicates that it has been added in this session (blue icon).
Edited indicates that it previously existed, but has been edited in this session (green icon).
Unedited indicates that it previously existed and has not been edited (green icon).

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Adding TMCCs

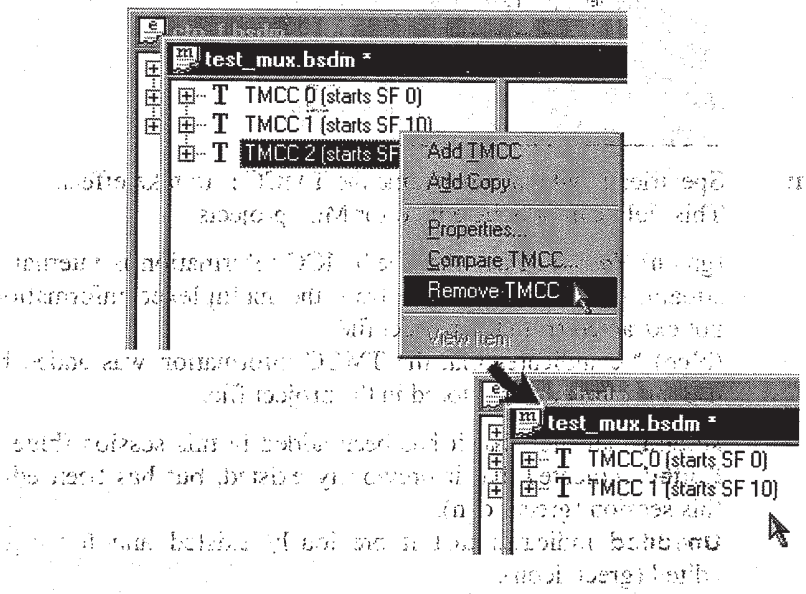


To add a TMCC to a project, highlight the project name in the workspace and select **Add TMCC** from the right-click menu.

Note that the superframe in which the TMCC is to start can be amended from the new TMCC properties dialog.

For the new TMCC to take full effect, the parameters will need to be set (see page 26).

Removing TMCCs



To remove a TMCC from a project, highlight the TMCC label in the TMCC window and select **Remove TMCC...** from the right-click menu.

Note that removing a TMCC may require some adjustment of the remaining TMCCs, e.g. the starting superframes.

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Reference

[1] ARIB STD-B20 Digital Broadcasting System and Related Optional Guidelines for Broadcasting Satellites

Glossary and Abbreviations

ARIB	Association of Radio Industries and Businesses
BSDM	Broadcast Satellite Digital Multiplexer
ISDB-S	Integrated Services Digital Broadcasting - Satellite
MPEG	Moving Picture Experts Group
SI	Service Information
STS	Special Transport Stream
TMCC	Transmission and Multiplexing Configuration Control

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