

# Steinhart Medizinsysteme GmbH



## User's Manual



Medical Imaging, Archiving, and Communication

CE 0123





## Important Information

Steinhart Medizinsysteme GmbH does not accept liability for the wrong or unprofessional use of the described software.

Hipax is certificated as a medical product for image processing, diagnosis, archiving, and communication. Nevertheless, diagnosis can only be made using special hires monitors. Please note the current regulations and prescriptions for digitized X-rays (secondary capture). The final interpretation of digitized mammography and thorax studies should be made using the X-ray hard copy.

*Copyright © 2005 Steinhart Medizinsysteme GmbH, Vörsstetten*  
All rights reserved.

Hipax™ is a registered trademark of Steinhart medizinische Systeme und elektronische Datenverarbeitung, Vörsstetten.

All patient names used in this manual are completely fictitious.

The contents of this manual are the property of Steinhart medizinische Systeme und elektronische Datenverarbeitung and may not be reproduced by any method, electronic or photographic, without the express written permission of the copyright holder.

Throughout this book trademark names are used. Rather than put in a trademark symbol at every occurrence of the trademark name, we state that we are using the names only in an editorial fashion and to the benefit of the trademark owner with no intention of infringing of the trademark.

We assume no responsibility for information and description as far as third-party products are concerned.

We are dedicated to improving and enhancing the software of our medial imaging and communication system. Consequently, the information in this manual is subject to change without notice. Current information about product improving can be received from the Hipax homepage: <http://www.hipax.de>.

Further inquiries can be addressed to: [info@hipax.de](mailto:info@hipax.de). Please give your installation number.

Dr. Martina Steinhart  
January 2005

**Steinhart** Medizinsysteme GmbH  
Grubstraße 6-8  
79279 Vörsstetten  
Germany



# Contents

<b>ABOUT THIS MANUAL.....</b>	<b>15</b>
Required Previous Knowledge .....	15
Writing Conventions .....	15
<b>CHAPTER 1: INTRODUCTION.....</b>	<b>17</b>
1.1 Hipax Review .....	18
1.2 System Requirements: Hardware, Operating Systems .....	18
1.2.1 Configuration requested for File Servers.....	18
1.2.2 Configuration requested for Viewers.....	19
1.2.3 Additional Components for Optional Viewer Extensions .....	19
1.2.3.1 CR Scan .....	19
1.2.3.2 Digitizing X-rays Using the TWAIN Interface .....	19
1.2.3.3 Digitizing X-rays Using the Cobra, Lumisys, or Vidar Digitizer .....	19
1.2.3.4 Video Grabbing.....	20
1.2.3.5 DICOM Communication .....	20
1.2.3.6 ISDN Communication .....	20
1.2.3.7 Archiving from Local Hard Disk or Patient CD .....	20
1.3 Restrictions using Hipax .....	20
1.3.1 Viewer.....	20
1.3.2 Server .....	21
1.4 DICOM Integration.....	21
<b>CHAPTER 2: INSTALLATION .....</b>	<b>23</b>
2.1 Installation of the Program.....	24
2.2 Starting the Program .....	24
2.3 Installation of the Modules.....	24
2.4 Licence.....	25
2.5 Installation of the TWAIN Driver .....	25
2.6 Installation of the Frame Grabber.....	25
2.7 Installation of the ISDN Adapter .....	26
<b>CHAPTER 3: HIPAX FUNCTIONS .....</b>	<b>27</b>
3.1 Modular Architecture .....	28
3.2 Base Module Standard .....	28
3.2.1 General Functions for Image Processing .....	28
3.2.2 Processing Multilayer and Multiframe Images.....	29
3.3 Tools of the Base Module Standard .....	29
3.3.1 Dynamics .....	29
3.3.2 Window Levelling .....	29
3.3.3 ROI (Region of Interest) .....	29
3.3.4 Measurements .....	30
3.3.5 Stack.....	30
3.4 Additional Hipax Modules .....	30
3.4.1 CR Connection.....	30
3.4.2 X-ray Digitizing .....	30
3.4.3 Video Grabbing.....	30
3.4.4 DICOM CD .....	31
3.4.5 Patient CD .....	31
3.4.6 Archive .....	31

3.4.7 Presentation .....	31
3.4.8 Multi Monitor .....	31
3.4.9 Database Evaluation.....	32
3.4.10 DICOM Print.....	32
3.4.11 DICOM Communication.....	32
3.4.12 ISDN Communication, Telemedicine.....	32
3.4.13 Telecardiology ("Echo").....	32
3.5 Base Module "light" .....	32
<b>CHAPTER 4: THE HIPAX USER INTERFACE .....</b>	<b>33</b>
4.1 Levels of the User Interface.....	34
4.1.1 Patient/Image Administration .....	34
4.1.2 Image Review .....	34
4.1.3 Image Processing .....	34
4.2 Loading Images to the Image Processing Screen.....	35
4.3 Layout Functions of the Image Processing Screen .....	36
4.3.1 Frame Colours.....	36
4.3.2 Frame Formats.....	37
4.3.3 Series Review.....	38
4.3.4 Increasing the Size of the Image Processing User Interface .....	39
4.4 The Button Bar of the Image Processing Screen .....	40
4.4.1 Configuring the Button Bar.....	40
4.4.1.1 Changing the Size of the Icons .....	40
4.4.1.2 Switching off Whole Button Boxes .....	41
4.4.1.3 Configuring the "Tools" Box .....	41
4.4.1.4 Configuring the "Processing" Box.....	41
4.4.2 The "Database" Box .....	42
4.4.3 The "Zoom" Box.....	43
4.4.4 The "C/W" Box .....	43
4.4.5 The "Tools" Box.....	44
4.4.6 The "Processing" Box .....	46
4.5 The Menu Strips.....	48
4.6 Main Menu .....	49
4.6.1 The "File" Submenu.....	49
4.6.1.1 Print.....	49
4.6.1.2 DICOM Print.....	50
4.6.1.3 Image Export.....	50
4.6.1.4 Open CD .....	51
4.6.1.5 Image Import .....	52
4.6.1.6 AVI Export .....	52
4.6.1.7 Anonymous .....	52
4.6.1.8 Send to Word .....	53
4.6.1.9 Clipboard.....	53
4.6.1.10 Exit .....	53
4.6.2 The "System" Submenu .....	53
4.6.2.1 Cancel .....	53
4.6.2.2 Header Info .....	54
4.6.2.3 Text .....	54
4.6.2.4 ISDN Send Jobs.....	54
4.6.2.5 DICOM Send Jobs .....	54
4.6.2.6 Setup.....	54

4.6.2.7 Logfile .....	54
4.6.2.8 X-ray Journal.....	54
4.6.2.9 New Entry into X-ray Journal .....	54
<b>4.6.3 The "Patient Folder" Submenu .....</b>	<b>55</b>
4.6.3.1 Server .....	55
4.6.3.2 Add new Patient.....	55
4.6.3.3 List .....	55
4.6.3.4 Save.....	55
4.6.3.5 Save All Images.....	55
4.6.3.6 Review .....	56
4.6.3.7 Read Patient CD .....	56
4.6.3.8 New Document .....	56
4.6.3.9 Query .....	56
<b>4.6.4 The "Zoom" Submenu.....</b>	<b>57</b>
4.6.4.1 1 to 1.....	57
4.6.4.2 All.....	57
4.6.4.3 Crop .....	57
<b>4.6.5 The "Layout" Submenu.....</b>	<b>57</b>
<b>4.6.6 The "Centre/Window" Submenu .....</b>	<b>57</b>
4.6.6.1 Auto Window.....	57
4.6.6.2 Histogram .....	58
4.6.6.3 Original .....	58
4.6.6.4 Mouse C/W Sensibility.....	58
4.6.6.5 Series.....	58
4.6.6.6 Current Image.....	58
4.6.6.7 Edit Entries .....	58
4.6.6.8 Example 1, 2, 3.....	58
<b>4.6.7 The "Tools" Submenu.....</b>	<b>59</b>
4.6.7.1 Next Image/Row .....	59
4.6.7.2 Previous Image/Row.....	59
4.6.7.3 1 × 1, 2 × 2, etc.....	59
4.6.7.4 ISDN Transmission.....	59
4.6.7.5 DICOM Transmission.....	60
<b>4.6.8 The "Processing" Submenu.....</b>	<b>60</b>
<b>4.6.9 The "Image Windows" Submenu .....</b>	<b>60</b>
4.6.9.1 Close.....	60
4.6.9.2 Close All.....	60
<b>4.6.10 The "Help" Submenu.....</b>	<b>61</b>
4.6.10.1 Contents .....	61
4.6.10.2 Topic Search.....	61
4.6.10.3 About .....	61
<b>4.7 Mouse Buttons .....</b>	<b>61</b>
4.7.1 Left Mouse Button, Short Click .....	61
4.7.2 Keeping the Left Mouse Button Pressed.....	61
4.7.3 Left Mouse Button, Double Click .....	62
4.7.4 Right Mouse Button, Short Click.....	62
4.7.5 Keeping the Right Mouse Button Pressed .....	64
4.7.6 Drag and Drop.....	64
<b>4.8 Keyboard.....</b>	<b>64</b>

<b>CHAPTER 5: THE PATIENT ADMINISTRATION.....</b>	<b>67</b>
<b>5.1 The Patient List.....</b>	<b>68</b>
5.1.1 <i>Display Modes.....</i>	68
5.1.2 <i>Loading Images.....</i>	70
5.1.3 <i>Status Button .....</i>	70
5.1.4 <i>Date .....</i>	71
5.1.5 <i>Search.....</i>	71
5.1.6 <i>Filters .....</i>	72
5.1.7 <i>Sorting .....</i>	72
5.1.8 <i>Further Standard Functions of the Patient List.....</i>	73
5.1.9 <i>Additional Functions of the Patient List .....</i>	73
5.1.10 <i>Pop-up Menu .....</i>	74
<b>5.2 Database Structure.....</b>	<b>75</b>
5.2.1 <i>Basic Patient Data.....</i>	75
5.2.2 <i>Studies.....</i>	75
5.2.3 <i>Images .....</i>	75
<b>5.3 Creating a New Patient Folder.....</b>	<b>76</b>
<b>5.4 Basic Patient Data .....</b>	<b>77</b>
<b>5.5 Studies .....</b>	<b>78</b>
<b>5.6 Images .....</b>	<b>79</b>
5.6.1 <i>Storing Images in the Database .....</i>	80
<b>5.7 Database Evaluation .....</b>	<b>81</b>
5.7.1 <i>Defining the Keywords.....</i>	81
5.7.2 <i>Relating Keywords to a Patient Entry .....</i>	82
5.7.3 <i>Relating Documents to a Patient Entry.....</i>	83
5.7.4 <i>Relating Keywords to an Image.....</i>	83
5.7.5 <i>Loading Accompanying Documents.....</i>	85
5.7.6 <i>Evaluation.....</i>	85
5.7.7 <i>Creating Own Evaluation Macros.....</i>	86
<b>CHAPTER 6: IMAGE REVIEW.....</b>	<b>89</b>
<b>6.1 Opening the Image Review Window .....</b>	<b>90</b>
<b>6.2 Functions of the Image Review Window .....</b>	<b>90</b>
6.2.1 <i>Buttons that are Generally Available .....</i>	90
6.2.2 <i>Additional Functions in the Image Review Button Bar.....</i>	91
6.2.3 <i>Buttons in the Status Bar of the Thumbnails .....</i>	91
6.2.4 <i>Coloured Framed Thumbnails .....</i>	92
<b>CHAPTER 7: IMAGE ACQUISITION.....</b>	<b>93</b>
<b>7.1 CR Connection with Orex (Digident).....</b>	<b>94</b>
<b>7.2 CR Connection with Lumisys ACR-2000 .....</b>	<b>94</b>
7.2.1 <i>Hardware Installation.....</i>	94
7.2.2 <i>Taking the X-ray.....</i>	94
7.2.3 <i>The Hipax CR-Scan Menu .....</i>	94
7.2.4 <i>Configuration of the Filter Macros .....</i>	96
<b>7.3 TWAIN/Scan .....</b>	<b>98</b>
7.3.1 <i>Patient Data .....</i>	98
7.3.2 <i>Selecting a TWAIN Source .....</i>	98
7.3.3 <i>Opening the TWAIN Source .....</i>	99
7.3.4 <i>Starting the Scan Process .....</i>	99



7.3.5 Optimizing Digitized Images.....	100
7.3.6 Filtering .....	100
7.3.7 Filter Configuration .....	100
7.3.8 Folder Function .....	100
7.3.9 Scanning without Folder Function.....	101
7.4 Vidar X-ray Digitizing .....	101
7.4.1 Film Placement.....	101
7.4.2 Opening the Hipax Vidar Menu .....	102
7.4.3 Patient Data.....	102
7.4.4 Adjustments.....	102
7.4.5 Scanning Process .....	103
7.4.6 Driving the Digitizer.....	103
7.4.7 Image Processing.....	104
7.4.8 Pre-adjusted Dynamics Curves.....	105
7.4.9 Cutting Images.....	105
7.5 Cobra X-ray Digitizing.....	107
7.6 Video Grabbing using Matrox or DirectShow Cards.....	108
7.6.1 Hardware Installation .....	108
7.6.2 Adjustments in the Setup.exe File .....	108
7.6.3 Functions of the Video Setup Program VideoSetup.exe .....	109
7.6.4 Start the Video Setup Program .....	109
7.6.5 Settings for Matrox Meteor II Frame Grabbers .....	110
7.6.5.1 Select a DCF .....	110
7.6.5.2 Cropping .....	111
7.6.5.3 Number of Images per Second (Frame Rate).....	111
7.6.5.4 Capture Buffer .....	111
7.6.5.5 Write Delay .....	111
7.6.5.6 Deinterlace Source .....	112
7.6.5.7 Output Format.....	112
7.6.6 Adjustments for DirectShow Frame Grabbers.....	112
7.6.6.1 Selecting the Video Input.....	112
7.6.6.2 Adjustments of the Video Image.....	113
7.6.6.3 Record Adjustments .....	113
7.6.6.4 Cropping .....	114
7.6.6.5 Number of Images per Second (Frame Rate).....	114
7.6.6.6 Capture Buffer .....	114
7.6.6.7 Write Delay .....	114
7.6.6.8 Deinterlace Source .....	114
7.6.6.9 Output Format.....	115
7.6.7 Adjustments for AVI Records.....	115
7.6.8 Display Mode of the Video Window .....	116
7.6.9 Compressing the Video Sequences .....	116
7.6.10 Before Starting the Records.....	116
7.6.11 Live Image and Record .....	117
7.6.12 Record with Integrated Video Image .....	118
7.6.12.1 Grabbing Sequences .....	119
7.6.12.2 Grabbing Single Images .....	119
7.6.13 Record with Flying Video Window.....	120
7.6.13.1 Grabbing Sequences .....	120
7.6.13.2 Grabbing Single Images .....	121

7.6.14 Image Processing using the Video Menu Strip.....	121
7.6.14.1 Loading Sequences.....	121
7.6.14.2 Layout .....	121
7.6.15 Filtering.....	122
7.6.16 Image Transmission .....	122
7.7 Video Grabbing Using DFG/LC with Direct Draw .....	125
7.7.1 Adjustments in the Setup.exe File .....	125
7.7.2 Hardware Installation.....	125
7.7.3 Starting the Video Setup Program Video.exe.....	125
7.7.4 The User Interface of Video.exe .....	126
7.7.5 "Settings" Submenu .....	126
7.7.5.1 Video Input .....	126
7.7.5.2 Sync Level.....	127
7.7.5.3 Video Format.....	127
7.7.5.4 Capture .....	127
7.7.6 "Live" Submenu.....	128
7.7.6.1 Live Mode.....	128
7.7.6.2 Direct Draw.....	128
7.7.6.3 Syst. Memory Live Speed .....	129
7.7.7 "Image" Register.....	129
7.7.7.1 Image Optimization .....	129
7.7.7.2 Colour Format .....	129
7.7.8 Saving the Entries.....	129
7.7.9 The Hipax "Video" Menu Strip .....	130
7.7.9.1 Grabbing Images.....	130
7.7.9.2 Image Processing.....	130
7.7.9.3 Selecting the Video Source .....	131
7.7.9.4 Folder Function .....	131
7.7.10 External Controls .....	131
7.8 Video Grabbing with Hi-Line Frame Grabber.....	132
7.8.1 Activating and Opening the Hi-Line Menu.....	132
7.8.2 Settings.....	132
7.8.3 Digitizing Process.....	132
7.8.4 Scanning without Folder Function .....	133
7.8.5 Folder Function.....	133
7.9 DICOM CD .....	133
7.9.1 Open CD .....	133
7.9.2 CD Review .....	134
7.9.3 DICOMDIR CDs without Thumbnails.....	135
7.9.4 Playing the Sequences.....	135
7.9.5 Compression.....	136
7.9.6 Transferring Sequences from the CD to the Hard Disk.....	136
7.10 X-ray Journal.....	137
CHAPTER 8: IMAGE PROCESSING .....	139
8.1 Magnifying Glass.....	140
8.2 Window Levelling .....	140
8.2.1 Changing the Window Values.....	141
8.2.1.1 Changing the Window Values using the Mouse.....	141
8.2.1.2 Changing the Window Values in the Button Bar .....	141
8.2.1.3 Changing the Window Values using the Scrollbar in the C/W Menu .....	142

8.2.1.4. Changing the Window Values by Direct Input.....	142
8.2.1.5 Changing the Window Values using the Histogram.....	142
<b>8.2.2 Reset the Original Window Values .....</b>	<b>143</b>
<b>8.2.3 Window Levelling in Image Series.....</b>	<b>144</b>
<b>8.2.4 Creating Centre/Window Presets.....</b>	<b>144</b>
<b>8.2.5 Loading Images with Pre-Defined Window Values.....</b>	<b>145</b>
<b>8.2.6 Evaluating the Grey Tones of an Image .....</b>	<b>145</b>
8.2.6.1 Density Profile.....	145
8.2.6.2 Histogram .....	146
<b>8.3 Dynamics .....</b>	<b>146</b>
<b>8.3.1 The Dynamics Curve.....</b>	<b>147</b>
8.3.1.1 Changing the Brightness.....	147
8.3.1.2 Colour Remapping.....	147
8.3.1.3 Irregular Dynamics Curve .....	148
8.3.1.4 Reverse Video .....	148
8.3.1.5 Reset of the Dynamics Curve .....	148
<b>8.3.2 Reverse Video.....</b>	<b>148</b>
<b>8.3.3 Histogram Equalization.....</b>	<b>149</b>
<b>8.3.4 Pre-adjusted Dynamics Curves.....</b>	<b>149</b>
<b>8.4 LookUp.exe.....</b>	<b>149</b>
8.4.1 The User Interface of LookUp.exe: Hipax LookUp Tables.....	150
8.4.2 Selection of the Gradation Curve.....	150
8.4.3 Distortion of the Gradation Curves.....	150
8.4.4 Linear.....	151
8.4.5 Labelling of the Buttons .....	151
8.4.6 Saving the Adjustments.....	151
<b>8.5 ROI, Diagnosis Support by Filtering.....</b>	<b>152</b>
8.5.1 Defining a ROI.....	152
8.5.2 Diagnosis Support.....	153
8.5.3 Deleting ROIs.....	153
8.5.4 16 Bit Filter.....	154
8.5.5 Free Processing .....	154
<b>8.6 Measurements.....</b>	<b>155</b>
8.6.1 Realisation of the Measurements .....	156
8.6.2 Measurement of Areas .....	156
8.6.3 Correcting .....	156
8.6.4 Changing the Scale .....	157
8.6.5 Deletion of the Measurements .....	157
8.6.6 Free Processing .....	157
8.6.7 Macro Record .....	158
8.6.8 Playing a Macro .....	160
<b>8.7 Marking and Writing.....</b>	<b>160</b>
8.7.1 Marking.....	160
8.7.2 Writing.....	161
<b>8.8 Stack .....</b>	<b>161</b>
8.8.1 Display of Image Series .....	161
8.8.2 Previous and Next Image.....	162
8.8.3 Cine-Loop.....	163
8.8.4 Series Review .....	165

<b>8.9 Multi Monitor .....</b>	<b>166</b>
<b>8.9.1 Configuration of the Module .....</b>	<b>167</b>
<b>8.9.2 Installation of the Module.....</b>	<b>168</b>
<b>8.9.3 Loading Images.....</b>	<b>168</b>
<b>8.9.4 Activating a Monitor .....</b>	<b>168</b>
<b>8.9.5 Image Display in a Multi Monitor System .....</b>	<b>168</b>
<b>8.10 Presentation.....</b>	<b>170</b>
<b>8.10.1 Preparing a Presentation .....</b>	<b>171</b>
<b>8.10.2 Image Processing Preparing a Presentation.....</b>	<b>171</b>
<b>8.10.3 Inserting Images into a Presentation .....</b>	<b>172</b>
<b>8.10.4 Processing the Patient List and the Image List .....</b>	<b>172</b>
<b>8.10.5 Functions of the Presentation Review .....</b>	<b>173</b>
<b>8.10.6 Transferring a Presentation within a Network.....</b>	<b>174</b>
<b>8.10.7 Carrying out a Presentation.....</b>	<b>175</b>
<b>8.11 Telecardiology (Echo Module).....</b>	<b>175</b>
<b>8.11.1 Loading Sequences .....</b>	<b>176</b>
<b>8.11.2 Layout.....</b>	<b>176</b>
<b>8.11.3 Processing Sequences.....</b>	<b>177</b>
<b>8.11.4 Anonymize.....</b>	<b>177</b>
<b>8.11.5 Measurements.....</b>	<b>178</b>
<b>8.11.6 Image Transmission .....</b>	<b>178</b>
<b>CHAPTER 9: STORING IMAGES ON DIGITAL MEDIA .....</b>	<b>179</b>
<b>9.1 Local Archiving System .....</b>	<b>180</b>
<b>9.1.1 Archive Dialogue.....</b>	<b>180</b>
<b>9.1.2 Presetting .....</b>	<b>180</b>
9.1.2.1 Data Volume .....	181
9.1.2.2 Compression .....	181
9.1.2.3 The Temporary Archiving Directory .....	181
9.1.2.4 Name of the Media.....	181
9.1.2.5 Label Print .....	182
<b>9.1.3 The Archiving Process .....</b>	<b>182</b>
9.1.3.1 Start.....	182
9.1.3.2 Burning Process .....	182
9.1.3.3 Verification .....	182
<b>9.1.4 How to Find Archived Images? .....</b>	<b>183</b>
<b>9.1.5 Ascribing Archived Images.....</b>	<b>184</b>
<b>9.1.6 Archiving Media .....</b>	<b>184</b>
<b>9.1.7 Backup.....</b>	<b>184</b>
<b>9.2 Patient CDs: The Private Health Disk .....</b>	<b>185</b>
<b>9.2.1 Relating Documents and Other Files to a Patient.....</b>	<b>185</b>
<b>9.2.2 Creating a CD with all Images and Data of a Patient .....</b>	<b>186</b>
<b>9.2.3 Creating a Patient CD with Selected Images of a Patient.....</b>	<b>186</b>
<b>9.2.4 Burning Process .....</b>	<b>186</b>
<b>9.2.5 Content of the Hipax Private Health Disk .....</b>	<b>187</b>
<b>9.3 The Patient CD Viewer .....</b>	<b>187</b>
<b>9.3.1 Studies.....</b>	<b>187</b>
<b>9.3.2 Selecting Images .....</b>	<b>188</b>
<b>9.3.3 Scrolling .....</b>	<b>189</b>
<b>9.3.4 The Button Bar of the Viewer.....</b>	<b>189</b>
9.3.4.1 The Viewer Layout Menu .....	189

9.3.4.2 The Viewer Tools Menu .....	189
9.3.4.3 The Viewer Zoom Menu.....	190
9.3.4.4 The Viewer C/W Menu.....	190
9.3.4.5 The Viewer Cine-Loop-Menu .....	190
<b>9.3.5 Pop-up Menu.....</b>	<b>191</b>
<b>9.3.6 Mouse Functions .....</b>	<b>191</b>
<b>9.4 CD/DVD Robot Module .....</b>	<b>191</b>
9.4.1 Requirements .....	191
9.4.2 Installation .....	192
9.4.3 Configuration of the Dongle Manager .....	192
9.4.4 Configuration of the Creation Server.....	192
9.4.5 Hipax Configuration .....	193
<b>CHAPTER 10: ISDN COMMUNICATION.....</b>	<b>195</b>
10.1 Review.....	196
10.2 Requirements .....	196
10.3 Standby Mode.....	197
10.4 Phone Book .....	197
10.4.1 Creating a New Entry and Changing Entries .....	198
10.4.2 Deletion of Entries.....	199
10.4.3 Import .....	199
10.4.4 Searching.....	199
10.4.5 The Start Number .....	199
10.4.6 Selecting the Receiver .....	199
10.5 Selecting Images to be Sent .....	200
10.5.1 Active Image .....	200
10.5.2 Selected Images .....	200
10.5.3 All Displayed Images .....	200
10.5.4. Sending Images from the Database.....	200
10.6 Preparing the Transmission.....	202
10.6.1 Standard (PNG).....	202
10.6.2 Express (JPEG) .....	203
10.6.3 Original (DICOM).....	203
10.6.4 Sending Notes .....	203
10.7 Starting the Transmission.....	204
10.7.1 Establishing a Connection .....	204
10.7.2 Connection Problems .....	204
10.8 Sending Images at Pre-Adjusted Times.....	205
10.9 Image Receiving.....	207
10.10 Transmission Time .....	207
10.11 Transmission Costs.....	207
10.12 ISDN Configuration .....	208
10.12.1 Multiple Subscriber Number.....	209
10.12.2 Two-Channel Transmission.....	209
<b>CHAPTER 11: DICOM COMMUNICATION .....</b>	<b>211</b>
11.1 DICOM Functions .....	212
11.1.1 DICOM Components SCP and SCU .....	212
11.1.2 Internal and External Communication Using DICOM .....	212
11.2 DICOM Requirements .....	213

<b>11.3 DICOM Configuration .....</b>	<b>213</b>
<b>11.3.1 Activating the SCP and SCU.....</b>	<b>214</b>
<b>11.3.2 Configuration for Receiving Images (SCP).....</b>	<b>215</b>
<b>11.3.3 Entering the DICOM Receiving Stations .....</b>	<b>216</b>
<b>11.3.4 Connecting the Dial-up Program.....</b>	<b>217</b>
<b>11.4 Selecting Images to be Sent.....</b>	<b>218</b>
<b>11.4.1 Active Image.....</b>	<b>218</b>
<b>11.4.2 Selected Images or all Displayed Images.....</b>	<b>218</b>
<b>11.4.3. Sending Images from the Database .....</b>	<b>219</b>
11.4.3.1 Selecting All Images of a Patient.....	219
11.4.3.2 Selecting All Images of a Study.....	219
11.4.3.3 Selecting Images from the Image Review .....	220
<b>11.5 Starting the DICOM Transmission .....</b>	<b>220</b>
<b>11.6 Encryption and Compression.....</b>	<b>221</b>
<b>11.7 Connection Problems .....</b>	<b>222</b>
<b>11.8 Transmitting Documents and other Files.....</b>	<b>222</b>
<b>11.8.1 Relating Documents and other Files to a Patient .....</b>	<b>222</b>
<b>11.8.2 Opening the Additional Files .....</b>	<b>223</b>
<b>11.8.3 Sending the Additional Files via DICOM Communication.....</b>	<b>223</b>
<b>11.9 Image Receiving .....</b>	<b>224</b>
<b>11.10 DICOM Query .....</b>	<b>224</b>
<b>11.10.1 Preparation.....</b>	<b>224</b>
<b>11.10.2 Adjustments .....</b>	<b>225</b>
<b>11.10.3 Starting a DICOM-Query.....</b>	<b>226</b>
<b>11.10.4 Sorting the Query Results.....</b>	<b>227</b>
<b>CHAPTER 12: DICOM WORKLIST.....</b>	<b>229</b>
<b>12.1 The Functions of the DICOM Worklist Module.....</b>	<b>230</b>
<b>12.2 Activating the Modules .....</b>	<b>230</b>
<b>12.3 Worklist.ini File .....</b>	<b>230</b>
<b>12.4 Starting the DICOM Receiving Standby.....</b>	<b>232</b>
<b>12.5 Starting the Worklist Management Function .....</b>	<b>232</b>
<b>CHAPTER 13: DICOM PRINT .....</b>	<b>235</b>
<b>13.1 DICOM Print Configuration .....</b>	<b>236</b>
<b>13.1.1 Requirement.....</b>	<b>236</b>
<b>13.1.2 Configuration .....</b>	<b>236</b>
<b>13.1.3 Architecture of the Layout File PrintDef.ini Editor.....</b>	<b>238</b>
13.1.3.1 [Printer]: General Printer Adjustments.....	238
13.1.3.2. [Default], [1]...[X]: Layout Sections .....	239
<b>13.2 Printing Images Using the DICOM Print Module.....</b>	<b>242</b>
<b>CHAPTER 14: SYSTEM CONFIGURATION.....</b>	<b>243</b>
<b>14.1 Setup Window.....</b>	<b>244</b>
<b>14.1.1 Modules .....</b>	<b>244</b>
<b>14.1.2 General Configuration .....</b>	<b>245</b>
14.1.2.1 Reading Directory.....	245
14.1.2.2 Standard Save Format (DB).....	246
14.1.2.3 Font .....	246
14.1.2.4 Scale .....	246
14.1.2.5 Stack Mode .....	246

14.1.2.6 Program Start: Show Patient List.....	246
14.1.2.7 Store 16 Bit RGB Image as Grey Image.....	246
14.1.2.8 Mix Images.....	247
14.1.2.9 Loading Images Directly from the Patient List .....	247
14.1.2.10 Keep Position of all Windows After the Termination of the Program.....	247
14.1.2.11 ISDN Start Number.....	247
14.1.2.12 Print .....	247
14.1.2.13 Image Cache .....	247
14.1.2.14 Keep Standby Mode after Program Exit .....	248
<b>14.1.3 DICOM Configuration .....</b>	<b>248</b>
14.1.3.1 DICOM Communication.....	249
14.1.3.2 DICOM Print.....	249
<b>14.1.4 External Controls.....</b>	<b>249</b>
<b>14.1.5 Load Images .....</b>	<b>251</b>
<b>14.1.6 User Administration .....</b>	<b>252</b>
<b>14.2 Setup.exe File.....</b>	<b>252</b>
<b>14.2.1 General Configurations.....</b>	<b>252</b>
14.2.1.1 Microsoft WORD Image Export .....	252
14.2.1.2 Zoom Interpolation.....	253
14.2.1.3 Enable Hipax Setup .....	253
14.2.1.4 Minimum Patient Data .....	253
14.2.1.5 Use Big Icons.....	253
14.2.1.6 Grey Monitor .....	253
14.2.1.7 Enable Compression .....	254
14.2.1.8 Enable Hipax "VideoQuick-Format" .....	254
14.2.1.9 Transparent Text Markings.....	254
14.2.1.10 Size of Magnifying Glass .....	254
14.2.1.11 Font Size (Text Markings).....	255
14.2.1.12 Measurement Line Width.....	255
14.2.1.13 DICOM Modality Type.....	255
<b>14.2.2 Video Grabbing.....</b>	<b>255</b>
14.2.2.1 Frame Grabber .....	256
14.2.2.2 Screen Machine.....	256
14.2.2.3 DFG .....	256
14.2.2.4 Grab and Save Image.....	256
14.2.2.5 MRT PC Card Grabber: Grab Grey Images.....	257
<b>14.2.3 TWAIN.....</b>	<b>257</b>
14.2.3.1 Version 1 (Standard, X-ray Scanner).....	257
14.2.3.2 Version 2 (Lead) .....	257
14.2.3.3 Vidar Multi-Image Mode.....	258
14.2.3.4 Vidar Image Folder .....	258
14.2.3.5 OK.....	258
<b>14.2.4 Import/Export.....</b>	<b>258</b>
14.2.4.1 Fixed Import Path .....	259
14.2.4.2 Delete Images after Import .....	259
14.2.4.3 Start Program before Import .....	259
14.2.4.4 Import: Hide Program.....	260
14.2.4.5 Fixed Export Path .....	260
14.2.4.6 Create New Folder.....	260
14.2.4.7 Start Program after Export.....	261
14.2.4.8 Export: Hide Program .....	261

14.2.4.9 Image Format.....	261
<b>14.2.5. Database.....</b>	<b>261</b>
14.2.5.1 Available Databases.....	262
14.2.5.2 "Delete" Password.....	262
14.2.5.3 Database Privilege .....	262
14.2.5.4 New .....	262
14.2.5.5 DB Name.....	262
14.2.5.6 DB Alias .....	263
14.2.5.7 PIC-Path.....	263
14.2.5.8 SMALLPIC-Path.....	263
14.2.5.9 DB-Path.....	263
14.2.5.10 Save .....	263
14.2.5.11 Edit.....	263
14.2.5.12 OK .....	264
<b>14.2.6 Multiple Database .....</b>	<b>264</b>
14.2.6.1 Working with the Multiple Database .....	264
14.2.6.2 Example for the Use of the Multiple Database .....	264
<b>14.3 Saving Important Hipax Files .....</b>	<b>265</b>
<b>CHAPTER 15: USER ADMINISTRATION.....</b>	<b>267</b>
15.1 General Information .....	268
15.2 Administrator .....	269
15.3 User .....	269
<b>CHAPTER 16: NETWORK CONFIGURATION.....</b>	<b>271</b>
16.1 Configuration of the Small Network for Consultants .....	272
16.2 Installing the Small Network.....	272
16.2.1 Release the Hard Disk .....	272
16.2.2 Hipax Installation .....	273
16.2.3 Setup of the Server.....	273
16.2.4 Configuration of the Workstations .....	273
16.2.5 Example for the Simple Connection of Two PCs .....	274
16.2.6 Using the File Server as a Hipax Client .....	275
16.3 Important Notes .....	275
<b>INDEX.....</b>	<b>277</b>



## ABOUT THIS MANUAL

This documentation describes the whole functional range of the Hipax X-ray image processing system:

- General information
- Installation
- Description of functions
- Operation
- Hints and tricks
- Index

## Required Previous Knowledge

You should be familiar with the basic functions of a Personal Computer (IBM or compatible) as well as Windows 2000 or XP.

## Writing Conventions

In this manual the following writing conventions are used:

- References to other chapters are displayed in italics.  
Example:  
See also *chapter 3.3*.
- Names of directories or files are printed in italics.  
Example:  
The file *Setup.exe* in the directory *\Hipax\prg\* can be used to...
- Menu titles and button titles are set in quotation marks.  
Example:  
Click on the "OK" button.
- Keywords in the text are marked using bold letters.  
Example:  
A short **note** attached to an image can be entered into the "**Image Info**" edit field.



## **CHAPTER 1: INTRODUCTION**

## 1.1 Hipax Review

The Hipax system is a communication tool for medical images. It enables the capture, processing and transmitting of radiological data. Text data, such as studies or patient data, as well as high resolution images can be processed and transmitted.

Hipax offers professional image processing tools for every kind of image data.

The Hipax system is based on the DICOM 3 standard, which defines the way of communication between different digital imaging modalities. For example, image data can be received from the following modalities:

- computed radiography (CR)
- computed tomography (CT)
- magnetic resonance imaging (MRI)
- sonography and multiframe sonography
- X-ray film digitizer, secondary capturing devices
- digital subtraction angiography
- image processing workstations
- digital archives

Communication can be made using different media. The data transmission is then made via TCP/IP protocol – within a local area network (LAN) as well as with external stations. As a result, different communication techniques can be used (e.g. ISDN, modem, internet, intranet).

## 1.2 System Requirements: Hardware, Operating Systems

Hipax is a powerful software that can be driven on a standard PC. The basic equipment in hardware and operating software to run Hipax is described here.

**Note:** For full performance of the program in Windows XP at least main user or administrator authorisation must be granted to each user.

### 1.2.1 Configuration requested for File Servers

(without Hipax server software. See *chapter 16*.)

- Pentium III or IV CPU with at least 1.5 GHz, or comparable AMD processor in Windows 2000 or XP/2003
- Minimum 512 MB memory
- Minimum 36 GB SCSI hard disk, depending on the data volume and the duration of storage
- Standard graphics card and standard monitor
- Network card with standard chip, e.g. RTL 8139D
- TCP/IP network connection for the internal and external communication

### **1.2.2 Configuration requested for Viewers**

- Pentium III or IV CPU with 1 GHz or more (minimum 1.5 GHz for cardiology), or comparable AMD processor
- Minimum 256 MB main memory, depending on the demands; 2 GB for cardiology
- At least 5 GB hard disk, depending on the volume of the data to be saved temporary
- Analogous colour monitor, 17" or 20" inches for demonstration, hires monitor for diagnoses
- Graphics card, resolution of 1024×768 or more, in True Colour mode
- Windows 2000 or XP
- CD drive to install the program
- LPT or USB plug for the dongle

### **1.2.3 Additional Components for Optional Viewer Extensions**

Additional modules can require further hardware and software components:

#### **1.2.3.1 CR Scan**

(see *chapters 7.1 and 7.2*)

- SCSI controller to connect the CR system (possibly delivered by the manufacturer of the CR system)
- CR system of Lumisys, Orex, Gendex, Cobra
- Corresponding driver software
- From other CR systems, the images can be received via DICOM communication (see *chapter 1.2.3.4*)

#### **1.2.3.2 Digitizing X-rays Using the TWAIN Interface**

(see *chapter 7.3*)

- SCSI controller to connect the digitizer (possibly delivered by the manufacturer of the digitizer)
- TWAIN capable digitizer, suitable for scanning X-ray films
- TWAIN driver

**Note:** A still video camera is not suitable to digitize X-ray films.

#### **1.2.3.3 Digitizing X-rays Using the Cobra, Lumisys, or Vidar Digitizer**

(see *chapters 7.5, 7.1, and 7.4*)

- SCSI controller to connect the digitizer (possibly delivered by the manufacturer of the digitizer)
- Digitizer
- Corresponding driver (the Vidar driver can be delivered by us)

#### 1.2.3.4 Video Grabbing

(see *chapters 7.6, 7.7, and 7.8*)

- DFG/LC1 or -2 with Direct Draw (single images, standard video signals)
- Standard frame grabber used with DirectShow driver (e.g. DFG/LC1 or DFG/LC2) to grab single images or sequences, standard video signals
- Matrox Meteor 2 (Standard or Multichannel) for standard or non-standard video signals. Non-standard signals: corresponding DCF files are needed.
- Foresight frame grabber ACCUSTREAM 170, I-RGB 165, I-60 or I-50.
- Latest DirectX driver (<http://www.microsoft.com/directX>) to grab video images using DirectShow

#### 1.2.3.5 DICOM Communication

(see *chapter 11.*)

- TCP/IP-capable network card to communicate within a network
- ISDN router or modem for external communication

#### 1.2.3.6 ISDN Communication

(see *chapter 10*)

- ISDN adapter
- CAPI driver 1.1- or 2.0

#### 1.2.3.7 Archiving from Local Hard Disk or Patient CD

(see *chapters 9.1 and 9.2*)

- Media writer (CD-writer for patient CDs), optionally CD robot
- Software to drive writer
- Digital disk (e.g. CD, DVD, MO, WORM)

**Note:** The Hipax Archive module and Patient CD module include a DVD/CD-writer software.

### 1.3 Restrictions using Hipax

Hipax can be run together with the MS Windows operating systems. In many cases, the PC is not used exclusively for the Hipax system.

Please take account of the following restrictions, if Hipax is used together with other software systems.

#### 1.3.1 Viewer

##### 1.3.1.1 Database

Frequently, the Hipax viewer and a patient administration system are installed together on the same PC. This can cause a problem, if the patient

administration system is based on a Borland Paradox database, because Hipax is using the same database. In this case, the configurations of both systems have to be mixed. This is not possible, if the patient administration system requires an older version of the database (BDE).

#### 1.3.1.2 Communication using TCP/IP

Hipax can use the TCP/IP protocol for communication. To receive images, it must be guaranteed that not any other software is in the standby mode on the same port. These software systems are, for example:

- other DICOM server
- dial-up network (telecommunication) or RAS service
- modem software

#### 1.3.1.3 Communication using CAPI

The communication with Hipax can also be made using the CAPI protocol. Here, other CAPI capable programs can cause problems if they are installed on the same PC.

These are all programs using CAPI, especially

- fax programs
- dial-up network (telecommunication) or euro-file transfer programs
- remote control software

#### 1.3.1.4 Others

Additionally, Hipax can be disturbed by the following factors:

- software, which causes frequent new starts of the PC.
- software, controlling the data access (e.g. killer software)

### 1.3.2 Server

Generally, **no other software** must be run on the Hipax server, with the exception of the operating system (Windows 2000 or XP).

## 1.4 DICOM Integration

Using the DICOM 3 interface, the Hipax system can be integrated in an existing hospital network.





## **CHAPTER 2: INSTALLATION**

## 2.1 Installation of the Program

The installation CD includes all installation files. The software has to be freed using a dongle.

**Note:** For installation in Windows XP, each user needs to have administration authorisation.

Please make the installation by following the instructions given here:

1. Insert the Hipax Installation CD into the CD drive of the server PC.
2. Use the Windows Explorer to start the program *Setup.exe*, which is located on the CD.
3. Follow the instructions of the installation program.
4. Put the dongle on the LPT interface of the PC between the PC and the printer cable.

**Note:** The LPT interface has to be set as default.

## 2.2 Starting the Program



The Hipax viewer software can be started using a double click on this icon on the Windows desktop.

Another possibility to start Hipax is to use the Windows "Start" menu. To make this, please click on the "Start" button of the Windows taskbar. Select "Programs" – "Hipax" "Hipax Image Processing".

After installation of the communication modules ISDN and DICOM (see *chapter 2.3*), these functions can be started independently without opening the Hipax viewer (see *chapters 2.7* and *11.1.1*). The communication modules are then in a standby mode and able to receive images. The images are stored on the hard disk and can be loaded and processed later.

## 2.3 Installation of the Modules

After the start of Hipax, the "Patient/Image Administration" window opens. Please close this window. As a result, the image processing user interface appears. Use the main menu "System" → "Setup" to open the Hipax "**Setup**" window. Here, you can find the edit field "New Key".

The key to free the ordered modules can be found on the CD cover. Please enter this key into the edit field "**New Key**" and click on "**OK**".

The Hipax functions are listed below the edit field "New Key". To **activate the installed modules**, please set hooks into the corresponding **checkboxes**.

After closing the "Setup" window, the buttons corresponding to the installed modules appear in the button bar of the Hipax image processing interface (see *chapter 4.4*) or in the window "Patient/Image Administration" (see *chapter 5*). The menus of the different modules can be opened clicking on the corresponding buttons.

**Additional Hipax modules** can be purchased and freed subsequently. To make this, please send an order to your Hipax dealer. You will then receive a module key to be entered into the edit field "New Key" of the "Setup" window (main menu "System" – "Setup" (see *chapter 14.1.1*).

Besides the additional modules, the function list in the Hipax "Setup" window also contains the different tools of the Base Module that can be activated or deactivated individually by setting hooks into the corresponding checkboxes or removing existing hooks (see also *chapter 3.3*).

## 2.4 Licence

Your Hipax program is licensed automatically by putting the dongle into the LTP interface of your PC.

You have now the possibility to install the program on different PCs, but only the one installation on the PC with the dongle can be used.

## 2.5 Installation of the TWAIN Driver

Various imaging appliances (e.g. digitizers, still video cameras) can be headed by a TWAIN driver to transmit the images to Hipax. Please follow the installation instructions of the manufacturer. The TWAIN driver then can be loaded by Hipax (see also *chapter 7.3*).

**Note:** A still video camera is not suitable to digitize X-ray films.

## 2.6 Installation of the Frame Grabber

To digitize video signals you need a correctly installed frame grabber, which is connected to the video source. The choice of the frame grabber depends on the demands:

- To digitize **single images or sequences (standard video signals)** we recommend to use the DirectShow capable frame grabbers (e.g. DFG/LC1, DFG/LC2).
- Special frame grabbers are offered to grab **non standard video signals (only single images)**. Hipax supports the hi-line boards HIDEF ACCURA and frame grabber I-50 or I-60 (Foresight).

- Single images or **cine-loops (standard or non-standard)** can be digitized using the frame grabber Matrox Meteor 2 (Standard, Multichannel, or Digital).

**Note:** The Matrox driver software includes the DCF files for standard video signals, but not the DCF files of non-standard video signals. Ask the manufacturer of your modality for the necessary DCF files.

Please follow the user's instructions of the manufacturer to install the frame grabber. Furthermore, also a frame grabber driver has to be installed. The desired image quality can be adjusted using the configuration programs of the frame grabbers.

## 2.7 Installation of the ISDN Adapter

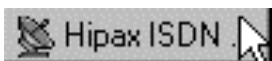
A correctly installed ISDN adapter with a CAPI 1.1 or CAPI 2.0 driver is needed in order to be able to send images directly by ISDN. Please follow the instructions for your ISDN adapter.

**Note:** In countries without CAPI capable ISDN lines image transmission can be made via DICOM communication (see *chapter 11.*).

**Note:** If the CAPI drivers have not been installed automatically with the ISDN adapter, it is possible that the drivers are not compatible with Windows 2000 or XP. In this case, new and up-to-date drivers would be necessary.

We recommend the use of the FRITZ! card of AVM, Berlin.

After the installation of the Hipax ISDN module (see *chapter 2.3*), the ISDN function is automatically in the **standby mode** as soon as Hipax has been started.



This button in the Windows taskbar shows the standby mode of the ISDN module.

The ISDN module can also be started independently using the Windows Explorer, directory `\Hipax\prg\`, file `Hiisdn.exe`. As a result, the ISDN module is in standby mode and able to receive images although the Hipax image processing program is not active. The received images are stored in the database and can be loaded and processed later.

## **CHAPTER 3: HIPAX FUNCTIONS**

### 3.1 Modular Architecture

Hipax has an open system architecture. The available imaging modules can be put together to a powerful image processing and administration system.

A simplified alternative is the Base Module "light" including all the image optimization functions, but not the features for measurements and series processing. This base module can only be extended by the TWAIN, Video, ISDN, and DICOM Communication module.

### 3.2 Base Module Standard

The base of any Hipax viewer installation is the Base Module Standard' including the general image processing functions, which are available for all image types: single images, series, and cine-loops.

#### 3.2.1 General Functions for Image Processing

- processing grey images and colour images
- window levelling for 10, 12, and 16 bit grey tone images, histogram, measurement of density
- dynamics: adjustment of contrast and brightness
- colour remapping
- diagnoses support, defining areas for filtering
- unsharp mask filters, edge enhancing
- reverse video
- measuring distances and angles, creating measurement macros
- writing and marking.
- zoom
- interpolation for full screen display of images
- magnifying glass
- cropping
- rotation, reflection
- image display in defined frames (e.g. 1×1, 2×1, 2×2, 3×2, 3×3, 3×4, 5×4)
- image import/export in all common formats (DICOM 3, TIFF, BMP, JPEG, PNG).
- image export to Word
- image review with small icons
- administration of images and patients, worklists.
- interface to patient administration systems
- interface to a foot-button (e.g. for grabbing video images)
- Printing (Windows printer)

### **3.2.2 Processing Multilayer and Multiframe Images**

The Base Module Standard also offers special functions for the processing of multilayer (e.g. CT, MRI) and multiframe images (cine-loops):

- display in stacks or side by side (spread mode)
- paging through series or sequence stacks
- synchronized paging through two or more image stacks
- synchronized comparison of two series by screen splitting
- cine-loop of image stacks forwards and backwards at any speed
- cine-loop of several sequences at one time
- zoom on whole series or sequence
- centre/window levelling of single images or of the whole series or sequence
- marking single images of a series or sequence
- series review
- selection of relevant layers
- printing either single images or a whole series or sequence
- series import/export (TIFF, BMP, JPEG, PNG, DICOM 3)
- import and conversion of sequences into a special format, by which the cine-loop of these sequences can be started at once with no loading time

## **3.3 Tools of the Base Module Standard**

The image processing and optimization functions of the Base Module Standard listed in *chapter 3.2* are distributed to different tools that can be activated or de-activated depending on the individual needs (see also *chapter 14.1.1*).

### **3.3.1 Dynamics**

Adjustment of the dynamic values of an image: contrast and brightness, colour remapping, reverse video, contrast optimization by histogram equalization (see *chapter 8.3*).

### **3.3.2 Window Levelling**

The centre/window functions allow a contrast optimization of images which have more than 256 (16 bit) grey tones. A histogram shows the grey distribution of an image. The automatic image analysis calculates new window parameters. A track bar controls the centre/window values. Measurement of the density (density profile) (see *chapter 8.2*).

### **3.3.3 ROI (Region of Interest)**

Diagnoses support in selected sections of the image by filtering: Edge enhancing by unsharp mask filters, spreading, reverse video (see *chapter 8.5*).

### **3.3.4 Measurements**

Quantitative analysis. Measurement of distances and angles. Writing and marking. Record of new macros for individual measurements in the image (see *chapter 8.6*). Writing and marking (see *chapter 8.7*).

### **3.3.5 Stack**

Special functions for the processing of multilayer (e.g. CT, MRI), and multiframe (e.g. cardiac cine-loops, ultrasound sequences) images: Selection of relevant layers in the image overview. Comparison of layers by image stack or spread mode. Quick paging. Screen splitting to compare two series. Cine-loop functions with forwards and backwards play in any speed (see *chapter 8.8*).

## **3.4 Additional Hipax Modules**

Additional modules can be added to the Base Module Standard.

### **3.4.1 CR Connection**

Using this modules, CR (computed radiography) images can be adopted from the digital X-ray systems Orex (see *chapter 7.1*), Gendex, or Lumisys ACR-2000 (see *chapter 7.2*). The images are internal stored as 16 bit grey images and can be saved or exported in different formats (e.g. DICOM, JPEG, Bitmap etc.).

### **3.4.2 X-ray Digitizing**

The TWAIN Module offers functions to receive images produced by an X-ray digitizer, a still video camera, or any other TWAIN source (see *chapter 7.3*).

Own modules are available to digitize images using the Vidar, Lumisys, or Cobra-Scan digitizers (see *chapters 7.4, 7.2, and 7.5*).

### **3.4.3 Video Grabbing**

The Hipax system enables users to connect non DICOM compatible modalities (e.g. non DICOM capable ultrasound, endoscope, microscope, CT, cardio workstation, etc.) to the DICOM world using the existing video plug. The images are added and can be stored in the Hipax administration system. Furthermore, it is possible to transmit the images in DICOM format to another DICOM compatible station (e.g. a DICOM archive).

Single video images (colour and grey images) can be grabbed as well as whole sequences. Hipax is even able to grab non-standard video signals. In any case, the selection of the suitable frame grabber is of central importance (see *chapter 2.6*). Using hires framegrabbers (Foresight) only single images can be grabbed.



The video grabbing is described in *chapters 7.6, 7.7, and 7.8*).

Additional buttons (e.g. a foot switch) can be used to drive the video grabbing functions (see *chapter 14.1.4*).

#### **3.4.4 DICOM CD**

The DICOM CD module can be used to read images from DICOMDIR CD's (e.g. cardiac cine-loops). A complete CD can be stored on the hard disk of the PC (see *chapter 7.9*).

#### **3.4.5 Patient CD**

This module enables the user to write different data of one patient on CD: images, diagnoses and laboratory reports, films and sound files, study date, name, address, and phone number of the physicians. The result is the Hipax Private Health Disk to be handed out to the patient, who is then able to bring it with him to any other physician.

Besides the images and documents, the Private Health Disk contains a list of the studies and a simple viewer. The viewer starts automatically, as soon as the physician or the patient himself inserts the CD into the CD-drive of his PC (see *chapter 9.2*).

Using the Patient CD module, even DICOMDIR CDs can be produced.

#### **3.4.6 Archive**

The Archive functions can be used to store the images on digital media (e.g. CD, DVD, WORM, MO) (see *chapter 9.1*). The images are then deleted automatically, while the patient data and small image icons are remaining on the hard disk. The paths of the archived images are stored in Hipax.

#### **3.4.7 Presentation**

Functions for the preparation and realization of image presentations, e.g. using a video beamer (see *chapter 8.10*).

#### **3.4.8 Multi Monitor**

Hipax offers the possibility to work with 2,3 or 4 landscape or portrait monitors. This module will be useful to process huge image series (e.g. CT, MRI, XA) or whole body images. To make this, one or two dual head graphics cards are needed (see *chapter 8.9*).

### **3.4.9 Database Evaluation**

The Evaluation module complements the Hipax database. Using this module, keywords can be added to single images. The keywords then are available for an evaluation. In this way, for example teaching collections can be drawn up (see *chapter 5.7*).

### **3.4.10 DICOM Print**

Printing images on film using a DICOM printer (see *chapter 13*).

### **3.4.11 DICOM Communication**

The image transmission is made using the TCP/IP protocol. This module can, for example, be used to receive DICOM images from a CT, to send or receive images within a local area network, or to exchange images with external Hipax stations. All data are completely ciphered before transmission starts. To reduce the transmission time, two different compression modes are available (see *chapter 11*).

### **3.4.12 ISDN Communication, Telemedicine**

The "ISDN" module can be used to transmit medical images via ISDN telephone lines. To make this, an ISDN adapter and ISDN lines supporting the CAPI Standard 1.1 or 2.0) are required (see *chapter 10*).

### **3.4.13 Telecardiology ("Echo")**

The "Echo" module can be used to transmit echo sequences via TCP/IP protocol (dial up network). The images are automatically ciphered and compressed before the transmission starts. The module contains different functions to display and process the cine-loops. Furthermore, sequences can be anonymized (see *chapter 8.11*).

## **3.5 Base Module "light"**

Single images can be acquired, viewed, and processed using the Hipax Base Module "light". It contains all functions of the Base Module Standard for image optimization (see *chapter 3.2.1*) with the exception of the measurement functions and the features to process multiframe/multilayer images. In contrast to the Base Module Standard, the Base Module "light" does not contain the multiframe/multilayer functions. The Base Module "light" can be combined with the DICOM Communication module for to be used as a DICOM viewer within a network.

## **CHAPTER 4: THE HIPAX USER INTERFACE**

## 4.1 Levels of the User Interface

The user interface of Hipax is divided into three levels:

### 4.1.1 Patient/Image Administration

In the standard configuration of the program the window "Patient/Image Administration" is opened automatically at any new start of Hipax. Only after the initial start of Hipax, the "Setup" window will be opened instead of the "Patient/Image Administration" window (see *chapter 2.3*).

The "Patient/Image Administration" shows the **patient database**. Here, patients, studies, or images can be selected. New patient folders can be created. The patient data are stored in the directory `\Hipax\db\`.

The different functions of the "Patient/Image Administration" are described in *chapter 5*.

### 4.1.2 Image Review

In the standard configuration of Hipax a double mouse click on a patient entry in the "Patient/Image Administration" opens the "Image Review" window. Here, all images or series of the current patient or only those images/series that have been selected in the "Patient/Image Administration" are shown side by side as small sized image icons. The image icons are stored in the directory `\Hipax\smallpic\`.

The functions of the "Image Review" are described in *chapter 6*.

### 4.1.3 Image Processing

The image processing itself can be made on this level of the program. Here, the images can be received from the modality or imported, displayed, optimised, sent and saved. The images are then stored in the directory `\Hipax\pic\`.

Already existing images can be loaded directly from the "Patient/Image Administration" or from the "Image Review" to the image processing user interface.

The user interface of the image processing window is described in *chapters 4.2 – 4.8*.

The instructions for the image processing tools can be found in *chapter 8*. The image acquisition is described in *chapter 7*.

## 4.2 Loading Images to the Image Processing Screen

In the standard configuration of Hipax, a double mouse click on an entry in the **patient list** ("Patient/Administration" window) loads the corresponding images to the "Image Review" window (see *chapter 6*). Here, the image icons can be used to select the images to be loaded to the image processing Screen.

To change the configuration please open the register "**Configuration**" of the "**Setup**" window using the main menu "System" – "Setup". Set a hook into the checkbox "Loading Images Directly from the Patient List".

☒ Loading Images Directly from the Patient List

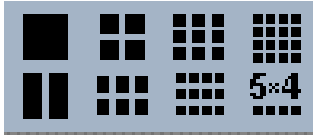
As a result, all images of a patient or study can be loaded directly from the "Patient/Image Administration" window to the image processing user interface (see also *chapter 5*).

To **cancel the loading process** use the main menu "System" – "Cancel" or this button in the right bottom part of the image processing user interface:

**Cancel**

### 4.3 Layout Functions of the Image Processing Screen

On the Hipax image processing screen images are displayed in **fixed frames**. Different frame layouts are available, e.g. 1×1, 2×1, 3×3, 4×4, or 5×4.



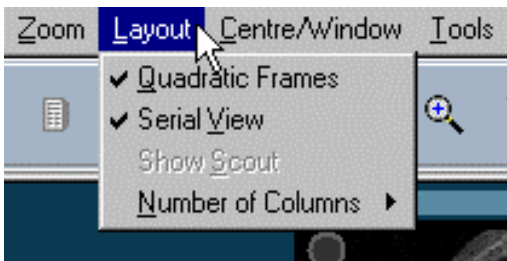
The desired number of image frames can either be selected using these buttons in the "Tools" box of the button bar or using the main menu, menu item "Tools".



Not any layout allows the user to display all loaded images at the same time. The **blue arrow** buttons can be used to page the displayed area up or down.

**Note:** The mouse wheel can also be used to page through the displayed area.

Different display modes can be selected in the menu item "**L**ayout" of the main menu.



#### 4.3.1 Frame Colours

On the image processing user interface, currently active images are framed by a **yellow margin**, while inactive images remain a **grey margin**. Selected images are marked by a **pink** spot in the upper left corner.

Using a **grey monitor**, the black and white mode can be adjusted on the user interface of the *Setup.exe* file (directory \Hipax\prg\) setting a hook into the "Grey Monitor" checkbox (see *chapter 14.2.1.6*).

As a result, active images are carrying a **white** margin. Selected images are marked by a **grey** margin. Inactive images are **black** framed.



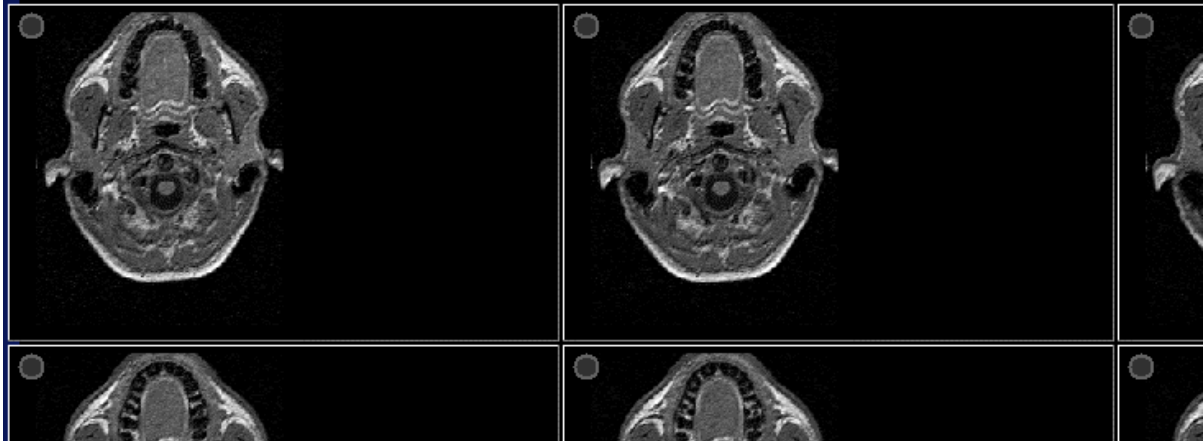
An image can be **selected** using a single mouse click on the **grey spot** in the left upper corner. As a result, the colour of the spot changes to **pink**. Another mouse click cancels the selection.

Using a **double mouse click** on the grey button **selects all** loaded images.

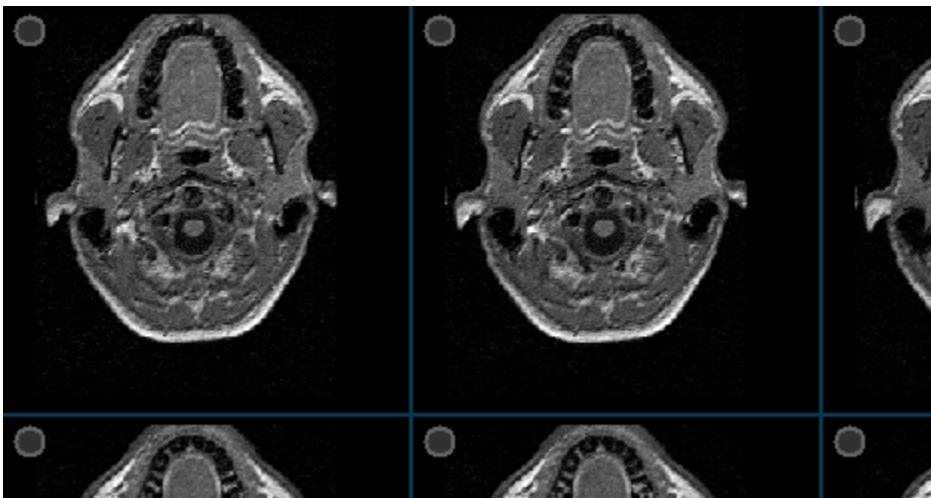
### 4.3.2 Frame Formats

The format of the image frames can be selected in the "Layout" submenu of the main menu.

**Without** the **hook** at the submenu "**Quadratic Frames**", the frame layout is filling the whole display area of the user interface. As a result, the frames are rectangular. The part of the frame that is not filled by the image remains black.



After **adding a hook** to the submenu "**Quadratic Frames**", the images themselves are displayed in the frame area as big as possible while the black parts are cut off. Exceptions are the layouts 1×1 and 2×1.



Besides the blue arrows in the button bar (see *chapter 4.4*), the "Quadratic Frame" mode offers a second possibility to page the displayed images up and down: blue bars located above and below the image frames:



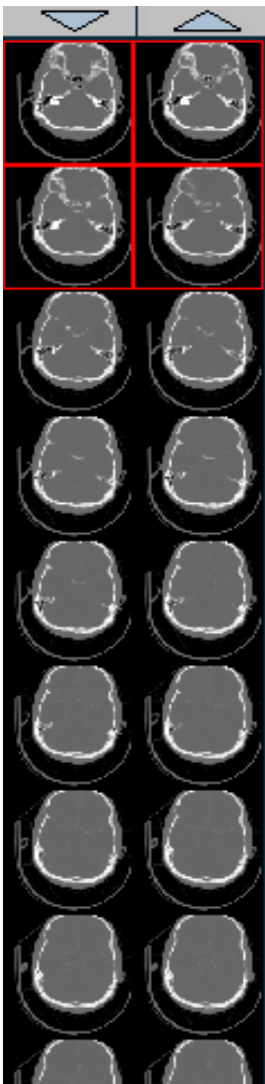
### 4.3.3 Series Review



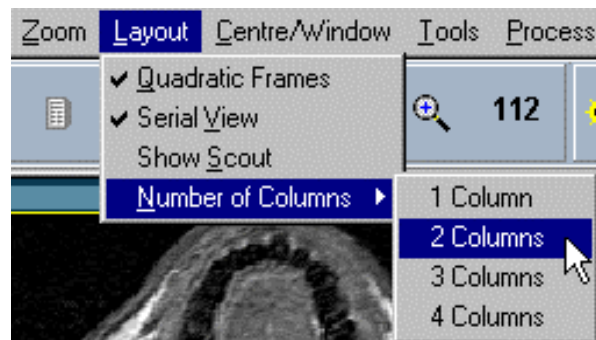
After clicking on the menu item "**Series Review**" of the "Layout" submenu, a strip appears on the left side of the user interface. Here, all images loaded are displayed in a series review as small icons.

The series review can help the user to get his bearings, e.g. within a huge CT series. The **red framed area** in the series review shows, which of the loaded images are currently displayed on the screen.

**Note:** Only **one image icon per sequence** or series appears in the series review, if the series or sequence has been loaded as a **stack** (see *chapter 8.8.1* and *14.1.2.5*). In contrast, **one icon for any single image** is displayed, if the series has been loaded in the **spread** mode.



The number of columns can be determined in the "Layout" submenu, using the menu item "**Number of Columns**".



The icons can be displayed in 1-4 columns. The more columns, the smaller the single image icons. The **size of the image icons** can also be determined by changing the width of the strip.

To **widen the series review**, please lead the mouse arrow to the right margin of the strip. Click on the left mouse button, remain the button pressed and move the mouse to the right.

To **narrow the series review**, please click again on the right margin of the strip. Move the mouse to the left remaining the mouse button pressed.

Clicking **on one of the image icons** of the series review, the corresponding image is automatically shown in the display area.

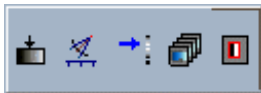




If several series have been loaded to the image processing screen the **blue wedge** buttons can be used to jump to the first image of the next (arrowhead pointing down) or previous series (arrowhead pointing up).

The **series review** strip can be **closed** using a double mouse click to the strip area below or on the right of the icons. Using another double mouse click to the left margin of the screen, the series review is opened again.

#### 4.3.4 Increasing the Size of the Image Processing User Interface



Each button in the "Processing" box of the button bar opens a context **menu strip** to the function selected (see *chapter 4.5*).



Using this button on the top of the menu strip makes the main menu and the button bar **invisible**. The image display area increases. The menu strip remains open.

**Note:** The same can be made using the **F5** key. Reset clicking the F5 key a second time.



This button on the bottom of the menu strip makes the status bar of the image processing user interface invisible.

The **wedge buttons** on the top and bottom on the menu strip are now pointing to the opposite direction. Clicking both buttons makes the main menu, the button bar, and the status bar visible again.



After the main menu and the button bar has been made invisible, this button appears in the upper right corner of the menu bar. Use this button to **close the menu strip**. Thus, the image display area can be **increased to a maximum**.



Please use this blue arrow button on the top of the image display area to **make the menu strip visible again**.

**Note:** The blue arrow button only appears in the layout mode "Quadratic Frames" (see *chapter 4.3.2*). If this is not activated, please use the **F5** button to **reset the standard screen size**.

## 4.4 The Button Bar of the Image Processing Screen

The button bar contains of a couple of buttons carrying graphic symbols. Here, the most important processing functions can be found.

**Note:** All functions offered by the button bar can also be started using the main menu (see *chapter 4.6*).

The number of tools is variable and the button bar can be configured individually switching the single button boxes on or off (see *chapter 4.4.1*).



The single buttons are arranged according to subject:

- The "**Database**" box contains different function according to the patient database (see *chapter 4.4.2*).
- In the "**Zoom**" box, several buttons to change the image size can be found (see *chapter 4.4.3*).
- Window levelling and dynamics can be changed using the buttons of the "**C/W**" box (see *chapter 4.4.4*).
- The "**Tools**" box offers the user layout frames and processing functions to different subjects (see *chapter 4.4.5*).
- The single buttons of the "Tools" box can be switched on or off individually (see *chapter 4.4.1.3*).
- Each button of the "**Processing**" box opens a menu strip according to different functions (see *chapter 4.5*). Parts of the buttons are corresponding to the Base Module, parts of them to additional modules.
- The single buttons of the "Processing" box can be switched on or off individually (see *chapter 4.4.1.4*).

### 4.4.1 Configuring the Button Bar

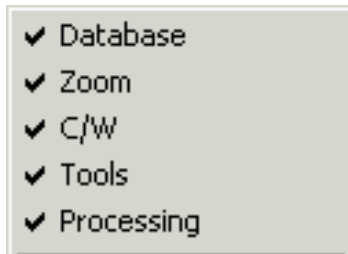
The Symbol bar can be **configured individually** corresponding to the needs:

#### 4.4.1.1 Changing the Size of the Icons

On big screens, the buttons of the button bar often appear much too small. Using the *Setup.exe* file in the directory *\Hipax\prg\* the icons can be increased by factor four (see *chapter 14.2.1.5*).

#### 4.4.1.2 Switching off Whole Button Boxes

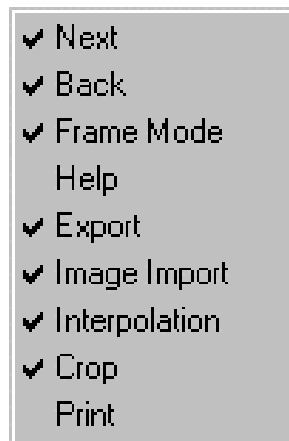
Using a **right mouse click** on the button bar opens a pop-up menu, where the names of the different boxes are listed.



To **delete a box from the bottom bar**, please remove the hook from the corresponding menu item using a single mouse click. Another mouse click used on the same entry replaces the hook. As a result, the corresponding button box appears again in the button bar.

#### 4.4.1.3 Configuring the "Tools" Box

Each individual button of the "Tools" box can be made visibly or invisibly. Clicking the right mouse button on one of the buttons in the "Tools" box opens a pop-up menu, where the names of the different buttons are listed.



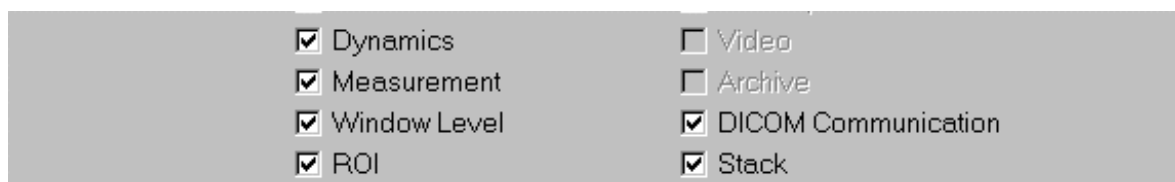
All functions shown in this screen shot are part of the Base Module Standard.

Additional functions will appear in the pop-up menu, if the following Hipax modules are installed, e.g.:

- "TWAIN/Scan" (see *chapter 7.3*)
- "Video Interface" (see *chapter 7.6* and *7.7*)
- "Hi-Line" (see *chapter 7.8*)
- "ISDN" (see *chapter 10.*)
- "DICOM Communication" (see *chapter 11.*)
- "DICOM Print" (see *chapter 13.*) are installed

#### 4.4.1.4 Configuring the "Processing" Box

The buttons in the "Processing" box can also be switched on or off individually. To make this, please open the "Setup" window using the main menu "System" – "Setup". Here, you find all the modules listed. A module can be inactivated by removing the hook from the corresponding checkbox. As a result, the corresponding button disappears from the "Processing" box of the button bar.



### 4.4.2 The "Database" Box



The "Database" box contains different functions according to the local database or the server database.



Opens the "**Patient/Image Administration**" window. Here, a new patient folder can be created or an existing patient folder can be opened. (see *chapter 5.1*).



This button can be used to open the "**Image Review**" window for the current patient, where small icons of all the images or series are displayed side by side (see *chapter 6*).



Using this button, the currently active image can be **stored in the patient database**. First, a dialogue opens, where the patient data can be checked and notes can be added to the image.



The folder of the patient, which is located in the patient list **previously to the current patient**, can all be loaded to the "Image Review" window or directly to the image processing screen using this button.



Loads the images of the **next patient** in the list to the "Image Review" window or the image processing screen.



Using this button, a query can be started to **access to the Hipax Server**. The button is only active, if the Hipax PC is used as a client within a network, enabled to access to the Hipax Server. The transmission is made using the Hipax protocol.



This button can be used to **store an image on the Hipax Server database**. It is only available, if the Hipax PC is used as a client within a network, enabled to access to the Hipax Server.



A DICOM query can be started using this button (see *chapter 11.10*). In contrast to the Hipax server access, the transmission is made using DICOM communication.

### 4.4.3 The "Zoom" Box



The "Zoom" box offers functions to magnify or to reduce an image.

**1:1**

The "1:1" button displays the current image in **original resolution**. One point of the image is equivalent to one point on the screen. Images with higher resolution than the screen is able to display, are cropped. Scrollbars can be used to select the visible part of the image.



Using this button the active image is shown **completely** in the current frame, independent of its real size.



This button allows to define an **area** of the image to be **magnified**.

The visible image area can be changed using the scrollbars.

Using the *Setup.exe* file in the directory \Hipax\prg\, an interpolation can be activated for zoomed images (see *chapter 14.2.1.2*).

**18**

Here, the percentage of **magnification** is shown.

**Note:** Over-magnification can lead to a lack of clarity in the images. Generally, there is no advantage in magnifying more than factor 2.

### 4.4.4 The "C/W" Box



The "C/W" box can be used to change the centre/window and brightness values of the current image (see also *chapters 8.2.1* and *8.3*).



This button starts an **automatic image analysis**, which calculates new window parameters.



The **histogram** shows the grey distribution of an image (*chapter 8.2.1.5*).



The "**Reset**" button restores the original centre/window values.



The upper arrow of the track bar adjusts the **dynamics** (brightness and contrast). The three lower arrows control the **centre/window** values.

### 4.4.5 The "Tools" Box

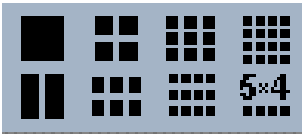


The "Tools" box contains different functions which can be configured individually. They allow the simplification of some important operation steps.

The following functions are **generally available**:



**Paging** up/down through the pictures currently loaded



**Display** selection (see *chapter 4.3*)



**Printing** images on a Windows capable printer (see *chapter 4.6.1.1*)



Opening the **help** file



Image **export** (see *chapter 4.6.1.3*)



Image **import** (see *chapter 4.6.1.4*)



**Cropping** an area from the image and enlarge it. In contrast to the "Zoom" function, the cropped area is displayed in an own image frame and can be saved as an own image. To close the area without saving, please click the right mouse button opening a pop-up menu and use the menu item "Close".



To display the active images on the **full screen**. The sharpness is adapted automatically by interpolation. Reset clicking any mouse button or using the "Esc" key.



Sending all images loaded to **MS Word**. This enables the user to add the images, e.g. to the results.

To activate the function, please close Hipax. Open the file `\Hipax\prg\Setup.exe` using the Windows Explorer. Set a hook into the checkbox "Microsoft WORD Image Export" (see *chapter 14.2.1.1*). Close the *Setup.exe* file and start Hipax again.

Please follow the instructions in *chapter 4.4.1.3*, to make the "Word" button in the button bar visible.

Other buttons are only **available** if the **corresponding modules** are **installed**:



To print images on a DICOM printer (see *chapter 13*). To make this, the **DICOM Print** module has to be installed.



The "Scan Images" button appears if the module **TWAIN/Scan** (see *chapter 7.3*) or **Hi-Line** (see *chapter 7.8*) are installed. It opens directly the user interface of the TWAIN source.



This button can be used to write selected images, series, or sequences of the current patient on CD. It appears after installation of the **Patient CD** module (see *chapter 9.2*).



The button "Grab **Video** Image" opens the "Live" window, showing the current images of the video source (see *chapters 7.6* and *7.7*).



This button opens a dialogue for **DICOM Communication** (see *chapter 11*).



The **ISDN Communication** (CAPI) contains a phone book to be opened using this button (see *chapter 10.1*).



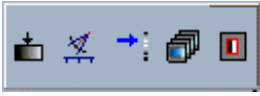
The user interface of the Cobra-Scan driver can be opened using this button (see *chapter 7.5*).



After the Orex module has been installed, the user interface of the Orex CR system can be started using this button (see *chapter 7.1*).

The "Tools" box can be configured independently (see *chapter 4.4.1.2*).

### 4.4.6 The "Processing" Box



Each button in the "Processing" box opens a context menu strip with detailed processing functions (see *chapter 4.5*).

Using the Base Module Standard, the following buttons are available in the "Processing" box:



To open the "**Dynamics**" menu (see *chapter 8.3*).



To open the "**Measure**" menu (see *chapter 8.6*). This button is lacking in the Base Module "light".



To open the "**Window Level**" menu (see *chapter 8.2*).



To open the "**Stack**" menu with special functions to process image series and sequences (see *chapter 8.8*). This button is lacking in the Base Module "light".



To open the "**ROI**" menu (= region of interest) offering various filters for diagnoses support (see *chapter 8.5*).

Further buttons can appear as soon as additional modules have been installed (see *chapter 2.3*).



To open the "**ISDN**" menu (see *chapter 10*) for transmitting images using CAPI ISDN line and Fritz! ISDN card.



This button opens the "**Hi-Line**" menu (see *chapter 7.8*) to grab video images via TWAIN using the hi-line frame grabbers HIDEF ACCURA, I-50, or I-60.



To open the "DICOM CD" menu for reading DICOMDIR CDs (see *chapter 7.9*).



To open the "**Presentation**" menu (see *chapter 8.10*).



The "**Echo**" menu to be opened using this button contains various telecardiology functions to display, project, anonymize, and send echo sequences. For the send function, the DICOM Communication module has also to be installed (see *chapter 8.11*).





To open the "**Video**" menu. The functions of the menu are varying, depending on the frame grabber and video mode used (see *chapters 7.6* and *7.7*).



The "**Evaluation**" menu to be opened with this button can be used to relate keywords to images. The menu to relate images to patients is located in the "Patient/Image Administration" window (see *chapter 5.7*).



Click this button to open the "Conference" menu for taking part on a teleconference.

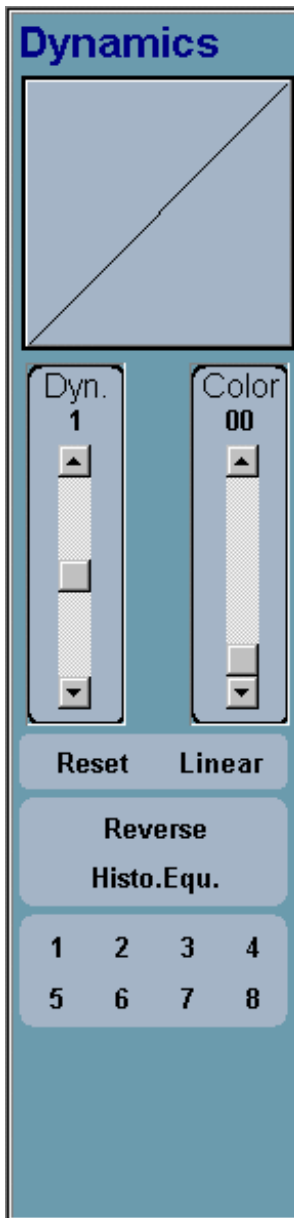


To open the "TWAIN/Scan" or "Vidar" module (see *chapters 7.3* and *7.4*).



This button opens the CR-Scan menu strip to drive the Lumisys CR system or a Lumisys X-ray digitizer (see *chapter 7.2*).

## 4.5 The Menu Strips



The example given here shows the menu of the "Dynamics" function.

In the standard configuration, the menu strip appears fixed at the right margin of the Hipax user interface.

Using a right mouse click on the menu opens a pop-up menu.



Here, the **position** of the strip can be **configured**:

For example, to move the strip from the right to the left side of the screen, please set a hook to the menu item "**Left Side**" and to the menu item "**Fixed**".

In the "**Auto Mode**", the menu appears automatically as soon as the mouse arrow touches the left or right margin of the screen.

Another possibility is to display the menu strip as an own "**Window**" to be moved independently on the screen.

In the lower part of the pop-up menu, the **subject** of the menu strip to be opened can be **selected**. This can also be made using a mouse click on the corresponding button in the "Processing" box of the button bar (see *chapter 4.4.6*).



These buttons on the top and bottom of the menu strip can be used to increase the size of the image display area (see *chapter 4.3.4*).

## 4.6 Main Menu

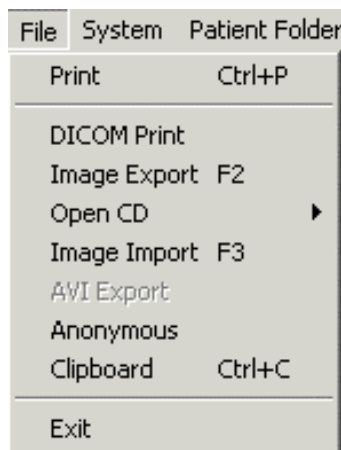
File System Patient Folder Zoom Layout Centre/Window Tools Processing Image Windows Help

The main menu bar is located at the upper margin of the screen. It has to be operated using the left mouse button or the keyboard.

The main menu offers all the same functions that can be started using the button bar (see *chapter 4.4*). Additionally, the main menu enables the user to perform further operations.

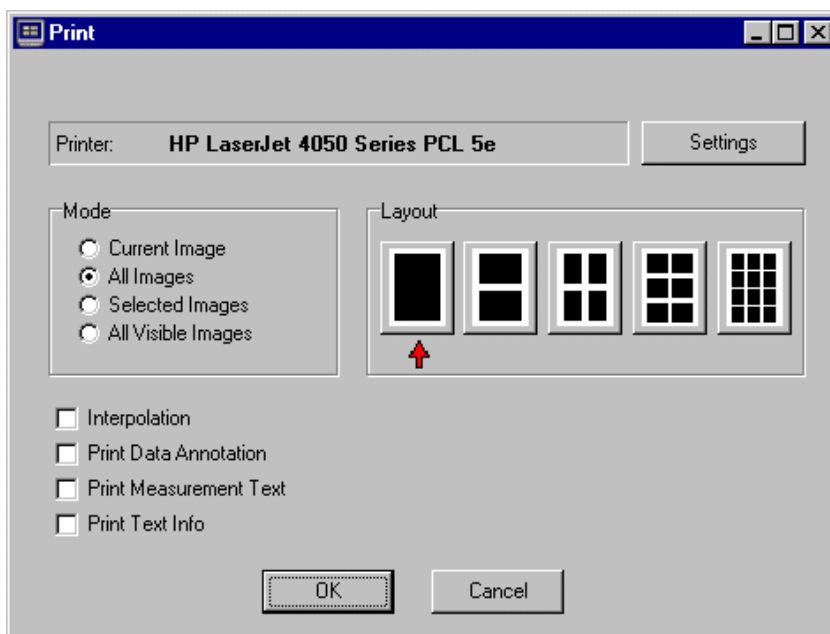
**Note:** This chapter mainly describes those operations, which cannot be started using the button bar.

### 4.6.1 The "File" Submenu



#### 4.6.1.1 Print

The "**Print**" function allows the image to be printed on a Windows printer. It opens a dialogue, where different image adjustments can be made:

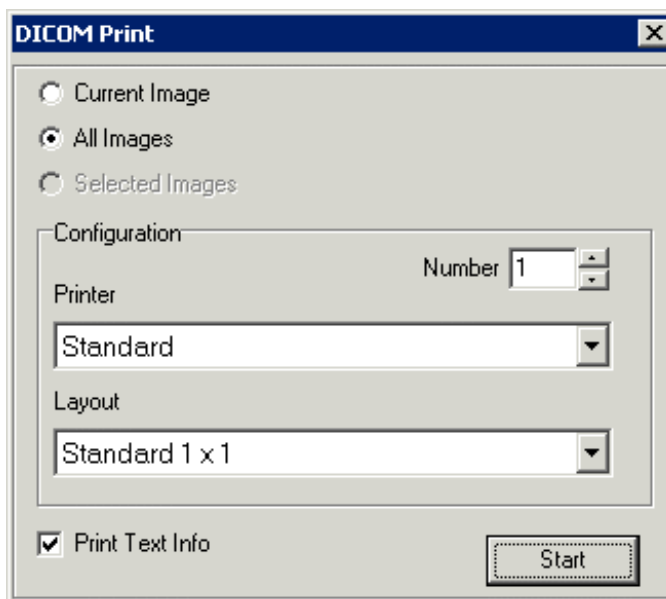


The "Print" dialogue can also be opened clicking on the corresponding button in the "Tools" box of the button bar (see *chapter 4.4.5*) or using the keys **Strg(Ctrl)+P**.

**Contrast** and **brightness** of images to be printed can be pre-adjusted using the Hipax "Setup" window, register "Configuration" (see *chapter 14.1.2.12*).

#### 4.6.1.2 DICOM Print

The "**DICOM Print**" menu item is only available if the corresponding module is installed. Clicking on this menu item or on the symbol in the button bar (see *chapter 4.4.5*) opens a dialogue where the final adjustments for the DICOM print can be made.



The user instructions for the DICOM Print function can be found in *chapter 13* of this manual.

#### 4.6.1.3 Image Export

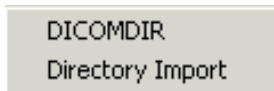
The "**Image Export**" menu item opens the "Saving Images" dialogue, where a directory path can be selected. Thus, the current image can be stored in the desired directory using any individual file name.

Hipax offers different saving formats: DICOM 3, JPEG, PNG, Bitmap, TIFF.

The "Image Export" function can also be started using the **F2** key of the keyboard.

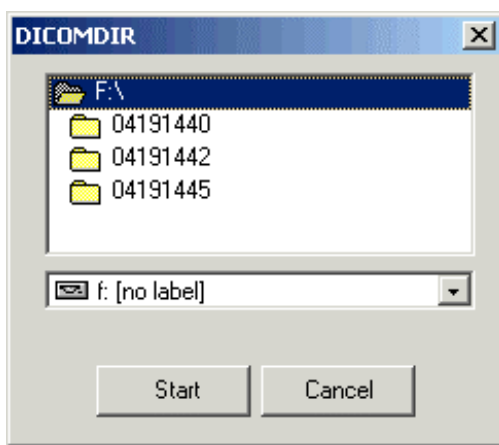
#### 4.6.1.4 Open CD

The "**Open CD**" menu item can be used to import images from CDs. It opens a submenu:



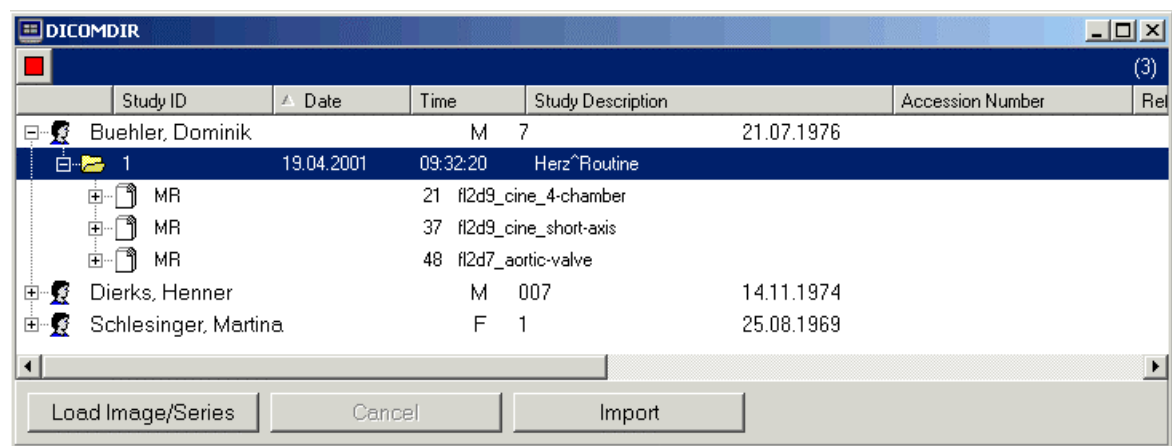
The "**DICOMDIR**" submenu item can be used to load images from a DICOMDIR CD (e.g. Patient CD or cardiac CD).

To make this, please insert the DICOMDIR-CD into the CD drive. The menu item "File" – "Open CD" – "DICOMDIR" opens a dialogue, where the CD drive can be selected from a drop down list.



Normally, the DICOMDIR file is located on the drive level of the CD. Therefore, the drive letter has to be marked in the dialogue before the reading process can be started.

The "**Start**" button opens a window, where the patient folder stored on the CD are listed.



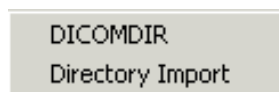
Similar to the Windows Explorer, the lower hierarchical levels can be made visible in a tree view using a double mouse click on an entry or using the "+" button: patient, study, series, single images of a series.

The "**Load Image/Series**" button loads all images of the selected level to the Hipax image processing user interface. Using The "**Import**" button, all the images are not only loaded, but directly added to the Hipax database.

The "**Cancel**" button can be used to interrupt the loading process.



This button opens the "HeaderEditor" window, where the DICOM header of an images can be processed.



The "**Directory Import**" function in the "Open CD" submenu searches the CD for images, which can be imported automatically to Hipax. A DICOmdir file is not needed.

First dialogue opens, where the CD drive and the desired directory on the CD can be selected. The "**Start**" button adds all the data of the selected subdirectory directly to the Hipax database..

#### 4.6.1.5 Image Import

The "**Image Import**" function in the "File" menu opens the "Load Images" dialogue. Here images can be selected in a directory tree and loaded to Hipax. Imported images can then be stored in the currently opened patient folder of the Hipax database.

Images also can be imported using the **pop-up menu** which opens after clicking the right mouse button on an image (see *chapter 4.7*) or using **F3**.

**Note:** Some image file formats use the LZW compression algorithm, which is patented. Hipax does not support this kind of image.

**Note:** To import 16 Bit images, it is necessary to decide, how the data should be interpreted. If the images should be shown as a grey image, please activate the checkbox "Store 16 Bit RGB Image as Grey Image" in the window "Configuration" of the "Setup" menu (see *chapter 14.1.2*).

#### 4.6.1.6 AVI Export

The "**AVI Export**" menu item is only available for sequences. It can be used to export the loaded sequence as an AVI file. To make this, a dialogue opens to select the directory path, where the AVI file should be saved.

**Note:** Avi files can be imported and added to the current patient folder using the "New Document" item of the "Patient Folder" menu (see *chapter 4.6.3.8*).

#### 4.6.1.7 Anonymous

To anonymize an image, please activate the "**Anonymous**" menu item. The image has then to be exported (e.g. using the F2) and re-imported. After saving, the DICOM header of the image copy is empty.

#### 4.6.1.8 Send to Word

The "**Send to Word**" menu item copies the active image and inserts it automatically into Word. Clicking on the Word symbol in the "Tools" box of the button bar has the same effect.

The function is only available after it has been activated using the Hipax *Setup.exe* file, directory *\Hipax\prg\* (see *chapter 14.2.1.1*).

**Note:** Word has to be started previously before this functions can be used.

#### 4.6.1.9 Clipboard

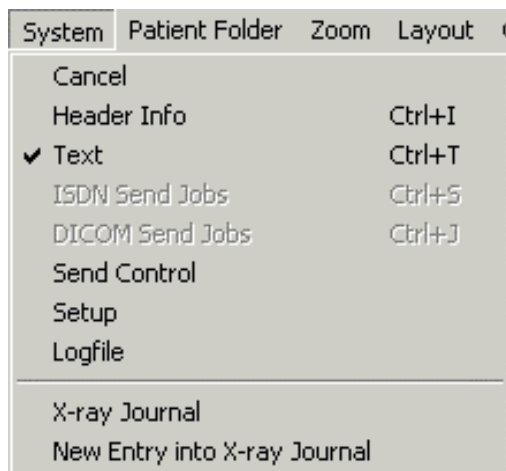
"**Clipboard**" can be used to copy the active image. The image can then be inserted into another Windows application.

The keys **Strg(Ctrl)+C** can also be used to copy the active image.

#### 4.6.1.10 Exit

Hipax can be closed using the "**Exit**" menu item. Another possibility to close Hipax is to click on the "x" button in the upper right corner of the user interface.

### 4.6.2 The "System" Submenu



#### 4.6.2.1 Cancel

Select this menu item to **stop the loading process of images**. The loading process can also be stopped using this button in the right bottom part of the image processing user interface:



#### 4.6.2.2 Header Info

The function "**Header Info**" in the "System" menu opens the DICOM header of the active image containing the image parameters and patient data.

**Note:** Only DICOM images have a complete DICOM header. In other image formats, the DICOM header only consists of a few lines.

#### 4.6.2.3 Text

After setting a hook to the "**Text**" menu item, the DICOM 3 parameters are shown in all DICOM images loaded.

#### 4.6.2.4 ISDN Send Jobs

Clicking on "**ISDN Send Jobs**" opens a list, where all ISDN jobs in process are listed (see *chapter 10.7.1*). This menu item is only available, if the module "ISDN Communication" has been installed.

#### 4.6.2.5 DICOM Send Jobs

Running DICOM send jobs can be queried using a mouse click on the menu item "**DICOM Send Jobs**" (see *chapter 11.3*).

#### 4.6.2.6 Setup

The "**Setup**" menu item opens the "Setup" window. Here, different registers are available for the Hipax system configuration (see *chapter 14.1*).

#### 4.6.2.7 Logfile

Clicking on the "**Logfile**" menu item opens the "LOG" window, where the most important Hipax processes are listed in chronological order.

#### 4.6.2.8 X-ray Journal

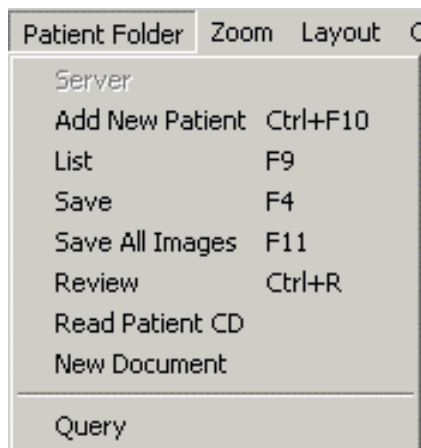
The **X-ray Journal** can be used to store relevant parameters of an X-ray study into an own database. The function is only available after the module "X-ray Journal" has been installed. The menu item opens a list of X-ray journal entries (see *chapter 7.10*), which have been entered previously into an own dialogue (see *chapter 4.6.2.9*).

#### 4.6.2.9 New Entry into X-ray Journal

The menu item "**New Entry into X-ray Journal**" opens a dialogue to enter the X-ray parameters of a current study. The function is only available, if the module "X-ray Journal" has been installed (see *chapter 7.10*).



### 4.6.3 The "Patient Folder" Submenu



#### 4.6.3.1 Server

After setting a hook to the submenu "**Server**", all images can be stored directly on the Hipax Server instead of the local database. To make this, the Hipax PC has to be used as a client within a network, enabled to access to a Hipax Server.

#### 4.6.3.2 Add new Patient

"**Add New Patient**" opens the "New Patient" window to enter the data of a new patient (see also *chapter 5.3*).

#### 4.6.3.3 List

The patient list of the "Patient/Image Administration" can be opened using the "**List**" menu item (see *chapter 5.1*).

#### 4.6.3.4 Save

Using the "**Save**" function relates the active image to the currently selected patient folder. The image is stored in the local database or on the server, depending on the pre-adjustments.

The currently active image can also be saved using the "Save Image" button in the "Database Box" of the button bar (see *chapter 4.4.2*). Furthermore, the key "F4" can be used for saving.

#### 4.6.3.5 Save All Images

The "**Save All Images**" menu item stores all the images loaded in the currently selected patient folder.

This can be made on the local disk as well as in the Hipax server database, depending on the pre-adjustments (see *chapter 4.6.3.1*).

#### 4.6.3.6 Review

The "**Review**" menu item opens the "Image Review" windows, where small icons of all the images of a patient are displayed side by side (see *chapter 6.*).

The "Image Review" window can also be opened clicking on the corresponding icon in the "Database" box of the button bar (see *chapter 4.4.2*) or using the keys Strg+R.

#### 4.6.3.7 Read Patient CD

"**Read Patient CD**" enables the user to open the images stored on a DICOM Patient CD using the Hipax software instead of the viewer located on the CD.

#### 4.6.3.8 New Document

Besides the images also **other files can be related to a patient**, e.g. documents (results, laboratory reports, etc.), films, or sound files.

The following **file formats** are supported: text (DOC, TXT), film (AVI, MPG), sound (WAV), multimedia (WMV).

Clicking on the "**New Document**" menu item opens a dialogue, where the desired file can be selected and marked. The selected file can then be loaded to Hipax using the "Open" button. As a result, the file is added automatically to the current patient folder.



This button opens the "Image Review" window, where the added files are displayed as symbols, e.g.:

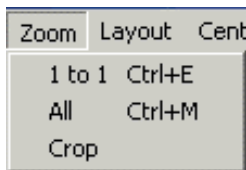


A double mouse click used on a symbol opens the corresponding file.

#### 4.6.3.9 Query

A DICOM query can be started using the "**Query**" menu item (see *chapter 11.10*).

#### 4.6.4 The "Zoom" Submenu



This menu offers nearly the same functions as the "Zoom" box of the button bar (see *chapter 4.4.3*).

##### 4.6.4.1 1 to 1

The "**1 to 1**" submenu, displays the active image in **original resolution**. One point of the image is equivalent to one point on the screen.

##### 4.6.4.2 All

After clicking on "**All**", the **complete image** is shown in the frame, independent of the real image size.

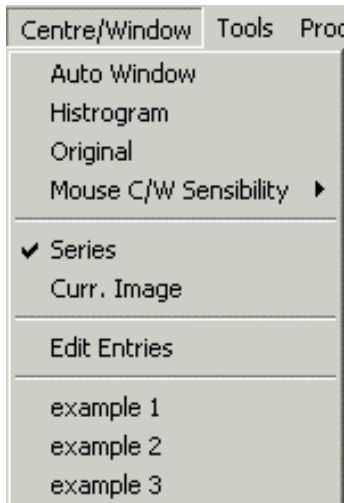
##### 4.6.4.3 Crop

The "**Crop**" function enables the user to define an image area to be magnified.

#### 4.6.5 The "Layout" Submenu

See *chapter 4.3*.

#### 4.6.6 The "Centre/Window" Submenu



All the functions of the submenu Centre/Window are also offered by the "Window Level" menu strip, which can be opened using the "Window Level" icon in the "Processing" box of the button bar (see *chapter 4.4.6*).

The window levelling is described in *chapter 8.2*.

##### 4.6.6.1 Auto Window

The "**Auto Window**" button starts an **automatic image analysis**, which calculates new window parameters.

#### 4.6.6.2 Histogram

The "**Histogram**" shows the grey distribution of an image. Here the centre/window levels can be changed with the mouse (see *chapter 8.2.1.5*).

#### 4.6.6.3 Original

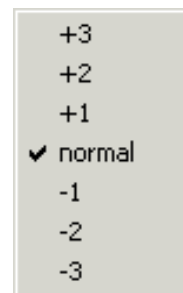
The "**Original**" menu item restores the original centre/window values. It is corresponding to the "Reset" button in the "Window Level" menu strip and with the "Reset" icon in the "C/W" box of the button bar.

#### 4.6.6.4 Mouse C/W Sensibility

The centre/window values can be changed keeping the left mouse button pressed and moving it across the image. Please move the mouse arrow up and down to change the window centre and move it in the horizontal direction to change the window width.

The sensibility of the mouse C/W function can be changed using the menu item "**Mouse C/W Sensibility**".

It opens another submenu, where the user can select between seven steps of sensibility. The higher the value, the shorter are the distances of mouse movement for changing the window values.



#### 4.6.6.5 Series

Please set a hook on the "**Series**" menu item using a mouse click, if you want to carry through the window levelling for all images of a series (see *chapter 8.2.3*).

#### 4.6.6.6 Current Image

To carry through the window levelling for only one selected image of a series, please set a hook to the menu item "**Current Image**".

#### 4.6.6.7 Edit Entries

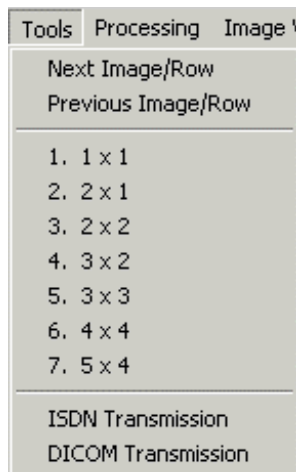
Hipax offers three presets of centre/window values which can be changed, added or restored by self edited centre/window presets.

This can be made in the "Default Config." window to be opened using the menu item "**Edit Entries**". The creation of centre window presets is described in *chapter 8.2.4*.

#### 4.6.6.8 Example 1, 2, 3

Clicking on the menu items "**Example 1**", "Example 2" or "Example 3", the pre-defined window values can be used on the current image or series (see *chapter 8.2.4*).

### 4.6.7 The "Tools" Submenu




The "Tools" menu contains the layout frames, which are also given as icons in the "Tools" box of the button bar. Furthermore, the ISDN and DICOM transmission can be started in this submenu.

Additional functions are the "Next/Image/Row" and the "Previous Image/Row" menu items.

#### 4.6.7.1 Next Image/Row

**Paging down** through the pictures currently loaded.




This can also be made clicking on this button in the "Tools" box of the button bar or using the wedge bar below the image display area of the screen: 

#### 4.6.7.2 Previous Image/Row

**Paging up** through the pictures currently loaded.



This can also be made using this button in the "Tools" box of the button bar or the wedge bar above the image display area of the screen: 

#### 4.6.7.3 1 × 1, 2 × 2, etc.

Distribution of the image **frames** on the screen. The menu offers seven different layout presets.

The layout presets can also be found in the "Tools" box of the button bar.

#### 4.6.7.4 ISDN Transmission

This menu item opens the phone book (see *chapter 10.4*). It is only active, if the ISDN Communication module has been installed.



The phone book can also be opened using this button in the "Tools" box of the button bar.

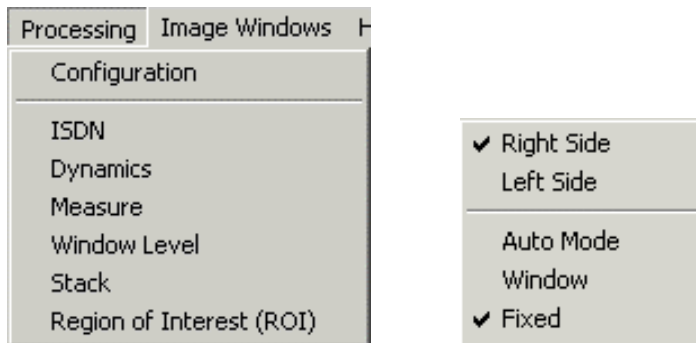
#### 4.6.7.5 DICOM Transmission

Please click on the "DICOM Transmission" menu item to open the dialogue for sending images via DICOM communication (see *chapter 11*). The menu item is only active, if the DICOM Communication module has been installed.



This button in the "Tools" box of the button bar also opens the DICOM Communication dialogue.

#### 4.6.8 The "Processing" Submenu

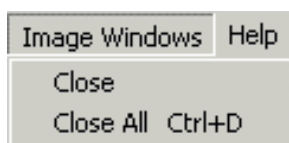


The "**Configuration**" menu item can be used to adjust the position of the menu strip. It opens the same **pop-up** menu as described in *chapter 4.5*).

Clicking on a menu item in the list below the "Configuration" tool opens the **menu strip** of the corresponding module (see *chapter 4.5*).

**Note:** Only those functions are listed in the submenu, which have been installed and activated previously.

#### 4.6.9 The "Image Windows" Submenu



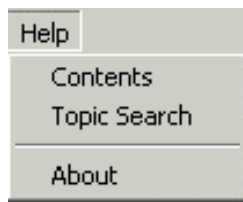
##### 4.6.9.1 Close

The "**Close**" menu can be used to close the currently selected images.

##### 4.6.9.2 Close All

"**Close All**" closes all images loaded. This can also be made using the **Strg(Ctrl)+D** key.

### 4.6.10 The "Help" Submenu



#### 4.6.10.1 Contents

The "**Contents**" menu item opens the Hipax online help.

#### 4.6.10.2 Topic Search

Using the "**Topic Search**" menu item a dialogue opens containing a list of terms. Here, keywords can be entered to get the user's instruction corresponding to the searched subject.

#### 4.6.10.3 About

The "About" menu item opens the Hipax start window showing the user name, the version number, and the dongle key or serial number.

## 4.7 Mouse Buttons

Hipax requires a mouse with two buttons (left and right). A wheel mouse offers additional functions to the Hipax user. The middle button of mice with three buttons is ignored.

### 4.7.1 Left Mouse Button, Short Click

Please press the left mouse button to:

- handle buttons, menus, scrollbars etc.
- mark images in the image review
- select patients, studies or images from the database
- set points to carry out a measurement
- select ROIs, images or measurement objects.

### 4.7.2 Keeping the Left Mouse Button Pressed

The **window levelling** (centre/window values) of grey images can be changed moving the mouse on the image while the left mouse button remains pressed. Please move the mouse arrow up and down to change the window centre and move the arrow in the horizontal direction to change the window width (see also *chapter 8.2.1*). To change the sensibility of the mouse C/W function see *chapter 4.6.6.4*.

To determine an area for "**ROI**" (see *chapter 8.5*), "**Zoom**" (see *chapter 4.4.3*), or "**Crop**" (see *chapter 4.4.5*), please press the corresponding button (ROI, zoom, or crop) first. Move then the mouse arrow to the upper left corner of the desired rectangle and press the left mouse button. Move the mouse with the pressed button until you have drawn out the rectangle. The process is finished after the button is released.

**Density** profiles are calculated along a line (see *chapter 8.2.5.1*). This line is defined by the mouse. Please press the "Density" button first. Move the mouse arrow to the left end of the desired line and press the left mouse button. Move the mouse with the pressed button until the line is drawn out.

#### **4.7.3 Left Mouse Button, Double Click**

The double clicking on the left mouse button carries out the following operations:

- Loading all images of the corresponding patient from the patient list into the image review (see *chapter 5.1*).
- Loading all images of one study from the study list of the patient/image administration into the image review (see *chapter 5.5*).
- Loading single images from the image list of the patient/image administration to the image processing screen (see *chapter 5.6*).
- Loading an image or a series from the "Image Review" window to the image processing screen (see *chapter 6*).
- Entering a new measurement scale (see *chapter 8.6.4*).
- Opens a dialogue to change texts which have been edited in the "Measurement" function (see *chapter 8.7.2*).
- Selecting a receiver from the ISDN phone book (see *chapter 10.4.6*).

#### **4.7.4 Right Mouse Button, Short Click**

Clicking on the right mouse button opens different context-defined pop-up menus.

Applied to the **button bar** or to the menu strips on the image processing screen it opens a pop-up menu for the configuration of the button bar or the menu strip, respectively (see *chapters 4.4.1* and *4.5*).

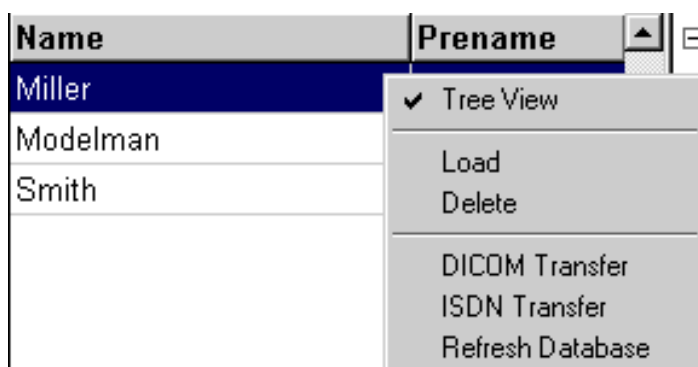
When used on an **image**, a short click on the right mouse button opens a pop-up menu containing different functions for the processing of images:



- "**Image Info**" opens a dialogue box where comments to the active image can be noted (see also *chapter 5.6*).
- The "**Display**" menu item opens another pop-up menu, where all the image frames available are listed (see *chapter 4.3*).  
**"Series Review"** opens a strip on the left side of the user interface, where, all images loaded are displayed as small icons (see *chapter 4.3.3*).
- Distances can be measured in the current image using the "**Distance**" menu item.  
**"Del. Meas."** deletes all measurements and from the current image.
- The "**Window Level**" menu item opens another pop-up menu.  
Please select here whether the window levelling should be made for all images of a **series** or sequence or only for the **current image**.  
Presets for the window levelling can be edited ("**Edit Entries**") or used (**example 1 to 3**) (see *chapter 8.2.4*).
- Images which have been scanned from the wrong side can be reflected or rotated using "**Mirror/Rotate**".



The short click on the right mouse button used to the **patient list**, opens the following pop-up menu:



- It is possible to switch between list view and tree view by setting or removing the hook to the menu item "**Tree View**".
- The images of the current patient can be **loaded** or **deleted**.

- All images of a patient can be sent to another station using **DICOM** or **ISDN Transfer** (see *chapters 10. or 11.*). To make this, the DICOM or ISDN module has to be installed.
- The Hipax **database** can be **refreshed** using the corresponding menu item (see also *chapter 5.1.10*).

#### **4.7.5 Keeping the Right Mouse Button Pressed**

This function activates the **magnifying glass**. The magnifying glass disappears as soon as the mouse button is released (see also *chapter 8.1*).

#### **4.7.6 Drag and Drop**

Images can be **imported** directly using the drag and drop function. To make this, please remain in Hipax and open the Windows Explorer via the Windows taskbar. Click with the left mouse button on the desired image file. Keep the mouse button pressed and pull the file to the image processing screen of Hipax. The image is imported to Hipax as soon as the mouse button is released.

Furthermore, the drag and drop function can be used to **move an image frame** to another position on the screen. To make this, please first press the "Alt" key of the keyboard. Then click with the left mouse button on the image. Keep the mouse button pressed until the mouse arrow has been placed on the desired position. The process is finished as soon as the mouse button is released (see also *chapter 8.8.1*).

### **4.8 Keyboard**

Some important proceedings of Hipax also can be carried out using the keyboard. Here is a list of all functions:

- |     |   |
|-----|---|
| F2: | Image export (see <i>chapter 4.6.1.3</i> ).   |
| F3: | Image import (see <i>chapter 4.6.1.4</i> ).   |
| F4: | To save images in the database of the current patient (see also <i>chapters 4.6.3.4</i> and <i>5.6.1</i> ). The format of the image can be adjusted in the "Setup" menu (see <i>chapter 14.1.2.2</i> ). The standard adjustment is DICOM. |
| F5  | To increase the image display area to the maximal size. As a result, the main menu and the button bar are disappearing from the screen. Reset clicking again on F5 (see <i>chapter 4.3.4</i> ).   |
| F6  | To open and close the menu strip used last (see <i>chapter 4.5</i> ).   |
| F9  | To open the "Patient-/Image Administration" (see <i>chapter 5</i> ).  |

- F11: To save all images loaded (see *chapter 4.6.3.5*). The format of the images can be adjusted in the "Setup" menu (see *chapter 14.1.2.2*). The standard adjustment is DICOM.
- Strg (Ctrl) + F10: Creation of a new patient folder (see *chapter 5.3*).
- Strg (Ctrl) + A: Direct call of the video grabbing (see *chapter 7.6* or *7.7*).
- Strg (Ctrl) + C: The clipboard sends an image to another Windows application (see *chapter 4.6.1.7*).
- Strg (Ctrl) + D: To close all images loaded (see *chapter 4.6.9.2*)
- Strg (Ctrl) + E: Zoom active image 1:1. Thus, one image point corresponds to one point on the monitor (see *chapter 4.4.3*)
- Strg (Ctrl) + I: The header info shows the list of image parameters and patient data of the current image, which have been read automatically (see *chapter 4.6.2.2*).
- Strg (Ctrl) + J: Check of current DICOM send jobs (see *chapters 4.6.2.5* and *11.5*).
- Strg (Ctrl) + M: Complete view of the active image (siehe *chapter 4.4.3*).
- Strg (Ctrl) + P: To print images on a windows printer (see *chapter 4.6.1.1*).
- Strg (Ctrl) + R: To open the "Image Review" window for the current patient (see *chapter 6*).
- Strg (Ctrl) + S: Check of current ISDN send jobs (see *chapters 4.6.2.4* and *10.7.1*).
- Strg (Ctrl) + T: Shows the text of the image parameters in the image (see *chapter 4.6.2.3*).

The following keys are both corresponding to the image review window (see *chapter 6*.)

Strg (Ctrl) + B: Paging down through the image reviews of all patients.

Strg (Ctrl) + N: Paging up through the image review of all patients.



## **CHAPTER 5: THE PATIENT ADMINISTRATION**

## 5.1 The Patient List

The patient list shows the content of the Hipax database. In a new Hipax installation the patient list contains one entry as an example.

**Note:** The database can be situated on a local PC (single workstation installation) or on an image/patient server in a network of a hospital or of a consulting room (network installation). In the case of a network installation, the data are available simultaneously from different PCs.

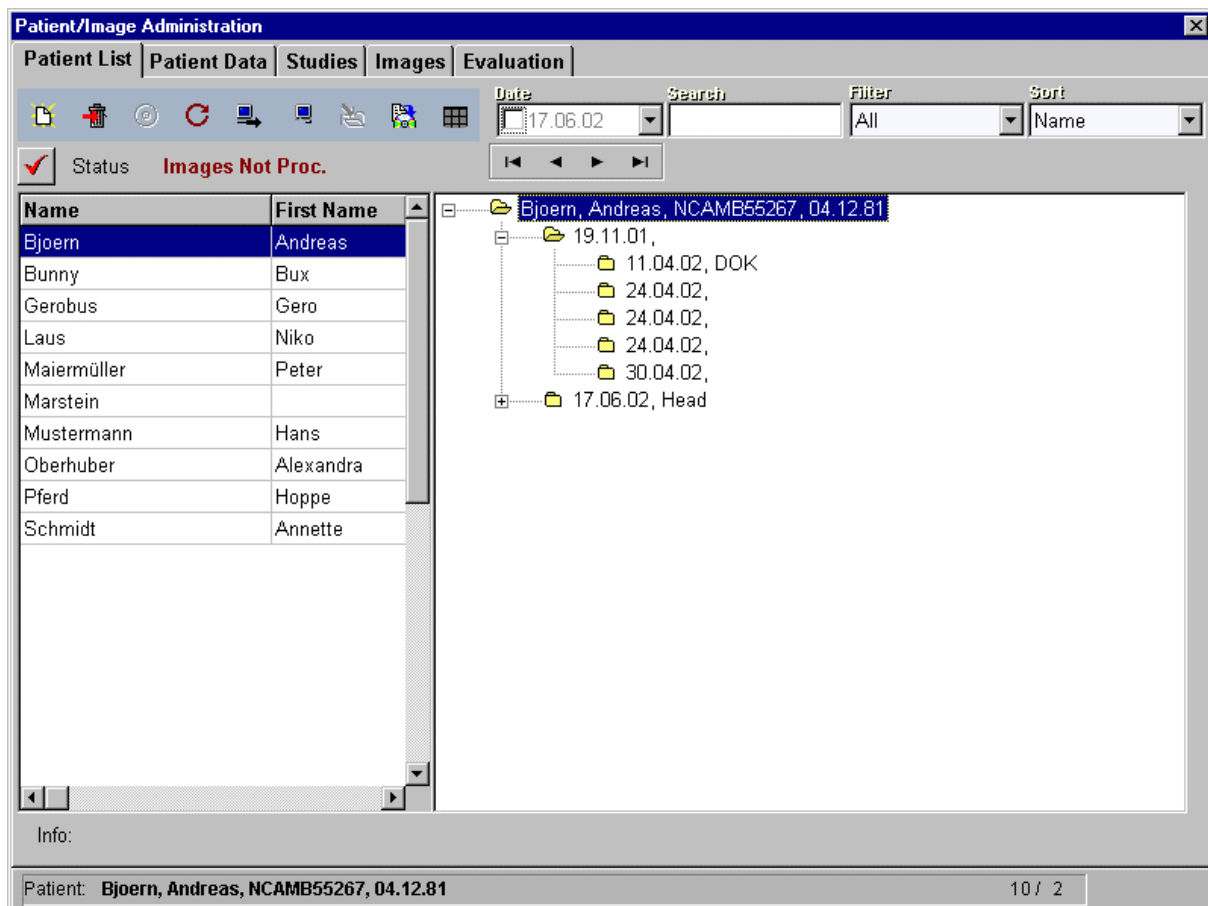
### 5.1.1 Display Modes

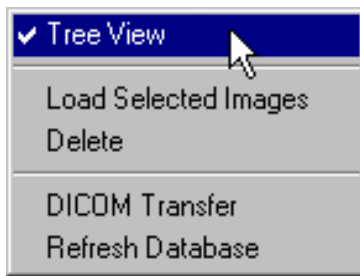
In the **standard adjustment**, the "Patient List" window is separated into two parts:

In the left part of the window, the patient data are listed. Normally, only the name and first name of the patients are visible. All the other data are covered by the tree view on the right side of the window.

**Note:** The displayed part of the patient list can be changed using the scroll bar on the bottom of the list.

The **tree view** shows the date of the different studies and the corresponding images. Similar to the Windows Explorer, entries can be opened to make subentries visible.





Using a right mouse click on the patient list opens a pop-up menu.

Please remove the hook from the menu item "Tree View" to change the display mode.

As a result, the tree view disappears and all the patient data become visible: name, first name, ID, birth date, date of creating (receiving) the images, sex, address.



The current patient is given in the status line of the patient list window:



**Note:** The system administrator is able to **restrict the authorization of the user**. There are different possibilities (see *chapter 14.2.5.3*):

- The user is only enabled to save image data in patient folders that already have been created.
- The user is only authorized to create new patient folders.
- The user can open patient folders and view and process images, but he is not authorized to save his actions (pure viewer station).

### 5.1.2 Loading Images

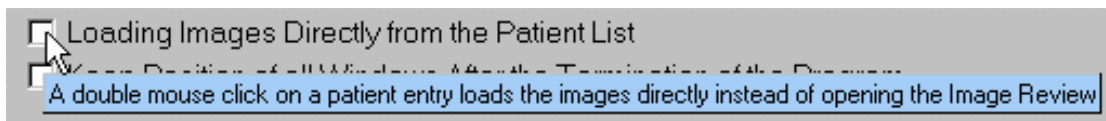
In the standard adjustment, a double click with the left mouse button on an entry **loads** all images of the corresponding patient **into the "Image Review" window** (see *chapter 6*).

A double mouse click used to a study in the tree view loads all the images of this study into the "Image Review" window.

Used to an image entry in the tree view, the double mouse click loads the corresponding image or series directly to the image processing screen of Hipax.

All images of one patient or study can also be **loaded directly to the image processing screen**. To make this, an adjustment has to be changed in the Hipax "Setup" window, using the following steps:

1. Close the "Patient/Image Administration" window.
2. Use the main menu, "System" → "Setup" to open the "Setup" window.
3. Open the register "Configuration".
4. Set a hook into the checkbox "Loading Images Directly from the Patient List".



Now, this button in the Patient List has to be used to load the images not directly to the image processing screen, but to the "Image Review" window.

### 5.1.3 Status Button



Each patient in the patient list has a "Status" button which determines, whether the current process has been closed or is still open.



Status **Images Not Proc.**

A patient gets the status "**Images Not Processed**" if:

- his data are newly entered
- his data have been just received via DICOM transfer
- his data have been just received via ISDN transfer
- a new image has been saved manually

the "Status" button has been pressed accordingly.

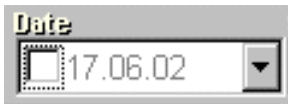




The status "**Images Processed**" will be acquired by a **mouse click on the "Status" button**.

This means that each patient or process must be checked off manually.

#### 5.1.4 Date



Using the "Date" drop down list field opens a calendar with the current month. The present date is marked by a red spot.



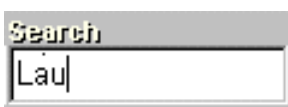
The **arrow buttons** on the top of the calendar can be used to page forwards or backwards through the months.

Please click on any date to search an image that have been produced on this day. As a result, a hook appears in the "Date" checkbox and the **patient list is reduced** to all entries containing images that have been made on the **selected date**.



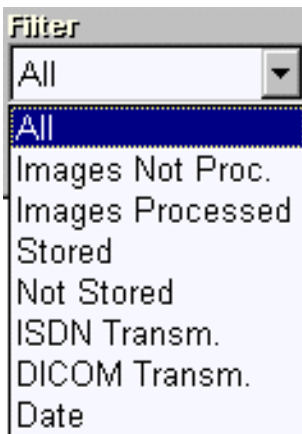
To show again all patients available, please remove the hook from the date checkbox.

#### 5.1.5 Search



Patients can be searched in the patient list entering the first letters of their name or first name into the "**Search**" edit field. Thus, Hipax jumps automatically to the next entry in the patient list starting with the entered letters. Of course, also the whole patient name can be entered.

### 5.1.6 Filters



The patients shown in the patient list can be filtered using different criteria.

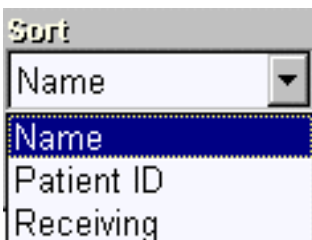
The patient list may contain **all** patients available, or only patient entries, which are:

- not processed
- are processed
- stored on externals disks (only if the "Archive" module is installed, see *chapter 9.1*)
- not stored on external disks (if the "Archive" module is installed)
- received via ISDN transfer (only if the "ISDN" module is installed, see *chapter 10.9*)
- received via DICOM transfer (if the "DICOM Communication" module is installed, see *chapter 11.9*)

As an example, if the filter is adjusted on "Images not Processed", only those patients are shown, whose images are still not processed (*chapter 5.1.3*). Each patient who already has been checked off, disappears from the list immediately.

**Note:** The entries in the filtered patient list are given in italics, to demonstrate that currently not all patient data on the database are listed.

### 5.1.7 Sorting



The patient entries can be sorted alphabetically ("**Name**"), using the **patient ID**, or chronologically ("**Receiving**").

When sorted by date ("Receiving") the most recent study is given on the top of the list. As soon as a new image is added to a patient by saving it in the database, the data are updated. The patient concerned appears at the top of the list.

**Note:** Changing the sorting criteria also changes the order of the columns in the patient list: the current sorting criteria becomes the first column of the list.

### 5.1.8 Further Standard Functions of the Patient List



The **"New"** button opens a dialogue where the data of a new patient can be entered (see *chapter 5.3*).



The **"Delete"** button deletes the current patient folder with all images from the patient list. A control message opens, asking if you really want to delete the patient folder.

**Note:** Deleted images and database entries are irretrievably removed from the system and cannot be restored using the Windows trash mode.



Using a mouse click on the **"Refresh Database"** button updates all tables of the database. This can, for example, be useful, after new images have been received via DICOM or ISDN transmission.



Please click this button to load all the images of the current patient or study to the "Image Review" window (see *chapter 6*).



Use these buttons to jump to the first, previous, next or last entry in the patient list.

### 5.1.9 Additional Functions of the Patient List

The following functions only appear after the installation of additional modules or after making the necessary settings in the Hipax configuration file.



The **"Archive"** button opens a new dialogue box for the storage of image data on external media (e.g. CD, DVD). The archiving process is described in *chapter 9.1*).

**Note:** This button is only available after the "Digital Media-Writer Archive" module has been installed.



Using this button, all the images of the currently selected patient can be transmitted via DICOM (see *chapter 11*).

**Note:** The **"DICOM Transfer"** button is only available if the "DICOM Communication" module has been installed.



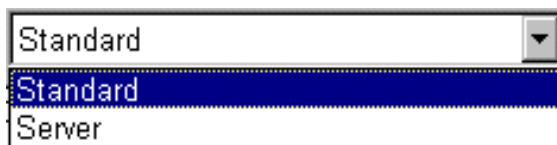
This button opens a dialogue for DICOM worklist.

**Note:** To make this, the modules "DICOM Communication" and "DICOM Worklist" have to be installed (see *chapter 11.* and *chapter 12.*).



The images of the current patient can be sent to another database clicking this button.

**Note:** The button is only available, if at least one other database has been entered into the "Database" menu of the Hipax *Setup.exe* file. This can only be made by the system administrator (see *chapter 14.2.5*).



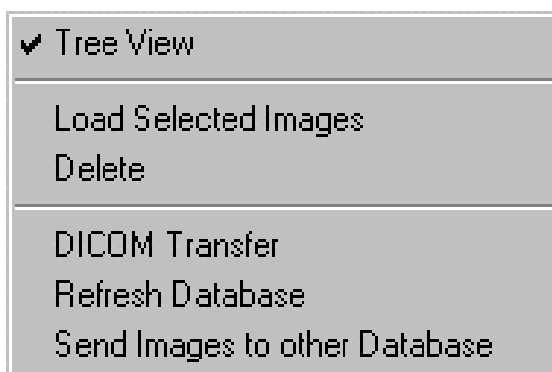
The same adjustments in the Hipax configuration file *Setup.exe* make this drop down list field visible. It contains all databases created in the configuration file. Thus, the user can directly access to the Hipax databases on other PCs.



A patient CD containing all images and additional files of the current patient can be created using this button (see *chapter 9.2*).

**Note:** This can only be made after the installation of the "Patient CD" module.

### 5.1.10 Pop-up Menu



A click with the right mouse button on the patient list or on the tree view opens a pop-up menu, which might contain following functions:

- activating or deactivating the tree view
- loading the images of the selected patient or study
- deleting the selected patient entry, study, or image (series)

- transferring images via DICOM or ISDN (if the "DICOM Communication" or "ISDN Communication module is installed)
- database refreshment to update the patient list
- sending images to another database (only available, if a multiple datat

## 5.2 Database Structure

The database is organized in three levels:



- Patient Data
- Studies
- Images

### 5.2.1 Basic Patient Data

The basic patient data can be found on the first level. The patient ID allows the exact identification of each patient (see *chapter 5.4*). The data of different studies can be attached to a certain patient. These studies are stored on the second level.

### 5.2.2 Studies

The second level contains the complete study data of a patient (see *chapter 5.5*). Each patient has at least one study. Images or image series can be attached to a certain study.

### 5.2.3 Images

The third level contains the images or series. The image list can display all the images of one patient or only the images of the selected study (see *chapter 5.6*).

Furthermore, the menu contains the register "**Evaluation**", which can only be opened, if the "Evaluation" module has been installed (see *chapter 5.7*).

### 5.3 Creating a New Patient Folder



Clicking on this icon in the button bar of the "Patient/Image Administration" window opens a screen mask where a new patient folder can be created.

**New Patient**

Save Cancel

**Patient**

Name

First Name  Birth Date

ID  Sex

Address

**Study Images**

ID  Access. No.

Date  Modality

Description

Physician

Ward

Please enter here the basic patient data and the data of the current study.

The "**Save**" button closes the dialogue box and stores the patient data in the database. As a result, the new patient data appear in the patient list immediately.

Please use the "**Abort**" button to cancel this procedure without storing the data.

The dialogue box "New Patient" also can be opened using the keyboard with Strg (Ctrl) + F10 or the menu item "Patient Folder" – "Add New Patient" in the main menu of the image processing user interface.

**Note:** The system administrator can decide, whether or not the user has to enter a minimum of patient data (name, patient ID, and sex) before he is enabled to use the save button (see *chapter 14.2.1.4*).

A "**Keywords**" field is available in the bottom part of the dialogue when the module "Evaluation" has been freed (see *chapter 5.7*).

## 5.4 Basic Patient Data

The complete basic data set of an existing patient can be accessed in the window "Patient Data".

The screenshot shows a software window titled "Patient/Image Administration" with a tabbed interface. The "Patient Data" tab is active. At the top of the tab are three buttons: "Edit", "Save", and "Cancel". Below these are several input fields arranged in a form. The fields and their values are: "Name" (Bjoern), "First Name" (Andreas), "Birth Date" (04.12.1981), "Patient ID" (NCAMB55267), "Sex" (m), "Address" (Helle Matte 5, 717171 Brummer), and "Receiving" (26.06.2002). At the bottom of the window, a status bar displays the text "Patient: Bjoern, Andreas, NCAMB55267, 04.12.81" and a small box containing the number "2".

Field	Value
Name	Bjoern
First Name	Andreas
Birth Date	04.12.1981
Patient ID	NCAMB55267
Sex	m
Address	Helle Matte 5, 717171 Brummer
Receiving	26.06.2002

Clicking the "**Edit**" button allows the user to change the entries.

The "**Save**" button can be used to save the new entries into the database.

Using the "**Cancel**" button, the entering process is interrupted without saving the changes.

**Note:** The user's authorization can be restricted by the system administrator. In this case, the user may not be enabled to change the entries of existing patient folders (see *chapter 14.2.5.3*).

## 5.5 Studies

Each patient record can contain multiple study entries.

**Patient/Image Administration**

**Patient List | Patient Data | Studies | Images | Evaluation**

ID: 4567      Access Number: 8092  
 Date: 19.11.2001      Modality:   
 Description: Head X-ray  
 Physician: Dr. Winter  
 Ward:   
 Studies:

Access. No.	ID	Description
8092	4567	Head X-ray
8765	4323	Head CT

Patient: Bjoern, Andreas, NCAMB55267, 04.12.81      2

New studies can be created using the "**New**" button.

Existing entries can be modified ("**Edit**" button) or deleted ("**Delete**" button).

**Note:** The deletion of a study also deletes all attached images.

The "**Cancel**" button can be used to abort the current entries.

Please use the "**Save**" button to save the current entries.

The "**Send**" button transfers all images of the current study using the DICOM Communication module SCU (see *chapter 11.4.3.2*).

All images of the selected study can be loaded into the "Image Review" window using the "**Load**" button or a double mouse click on this entry in the study list.

A newly stored image will be attached automatically to the current selected study.



## 5.6 Images

Each study can contain multiple image entries.

Patient/Image Administration

Patient List | Patient Data | Studies | **Images** | Evaluation

Load Delete Review

Display Mode

☐ All Images

☒ Study Images

Image Date	Description
11.04.2002	DOK
24.04.2002	
24.04.2002	CT
24.04.2002	

Please enter additional information here

Image Info

Edit Save

Description: DOK

Image Date: 11.04.2002

Patient: Bjoern, Andreas, NCAMB55267, 04.12.81 2

In the "**Display Mode**" field can be selected, whether the image list should show **all images** of a patient or only those of the current study ("**Study Images**").

The "**Load**" button or a double click on an entry in the list opens the corresponding image or series on the image processing user interface.

Please click the "**Delete**" button to delete a single image or image series.

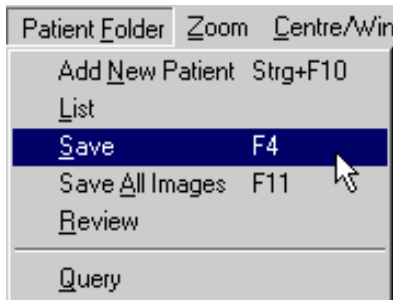
The "**Review**" button loads all the images displayed in the list into the "Image Review" window.

A short **note** attached to an image can be entered into the "**Image Info**" edit field. To make this, please click on the "**Edit**" button and write then the text into the box. Save the note using the "**Save**" button.

The edit boxes "Description" and "Image Date" reveal brief descriptions of the image type and the date.

### 5.6.1 Storing Images in the Database

The order "**Save**" in the menu "Patient Folder" of the main menu bar saves the current image in the database.



To save an image you also can use this button "Database" box of the button bar or the key "F4". The image will be associated to the currently selected patient and study.

As a result, the "New Image" dialogue opens, where further information about the current image can be entered.

The "**Format**" drop down list field offers different image saving formats (DICOM 3, JPEG, PNG, TIFF; Bitmap) For an example, it is possible to store imported TIFF images in DICOM 3 format.

The "**Save**" button attaches the image to the current patient/study record.

After the saving process is completed, the image is closed and disappears from the screen. Hipax creates an **image icon** of the saved image in JPEG format, to be shown in the "Image Review" window.

The menu item "**Save all DICOM Images**" or the key F11 saves all images loaded into the database. The required patient information is taken out of the DICOM header.

If the patient is not found in the database, the "Save" function adds this patient to the patient list automatically.

Images with other formats than DICOM are related to the currently selected patient folder.

## 5.7 Database Evaluation

Using the module "Database Manager", keywords can be added to images and patients. Later, a database evaluation can be carried through using the entered keywords. Hipax offers query presets, which allow users a fast database evaluation. Furthermore, own SQL queries can be created and administrated.

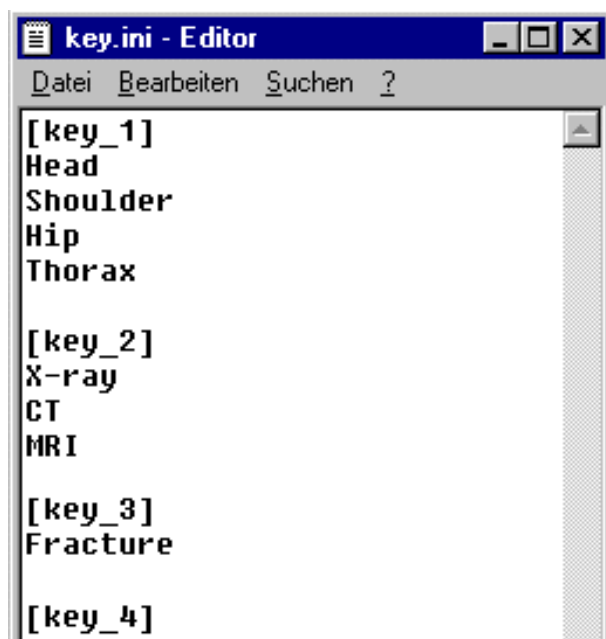
Additionally, documents can be added to any patient entry by expanding the database. These documents are, for example, texts that are stored on the hard disk like the image data.

**Note:** To use the module "Database Manager" the checkbox "**Evaluation**" has to be activated in the register "Modules" of the Hipax "Setup" window (see *chapter 2.3*).

**Note:** To get correct results of the database evaluation, each keyword has to be written in the same way as it has been defined before (e.g. with or without a capital initial letter).

### 5.7.1 Defining the Keywords

The keywords can be defined in the file *key.ini*, which is located in the directory *\Hipax\db\*.



The words are added to different groups of keywords (register [key\_1] to [key\_4]).

Please add as many keywords as you like to any of the four registers. The keywords are entered one below the other.

Hipax needs to be started again after the entries into the file *key.ini* have been saved.

### 5.7.2 Relating Keywords to a Patient Entry

The relation of keywords to a patient entry can be made in the bottom part of the register "**Patient Data**" of the "Patient/Image Administration" window (see *chapter 5.4*).

**Patient/Image Administration**

**Patient List** **Patient Data** **Studies** **Images** **Evaluation**

Edit Save Cancel

Name Bjoern

First Name Andreas Birth Date 04.12.1981

Patient ID NCAMB55267 Sex m

Address Helle Matte 5, 717171 Brummer

Receiving 26.06.2002

**Keywords**

Edit Save

Key 1 Key 3

Key 2 Key 4

**Documents**

☒ Anamnesis ☐ Diagnosis Edit Load Delete

☐ Therapy ☐ Comment

Patient: Bjoern, Andreas, NCAMB55267, 04.12.81 2

To make this, please use a single mouse click on the "**Edit**" button in the area "**Keywords**". As a result, the four drop down list fields "**Key 1**" to "**Key 4**" can be opened. Here, all the data that have been entered before into the file *key.ini* are listed in alphabetical order.

**Keywords**

Edit Save

Key 1 Key 3

Key 2 Key 4

Thorax

X-ray

CT

MRI

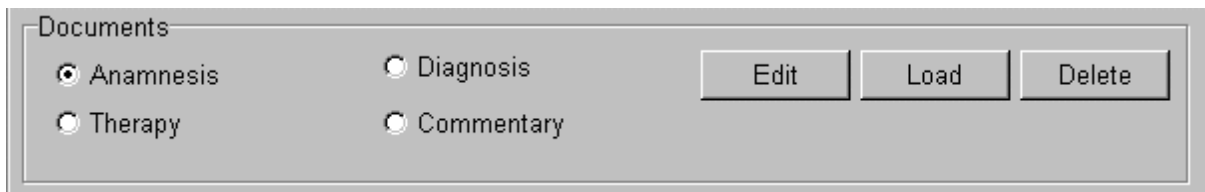
X-ray

☐ Therapy ☐ Commentary Edit Load Delete

Now, one keyword from any of the four drop down list fields can be selected and related to the current patient using the "**Save**" button. Of course, there is also the possibility to select only one or two keywords per patient.

### 5.7.3 Relating Documents to a Patient Entry

The relation of documents to a patient entry can also be made in the register "Patient Data" of the "Patient/Image Administration" window. Four different categories of documents are available in the area "Documents": **Anamnesis**, **Diagnosis**, **Therapy**, **Commentary**. The radio buttons can be used to select the desired category.



**Note:** To change the titles of the radio buttons, please use the file *doc.ini* in the directory `\Hipax\prg\` and define own titles. Start Hipax again to adopt the new entries.

A single mouse click on the "**Load**" button opens an explorer. Here, the desired document file can be selected. After clicking on the "**Edit**" button, the imported file is opened and can be edited. If no file has been imported, the "Edit" button opens an edit field, where a text can be entered manually. The "**Delete**" button deletes the imported file or the text entered into the edit field.

### 5.7.4 Relating Keywords to an Image



This button is located in the "Processing" box of the icon bar, on the image processing user interface of Hipax. It opens the work panel "**Evaluation**", where the keywords can be related to single images or series.

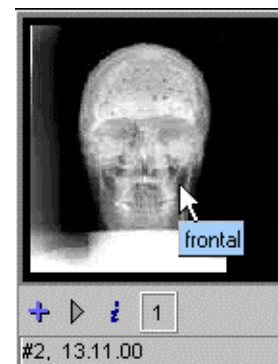


The "**Edit**" button in the work panel opens the window "New Image".

Here, up to four **keywords** can be added to the current image ("**Key 1**" to "**Key 4**"). The keywords are to be defined in the file *key.ini*, which is located in the directory *\Hipax\db\* (see *chapter 5.7.1*).

In the "**Description**" edit field, a short note can be entered for any image or selected using the drop down list function.

This description then appears in the "**Image Review**" window as a blue flag as soon as the mouse arrow is moved upon the corresponding icon.



After clicking on the "**Save**" button, all entries are saved together with the image. The window "New Images" is closed automatically. The selected keywords appear in the fields "Key 1" to "Key 4" in the "Evaluation" work panel.

### 5.7.5 Loading Accompanying Documents

Please open the register "Patient Data" in the window "Patient/Image Administration" to add documents to the selected patient (see *chapter 5.7.3*). The relation can be made using four different categories.

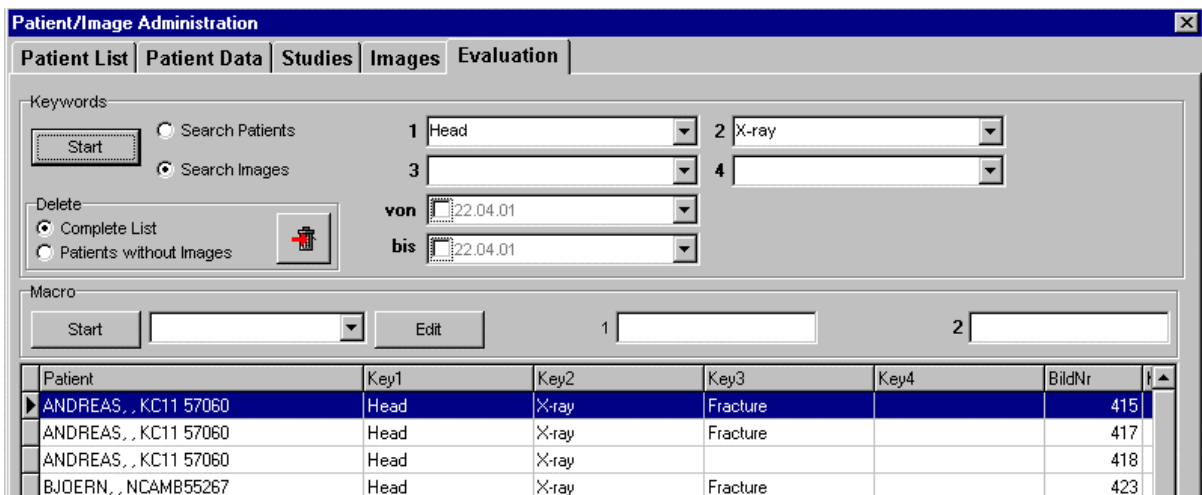


These categories also appear on the for buttons "**Anamnesis**", "**Therapy**", "**Diagnosis**", and "**Commentary**" in the "Evaluation" work panel of the Hipax image processing user interface. The related documents can be opened directly using these buttons.

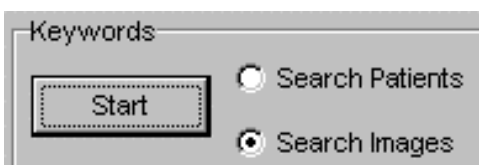
**Note:** To change the titles of the radio buttons, please use the file *doc.ini* in the directory `\Hipax\prg\` and define own titles. Start Hipax again to adopt the new entries.

### 5.7.6 Evaluation

The register "**Evaluation**" in the "Patient/Image Administration" window offers an own dialogue for the evaluation of the database.



The user can select, whether the database evaluation should be made based on patients (radio button "**Search Patients**" in the area "**Keywords**") or images (radio button "**Search Images**").



The drop down list fields "1" to "4" contain all keywords that have been entered before into the file *key.ini* (directory \Hipax\db\) (see *chapter 5.7.1*). Please select here the keywords to be used, or enter them manually into the edit field.

The drop down list fields "von" and "bis" open calendars. The database evaluation can be restricted to a defined period by selecting the first day of the period in the "von" list field and the last day in the calendar of the "bis" field.

Please start the evaluation using the "Start" button. The result of the query is then shown in the list in the bottom half of the window.

**Note:** The list shows only those patient entries or images, which contain all the keywords selected in the "Keywords" field (conjunction).

A **double mouse** click used on an entry in the list **opens an image** or a series (if images have been searched) **or opens the "Image Review" window** of the current patient (if patients have been searched).

The "Delete" field offers two possibilities: "Complete List" deletes all data from the result list. "Patients without Images" deletes only those patient entries from the list, which do not contain any images.

### 5.7.7 Creating Own Evaluation Macros

Hipax allows users to make own SQL macros in order to carry out individual database queries. These macros are corresponding to the entries in the registers "Patient Data", "Studies", and "Images".

The macros can be created using the file *DBMacro.ini* in the directory \Hipax\dbmacro\.

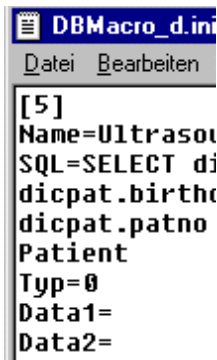
```
[5]
Name=Ultrasound Only
SQL=SELECT dicpat.name + ', ' + dicpat.first name AS Patient, dicpat.Id AS ID,
dicpat.birthday AS birth date, dicpat.date AS date, dicpat.PatNo from dicpat where
dicpat.patno IN (SELECT dicstud.patno from dicstud WHERE (dicstud.modality='US')) ORDER BY
Patient
Typ=0
Data1=
Data2=

[6]
Name=All Women
SQL=SELECT dicpat.name + ', ' + dicpat.first name AS Patient, dicpat.Id AS ID,
dicpat.birthday AS birth date, dicpat.date AS date, dicpat.PatNo, dicpat.sex from dicpat
where (dicpat.sex='#var1#') OR (dicpat.sex='#var2#') ORDER BY Patient
VAR1=Sex
VAR2=Sex
Data1=F
Data2=W
```



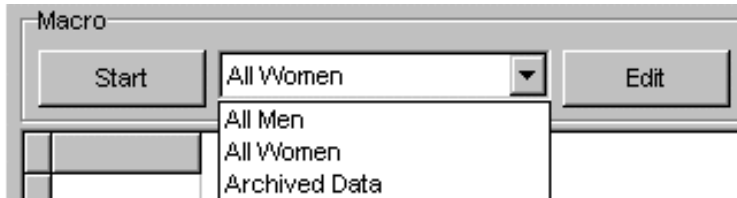
**Note:** We recommend to use the existing examples of macros as patterns for creating own SQL macros.

Hipax has to be started again after the entries into the file *DBMacro.ini* has been saved. The own SQL macros then can be retrieved in the area "Macro" of the register "Evaluation" ("Patient/Image Administration" window of Hipax).



The titles of the defined macros can be entered in the line "Name=" of the file *DBMacro.ini*.

As a result, the macro names appear in the "Patient/Image Administration" window, register "Evaluation", area "Macro" in a drop down list, which is located between the buttons "Start" and "Edit". The macro names are listed in alphabetical order.



The entries "**VAR1=**" and "**VAR2=**" in the file *DBMacro.ini* are responsible for the **labelling** of the two fields, which are located on the right hand side of the "Edit" button. The labelling is "1" and "2" if the entries "VAR1=" and "VAR2=" are lacking.



Two possible variants of **results** can be shown using the entries "**Data1=**" and "**Data2=**". After saving the file *DBMacro.ini* and starting Hipax, these result variants appear in the two fields on the right hand side of the "Edit" button.

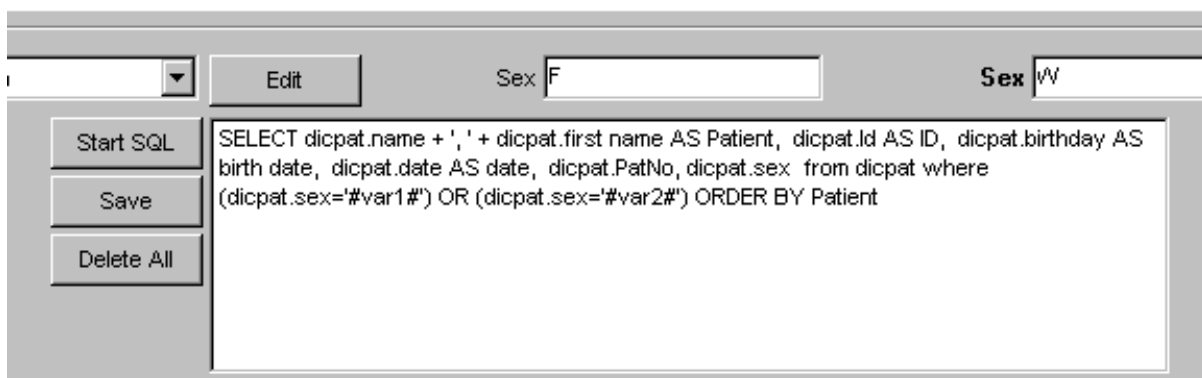
Female patients, for example, can be marked in the edit field "Sex" of the register "Patient Data" using the letter "F" as well as using the "W". In this case, "(dicpat.sex='#var1#') OR (dicpat.sex='#var2#')" has to be add to the macro "All Women", completed by the entries "Data1=F" and "Data2=W". As a result, the query delivers all patients with the entries "F" or "W" in the edit field "Sex" of the register "Patient Data".

The **"Start"** button starts the query. In the result list, all patients or images appear, which are corresponding to the query criterions.

The **"Edit"** button enables users to edit already defined macros. To make this, an edit field opens, containing the SQL text.

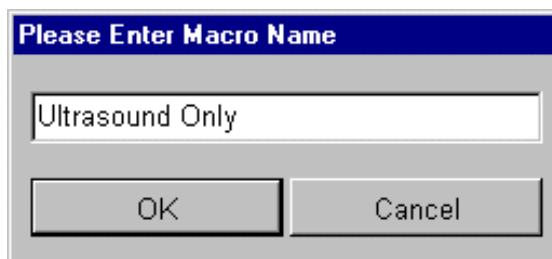
**Note:** First the **"Start"** button has to be clicked again for any newly selected macro name to show the corresponding SQL text.

**"Start SQL"** initiates a query for the current SQL macro to test, if the edited or selected macro is effective or correct. Only an accurate and sensible SQL text can deliver the desired result of the evaluation, which is the list of all patients or images searched.



The screenshot shows a software interface for editing SQL macros. At the top, there is a dropdown menu, an 'Edit' button, and two text fields labeled 'Sex' containing the characters 'F' and 'W'. Below these are three buttons: 'Start SQL', 'Save', and 'Delete All'. To the right of these buttons is a large text area containing the following SQL query: `SELECT dicpat.name + ', ' + dicpat.first name AS Patient, dicpat.id AS ID, dicpat.birthday AS birth date, dicpat.date AS date, dicpat.PatNo, dicpat.sex from dicpat where (dicpat.sex='#var1#') OR (dicpat.sex='#var2#') ORDER BY Patient`

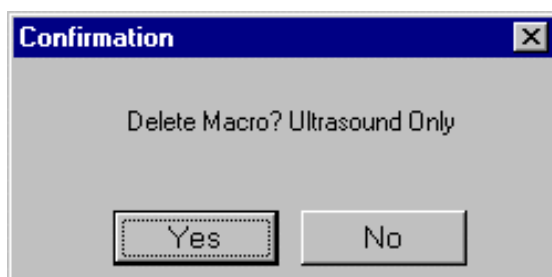
The **"Save"** button opens a dialogue where the desired name of the new macro can be entered.



The screenshot shows a dialog box titled 'Please Enter Macro Name'. It has a text input field containing the text 'Ultrasound Only'. At the bottom of the dialog are two buttons: 'OK' and 'Cancel'.

The new macro is saved using the **"OK"** button. As a result, the name of the new macro appears in the macro drop down list.

A selected macro can be deleted using the **"Delete All"** button. It opens a window to ask the user, if he really wants to delete the current macro.



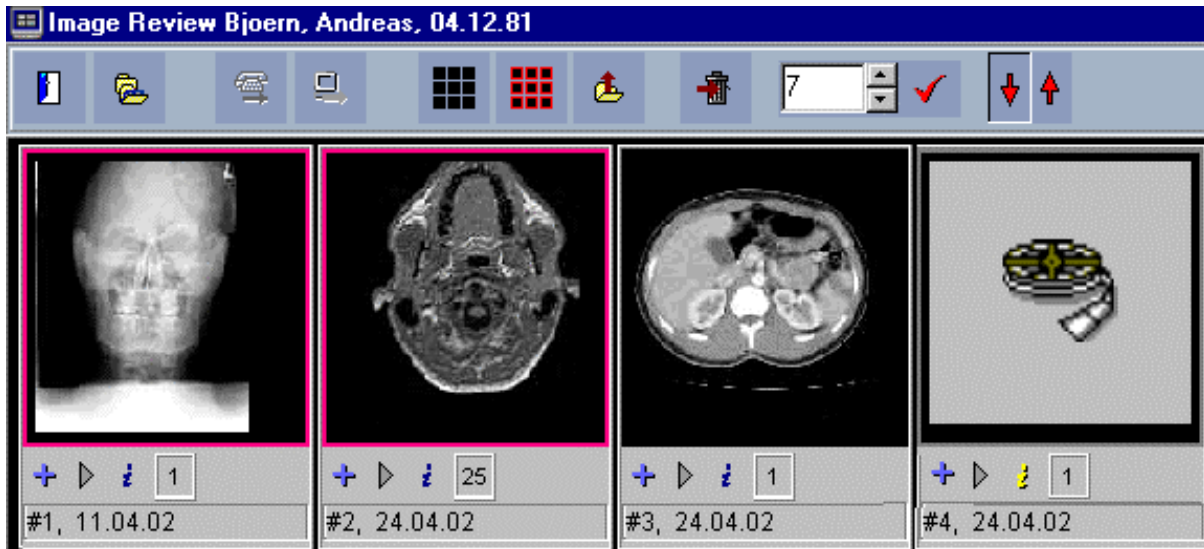
The screenshot shows a dialog box titled 'Confirmation'. It contains the text 'Delete Macro? Ultrasound Only'. At the bottom are two buttons: 'Yes' and 'No'.

## **CHAPTER 6: IMAGE REVIEW**

## 6.1 Opening the Image Review Window



This button in the "Patient/Image Administration" or on the image processing screen opens the "Image Review" window for the current patient.



In the "Image Review" window the thumbnails of all images of the currently selected patient are shown side by side.

## 6.2 Functions of the Image Review Window

A simple click with the left mouse button on a thumbnail **selects** the corresponding image or series. A second mouse click on the same thumbnail cancels the marking. Selected thumbnails are framed by pink margins.

A double mouse click on a thumbnail loads the corresponding image or series to the image processing screen.

### 6.2.1 Buttons that are Generally Available



This button can be used to **close** the "Image Review" window. This can also be made clicking on the × button in the upper right corner of the window.



The folder button opens the "Patient/Image Administration" window (see *chapter 5*).



Using this button **cancels** all the image **selection** that have been made before (see next button).



Clicking on this button **selects all the thumbnails** currently displayed in the "Image Review" window. This can, for example, be made to load all images of the current patient to the image processing screen (see next button), or to transmit all the images via DICOM or ISDN (see *chapters 10. and 11.*). Selected images are **pink** framed.



This button loads all images selected to the image processing screen.

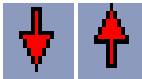


Use this buttons to delete all the selected images.

**Note:** The images are deleted once and for all not only from the "Image Review" window but from the patient folder.



Please select here the number of thumbnails to be shown in one row. The less the number of thumbnails is selected, the bigger are they displayed. Click the hook button to use the new adjustment on the "Image Review" layout.



The order of the thumbnails can be reversed using these red arrow button.

The keyboard can be used to page the thumbnails of all patients forwards (Strg+B) or backwards (Strg+N).

### 6.2.2 Additional Functions in the Image Review Button Bar



All selected images can be transferred directly from the image review via ISDN using this button (see also *chapter 10.5.4*). To make this, the ISDN module has to be installed.



Using this button transmits all selected images via DICOM transfer (see *chapter 11.*).

### 6.2.3 Buttons in the Status Bar of the Thumbnails



Single images or series can be loaded to the image processing screen using a mouse click on this button in the bottom part of the corresponding thumbnail.



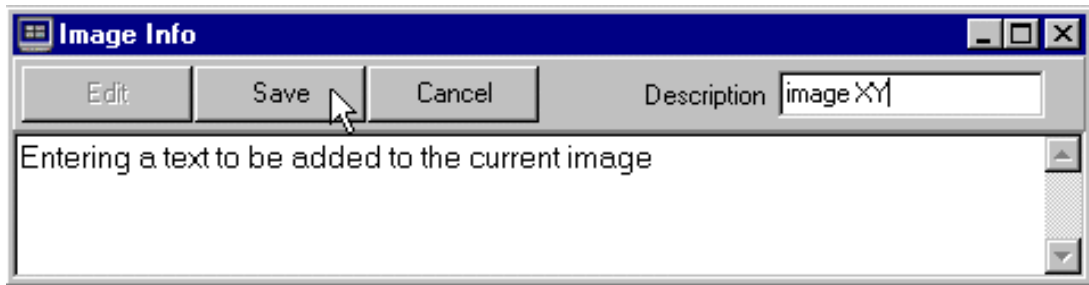
This function is only available for DICOM sequences (e.g. cardiac films). It can be used to play the cine-loops directly, without loading time (see *chapter 7.9*).



The number in the box gives the numbers of images of the corresponding series.



This button opens a dialogue box: "Image Info", where **notes** can be entered to the active image (see also *chapter 5.6*).



To enter or edit a text, the "**Edit**" button has to be used. The text can be saved by the "**Save**" button. "**Cancel**" closes the dialogue box without saving.



A yellow "i" in the status bar of the thumbnail shows that an image info has already been added to the corresponding image.

**Note:** Using ISDN transmission, the image info is sent together with the corresponding image.

Furthermore, the status line of the thumbnails contain the date of the corresponding image and the consecutive number.

#### 6.2.4 Coloured Framed Thumbnails

Selected thumbnails are framed by a **pink** margin.

A **yellow** margin shows that the corresponding image or series is not in direct access, but archived on an external disk (see *chapter 9.1*).

The thumbnails of image sequences that have been imported from a DICOMDIR CD are framed by a **green** margin to show that that these sequences can be started at once, without loading time (see *chapter 7.9*).

For **grey monitors**, Hipax offers the possibility to switch over to a black and white mode, where selected thumbnails are framed by a good visible, broad white margin. To make this, please open the *Setup.exe* file in the *\Hipax\prg\* directory and set a hook into the checkbox "Grey Monitor" (see *chapter 14.2.1.6*).

## **CHAPTER 7: IMAGE ACQUISITION**

## 7.1 CR Connection with Orex (Digident)

The Hipax module "Orex CR Connection" offers an interface between Hipax and the driver software of the Orex CR system. To activate the module, please open the Hipax "Setup" window and set a hook into the "CR System" checkbox.



This button in the "Tools" box of the button bar opens the user interface of the Orex (Digident) driver.

The user interface of the Orex driver is described in the Orex user's manual.

## 7.2 CR Connection with Lumisys ACR-2000

The Lumisys ACR-2000 as well as the Lumisys X-ray digitizers can be driven directly using Hipax.

### 7.2.1 Hardware Installation

Please install the CR system or X-ray digitizer following the corresponding user's instruction. Connect the scanner to the Hipax PC.

### 7.2.2 Taking the X-ray

Please use the X-ray cassette containing the foil or film to take the picture from the patient.

The foil or developed film can then be inserted into the ACR-2000 or X-ray digitizer, respectively.

### 7.2.3 The Hipax CR-Scan Menu



This button in the "Processing" box of the button bar opens the "CR-Scan" menu strip for Lumisys.

**REGISTER**

The "**Register**" button opens the "Patient/Image Administration" window of Hipax. Here, the desired patient folder can be selected from the list, or a new patient folder can be created.

**SCAN**

The "**Scan**" button starts the scanning process.



**SEND**

The "**Send**" button is only available, if the Hipax "DICOM Communication" module has been installed. It can be used to send images to another internal or external Hipax station (see *chapter 11*).

**PRINT**

The "**Print**" button is available, if the Hipax "DICOM Print" module has been installed. It can be used to print images on film (see *chapter 13*).

**Journal**

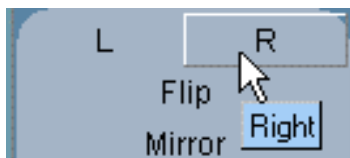
The "**Journal**" button opens the dialogue of the X-ray journal, where relevant parameters of the current X-ray study can be entered. The button is only available after the "X-ray Journal" module has been installed (see *chapter 7.10*).

**ARCHIVE**

Using the "**Archive**" button stores the images in the selected patient folder.

The CR-Scan menu strip offers a list of buttons carrying the names of **body parts**. Each of the buttons represents an own **preset** of a 16 bit filter to be used on the currently scanned image. The configuration of the filter macros is described in *chapter 7.2.4*.

The **drop down list field** can be used to **select the organ** or body part shown on the image to be scanned. As a result, the selected body part is entered into the **DICOM header**.



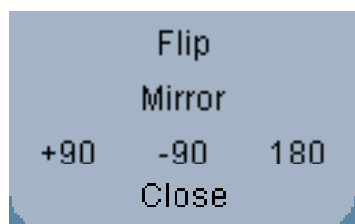
The buttons "**L**" and "**R**" can be used to mark the body sides in the image subsequently.

To make this, use a mouse click on the "**L**" or "**R**" button. Move the mouse arrow to the desired position in the image and release the mouse button.

As a result, the corresponding letter "**L**" or "**R**" appears in the image.

To **move** the letter subsequently, use a single click with the left mouse button on the letter. As a result, the colour of the letter changes to green. Now move the mouse arrow to the new position and click again on the left mouse button.

The letter can be **deleted**. To make this, use the right mouse button on the image and select the pop-up menu item "Del. Meas." (delete measurements).



Using these buttons, images can be rotated by **90°** or **180°**, and reflected horizontally ("**Flip**") as well as vertically ("**Mirror**").

Before the currently digitized image is **closed** using this function, Hipax asks if the user wants to save the image.



After activating the "Reverse" checkbox, the brightness of the currently scanned image is reversed. Bright changes to dark, and dark changes to bright.

### 7.2.4 Configuration of the Filter Macros

The configuration of the filter macros (16 bit filters) are made in the file *preproc.ini*, which is located in the subdirectory *Hipax\prg*.

There are 12 buttons to be configured. Each button has its own section in the ini file (section [1] to section [12]).

The following properties can be defined:

Title	The caption of the button (e.g. "Head", "Chest")
Hint	The bubble-help (when the mouse cursor is over the button)
Kernel	The "Kernel" size of the unsharp mask-filter (1-50). Smaller kernel sizes enhances fine structures in the image (e.g. for bones). Larger kernel sizes can be used to enhance bigger parts of the image (e.g. for chest images)
Enhancement	The "Enhancement" determines the filter strength (1-50)
Active	Set "Active=1" to make the button visible. "Active=0" means: The button is not visible
LookupTableType	Use the "LookupTableType" to determine a lookup table. (Only available for the Lumisys-CR module) 0: no lookup table is used (linear) 1: use an S-curve steepness 1 2: use an S-curve steepness 1.3 3: use an S-curve steepness 1.5 4: use an S-curve steepness 0.5 5: use an S-curve steepness 0.2 6: use an S-curve steepness 0.2, use a narrow window level 7: use an S-curve steepness 0.1, use a narrow window level 8: no lookup table is used (linear), use a narrow window level

Noise	<p>The "Noise" enables the additional noise filter.</p> <p>Noise=0 inactivates the noise filter</p> <p>Noise=1...n activates the noise filter. We recommend to use values between 1 and 3.</p>
Curve	<p>Curves that have been determined before in the configuration file <i>LookUp.exe</i> (see <i>chapter 8.4.1</i>) can be adopted here.</p> <p>For example, "Curve=3" is to be entered, if the curve that has been saved in the file <i>LookUp.exe</i> as number 3 shall be used in the current filter macro.</p>
Command:	<p>16 Bit filter for histogram equalization, specially developed for dull CR images with little contrast. Thus, the histogram is flattened. Use: „Command=HEQ.1.1.1“.</p> <p>Effects of the three parameters (HEQ):</p> <ul style="list-style-type: none"><li>• First value remains 1, must not be changed.</li><li>• Second value: gradient (1 to 5).</li><li>• Third value: balance (–5 to +5).</li></ul>
Type:	<p>Other 16 Bit filter type: Dull areas are stronger filtered. The outshining of the filter at strong enhancement factors is reduced.</p> <ul style="list-style-type: none"><li>• Type=0 (filter is not used)</li><li>• Type=1...X (filtering)</li></ul>
CR-Organ:	<p>A corresponding entry is created in the DICOM header when the image is saved.</p>
Subtract:	<p>Subtraction filter calculating the difference between two images.</p> <ul style="list-style-type: none"><li>• Subtraction=0 (no subtraction)</li><li>• Subtraction=1 (the marked image is subtracted from the current image)</li></ul>
Power:	<p>Using this function, the gradation of an image can be changed. The entry is Power=xyz. This value can be divided by 100. Examples:</p> <ul style="list-style-type: none"><li>• Power=0 (filter is not used)</li><li>• Power=100 (corresponds to an exponent of 1)</li><li>• Power=33 (corresponds to the third root)</li><li>• Power=50 (corresponds to the square root)</li><li>• Power=200 (corresponds to the square: pixel values squared)</li></ul>

WindowWidth: Preset of fixed window values for an image: window width

WindowLevel: Preset of fixed window values for an image: window center

The settings are stored automatically, when the "Filter Setup" window is closed.

**Note:** At the end of the list, the "ScanfilePath=" shows the directory path of the Lumisys scan program *Scanfile.exe*. Furthermore, the same line contains the directory path used by the Lumisys scan program to store the images temporarily. Here, Hipax can search for the images.

## 7.3 TWAIN/Scan

The "TWAIN/Scan" module is able to work together with TWAIN devices, e.g. X-ray digitizers, document scanners, still video cameras. Thus, Hipax starts not the devices directly but opens the user interface of the TWAIN source, where the necessary adjustments can be made.

The TWAIN configuration can be carried out in the Hipax *Setup.exe* file, directory *\Hipax\prg\* (see *chapter 14.2.3*).

**Note:** X-rays must not be digitized using a still video camera. To make this, special X-ray digitizers should be used.

Scanning 16 bit images, please decide whether the images should be shown as grey images or not. This takes place by a mouse click in the checkbox "**Store 16 Bit RGB Image as Grey Image**" in the window "Configuration" of the Hipax setup (see *chapter 14.1.2.7*).

### 7.3.1 Patient Data

Please select the desired entry from the patient list (see *chapter 5.1*) or create a new patient folder (*chapter 5.3*) before starting the scanning process. Close then the patient list.

### 7.3.2 Selecting a TWAIN Source

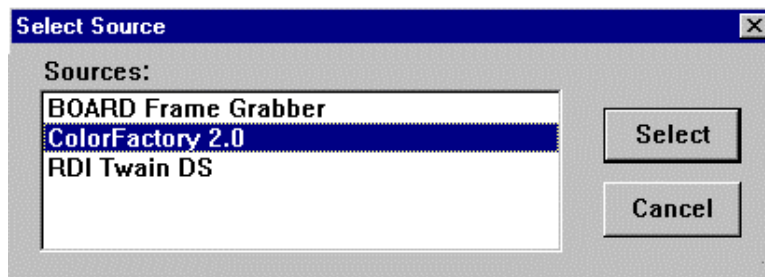


This button in the "Processing" box of the button bar opens the "TWAIN/Scan" menu strip, as well as the menu item "TWAIN" of the submenu "Processing".

The button and menu item are only available if the TWAIN/Scan module has been installed and activated (see *chapter 2.3*).

Select

The **"Select"** button opens a dialogue, where all TWAIN sources installed on the PC are listed. More than one TWAIN driver can be installed on the PC, but only one can be active at the same time.



Please use the mouse to choose the desired TWAIN source. Clicking on the **"Select"** button saves the selection.

Use the **"Cancel"** button to close the dialogue without making a selection.

**Note:** The selected TWAIN source remains active, even after the PC has been rebooted. The selection is valid for all Windows programs supporting TWAIN drivers.

### 7.3.3 Opening the TWAIN Source

**Scan**

The **"Scan"** button opens the user interface of the selected TWAIN source.



This button in the "Tools" box of the button bar can also be used to start the TWAIN source. Another possibility to open the TWAIN source is to use the main menu: "Tools" – "TWAIN/Scan".

On the TWAIN user interface, individual adjustments for the adoption of the image data can be made, for example:

- image resolution (in most cases 100-200 dpi are sufficient)
- colour mode (RGB, grey, 24, 16,12,10, 8 Bit etc.)
- image quality (e.g. brightness, colour, contrast)
- selecting the area to be scanned

### 7.3.4 Starting the Scan Process

The scanning process can be started using the corresponding button on the TWAIN source user interface. After the process is finished, the TWAIN window is closed automatically.

The digitized image appears on the Hipax image processing screen. It now can be processed and stored in the database, e.g. using the F4 button.

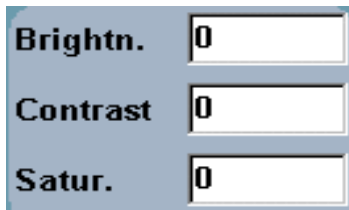
**Note:** Different saving formats can be chosen in the submenu "Configuration" of the Hipax setup, e.g. DICOM 3, TIFF, JPEG, Bitmap; PNG (see

*chapter 14.1.2.2*). The standard adjustment is DICOM, but to save memory space it may be useful to store images in a compressed format.

Depending on the scan mode, Hipax automatically calculates the DICOM image parameters (e.g. centre/window values). The image parameters and the current patient data entries are used to fill the **DICOM header** of the new image.

### 7.3.5 Optimizing Digitized Images

The "TWAIN/Scan" menu strip offers special functions for image optimization.



A screenshot of a dialog box for image optimization. It contains three vertical sliders, each with a label to its left: 'Brightn.', 'Contrast', and 'Satur.'. Each slider has a numerical value '0' displayed in a small box to its right.

**Brightness, contrast, and colour saturation** (in colour images) can be adjusted. In each case, the range is from -1000 (dark or no contrast respectively) to +1000 (bright or high contrast respectively). The standard adjustment is 0.



Click on the "**OK**" button to calculate the new image.

### 7.3.6 Filtering

The **drop down list field** below the "OK" button contains a list of organs.



A screenshot of a drop-down menu. The menu is open, showing a list of body parts: 'Head', 'Arm/Leg', 'Chest', 'Chest/N', 'Pelvis', 'Bone', 'Shoulder', and 'Abdomen'. The list is contained within a rectangular box with a scroll bar on the right.

Please select the desired body part from the list.



Clicking on the "**Start**" button uses a pre-defined filter on the active image.

The "**Reset**" button restores the original image.

### 7.3.7 Filter Configuration

The configuration of the filter macros (16 bit filter) are made in the file *preproc.ini*, which is located in the subdirectory *\Hipax\prg\*.

The user instructions for the filter configuration can be found in *chapter 7.2.4*.

### 7.3.8 Folder Function



The "**Open Folder**" button opens a study folder, where all images of one study or one scanning series can be stored together.

After clicking on the "**Close Folder**" button, all images that have been digitized until this moment disappear from the screen. The images are stored automatically together in a study series.

Only one thumbnail for each folder appears in the "Image Review" window. In the image processing screen, the image of one folder are handled as images of one series. As a result, all image processing steps are carried through for all images of the series at the same time, e.g. window levelling or dynamics.

**Note:** The "Close Folder" button is activated automatically by clicking on the "Open Folder" button.

### 7.3.9 Scanning without Folder Function

Without using the "Open Folder" button before the scanning process has been started, the digitized images have to be saved manually, e.g. using the keys F4 or F11. Hipax then creates an own thumbnail for each image grabbed.

## 7.4 Vidar X-ray Digitizing

Using the Hipax module "Vidar X-ray Digitizing", the X-ray digitizers of Vidar, SIERRA, DiagnosticPro, and MammographyPro can be **driven directly** by Hipax (ActiveX driver).

The digitizer scans the film and recognizes independently the size of the image. Only the image itself is digitized, not the margin area.

**Note:** An additional Hipax tool allows users to cut the single images, e.g. of a CT film, automatically. Then, the images are put together to a series. Please contact us, if you are interested in this feature (see *chapter 7.4.9*).

**Note:** The Vidar digitizer can also be **connected** to Hipax **using the TWAIN** interface. To make this, special adjustments needs to be made in the Hipax *Setup.exe* file (directory *\Hipax\prg\*) (see *chapters 14.2.3.3* and *14.2.3.4*).

### 7.4.1 Film Placement

Whole batches of X-rays can be digitized with the same adjustments using the Vidar digitizer DiagnosticPro. The single films in a batch must not be of the same size. It is only important to position the X-rays on the left border of the batch feeder. Please also follow the instructions of your digitizer.

In contrast to DiagnosticPro, the Vidar SIERRA can only digitize single X-rays.

**Note: Attention!** To avoid mistakes, we recommend to mark the sides of the X-ray (R/L) before starting the scanning process.

### 7.4.2 Opening the Hipax Vidar Menu



This button in the "Proceeding" box of the Hipax button bar opens the "Vidar" menu strip. It is assumed that the "Vidar X-ray Digitizing" module has been previously installed.

### 7.4.3 Patient Data

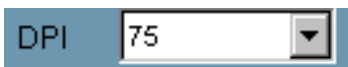
Patient List

The "**Patient List**" button in the Vidar menu strip can be used to open the "Patient/Image Administration" window.

Here, a new patient folder can be created (see *chapter 5.3*). An existing patient can be selected using a single mouse click on the corresponding entry in the patient list. Close then the "Patient/Image Administration" window.

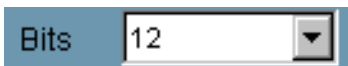
### 7.4.4 Adjustments

Before the scanning process is started, the parameters for the image to be scanned has to be adjusted. To make this, the "**Vidar**" menu offers different functions:

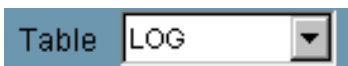


The "**DPI**" list offers different values of resolution. We recommend to use a resolution of 150 DPI as default (corresponding to about 2.5 LP/mm (line pairs per mm)).

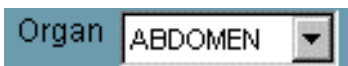
**Note:** In most cases, an increase of the resolution will probably have no diagnostic advantages. On the other side, high resolution images require much memory. This is a great disadvantage, because the saving, loading or the transmission of these images is very costly.



The number of **bits** should be adjusted at 12 as default.



The "**Table**" list contains different pre-defined lookup tables, which can be used to get different sensitivities of scans.



The "**Organ**" list can be used to select the body part shown on the image to be scanned. As a result, the selected body part is entered into the DICOM header.



☒ Dark Enhance

After activating the checkbox "**Dark Enhance**", dark areas of the image are intensified.

**Note:** This increases the duration of the scanning process.

☒ Batch Mode

The checkbox "**Batch Mode**" has to be activated, if a whole batch of X-rays should be scanned using the Vidar DiagnosticPro. Each image of a batch is then saved as a single image.

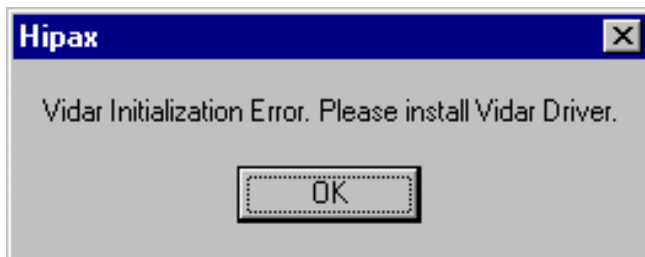
☒ Scan and Save

The "**Scan and Save**" checkbox can be activated to save the scanned images automatically. Thus, the images cannot be processed before saving.

### 7.4.5 Scanning Process

Scan

The scanning process is started using the "**Scan**" button. The single X-ray or the X-rays of a batch inserted are digitized. A window opens on the user interface showing the success of the scanning process.



This **error message** appearing after clicking on the "Scan" button shows that the **Vidar driver** (Active X) has not been installed. The Vidar driver can be found on the Hipax installation CD.

### 7.4.6 Driving the Digitizer

Selftest   Calibrate

The selftest of the Vidar digitizer is started using the "**Selftest**" button.

Using the "**Calibrate**" button, the digitizer carries through a self adjustment. Please study the user's manual of the scanner to get further information.

Eject

After clicking on the "**Eject**" button, the Vidar digitizer pulls the currently inserted X-ray through without scanning.

### 7.4.7 Image Processing

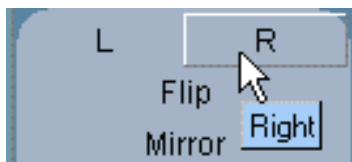
Save

The "**Save**" button can be used to store the digitized image in the database. Hipax offers different saving formats (e.g. DICOM, TIFF, JPEG). The standard adjustment is DICOM (see *chapter 14.1.2.2*).

Send      Print

Using the "**Send**" button, images can be sent directly from the "Vidar" menu to another DICOM station. To make this, the module "**DICOM Communication**" has be installed (see *chapter 11*).

The "**Print**" button is only available if the "DICOM Print" module has been installed. Thus, the digitized images can be print out again on film (see *chapter 13*), e.g. using another film format.



The buttons "**L**" and "**R**" can be used to mark the body sides in the image subsequently.

To make this, use a mouse click on the "L" or "R" button.

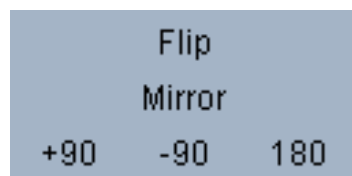
Move the mouse arrow to the desired position in the image and release the mouse button.



As a result, the corresponding letter "L" or "R" appears in the image.

To **move** the letter subsequently, use a single click with the left mouse button on the letter. As a result, the colour of the letter changes to green. Now move the mouse arrow to the new position an click again on the left mouse button.

The letter can be **deleted**. To make this, use the right mouse button on the image and select the pop-up menu item "Del. Meas.".



Using these buttons, images can be rotated by **90°** or **180°**, and reflected horizontally ("**Flip**") as well as vertically ("**Mirror**").

Close

Before the currently digitized image is **closed** using this function, Hipax asks if the user wants to save the image.

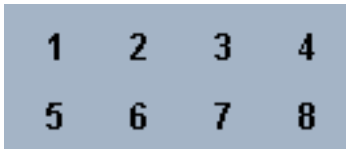


The **digitization process is started** clicking on the "Scan" button in the "Vidar" menu.

It also can be started using this button in the "Tools" box of the button bar or clicking on the menu item "TWAIN/Scan" in the submenu "Tools".

#### 7.4.8 Pre-adjusted Dynamics Curves

Eight number buttons are available in the bottom part of the "Vidar" menu.



A pre-adjusted **look-up curve** is behind each of these buttons. The description how to define own look-up curves and how to name the buttons can be find in *chapter 8.4.1*.

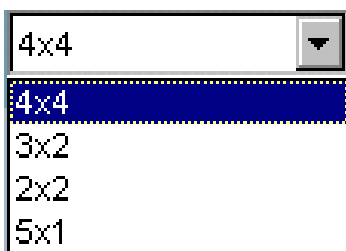
#### 7.4.9 Cutting Images

Optionally, Hipax offers a function for cutting digitized images in defined sections. To make this, the file *cut.ini* is needed to be located in the directory *\Hipax\prg\*.

**Note:** Using the *cut.ini*, the cutting functions are replacing the dynamic curve buttons in the "Vidar" menu.

This function allows the user, for example, to **cut the layers out of a scanned CT or MRI film** and to put them together to a digital series.

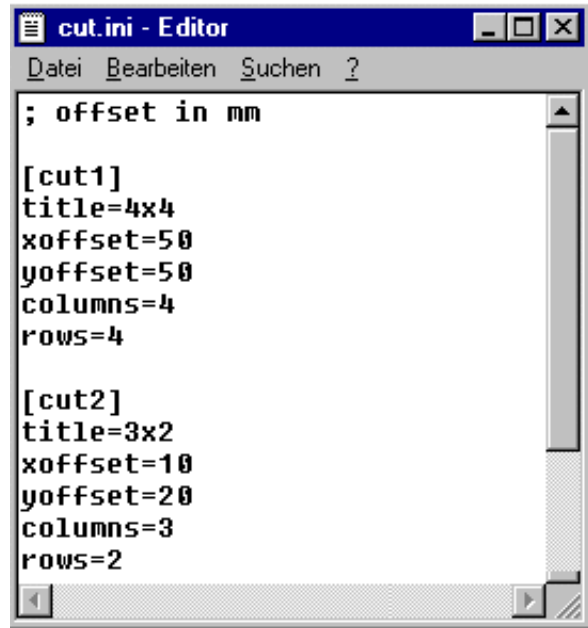
Another possibility is to cut defined single layers out of the scanned film putting them together to a **new, reduced image stack**, which can be viewed and processed more easily.



In the drop down list field, four different cutting configurations are available. They can be **setup freely** using the file *cut.ini*, which is located in the directory *\Hipax\prg\*.

Using the *cut.ini* file, the following parameters can be adjusted for the four cut presets:

- **title**: entry in the drop down list field of the "Vidar" menu.
- **xoffset**: offset at the left margin
- **yoffset**: offset at the upper margin
- **columns**: number of columns
- **rows**: number of rows.



After saving the changes in the *cut.ini* file, Hipax has to be started again.

Start

Please use the "**Start**" button in the "Vidar" menu to start the cutting procedure.

Delete

The "**Delete**" button deletes all the cut images of the preceding cutting process. The original image is not deleted.

Save

Please click the "**Save**" button to save the new image stack as a series in the database.

In the "Image Review" (see *chapter 6*) only the thumbnail of one of the images of each created series is shown. After loading the series into the image processing, all images of the series are displayed.

Blacken

To remove burned text that have been scanned with the images, click on the "**Blacken**" button and move the mouse arrow to the desired position on the image. Click then on the left mouse button and move the mouse leaving the mouse button pressed until a rectangle of the desired size has been pulled out.

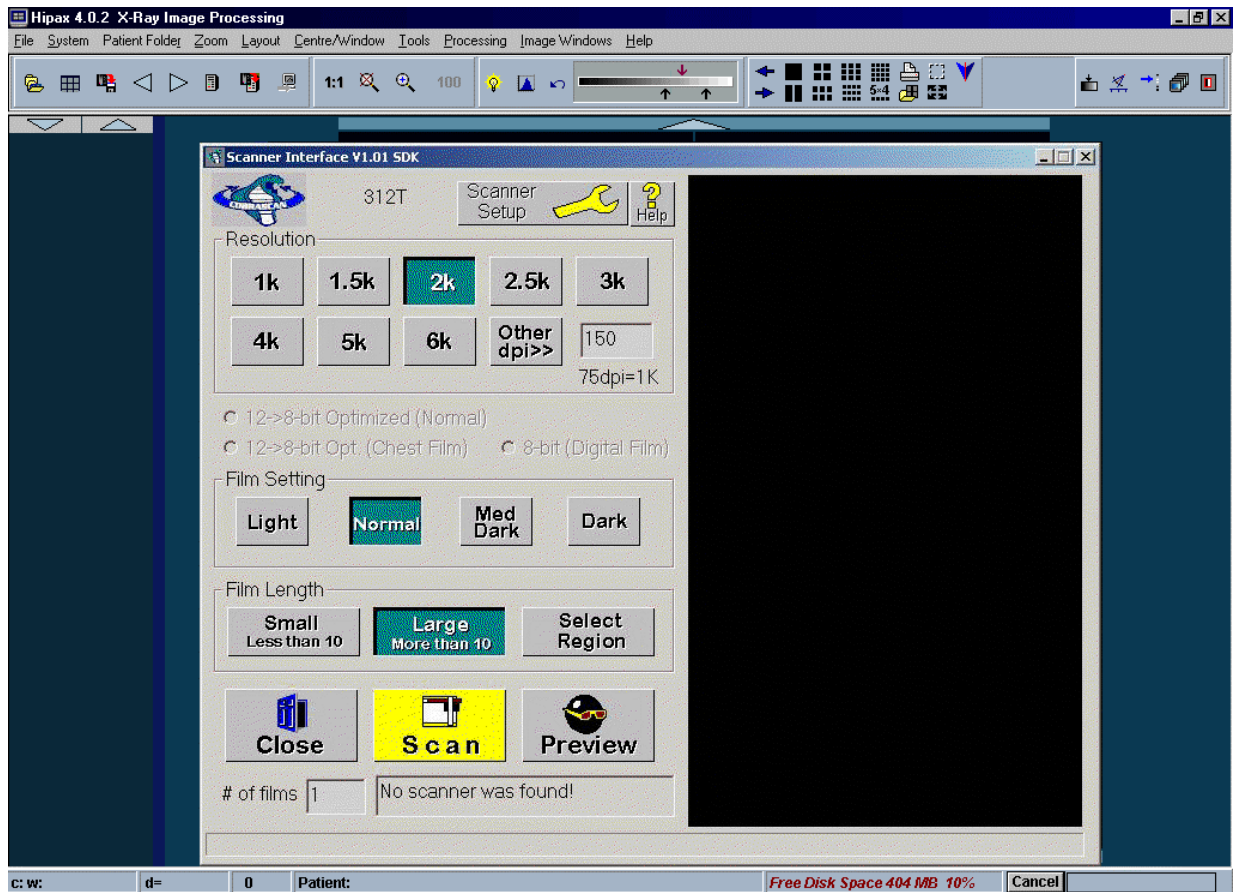
The rectangular area becomes black as soon as the mouse button has been released.

## 7.5 Cobra X-ray Digitizing

The Hipax module "Cobra X-ray Digitizing" offers an interface between Hipax and the Cobra-Scan driver.



This button in the "Tools" box of the button bar opens the user interface of the Corel Scan driver.



The user interface of the Cobra-Scan driver is described in the Cobra-Scan user's manual.

## 7.6 Video Grabbing using Matrox or DirectShow Cards

The following instruction relates to the video grabbing process using a Matrox Meteor frame grabber (Standard or Multichannel) or using a frame grabber to be addressed by a DirectShow driver (e.g. DFG/LC1).

Two different Hipax configuration files are available to adjust the grab parameters: *Setup.exe* and *VideoSetup.exe*. Both files are located in the directory *\Hipax\prg\*.

### 7.6.1 Hardware Installation

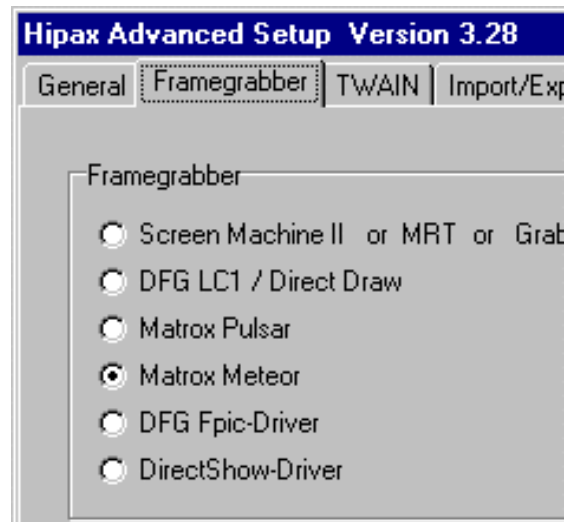
Please follow the user's instructions of your video source and frame grabber to make the installation. The PC graphics card has to be configured in the True Colour or High Colour mode.

### 7.6.2 Adjustments in the Setup.exe File

To make the video functions available, Hipax needs to know the frame grabber used. The necessary adjustments can be made in the Hipax program *Setup.exe* to be found in the directory *\Hipax\prg\*.

Please use the Windows Explorer to start the Setup.exe program. Open then the "**Framegrabber**" section

The used frame grabber can be selected in the upper left area of the window. Click on the "**Matrox Meteor II**" radio button if you are using a **Matrox Meteor II** Standard, Multi-Channel, or Digital.



The "**DirectShow Driver**" radio button is available for frame grabbers, which can be driven by DirectShow driver.

**Note:** To use the DirectShow driver with Hipax, the DirectX version 8.0 or more has to be installed. It can be downloaded from the internet (e.g. [www.microsoft.com/directx](http://www.microsoft.com/directx)).

**Note:** After clicking on the radio button "DFG LC1 / Direct Draw", the frame grabbers DFG/LC1 or DFG/LC2 can also be addressed using Direct Draw. In this case, only single images can be grabbed. The user's instruction for the Direct Draw mode can be found in *chapter 7.7*.

### 7.6.3 Functions of the Video Setup Program *VideoSetup.exe*

The video setup program *VideoSetup.exe* is also located in the directory `\Hipax\prg\` and can be started using the Windows Explorer. Here, different adjustments for the video record can be made:

- video source
- video format (dimension)
- frame rate
- deinterlace (eliminating the 'comb effect')
- colour format of the output (RGB 24 or 256 grey scales)

The adjustments are stored in an ini file as a record configuration. The name of the ini file depends on the used frame grabber or on the adjustments in the *Setup.exe* file (see *chapter 7.6.4*):

- *MeteorConfig.ini* for Meteor II
- *VideoConfig.ini* for DirectShow

**Note:** The user interface of the video setup program varies, depending on the used frame grabber. *Chapter 7.6.5* describes the user interface for Matrox Meteor II, *chapter 7.6.6* for DirectShow driven frame grabbers.

The effect of the adjustments carried out in the video setup program can be proved directly in an own display area.

### 7.6.4 Start the Video Setup Program

After the *VideoSetup.exe* has been started, the program first searches for the corresponding ini file containing former configuration adjustments. The first of the configurations saved in the ini file is then loaded automatically. The edit field "**Active Configuration**" shows the name of the currently loaded configuration.

**Note:** An error message appears during the **first start of the program** complaining about the **lacking ini file**. Please click on "OK". Make your adjustments for the desired video configuration.



A new ini file will be created as soon as the adjustments are saved using this button.

The button bar of the Hipax video setup program offers the following functions:



load an existing configuration





save the current configuration



save the current configuration using a new name



delete a configuration



record a single test image to prove the adjustments



record a test AVI file to prove the adjustments

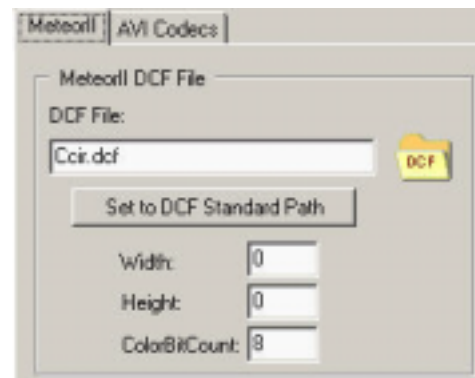
The functions of the main menu are described in *chapters 7.6.8 and 7.6.9*.

## 7.6.5 Settings for Matrox Meteor II Frame Grabbers

### 7.6.5.1 Select a DCF

The Meteor frame grabber needs information about the type of video signal to be grabbed. This information is stored in so-called DCF (Digitizer Information Files).

The DCF files for standard video formats are automatically installed together with the Matrox Meteor drivers. In contrast, the DCF describing the signals of non-standard formats have to be added manually.



The **DCF folder** opens a dialogue, where the DCF file can be selected. Please load the selected DCF using the "Open" button in the dialogue. As a result, the name of the selected file appears in the "DCF" edit field.

Based on the selected DCF, the video setup program now produces a live image, which appears in the display area of the video setup user interface.

The data for **width**, **height**, and **color bit count** described by the selected DCF appear in the corresponding edit boxes.

**Note:** The display area remain black or the message "**Live Display Not Started**" appear, if the path of the desired DCF has no been found.

Set to DCF Standard Path

After clicking on "**Set to DCF Standard Path**", the program starts to search in the registry, where the DCF files have been copied during



the installation of the drivers. Please click again on the DCF folder button to display the corresponding files in the selecting dialogue.

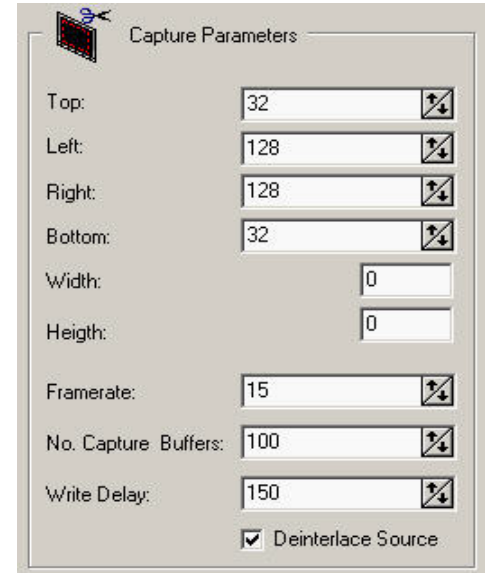
The "**Capture Parameters**" area offers different settings to process the raw video data.

#### 7.6.5.2 Cropping

Using the counting buttons of "**Top**", "**Left**", "**Right**", and "**Bottom**", the number of points can be selected, by which the image should be cut from each direction.

Thus, only a crop of the originally produced image will be adopted. An image of 768×576 pixels can, for example, be cut to 512×512 pixels.

The size of the cut image is given in the "**Width**" und "**Height**" fields.



#### 7.6.5.3 Number of Images per Second (Frame Rate)

The number of images to be grabbed per second can be adjusted in the "**Frame Rate**" field.

**Note:** The value shows, how many images should be grabbed per second. The frequency of the really recorded images depends on the performance of the computer and on the selected processing features, e.g. cutting, changing colour formats, compression of AVI files.

#### 7.6.5.4 Capture Buffer

Depending on the performance of the PC, the storage of the images on the hard disk can take significantly more time than the record of a video sequence. For this reason, the images are first hold in a buffer, before they are stored on the hard disk.

The buffer size can be adjusted in "**No. Capture Buffers**". The default adjustment of 100 should not be changed.

#### 7.6.5.5 Write Delay

The period of time between the storage of the single images of a sequence can be adjusted in the "**Write Delay**" edit field. These short write delays enable the computer to record images even during the saving process. The standard adjustment of 150 msec. should not be changed.

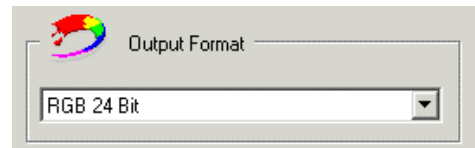
### 7.6.5.6 Deinterlace Source

Each video image consists of two half images. One half image is given by the even lines of the image, the other half image is given by the odd lines of the image. The digitization of video sequences with extreme movements can cause fuzzy images, the so called comb effect, because of a shift between even and odd lines of the image.

Please click on the "**Deinterlace Source**" checkbox to **reduce the comb effect**.

### 7.6.5.7 Output Format

The 24 Bit RGB format (e.g. PAL) produced by a DCF (Digitizer Information File) can be converted to grey values.



To make this, the desired format can be selected from the "**Output Format**" drop down list field. 8 Bit formats (e.g. RS170 or CCIR) cannot be converted to 24 Bit RGB.

**Note:** The live image is displayed as described by the DCF file, independent of the adjustment. The conversion is only visible in the recorded images or sequences.

## 7.6.6 Adjustments for DirectShow Frame Grabbers

**Note:** To use the DirectShow driver with Hipax, the DirectX version 8.0 or more has to be installed. It can be downloaded from the internet (e.g. [www.microsoft.com/directx](http://www.microsoft.com/directx)).

### 7.6.6.1 Selecting the Video Input

The frame grabber to be used can be selected in the drop down list field "**Video Input Device**".

**Note:** If the computer does not contain a frame grabber for DirectShow, an error message appears: "No Video Input Devices available".

The video input, from which the data should be digitized (e.g. Composite, SVHS, etc.) can be selected from the "**Video Input**" drop down list field. Please select the entry "3. Video Composite In" for the DFG/LC1 frame grabber.



In the "**Video Input Format**" drop down list field, the format of the video signal can be selected (e.g. PAL, NTSC).

Now, the live video image should appear in the display area of the VideoSetup program.

The colour format can be selected from the "**Video Input Color Format**" list (e.g. RGB24, YUY2).

#### 7.6.6.2 Adjustments of the Video Image

In the "**Image**" section, different parameters can be adjusted:

- Brightness
- Contrast
- Saturation
- Sharpness
- Hue
- Gamma
- White Balance
- Backlight Compensation

After activating one of the "**Auto**" checkboxes, the corresponding parameter is adjusted automatically by the frame grabber.

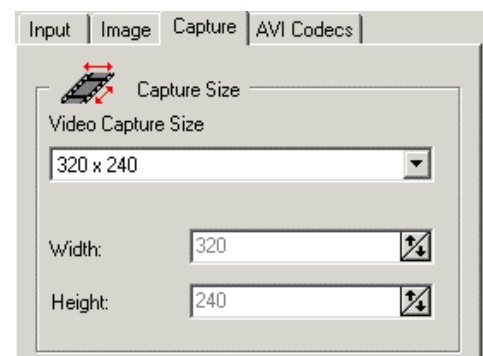
**Note:** Not all frame grabbers and drivers allow to make adjustments for each of the listed parameters. The scroll boxes of parameters, which are not supported are deactivated.

The "**Default Settings**" button restores the standard adjustments of all parameters.

#### 7.6.6.3 Record Adjustments

The resolution of the raw video data selected by the frame grabber can be selected in the "**Capture**" section.

Pre-defined resolutions can be found in the "**Video Capture Size**" drop down list.

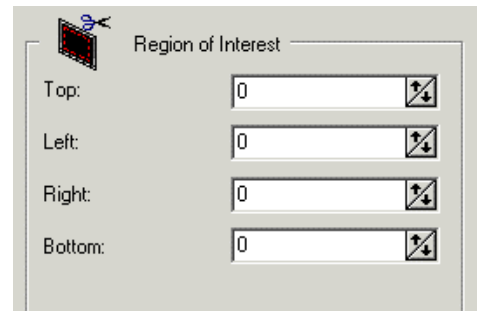


Selecting the entry "**Individual**" enables the user to adjust the resolution using the edit fields "**Width**" and "**Height**" exactly in numbers of pixels.

#### 7.6.6.4 Cropping

Hipax offers the possibility to grab only a **crop** of the image recorded by the frame grabber. Thus, e.g. an image of 768×576 pixels can be reduced to 512×512 pixels.

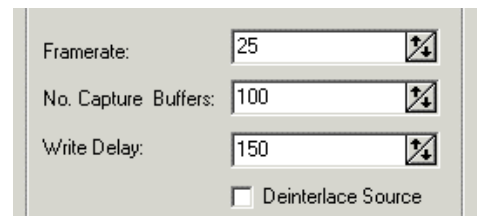
Using the count fields "**Top**", "**Left**", "**Right**", and "**Bottom**" of the "**Region of Interest**" menu, the number of pixels to cut the image on each margin can be selected.



#### 7.6.6.5 Number of Images per Second (Frame Rate)

In the "**Frame Rate**" area, the number of images to be grabbed per second can be entered.

**Note:** The selected value shows, how many images per second **should** be selected. Nevertheless, the frequency of the really recorded images depends on the calculation capacity of the PC, and on the way of image processing.



#### 7.6.6.6 Capture Buffer

The buffer size can be adjusted in "**No. Capture Buffers**". The default adjustment of 100 should not be changed (see *chapter 7.6.5.4*).

#### 7.6.6.7 Write Delay

In the "**Write Delay**" edit field, the value 150 is entered as a default. It should not be changed (see *chapter 7.6.5.5*).

#### 7.6.6.8 Deinterlace Source

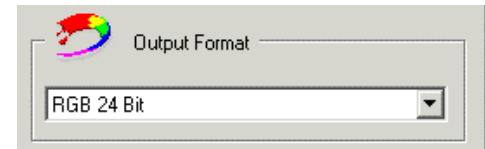
Clicking on the "**Deinterlace Source**" checkbox reduces the **comb effect** (see *chapter 7.6.5.6*).

### 7.6.6.9 Output Format

The 24 Bit RGB format (e.g. PAL) produced by a DCF (Digitizer Information File) can be converted to grey values.

To make this, the desired format can be selected from the "**Output Format**" drop down list field. 8 Bit formats (e.g. RS170 or CCIR) cannot be converted to 24 Bit RGB.

**Note:** The live image is displayed as described by the DCF file, independent of the adjustment. The conversion is only visible in the recorded images or sequences.



### 7.6.7 Adjustments for AVI Records

Generally, two types of AVI files can be recorded:

- **Uncompressed AVI files (RGB Uncompressed).**

They occupy a lot of hard disk memory. On the other hand, there is no calculation capacity needed for compression.

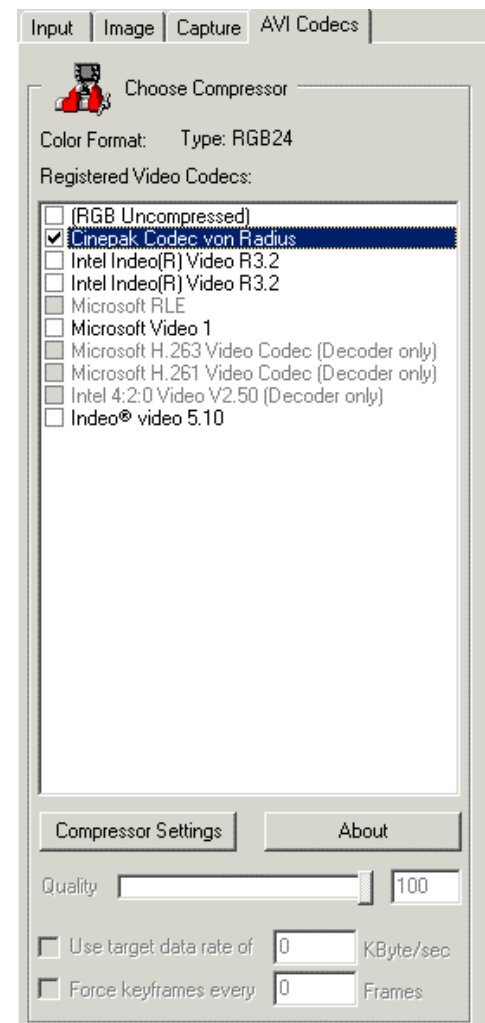
- **Compressed AVI files**

They need less memory than uncompressed files. However, a high calculation capacity is necessary to compress the video data. For data compression or decompression, a video codec (CODEC = Compressor – Decompressor) is needed.

The video codecs registered in the system are listed in the "**AVI Codecs**" section of the VideoSetup user interface. Not all codecs are suitable for each image format and colour dept. Some codecs can only be used to decompress (play) video data. Codecs, which are not available for the current record settings are inactive and greyed out.

The "**Compressor Settings**" button opens a dialogue to adjust the internal compression parameters of the currently selected codec. Type and number of parameters are varying between different codecs.

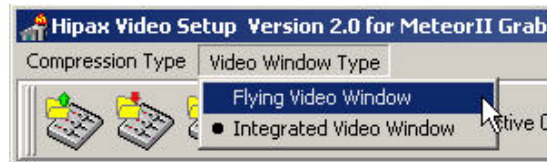
The "**About**" button opens the info window of the selected codecs.



The scroll bar, checkboxes, and edit fields in the bottom part of the menu are only available for codecs without an own setting dialogue (see "Compression Settings").

### 7.6.8 Display Mode of the Video Window

The menu item "Video Window Type" in the main menu of the VideoSetup interface offers two layouts for the video display area in Hipax.



- "Flying Video Window": free windows (*chapter 7.6.13*)
- "Integrated Video Window": integrated into the Hipax user interface (see *chapter 7.6.12*)

### 7.6.9 Compressing the Video Sequences

In the "Compression Type" submenu can be adjusted, whether or not images sequences are to be compressed. Thus, the images are converted into lossless JPEG format. The compression reduces the size of the files by factor 2-4, without losing image details.



**Note:** The compression can only be made for sequences, not for single images.

Select the menu "After new Sequence Captured" to compress each sequence automatically before saving.

Using the menu item "When writing Patient CD" allows the user to compress the images only in the case, when they should be written CD. This function is suitable to create cardiac DICOMDIR CDs.

**Note:** The compression process can take some time, depending on the capacity of the computer.

### 7.6.10 Before Starting the Records

The following criteria must be fulfilled before a video image can be grabbed:

- The type of the frame grabber must be adjusted in the Hipax program *Setup.exe* (not to be confused with *VideoSetup.exe*): Matrox Meteor or DirectShow driver (*chapter 7.6.2*).
- The corresponding **ini file** with the desired video configuration must be created by saving the adjustments made in the *VideoSetup.exe* program. Thus, the ini file must be located in the directory `\Hipax\prg\` (see *chapter 7.6.4*).



- The **entries** in the ini file **must be valid**. This can be tested using the display area in the *VideoSetup.exe* program
- Please check if the **video source** has been **connected** (to the correct input).
- The Hipax **Video module** must be installed and freed in the "Setup" window of the Hipax user interface (main menu: "System" – "Setup").

### 7.6.11 Live Image and Record



This button in the "Processing" box of the button bar opens the Video menu.



The "**Live**" button can be used to switch the display of the live video image on or off.

In the "Flying Video Window", see *chapter 7.6.8*), the display window can also be closed using the "X" icon in the upper right corner.



This button starts the grabbing process. The **record** can be finished manually using again the same button or automatically after a pre-defined period of time (see below, Maximum Frames).

☒ Save

After setting a hook into the "**Save**" checkbox, the grabbed images or sequences are not shown in the display area but stored directly in the currently selected patient folder (**Auto Save**). If this option is not activated, the records are shown in the display area and must be saved manually.

☒ Curr. Image

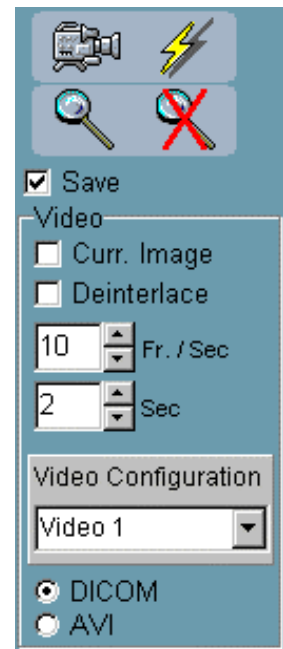
The "Curr. Image" checkbox has to be activated to **grab single images**. Otherwise, Hipax records automatically whole **sequences**.

☒ Deinterlace

The "**Deinterlace**" function can be used to reduce the "comb effect" in the recorded sequence (see *chapter 7.6.5.6*).

10 Fr. / Sec

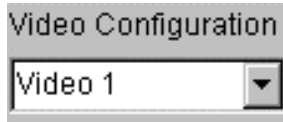
In this edit field, the number of images to be grabbed per second (**frame rate**) can be selected. The maximum adjustment for DirectShow frame grabbers using the PAL system is a frame rate of 25 images per second. Using the American system NTSC, up to 30 images per second can be grabbed.



**Note:** The real number of images grabbed per second depends on the video source, the calculation capacity of the computer, and on the driver.



This edit field called "**maximum frames**" shows the **maximum length** of the record in seconds. After this period of time, the record is stopped automatically.



The "**Video Configuration**" drop down list can be used to select one of the record configuration created in the VideoSetup program (see *chapter 7.6.4*).

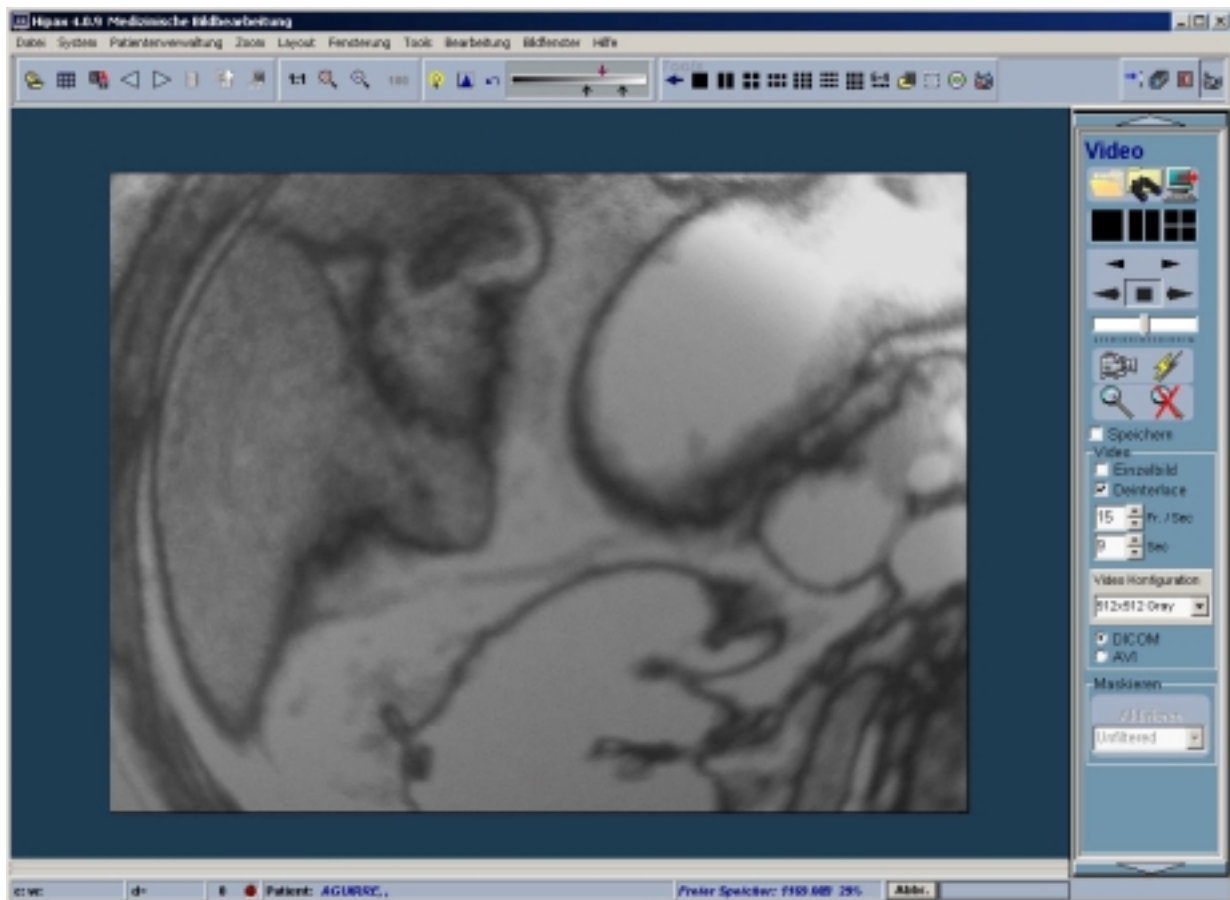


The saving format of the grabbed sequences can be adjusted here: DICOM format or AVI file.

**Note:** This option is only available if "Curr. Image" is not activated.

### 7.6.12 Record with Integrated Video Image

Please use the *VideoSetup.exe* to select, whether you want to display the live video image integrated into the Hipax user interface or in a separate window (see *chapter 7.6.8*).







In the "Integrated Video Window" mode, the live images is shown integrated into the Hipax user interface, as soon as the "Live" button has been used. A second mouse click on the "Live" button closes the live window.

#### 7.6.12.1 Grabbing Sequences

To grab sequences, the checkbox "Curr. Images" has to be inactive.

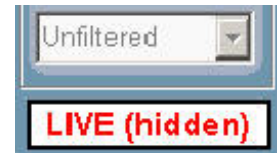


Please click on the "Live" button, if the video image is not visible yet.



The "Record" button starts the grabbing process. After the record has been finished, the live image is set into the background. Thus, the result of the record can be checked immediately.

**Note:** The red text in the bottom part of the video menu remembers the user that the live image is still in the background.



After the new start of the grabbing process, the live image appears immediately, and the record starts without delay.

The integrated live video image is closed immediately, if:

- the "Live" button is used a second time
- another menu bar is opened
- the patient list or image review is opened.

#### 7.6.12.2 Grabbing Single Images

To grab single images, the "Curr. Image" checkbox has to be activated.



After clicking on the "Live" button, the live image becomes visible

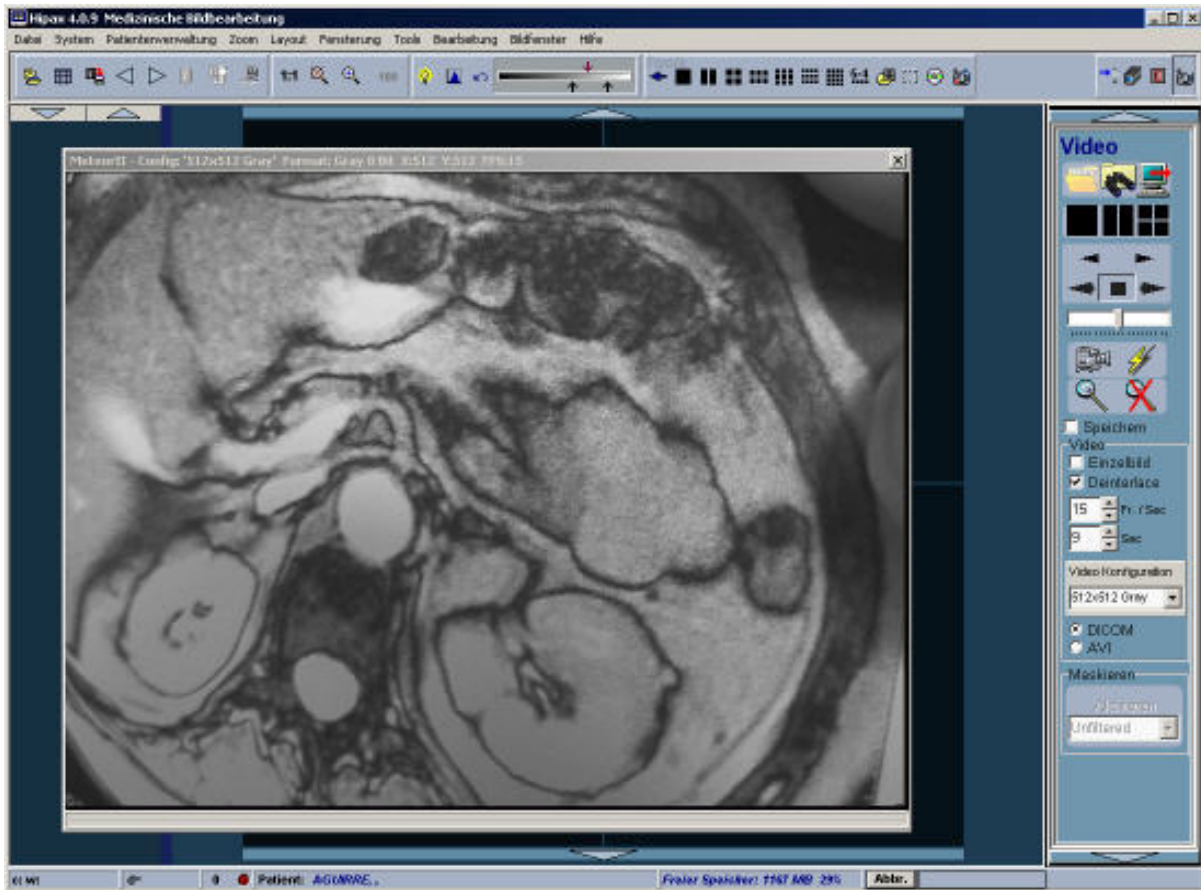


Clicking on the "Record" button grabs the current image. In contrast to the record of sequences, the live image remains in the foreground.

**Note:** If the "Save" checkbox has been activated, the grabbed images are not shown in the display area, but stored immediately in the database. If this auto save function is not active, the video images remain on the user interface and can be stored manually using F4 or F11.

### 7.6.13 Record with Flying Video Window

Please use the *VideoSetup.exe* to select, whether you want to display the live video image integrated into the Hipax user interface or in a separate window (see chapter 7.6.8).



In the "Flying Video Window" mode, the live images is shown in an own window, as soon as the "Live" button has been used. To close the live window, please use the "X" button in the upper right corner of the window.

#### 7.6.13.1 Grabbing Sequences

To grab sequences, the checkbox "**Curr. Image**" **must not** be activated.



Click on the "Live" button if the live image is not visible.



The "Record" button starts the grabbing process. The record is stopped automatically after the pre-adjusted period of time. It can also be stopped manually using a second mouse click on the "Record" button.

### 7.6.13.2 Grabbing Single Images

To grab single images, the checkbox "**Curr. Image**" must be activated.



After clicking on the "Live" button, the live image becomes visible.



The "Record" button can be used to grab the current image. In contrast to the record of sequences, the live image remains in the foreground after the single video image has been grabbed.

### 7.6.14 Image Processing using the Video Menu Strip

Besides the record functions, the Hipax video menu offers different possibilities to display and process images.

#### 7.6.14.1 Loading Sequences

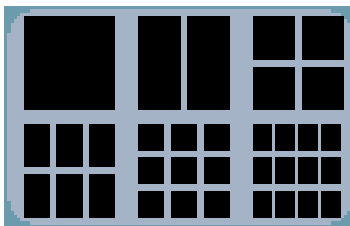


This button opens the "Patient/Image Administration" window. A double mouse click used on an entry in the patient list loads the corresponding images or sequences directly to the Hipax image processing screen.



Using the button with the binoculars, images can be queried from the server. To make this, the local PC must be connected to a Hipax Server.

#### 7.6.14.2 Layout



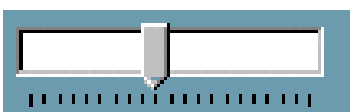
The "Video" menu offers six different frame **layouts** for displaying the sequences (1×1, 2×1, 2×2, 3×2, 3×3, or 4×3).



Use this buttons to **page** forwards and backwards within an image stack.



The arrow buttons can be used to play a sequence forwards or backwards as a cine-loop. The button in the middle stops the film.



The small scroll bar changes the playing speed.



The **magnify** is available to define any **crop** using the mouse.



Using this button, the current sequence will be reduced to the **original size**.

**Note:** Both zoom function are corresponding to all images of the sequence.

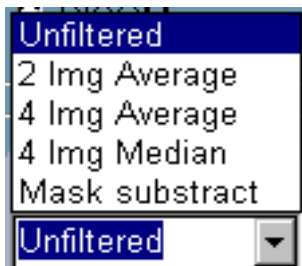
### 7.6.15 Filtering



The "Mask" drop down list field offers a selection of special filters to display image sequences:

- subtraction: all images are subtracted from a pre-defined image of the same sequence to fade out body structures of less interest
- average: calculating means between two or more images to suppress the noise.

Please chose the desired filter and start the animation of the sequence using the arrow buttons. The "Mask" list contains the following entries:



- **Unfiltered**
- **2 Img Average:** calculating the average of two images of the sequence at a time
- **4 Img Average:** average of four images at a time
- **4 Img Median:** calculating the median of four images at a time

- **Mask subtract:** This method can be used to display records with contrast medium without disturbance. First select an image of the sequence without contrast medium. Select then "Mask subtract" from the "Mask" list. After starting the cine-loop, all images are subtracted automatically from the selected image.

### 7.6.16 Image Transmission

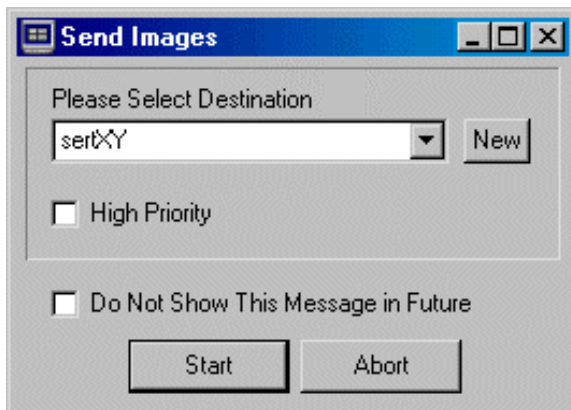


This button in the "Video" menu is available for image transmission using the **DICOM Communication** module.

**Note:** To use this function, the Hipax module "DICOM Communication" has to be installed. Please see the Hipax user's instruction for DICOM Communication.

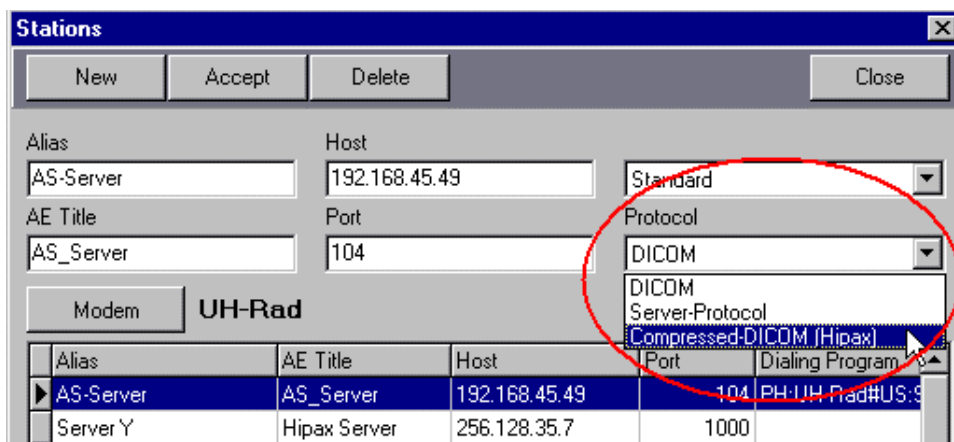
**Note:** The images to be sent have to be selected before the phone button can be used. To make this, click on the **grey spot** in the upper left corner of the desired images. As a result, the colour of the spots changes to **pink**.

After clicking on the communication button, the selected images are lossless **compressed** by factor 2.5 **automatically**. The "Send Images" window opens.



The drop down list field "**Please Select Destination**" opens the list of the destination names that have been entered before into the "Stations" window (see *chapter 11.3.3*).

The "**New**" button opens the "Stations" window, where new destinations can be entered (see *chapter 11.3.3*).



Using the "**New**" button new stations can be added to the list. To make this, the "**Alias**" (name of the station to be read by the user), "**AE Title**" (name of the station to be read by the PCs), "**Host**" (TCP/IP address), and "**Port**" (definition of the service) of the station have to be entered.

The "**Protocol**" drop down list field can be found in the "Station" window on the right side of the second line. It contains the following entries:

- "**DICOM**" has to be selected to communicate with any DICOM Station within the **LAN**. Here, the standard port number is 104. An encryption of the data is not necessary.
- "**Server-Protocol**" can be chosen, if the receiving station is a **Hipax Server**. The standard adjustment for the port number is 1000.
- Select "**Compressed-DICOM (Hipax)**" to send data to an **external Hipax viewer**. As a result, all data are encrypted before transmission starts.

Using the "**Accept**" button saves the new entry. The "**Delete**" button deletes the selected entry from the list. "**Close**" can be used to close the "Stations" window.

A mouse click on the checkbox "**High Priority**" in the "Send Images" window shows the high priority of the current images to the receiver.

If you want to transmit several images to the same address, you can deactivate the "Send Images" window clicking on the checkbox "**Do Not Show This Message in Future**". The window will reappear automatically after a new start of Hipax.

To start the DICOM transmission please use the "**Start**" button.

The "Send Images" window can be closed without starting the transmission using the "**Abort**" button.

**Note:** If only **registered users** can connect to the destination, the "Start" button opens a "**Login**" dialogue, where the user name and the password can be entered.

First, the user name and password of the sending station have to be registered on the destination. The access authorisation of each user can be determined individually.

Running DICOM send jobs can be queried clicking on the menu item "DICOM Send Jobs" in the submenu "System" of the main menu or, directly, by pressing the "Ctrl" (Strg) and "J" keys simultaneously.

## 7.7 Video Grabbing Using DFG/LC with Direct Draw

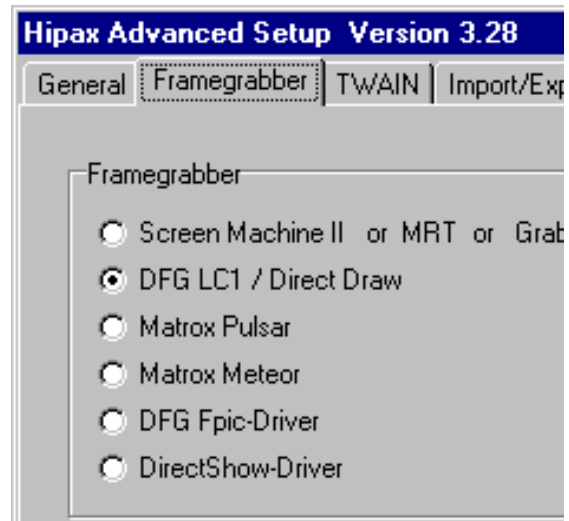
To grab only single video images, the DFG/LC1 or DFG/LC2 frame grabber can be used with DirectShow driver as described in *chapter 7.6.6* as well as with Direct Draw.

### 7.7.1 Adjustments in the Setup.exe File

The DirectDraw mode can be selected in the Hipax program *Setup.exe* to be found in the directory *\Hipax\prg\*.

Please use the Windows Explorer to start the *Setup.exe* program. Open then the "Framegrabber" section.

The "DFG" button in the "Framegrabber" register opens the user interface of the *Video.exe* (see *chapter 7.7.3*).



### 7.7.2 Hardware Installation

Please install the frame grabber card and the driver first following the corresponding user's instructions. The video source is then connected to the frame grabber card. The plugs used on both ends of the cable must have the same colour.

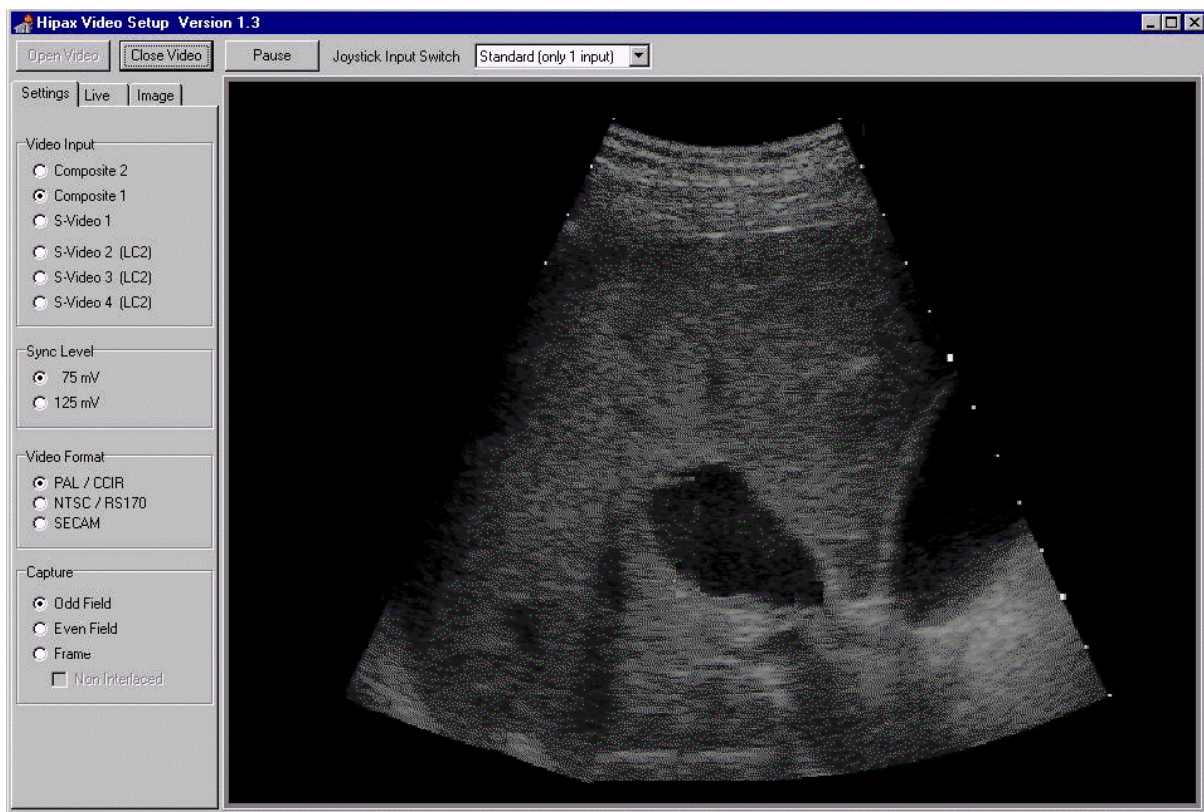
### 7.7.3 Starting the Video Setup Program Video.exe

The adjustments for the video grabbing using the frame grabber cards DFG/LC1 or DFG/LC2 can be made in the configuration file *Video.exe*. The configuration is carried through **once, before the first video grabbing starts**. The adjustments can be kept until it becomes necessary to change something, e.g. because a new video source is used, etc.

The Hipax configuration program *Video.exe* is located in the directory *\Hipax\prg\*. Please use the Windows Explorer to start the program or the "DFG" button in the "Framegrabber" register of the *Setup.exe* program (see *chapter 7.7.1*).



### 7.7.4 The User Interface of Video.exe

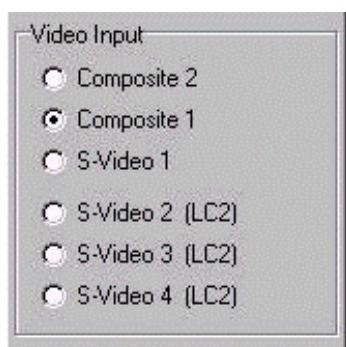


The "**Open Video**" button starts the video display. The image display is closed using the "**Close Video**" button. The "**Pause**" button freezes the video image.

The drop down list field "Joystick Input Switch" offers three possibilities: **Standard (only 1 input)**, **1 Input**, **2 Input**. In this way, users are enabled to connect up to three video sources and to switch between them. We recommend to use the standard adjustment, if only one video source is connected.

### 7.7.5 "Settings" Submenu

#### 7.7.5.1 Video Input



In this field, the **video input** of the frame grabber card is selected, where the plug of the cable between the video source and the card has been put.

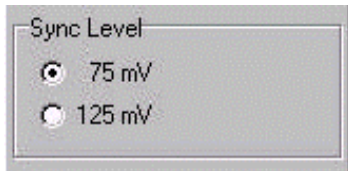
Please use one of the three upper radio buttons for the frame grabber card **DFG/LC1**.

All six ports are available for the frame grabber card **DFG/LC2**.



**Note:** Please test if you have used the correct video input by starting the video display with the "**Open Video**" button. The video is only displayed if the right port has been selected. Otherwise, the display area remains black.

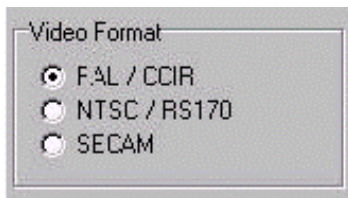
#### 7.7.5.2 Sync Level



The synchronization of the video source is selected in "**Synchronization Level**". The adjustment "75 mV", for example, is suitable for video sources with poor synchronization, like VCRs.

Please study the user instructions of your video source to find the correct adjustment.

#### 7.7.5.3 Video Format

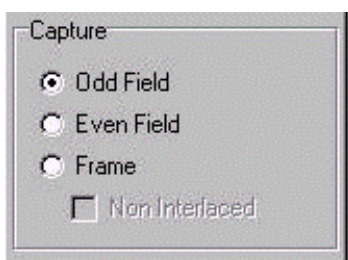


Here, the type of video signals produced by the video source can be selected. The DFG/LC frame grabbers support PAL/CCIR, NTSC/RS170, and SECAM.

**Note:** Sometimes, there is no information about the video format given in the user instructions of the video source. In this case, you also can find out the correct adjustment by yourself. To make this, please activate one of the three radio buttons and start then the video display using the "**Open Video**" button. Artefacts will occur in the image, if the wrong radio button has been selected.

#### 7.7.5.4 Capture

The "Capture" adjustments are corresponding to the image lines. Each video image is compounded of two half images. One half image is given by the even lines of the image, the other half image is given by the odd lines of the image. Rapid movements cause a shift between even and odd lines, because the images are recorded behind each other.



After activating the radio button "**Odd Field**", only the odd lines of the video images are adopted in Hipax. However, the grabbed image appears complete, because of an automatic interpolation between the lines.

Selecting the radio button "**Even Field**", Hipax only grabs the even image lines.

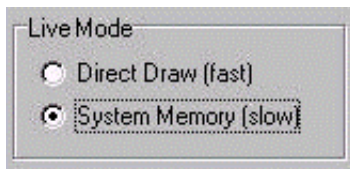
"**Frame**" means that both half images are grabbed. This adjustment makes only sense, if there are no extreme movements in the video film.

The checkbox "**Non Interlaced**" can only be activated if the option "Frame" has been selected. With "Non Interlaced", all lines are displayed in one video signal at the same time. As a result, the image is no more compounded of two half images. Please note that this function cannot be used on all types of video signals.

## 7.7.6 "Live" Submenu

### 7.7.6.1 Live Mode

The graphics card needs a direct draw driver to display the images without flickering. The direct draw driver causes the direct transmission of image data from the frame grabber to the graphics card.



The direct draw driver will be connected by selecting the radio button "**Direct Draw (fast)**". The images then are displayed in there natural order.

The additional adjustments of the direct draw mode are described in 7.7.6.2.

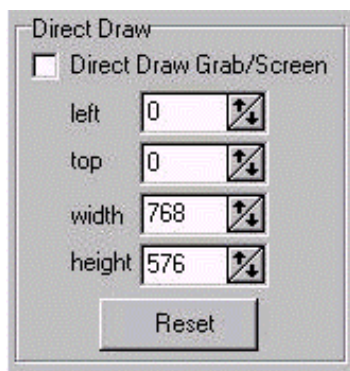
Some older graphics cards do not support the direct draw mode. Here, the image data are transmitted indirectly from the frame grabber via the RAM to the graphics card. As a result, the display of the images is slowed down; the maximal speed is 10 images per second.

In this case, the option "**System Memory (slow)**" has to be selected. The selection of the picture frequency is described in *chapter 7.7.6.3*.

### 7.7.6.2 Direct Draw

The option "Direct Draw (fast)" in the area "Live Mode" (see 7.7.6.1) frees the functions in the "Direct Draw" field.

The checkbox "**Direct Draw Grab/Screen**" has to be activated to adopt the following adjustments to Hipax.

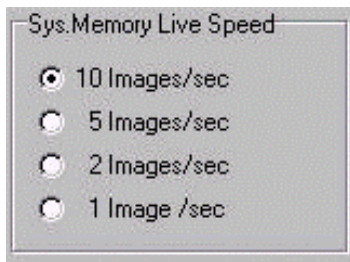


The numbers in the fields "**width**" and "**height**" give the height and width of the current image. The image height and width can be reduced by decreasing the values. In this way, for example, black margins can be cut off the images.

The image crop then can be moved by changing the values of "**left**" and "**top**".

The "**Reset**" button restores the original values.

### 7.7.6.3 Syst. Memory Live Speed



The radio button "System Memory (slow)" in the field "Video Input" (see 7.7.6.6.1) frees the options in the field "**System Memory Live Speed**". This adjustment should only be used for older graphics cards. In any other case, we recommend to use the direct draw mode.

Here, the picture frequency can be adjusted, which means the number of images to be displayed in one second.

**Note:** The higher the picture frequency, the more are the strains for the processor.

## 7.7.7 "Image" Register

### 7.7.7.1 Image Optimization

This register offers different scroll bars to adjust **brightness**, **contrast**, colour **saturation**, and **hue**.



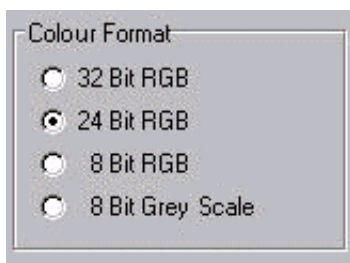
This button re-establishes the standard adjustments.



The checkbox "**Automatic Gain Control**" controls the entrance sensibility. As a result, the brightness and contrast of the grabbed images is changed.

After clicking on the checkbox "**Show Colour Bars**", a colour test scale instead of the video image appears in the display window of the *Video.exe*.

### 7.7.7.2 Colour Format



The bit values and colour formats can be selected in this area. Please choose between RGB mode or grey image.

The image grabbed in Hipax is then displayed and stored in the chosen mode.

## 7.7.8 Saving the Entries

All adjustments are adopted automatically when the program *Video.exe* is closed. Hipax then has to be opened again, before the video digitization can be started.

### 7.7.9 The Hipax "Video" Menu Strip



This button in the "Processing" box of the button bar opens the Video menu.

#### 7.7.9.1 Grabbing Images

**Live**

The "**Live**" button starts the display of the video in a window or pressing the keys "Ctrl" (Strg) and "A" on the keyboard simultaneously.



This button in the "Tools" box of the button bar opens the video window directly. It has the same function as the "Live" button.

**Pause**

Click on the "**Pause**" button to freeze the current video image.

**Grab**

To get an image from the frame grabber, please press the "**Grab**" button or the space bar of the keyboard.

#### 7.7.9.2 Image Processing

<b>Brightn.</b>	<input type="text" value="0"/>
<b>Contrast</b>	<input type="text" value="0"/>

**Brightness** and **contrast**, even of colour images, can be adjusted by entering new values in the edit boxes. The range is from -1000 (dark or no contrast) to +1000 (bright or high contrast). The standard adjustment is 0.

**Grey**

**OK**

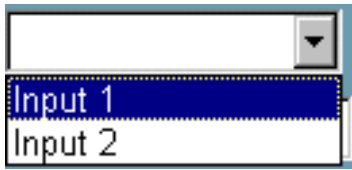
Please click "**OK**" to calculate the new image.

The "**Grey**" button calculates an 8 bit grey image from a digitized RGB colour image and reduces the required memory for storing the image.

The grey image adjustment also is available in the submenu "Configuration" of the Hipax setup. Please click on the checkbox "Store 16 Bit RGB Image as Grey Image" (see also *chapter 14.1.2.7*).

**Note:** If you want to save the image in the database, a saving format can be chosen (DICOM 3, TIFF, JPEG, Bitmap, PNG) in the submenu "Configuration" of the Hipax setup (see also *chapter 14.1.2.2*). The standard adjustment is DICOM, but to save memory space it may be useful to store images in a compressed format.

### 7.7.9.3 Selecting the Video Source



In the *Video.exe* file, an adjustment can be made to enable the user to select between up to three video sources (see *chapter 7.7.4*). Please select the desired video source from the drop down list field.

### 7.7.9.4 Folder Function

**Open Folder**

The "**Open Folder**" button opens a study folder, where all images of one study or one scanning series can be stored together.

**Close Folder**

After clicking on the "**Close Folder**" button, all images that have been grabbed until this moment disappear from the screen. The images are stored automatically together in a study series.

Only one thumbnail for each folder appears in the "Image Review" window,. In the image processing screen, the image of one folder are handled as images of one series. Thus, all image processing steps are carried through for all images of the series at the same time, e.g. window levelling or dynamics.

**Note:** The "Close Folder" button is activated automatically by clicking on the "Open Folder" button.

### 7.7.10 External Controls

External controls, e.g. a **foot switch**, can be used to start Hipax functions. This is useful, especially for the video grabbing, for example with an ultrasonic appliance or an endoscope.

Normally, external controls are attached to the serial interface (COM1 or COM2) of the PC.

In the menu "External Controls" of the Hipax "Setup" window different functions can be adjusted after using a mouse click on the checkbox "**Activate External Controls**" (see *chapter 14.1.4*).

## 7.8 Video Grabbing with Hi-Line Frame Grabber

Using the Hi-Line frame grabbers HIDEF ACCURA, I-50, or I-60, hires video signals can be grabbed. The frame grabber is driven from Hipax via TWAIN driver.

### 7.8.1 Activating and Opening the Hi-Line Menu

Please open the Hipax "Setup" window using the main menu "System" – "Setup" and activate the Module "Hi-Line" setting a hook into the corresponding checkbox. To make this, the Hi-Line module has to be installed previously.



The "Hi-Line" menu strip can be opened using this button in the "Processing" box of the button bar or using the main menu: "Processing" – "Hi-Line Digitization".

### 7.8.2 Settings

#### Select

The "**Select**" button can be used to select the TWAIN driver. Several TWAIN drivers can be installed on a PC, but only one can be active at the same time. The selection also affects all other Windows programs supporting TWAIN drivers. The selected TWAIN driver remains active even when the program has been terminated or the PC has been rebooted.

#### Configuration

After clicking on the "**Configuration**" button, a user interface is opened, where the frame grabber can be configured. For example, the video signal can be determined here.

### 7.8.3 Digitizing Process

#### Scan

The "**Scan**" button starts the TWAIN driver. The video signals are digitized. After closing the TWAIN program, the grabbed image is delivered to Hipax and displayed in the image processing user interface.

The TWAIN driver can also be started by pressing the space bar of the keyboard.



### 7.8.4 Scanning without Folder Function

Without using the "Open Folder" button before the scanning process has been started, the digitized images have to be saved manually, e.g. using the keys F4 or F11. Hipax then creates an own thumbnail for each image grabbed.

### 7.8.5 Folder Function

#### Open Folder

The "**Open Folder**" button opens a study folder, where all images of one study or one scanning series can be stored together.

#### Close Folder

After clicking on the "**Close Folder**" button, all images that have been grabbed until this moment disappear from the screen. The images are stored automatically together in a study series.

Only one thumbnail for each folder appears in the "Image Review" window,. In the image processing screen, the image of one folder are handled as images of one series. As a result, all image processing steps are carried through for all images of the series at the same time, e.g. window levelling or dynamics.

**Note:** The "Close Folder" button is activated automatically by clicking on the "Open Folder" button.

## 7.9 DICOM CD

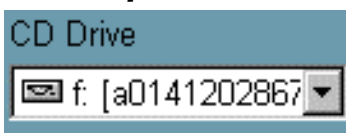
DICOM CDs are usually archiving media, which are used to store memory intensive cardiac multiframe images. The DICOM CD module can be used to read data from a DICOM CD. To make this, the module must be installed and activated (see *chapter 2.3*).

Playing cine-loops from a CD, a drive with at least 30fold speed should be used. Otherwise, the drive would be unable to read the data fast enough to display it.



The "**DICOM CD**" menu can be opened clicking on this button or using the menu item "DICOM CD" in the submenu "Processing".

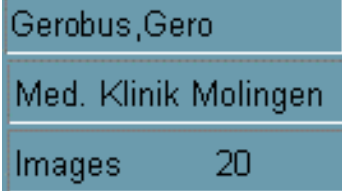
### 7.9.1 Open CD



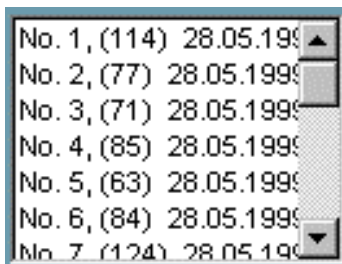
First of all, the **CD drive** in which the CD is inserted has to be chosen in the bottom part of the DICOM CD menu. The standard adjustment is "f:".

### Open CD

The DICOM CD can be opened clicking on the button "**Open CD**".



As a result, the **name** of the **patient** and **hospital** and the **number of series** stored on the CD are displayed in the DICOM CD menu.

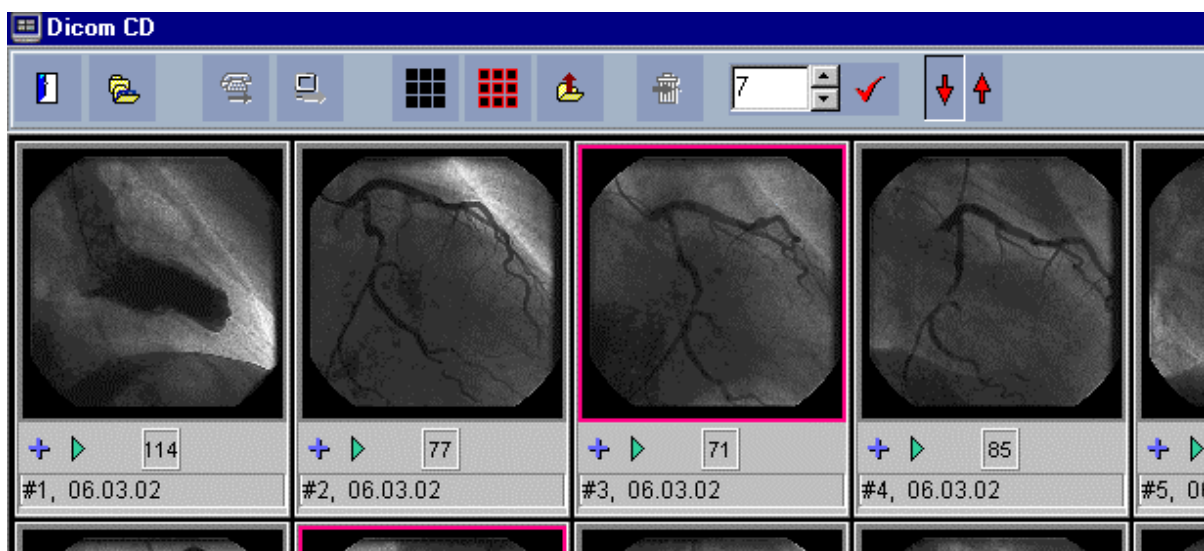


Furthermore all sequences stored on the DICOMDIR CD are **listed** in the bottom part of the DICOM CD menu. The information given here are: the number of the sequence, number of images per sequence, date of the study.

## 7.9.2 CD Review

### CD Review

The "**CD Review**" button in the "DICOM CD" menu opens the "DICOM CD" window, where thumbnails of all the sequences are displayed side by side.



Using the plus button in the status line of a thumbnail loads the corresponding sequence to the image processing screen.



The **green triangle** opens an own window, where the corresponding sequence is displayed as a cine-loop.





This button loads all sequences selected to the image processing screen.

Hipax offers the possibility to **transmit sequences directly from the CD** to another Hipax station. To make this, the modules DICOM Communication or ISDN Communication must be installed. As a result, the corresponding buttons appear in the CD Review:



For all other buttons see *chapter 6.2*.

### 7.9.3 DICOMDIR CDs without Thumbnails

Info

Some CDs do not contain image icons. In this case, the content of the CD can be displayed in a tree view using the "Info" button.

### 7.9.4 Playing the Sequences

Cine-Loop

The "Cine-Loop" can be started using this button in the DICOM CD menu or using the **green triangle** in the CD review (see *chapter 7.9.2*). As a result, the corresponding sequence is displayed in an own window, offering special functions:



forward and backward play mode



single step paging forward/backward



zoom



closing the cine loop window



play and pause button



scroll bar to adjust the playing speed

**Note:** The cine loop of a sequence can also be started using a double mouse click on the corresponding entry in the CD list field (see *chapter 7.9.1*).



Clicking on this **red arrow** in the DICOM CD menu allows the user to play all the sequences loaded at the same time.



With the track bar, the **speed** of the cine-loop can be adjusted. Moving the scroll box to the right slows down the display speed.

### 7.9.5 Compression

Compress

Using this button, sequences can be **compressed**, e.g. for the archiving or telemedicine.



In the "Enh." drop down list, the **compression strength** can be determined by selecting a value between 0 and 100.

### 7.9.6 Transferring Sequences from the CD to the Hard Disk

Import

The "**Import**" button copies the content of a complete CD to the hard disk.

Imported sequences are stored in the **Video Quick Format**. This special video format allows users to start the sequences at once, without any loading time.

**Note:** As the Sequences are stored uncompressed, please take care that your hard disk has enough memory.

After the import process ends, the patient data can be found in the patient list. In the "**Image Review**" window, the thumbnails of these sequences are framed by **green margins**, to show that these sequences can be started at once.

The Video Quick format can also be inactivated using the *Setup.exe* file in the directory *\Hipax\prg\*. (see *chapter 14.2.1.8*).

## 7.10 X-ray Journal

The X-ray Journal enables the user to enter the X-ray parameters that have, for example, been used for a CR X-ray study (e.g. see *chapters 7.1* and *7.2*). The X-ray parameters are stored in an own database. Furthermore, the data are entered automatically into the DICOM header of the current image.

The menu item "**New Entry into X-ray Journal**" in the "System" submenu opens a dialogue, where the different parameters can be entered.

The fields "**Name**", "**First Name**", "**Birth**", and "**ID**" contain the data of the currently selected or loaded patient.

"**Time**" and "**Receiving**" show the current time and date.

The body part to be examined can be entered into the "**Organ**" field. "**Position of X-ray Tube**" gives the position of the study, e.g. apical or lateral.

Furthermore, the "**Thickness of the Object**", the radiation dose ("**mA**" and "**kV**") and the "**Duration of exposure**" can be entered.

"**Operator**" means the name of the person carrying through the X-ray study.

An estimation of the **image quality** can be entered into the corresponding edit field.

The "**Description**" edit field enables the user to add a short note to the X-ray study.



These buttons besides the "**Organ**", "**Operator**", and "**Image Quality**" edit fields open text fields, where common entries can be listed. The entries then appear in the corresponding drop down list fields.

Save

Using the **"Save"** button, the data of the current X-ray study are stored in an own database. Thus, the dialogue is closed automatically.

Cancel

The **"Cancel"** button can be used to close the dialogue without saving the entries.

Please use the main menu **"System" – "X-ray Journal"** to access to former entries into the X-ray journal.

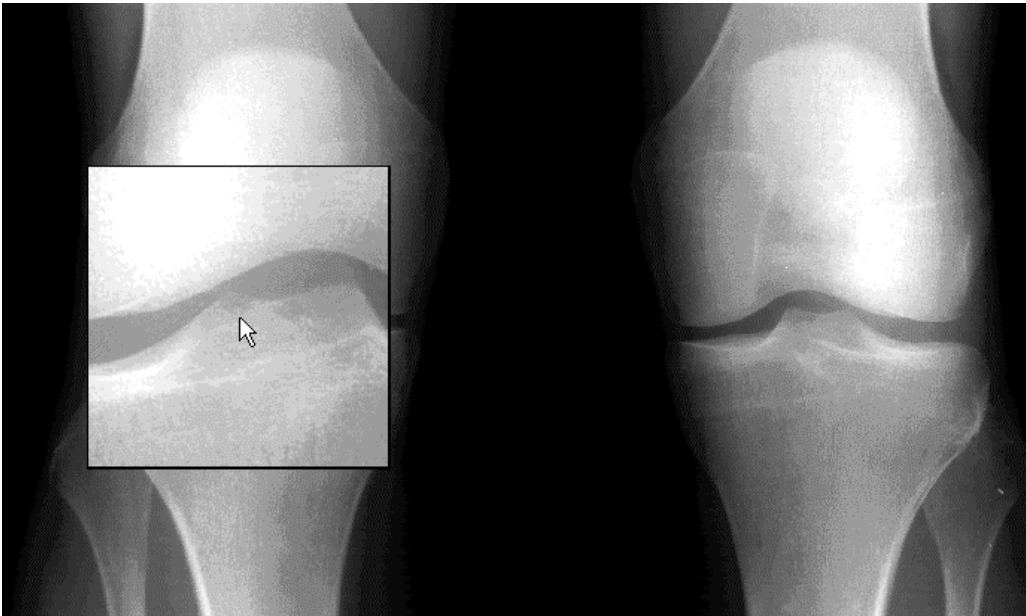
Röntgenjournal													
Name	Vorname	Geburt	ID	Zeit	Datum	Organ	Aufnahmestellung	Objektdicke (cm)	mA	kV	Dauer der Aufnahme (msec)	Visum	Bildqualität
Bjoern	Andreas	04.12.1981	NCAMB5526	14:10:09	16.07.2003			0	0	0			
Laus	Niko	06.12.0100	272937	14:27:10	16.07.2003	Thorax	ap	20	0	0	0	Engle	gut
Bjoern	Andreas	04.12.1981	NCAMB5526	15:44:28	16.07.2003	Hand		0	0	0	0	Sommer	gut

OK

## **CHAPTER 8: IMAGE PROCESSING**

## 8.1 Magnifying Glass

To magnify a small image area quickly, the magnifying glass is available. As long as the **right mouse button** is pressed, the area around the mouse cursor appears magnified.



For example, the magnifying glass can be used to place measurement points exactly.

The **size of the magnifying glass** can be changed using the *Setup.exe* file in the directory `\Hipax\prg\` (see *chapter 14.2.1.10*).

## 8.2 Window Levelling



The "Window Level" menu strip can be opened either clicking on this button in the "Processing" box or on the menu item "Window Level" in the submenu "Processing".

The "Window Level" functions are used to adjust the window values **for images with more than 8 bit** grey resolution.

In many cases, medical images contain 1,024 or 4,096 (CT, MRI) grey scales. In some cases the grey resolution goes up to 16 bit (ca. 65,000 grey scales). The PC only can handle images with 256 grey scales.

To be able to display these images on the screen at all, the window range must be defined to reduce the grey tones to the available 256 grey scales.

Images that are digitized with X-ray scanners (e.g. Vidar digitizer) normally contain 12 bit grey tones. After the scanning process, the window values will be adjusted automatically. The values can be changed manually later.

The window values consist of two parameters:

- The **window centre** defines the position of the visible window of grey values.
- The **window width** determines the quantity of visible grey scales. All grey scales outside this range are set to black or white.

**Note:** All functions of "Window Level" are exclusively applicable to images with more than 8 bit grey tones. For images with 8 bit grey tones or less, please use the processing tool "Dynamics" (see also *chapter 8.3*).

### 8.2.1 Changing the Window Values

Hipax offers five possibilities to change the centre/window values.

The **speed of the modification** depends on the size of the image, the available RAM of the computer, and the processor speed.

#### 8.2.1.1 Changing the Window Values using the Mouse

The simplest way to change the centre/window values is to keep the left mouse button pressed and to move it across the image.

Please move the mouse arrow up and down to change the window centre and move it in the horizontal direction to change the window width.

#### 8.2.1.2 Changing the Window Values in the Button Bar

Additionally the centre/window functions are available in the button bar.



The regulation of the window values takes place by moving the three lower arrows, which enclose the visible range.

Moving the two black arrows widens or narrows the range of visible grey scales (window width).

The white arrow between the black ones can be used to change the position of the grey scale range (window centre).

The upper arrow adapts the dynamics (see *chapter 8.3*).



The **automatic image analysis** calculates the optimum window parameters. This can also be made using the "**Auto**" button in the menu strip.

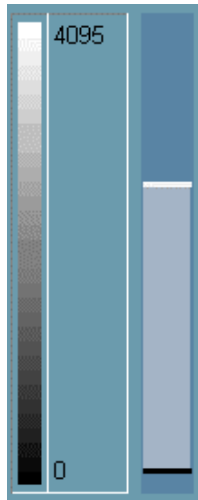


This button opens the "**Histogram** window (see *chapter 8.2.1.5*).



The "**Reset**" button restores the original centre/window values.

#### 8.2.1.3 Changing the Window Values using the Scrollbar in the C/W Menu



Using the mouse, the window scrollbar in the C/W menu strip can be adjusted to a new position or width.

Moving the whole scrollbar changes the position of the displayed grey scale window (centre).

Moving the upper or lower end of the scrollbar narrows or widens the area of displayed grey scales (width).

The grey bar on the left side illustrates the grey range of the image.

#### 8.2.1.4. Changing the Window Values by Direct Input

Centre	<input type="text" value="1415"/>
Width	<input type="text" value="2477"/>

The window centre and width can also be changed entering the new values into the corresponding edit boxes.

**Process**

Please click the "Process" button to calculate the new image.

#### 8.2.1.5 Changing the Window Values using the Histogram

The histogram shows the grey distribution of an image. Also here the window values can be changed.

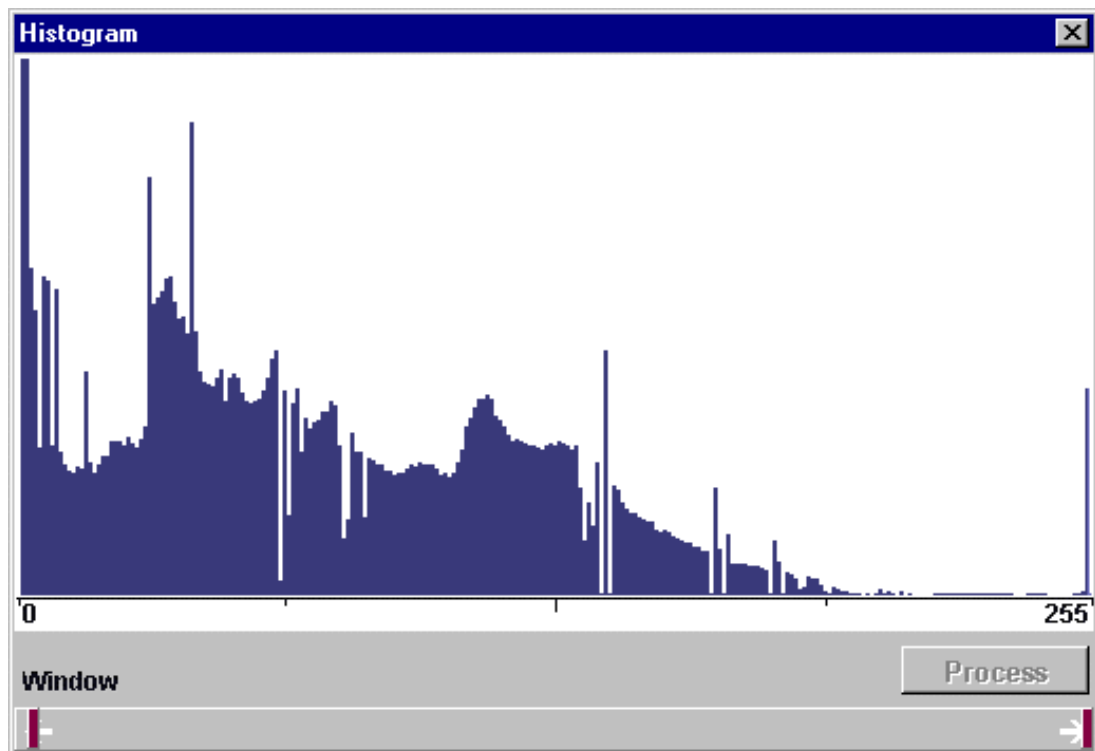


The Histogram window can be opened clicking on this icon in the button bar.

Other possibilities to open the "Histogram" window are to use the "Histogram" button in the "C/W" menu strip,

**Histogram**





The visible window can be adapted manually to the histogram moving the **red scroll bars** in the status line of the histogram window with the left mouse button.



The new window **values are calculated** clicking on the "Process" button.

### 8.2.2 Reset the Original Window Values



The "**Reset**" button in the "C/W" box of the button bar restores the original centre/window values.



The original image can also be restored using the "Reset" button in the C/W menu strip,

or clicking on the menu item "**Original**" of the "Centre/Window" submenu.

### 8.2.3 Window Levelling in Image Series

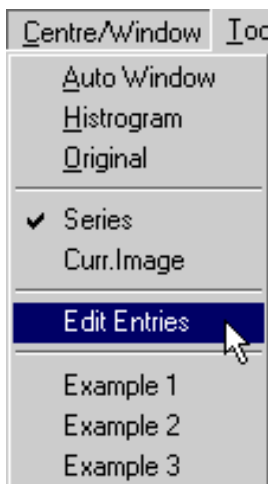
If you are working with series (e.g. CT or MRI), you can chose the processing mode:



The new centre/window values can be processed in the whole series selecting the "**Series**" radio button.

Please select "**Curr. Image**" if you only want to change the window levelling of single images.

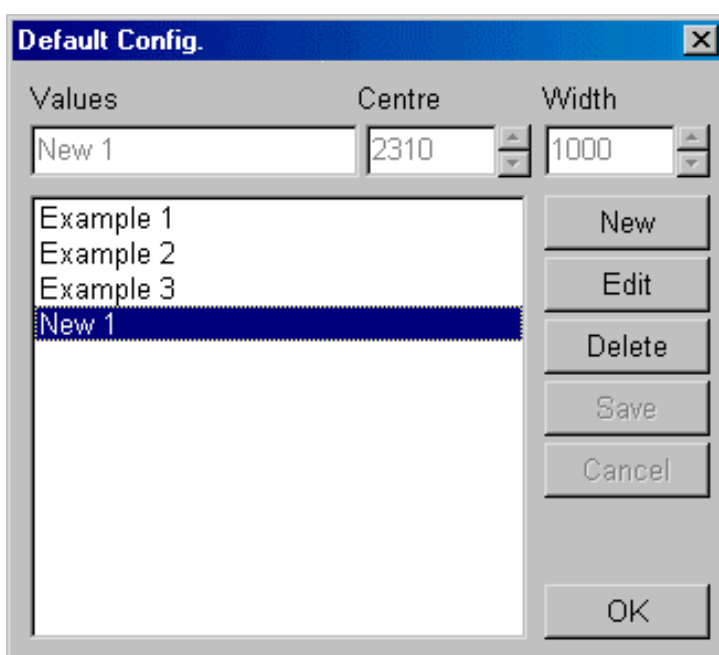
### 8.2.4 Creating Centre/Window Presets



Hipax offers three presets of centre/window values, which can be obtained in the submenu "Centre/ Window" clicking on the menu items "**Example 1**", "Example 2" and "Example 3".

These three presets can be changed, and they can be added or replaced by **self edited centre/window** presets.

To make this, please click on the menu item "**Edit Entries**" in the submenu "Centre/Window". As a result, the window "Default Config." opens:



The **"New"** button allows the user to add new entries to the preset list. The values of present presets can be changed after clicking on the **"Edit"** button.

In both cases, the cursor jumps first into the **"Value"** edit field, where the name of the new or changed preset can be entered. Please select then the desired window values in the **"Centre"** and **"Width"** list fields.

Please save the new entries by mouse clicking on **"Save"**. **"Cancel"** interrupts an edition without saving.

The **"Delete"** button deletes a selected preset.

The **"OK"** button closes the window as well as the × button in the upper right corner of the dialogue.

### 8.2.5 Loading Images with Pre-Defined Window Values

Individual window levels can be pre-defined for each modality. Thus, the images are loaded automatically with these C/W values. The corresponding adjustment can be made in the Hipax "Setup" window, menu "Load Images" (see *chapter 14.1.5*).

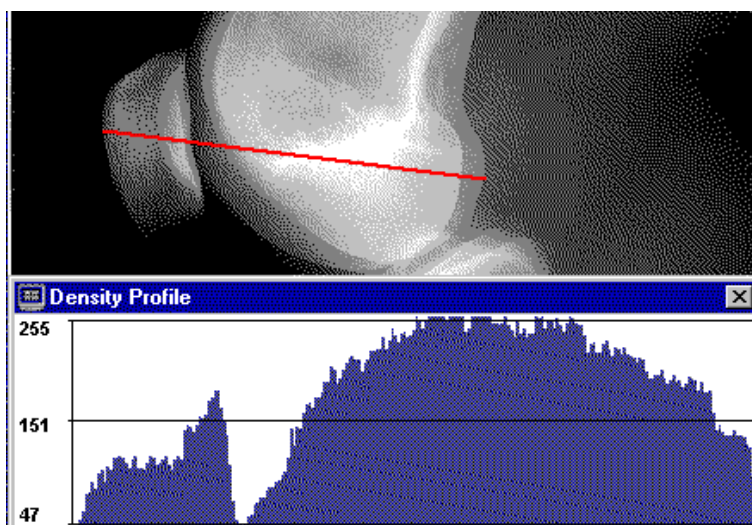
### 8.2.6 Evaluating the Grey Tones of an Image

#### 8.2.6.1 Density Profile



The **"Density"** button of the "Window Level" menu strip allows the presentation of grey tones (density values) along a line.

The line is defined by the mouse. Please move the mouse arrow to the left end of the desired line and press the left mouse button. Move the mouse with the pressed button until the line is drawn out.



Bright (dense) areas produce high values in the graphic.

**Note:** The mouse coordinates (x, y) and the grey tone of the current pixel (d) are displayed in the status bar.

x=205 y=5 d=93

### 8.2.6.2 Histogram

The histogram shows the frequency of the single grey tones in the image (see the figure in *chapter 8.2.1.5*).



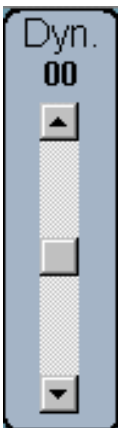
Using this button, the "Histogram" button in the "C/W" menu strip, or the menu item "Histogram" of the "Centre/Window" menu calculates the histogram of the current image.

## 8.3 Dynamics



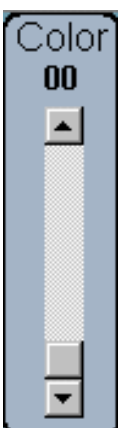
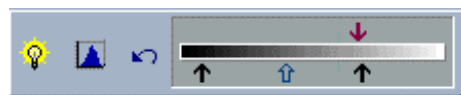
The menu strip "Dynamics" is opened either clicking on this button in the button bar or clicking on the menu item "Dynamics" in the submenu "Processing".

The "Dynamics" functions can be used to **change the brightness and the contrast** of an image. The dynamics curve of the image shows the changes. This technique enhances certain grey ranges at the expense of others. For example, the increase in brightness results in a worsened display of the already bright areas of the image.



The infinitely variable "Dyn." scroll bar allows an exact adjustment of the dynamics.

**Note:** The change of the dynamics also can be adjusted in the **button bar** moving the upper (red) arrow of the scroll bar.



Another possibility to display grey images is the use of **colours**. The colour remapping assigns a colour to each grey tone. Thus, areas with low contrast can be better displayed. Also here Hipax offers an infinitely variable scroll bar.

**Note:** All dynamics changes are related to the visible 8 bit (256 grey scales) of an image.

The change of the dynamic range is shown in the dynamics curve.

### 8.3.1 The Dynamics Curve

#### 8.3.1.1 Changing the Brightness

A steep curve makes the image brighter.

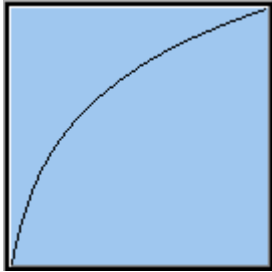


Image brightening

A flat curve makes the image darker. Bright areas in the image get more contrast.

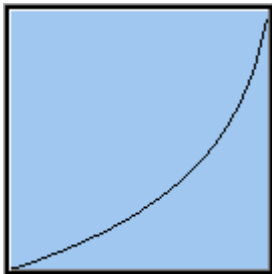
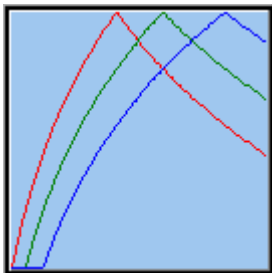


Image darkening

#### 8.3.1.2 Colour Remapping

The "Colour" scroll bar remaps grey tones to colours. The dynamics curve of the image is separated in a red, green and blue part. The distribution of the colours is determined by the shape and the course of the three curves.

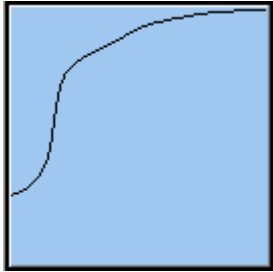


Colour remapping

### 8.3.1.3 Irregular Dynamics Curve

In some cases the dynamics curve is saved together with an image. This happens, for example, after a histogram equalization, which calculates a new grey distribution of the image (see *chapter 8.3.3*).

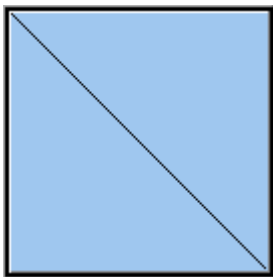
In this case the dynamics curve has an irregular shape.



Dynamics curve after a histogram equalization

### 8.3.1.4 Reverse Video

If the grey tones of the image are reversed (reverse video) (see *chapter 8.3.2*), the display of the curve is reversed, too.



Reverse video

### 8.3.1.5 Reset of the Dynamics Curve



The "**Reset**" button restores the original brightness and contrast values. All changes of graduation are cancelled.

The "**Linear**" button straightens the dynamics curve and cancels the intensification of a grey range.

### 8.3.2 Reverse Video



Clicking on the "**Reverse**" button the brightness of an image is reversed. Bright changes to dark, and dark changes to bright.

### 8.3.3 Histogram Equalization

#### Histo.Equ.

The **histogram equalization** ("Histo.Equ.") optimizes the brightness of an image using all available grey scales of the image in the same frequency. It would not be useful to apply this function to images with large black background areas, because the black ranges would be enhanced as well, although they are of little interest.

### 8.3.4 Pre-adjusted Dynamics Curves

1	2	3	4
5	6	7	8

In the bottom part of the "Dynamics" menu strip, you can find a block of normally **eight number buttons**. A pre-adjusted look-up curve is behind each of these button.

*Chapter 8.4* describes how to define own look-up tables and how to name the buttons.

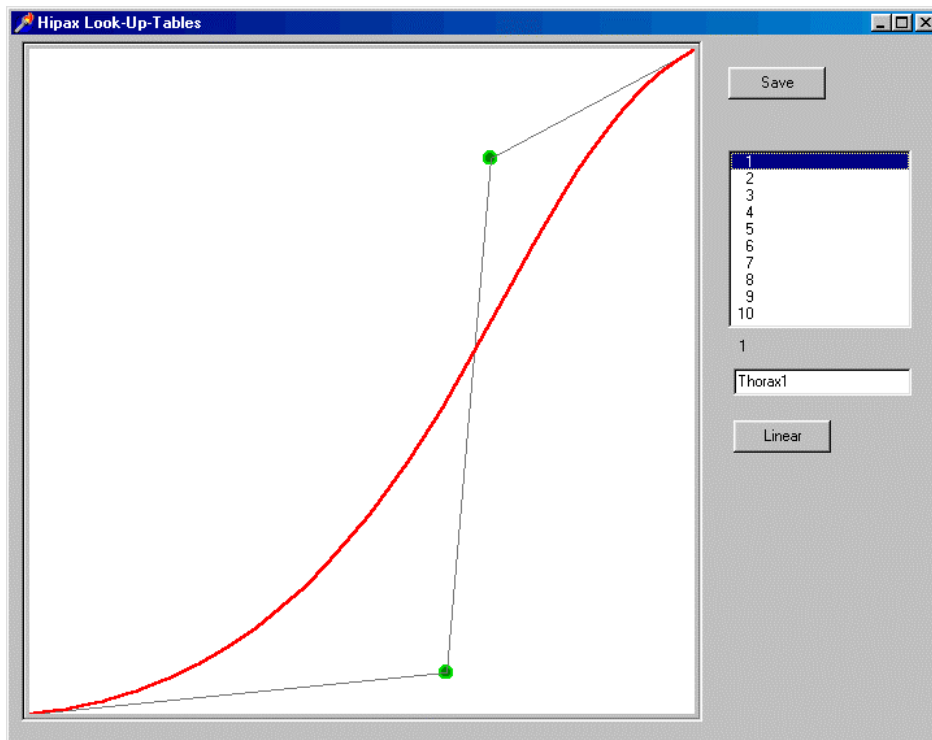
## 8.4 LookUp.exe

The Hipax Program *LookUp.exe* allows users to pre-define different gradation (dynamics) curves. In the "Dynamics" and the "Vidar" menu of the image processing user interface, the defined gradation curves then can be used to the active image.

The program is located in the directory *\Hipax\prg\*.

The following text explains how to adjust the gradation curves using the program *LookUp.exe*:

### 8.4.1 The User Interface of LookUp.exe: Hipax LookUp Tables

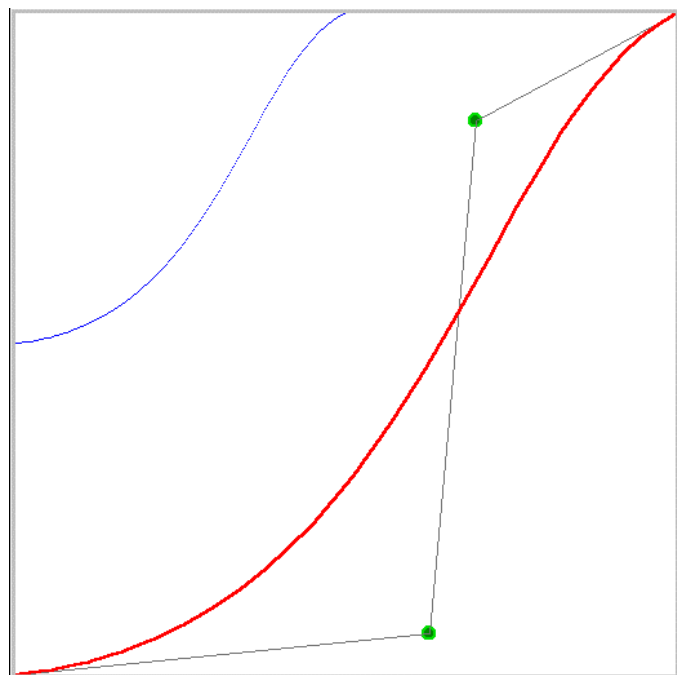


### 8.4.2 Selection of the Gradation Curve

The individual **gradation curves can be opened** using a single mouse click on the numbers 1 to 10 in the right upper part of the user interface of *LookUp.exe*.

### 8.4.3 Distortion of the Gradation Curves

The gradation curves are **distorted** using the mouse. To make this, please move the mouse arrow to the **green spots** on the distortion line – one after the other - and press the left mouse button. Move the mouse with the pressed button until you have adjusted the desired shape of the curve.





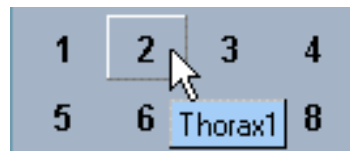
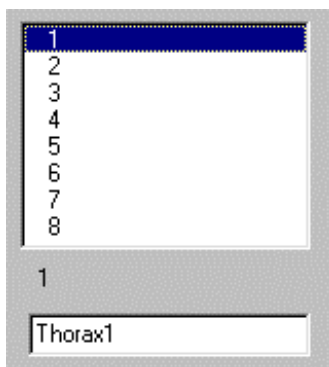
#### 8.4.4 Linear

Using the "**Linear**" button, the currently selected curve is **straightened**.

#### 8.4.5 Labelling of the Buttons

The entered curves are **used on the current image** by clicking on the buttons "1" to "8" in the menu "Dynamics" or "Vidar" of the Hipax image processing interface.

To identify the adjusted curves, a **name for each curve** can be entered into the edit field below the list of curve numbers in the *LookUp.exe*. As a result, the name of the corresponding curve appears as soon as the mouse arrow is moved on one of the number buttons in the "Dynamics" and "Vidar" menu.



#### 8.4.6 Saving the Adjustments

The newly adjusted gradation curve and the labelling of the corresponding button are saved using the "**Save**" button. The new gradation curve then is available immediately in the Hipax image-processing interface.

In the window "Hipax LookUp Tables", a newly saved gradation curve is shown as a blue line.

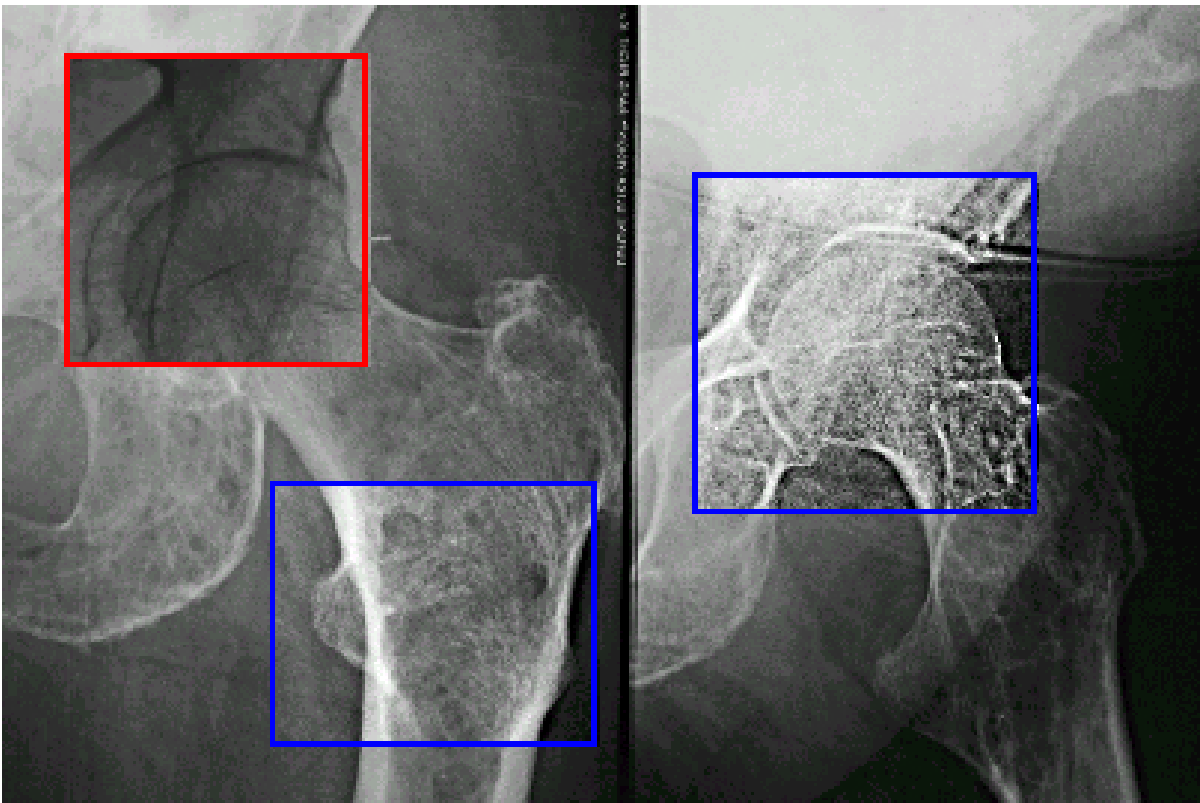
## 8.5 ROI, Diagnosis Support by Filtering



The "ROI" menu strip can be opened using this button in the button bar or the menu item "**Region of Interest**" in the submenu "Processing".

ROI is the abbreviation of REGION OF INTEREST and signifies the area, which shall be processed.

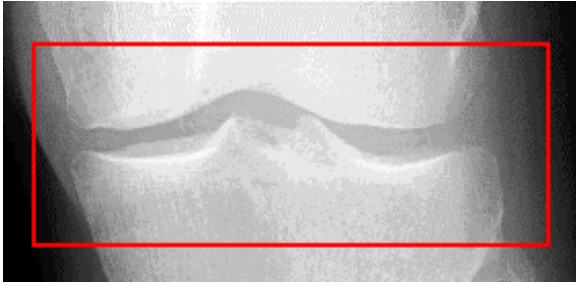
ROIs are marked by **red** or **blue frames**. The currently selected ROI is red. A ROI can be selected using a mouse click on the corresponding frame.



### 8.5.1 Defining a ROI

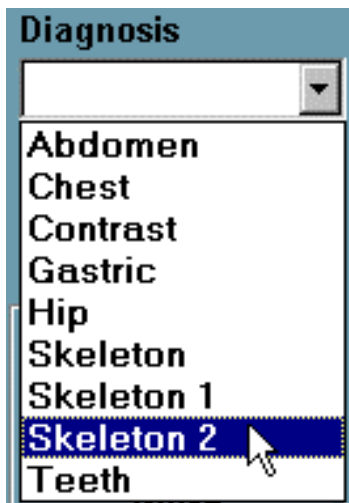
#### Define

To determine an area for "ROI", please click on the "**Define**" button. Then move the mouse arrow to the upper left corner of the desired rectangle and click on the left mouse button. Move the mouse with the pressed button until you have drawn out the rectangle. The process is completed after the release of the button.



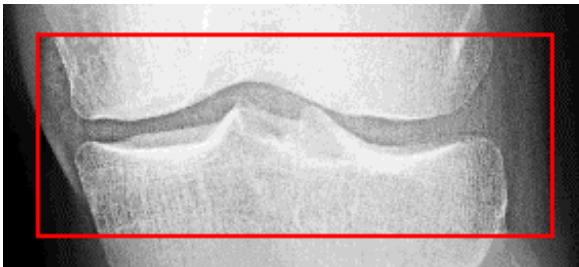
The frame colour of this new ROI is **red**. All following filter operations are related to this (red) ROI.

### 8.5.2 Diagnosis Support



The "**Diagnosis**" list contains optimization macros for certain image types. They are applicable to the currently selected (red framed) ROI.

After selecting a macro the processing starts. The result is displayed in the image.



It is possible to use **different filters**, one after the other.



Mouse clicks on the **red arrow** show the results of the different processing variations used in the current ROI. Even the original data can be made visible this way.

**Note:** Each filter processing carried out is based on the original data.

### 8.5.3 Deleting ROIs



The "**Delete**" button deletes all ROIs and restores the original image.

### 8.5.4 16 Bit Filter



The "ROI" menu strip contains a couple of **buttons** carrying the **names of body parts**. Each button represents a pre-defined filter to be used on the currently selected image.

**Note:** The 16 bit filters can only be saved in a new image, stored the first time after digitization. In contrast, ROIs can also be stored subsequently.

Please use the "**Edit**" button if you want to configure the filters. As a result, the file *Preproc.ini* opens with the user interface called "Setup". The user instructions for the filter configuration using the *Preproc.ini* file can be found in *chapter 7.2.4*.

### 8.5.5 Free Processing

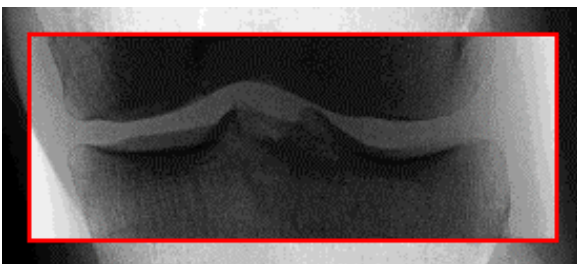
The filter operations used in the macros can also be applied manually. Several filter parameters can be adjusted.



Please click on the "**Free Processing**" checkbox to activate these additional functions.

**Reverse**

The "**Reverse**" filter reverses the grey scales. Dark changes to bright and bright changes to dark.



**Spreading**

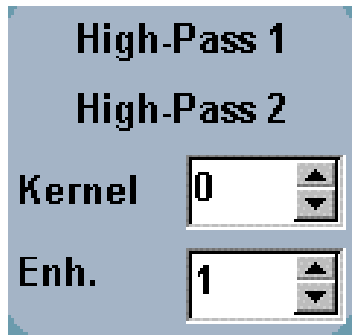
The "**Spreading**" filter analyses the ROI data. It sets the darkest value to black and the brightest to white. The grey tones in between are stretched accordingly.

**Noise**

The "**Noise**" filter suppresses the noise in the defined area of an image by reducing the peaks of the grey range.

## Emboss

Clicking on this button, the "**Emboss**" filter is used on the defined area of the image.



The "**High-Pass**" filters enhance the edges in the ROI (unsharp mask filtering). Adjustable parameters are the "**Kernel Size**" (1 – 50 mm) and the enhancement factor "**Enh.**" (1 – 99). The kernel size describes the size of the structure in the image, which is to be enhanced. The enhancement factor directs the scale of change.

"High-Pass 1" and "High-Pass 2" are filters of different intensities. "**High-Pass 1**" adds the edge image to the original image. "**High-Pass 2**" makes the same, but with reduced peaks. This prevents the highest peaks becoming too bright and the darkest values too dark.

## 8.6 Measurements



The "**Measure**" menu strip can be opened either clicking on this button or using the menu item "Measure" in the submenu "Processing".

For the quantitative evaluation of the image, different macros are available. Furthermore own macros can be created and saved (see *chapter 8.6.6*).

Hipax offers macros for the measurement of distances, areas, and angles (between three or four points) and for the creation of ellipses with freely eligible radius.

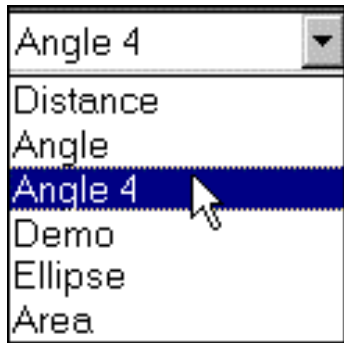
**Note:** Please **calibrate** the measurement function by measuring a known distance before starting the real measurements.

The scale of any measurement can be changed subsequently (see *chapter 8.6.4*).

To change the **thickness of the lines**, the *Setup.exe* file in the directory *\Hipax\prg\* can be used (see *chapter 14.2.1.12.*).

The **font size** (see *chapter 14.2.1.11*) and **text colour** (see *chapter 14.2.1.9*) of the measurement values can also be selected in the *Setup.exe* file. The colours available are: black or white with black shadow.

### 8.6.1 Realisation of the Measurements



Please **select the desired macro** from the macro list.

In our example, we selected the macro "Angle 4", to measure two angles between four points or two lines.



Please click the "**Start**"

button to execute the macro.



Now, the **first point can be placed** with the mouse. In the **green hint field** a short message appears to show, which point has to be placed next.

**Note:** If several images are displayed on the screen, the first point of the measurement selects one image. All the other points must be placed in this image, too.

**Note:** Please use the magnifying glass to place a point exactly (*chapter 8.1*).

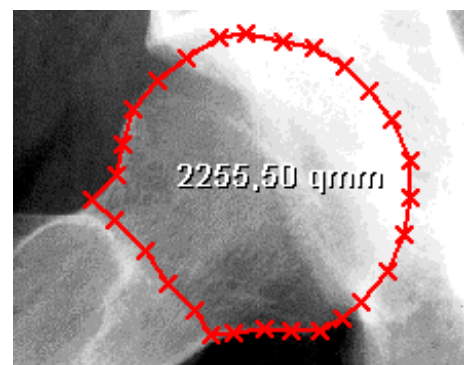
A measurement can be **interrupted** using the "**Start**" button again.

### 8.6.2 Measurement of Areas

To measure areas, the circumference of the area has to be marked first.

Select the menu item "Area" from the macro list and click on the "Start" button. You can now start to surround the object to be measured setting one point behind the other using the left mouse button.

Using the right mouse button on the first point connects all points by a curve. The measurement result appears in the middle of the area.

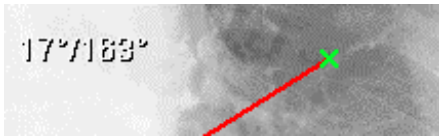


The circumference of an area can also be changed by moving single points (see *chapter 8.6.4*).

### 8.6.3 Correcting

The position of points can be changed subsequently with the mouse.

To make this, please click on the point with the left mouse button. As a result, the point appears in green.

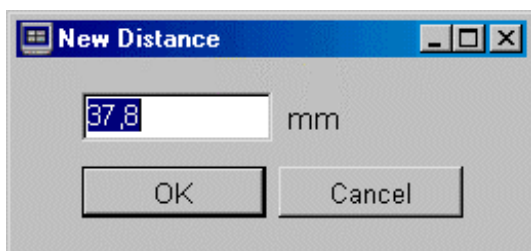


Then move the mouse arrow to the desired position and click on the left mouse button again.

The same procedure can be used to move texts (display of angles and distances) within the image.

#### 8.6.4 Changing the Scale

A double click with the left mouse button on a distance display opens a dialogue box, where the new distance can be defined.



The entry is made in 1/100 mm. The "OK" button closes the dialogue box. All measurements in the image are changed accordingly.

#### 8.6.5 Deletion of the Measurements

**Delete All**

Please click on the "**Delete All**" button to delete the measurements of the current image.

#### 8.6.6 Free Processing

The "Free Processing" functions allow the user to set single texts, points or lines. In a second step, these objects can be connected to measure distances or angles.



Please click into the checkbox "**Free Processing**" to make the additional functions visible.

In the "**New**" field, three types of objects are available:

**Text**

The "**Text**" button allows the user to place texts into the image.

Please double click on the text to change it subsequently.

**Point**

The "**Point**" button can be used to set a new point into the image.

**Line**

Please click on the "**Line**" button to create a line. Two lines are connected if they have points in the same position.

The new objects can now be connected using the buttons in the "**Process**" field.

**Hinweis:** The **thickness of the lines** can be changed in the *Setup.exe* file, directory `\Hipax\prg\` can be used (see *chapter 14.2.1.12.*).

**Angle**

Please click the "**Angle**" button to calculate the angle of two selected lines. Hipax displays the acute and the obtuse angle.

**Distance**

The "**Distance**" button calculates the distance between two points or between a point and a line. To make this, please select the desired points or the point and a line point by a mouse click.

**8.6.7 Macro Record**

The macro recorder enables the user to record new measurement macros.

**Record**

Please click the "**Record**" button first.

**Record**

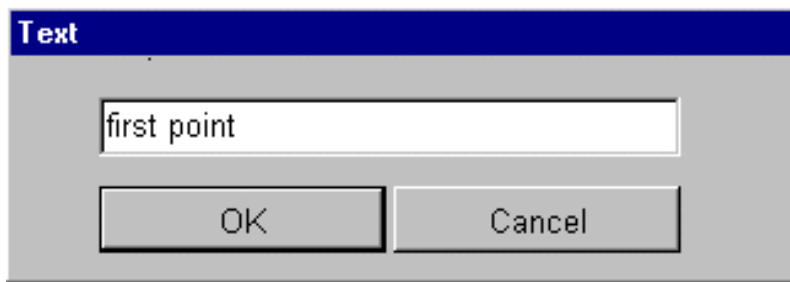
The **red hint field** in the upper part of the menu strip shows the record mode.

**Point**

After clicking on the "**Point**" button, new points can be added to the image.

As a result, a dialogue opens, where a **short instruction messages** can be entered for every new point. These messages make it easier to set the correct points during the play back of the macro.





### Line

Click on the "**Line**" button and then on two of the points set before. As a result, a line is recorded between the two points.

### Distance

Using the "**Distance**" button and clicking then on the lines or points set before, the distance can be measured between two points or between a point and a line.

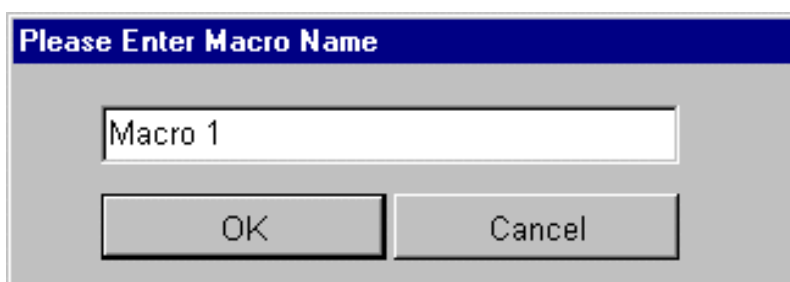
### Angle

The "**Angle**" button can be used to measure the angle between two lines created before.

**Note:** A current macro record can be **aborted** clicking again the "**Record**" button.

### Save

Clicking on the "**Save**" button opens a dialogue, where a macro name can be entered:



The macro name, which is defined here, will be displayed in the macro list (see *chapter 8.6.1*).

### Del. Meas.

To delete a macro from the list, please use the "**Del. Meas.**" button.

### 8.6.8 Playing a Macro



To play the own macro, please **select the macro name** from the list.

Click on the **"Start"** button.

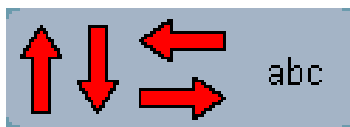
As a result, the first **instruction text** appears in the **green hint field** to show where to set the first point.

Then, the second instruction appears, etc., until the measurement procedure is finished.

## 8.7 Marking and Writing

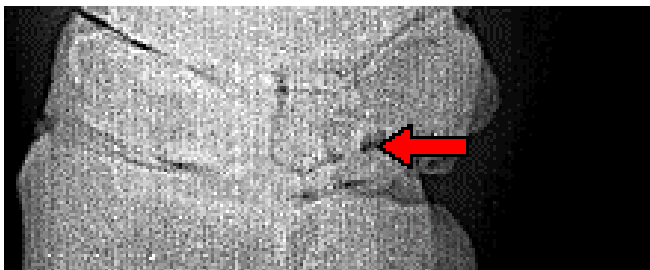


The **"Measure"** menu strip to be opened using this button in the "Processing" box of the button bar also contains functions for writing and marking.

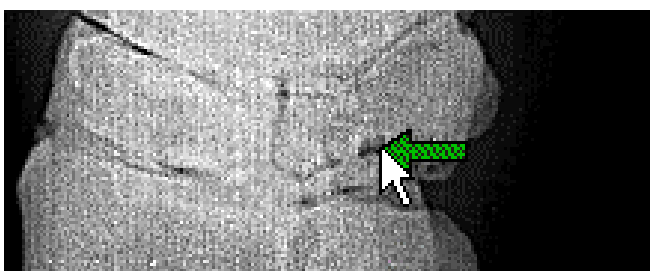


### 8.7.1 Marking

To mark an interesting structure in the image, please click the left mouse button on one of the four **red arrows** in the "Measure" menu. Move then the mouse to the desired position and click again on the left mouse button. As a result, the red arrow appears in the image.



Arrows that have already been positioned can be moved subsequently. To make this, use the **"Alt"** key of your keyboard and click then the left mouse button on the arrow. The colour of the arrow changes to **green**.



Move then the mouse to the new position and click again the left mouse button.

### Delete All

To delete the arrows, please click the "**Delete All**" button in the menu strip.

### 8.7.2 Writing

**Texts** can be added to an image using these buttons:



Both buttons open a dialogue, where the desired text can be entered.

Using a single mouse click on the text, the colour changes from white to green. The text can now be **moved** by clicking the left mouse button on the desired new position.

Using a double mouse click on the text opens the "Text" dialogue, where the text can be **changed**.

### Delete All

The "**Delete All**" button deletes the text from the image.

**Note:** The **text colour** can be selected in the *Setup.exe* file, directory *\Hipax\prg\*: black or white with black shadow (see *chapter 14.2.1.9*).

**Note:** The **font size** can also be determined using the *Setup.exe* file (see *chapter 14.2.1.11*).

## 8.8 Stack



The "Stack" menu strip is opened either using this button in the "Processing" box of the button bar or using the menu item "Stack" in the submenu "Processing".

The "Stack" menu strip offers special functions for the processing of multilayer (e.g. CT, MRI), and multiframe (e.g. Echo, US) images.

### 8.8.1 Display of Image Series

There are two ways displaying image series:

- **Stack mode:** The images are put on one image stack. Please page up or down to see the next or last image (see *chapter 8.8.2*).
- **Spread mode:** The images are displayed side by side on tiles.

### Spread Series

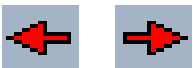
The "**Spread Series**" button switches between these two variants.

**Note:** In the "Setup" submenus "Configuration" and "Load Images" (main menu ("System" – "Setup")) it can be decided whether or not the **standard adjustment** should be "**Stack Mode**" (see *chapters 14.1.2.5* and *14.1.5*).

### Split

The "**Split**" button subdivides the screen into two columns. This function allows the user to display two image series simultaneously. Another possibility is, to display a whole series on small tiles in one column and single images of the series big sized in the other column.

**Note:** In the "Split" mode, the active part of the screen carries a **red bar** on its bottom margin.



The **red arrows** move selected images from one column to the other. Images also can be moved using the **drag and drop** feature. To make this, please first press the "**Alt**"-key of the keyboard. Then click with the left mouse button on the image. Let the mouse button pressed until the mouse arrow has been placed on the desired position. The process is finished as soon as the mouse button is released.

The **scroll bar** in the "Stack" menu strip can be used to page up or down through the images loaded.

### 8.8.2 Previous and Next Image

#### Prev. Next

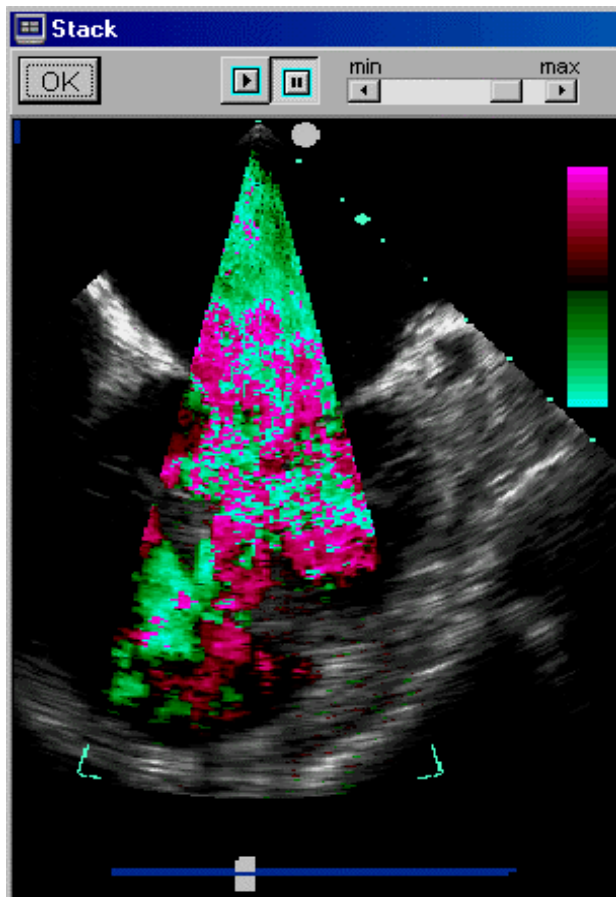
In the "**Stack Mode**" the "Prev." (**previous**) and "**Next**" buttons allow the user to page the current image stack forwards or backwards. The paging up and paging down also is possible clicking with the left mouse button on the left (forwards) or right (backwards) margin of the image stack.

In the "**Spread Mode**" the buttons have the same function. In this case, the full image stack is paged up and down within the selected frame, starting from the currently active image.

### 8.8.3 Cine-Loop

#### Cine-Loop

The "**Cine-Loop**" button can be used for the **quick display** of video sequences or the quick paging of image series,.



The "**Stack**" window displays the cine-loop.

Please click the "**OK**" button to close the window.



The "**Play**" and "**Pause**" buttons start or stop the animation.

Another possibility to stop the cine-loop is clicking the left mouse button into the display area of the "Stack" window. A second mouse click starts the cine-loop again.



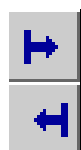
The **scroll bar** allows the user to adjust the animation **speed**.

**Note:** If the image series are very extensive or if the PC does not have enough memory, the image data are temporarily saved on the hard disk. In this case, the display speed can be very slow.

The **following functions** of the stack image **only appear playing multiframe** images (DICOM sequences, e.g. cardiac or sonographical sequences).



The **scroll bar** and the number show, at which position and which number the current image is located in the whole sequence.



These buttons allow the user to set **tabs**, which adjust a **shortened image sequence**. The length of the new sequence is given by the length of the blue area in the scroll bar.



This button **plays** the newly adjusted **shortened sequence**.



These two switches **page** the sequence one image **forwards** or



**backwards**.



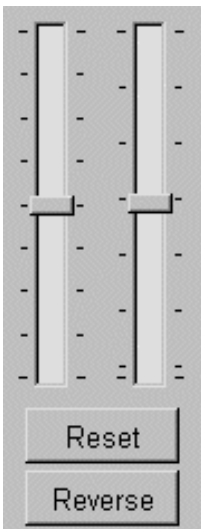
The **playing direction** of the sequence can be reversed using these buttons.



The "**Zoom**" button enlarges an area of the sequence. The area can be changed using the scroll bars at the right and the lower margin of the image.



This button loads a selected image from the cine-loop to the image processing.



The **scroll bars** steer the **dynamics** of the images. The left scroll bar adjusts the contrast, the right scroll bar adjusts the brightness of the image series.

The "**Reset**" button restores the original grey tones.

The "**Reverse**" button reverses the grey scales. Dark changes to bright and bright changes to dark.

**Note:** The first loop of a multiframe cine-loop could run faltering, but then the cine loop should run smooth and in real time assuming a PC with a sufficient capacity.



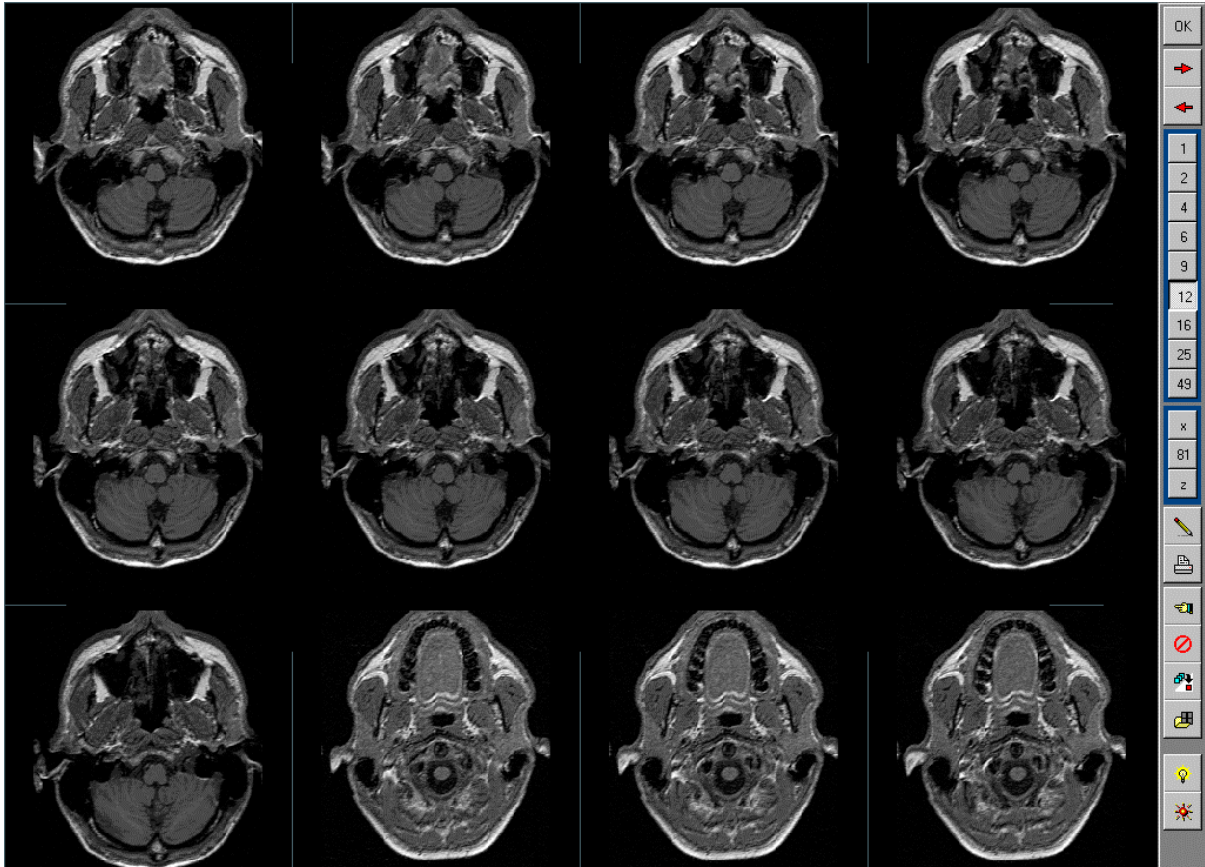
This button and scroll bar in the "Stack" menu are **only available for multiframe images** loaded in the stack mode. Clicking on the button, the selected sequence stack is played within the frame. Thus, several cine-loops can be played simultaneously.

The scroll bar can be used to change the playing speed.

### 8.8.4 Series Review

#### Series Review

The "**Series Review**" button loads the current image series into a series review window. Here, all images are displayed side by side.



The following functions are available.



The "**OK**" button closes the series review.



The **red arrows** allow the user to page the series up and down.



The number buttons can be used to adjust the number of frames in the image review.





These buttons contain three presets for the image distribution, which can be adjusted manually in the section [Series] of the *tile.ini* file (see *chapter 8.9.1; Step 5*).



Using this button, the running numbers of the images can be shown.



The series review can be printed using this button.



The **automatic image analysis** calculates the optimum window parameters of the whole series. Please click again on the button to get the original windows.



The colour remapping assigns a colour to each grey tone.

Single **images can be enlarged** clicking with the right mouse button into this image. Please click again the right mouse button to go back to the series review.

A single click on the **left mouse button closes** the series review.

## 8.9 Multi Monitor

Hipax offers the possibility of connecting up to four monitors to one PC. Using this function, all images of a big sized series (CT, MRI, etc.) can be viewed at the same time. Up to four series can be compared (e.g. monitor 1 shows the first series, monitor 2 shows the second series etc.). Each of the loaded series can be quick paged in a cine-loop independently from the other series. Another possibility is to use two hires portrait monitors to display thorax images.

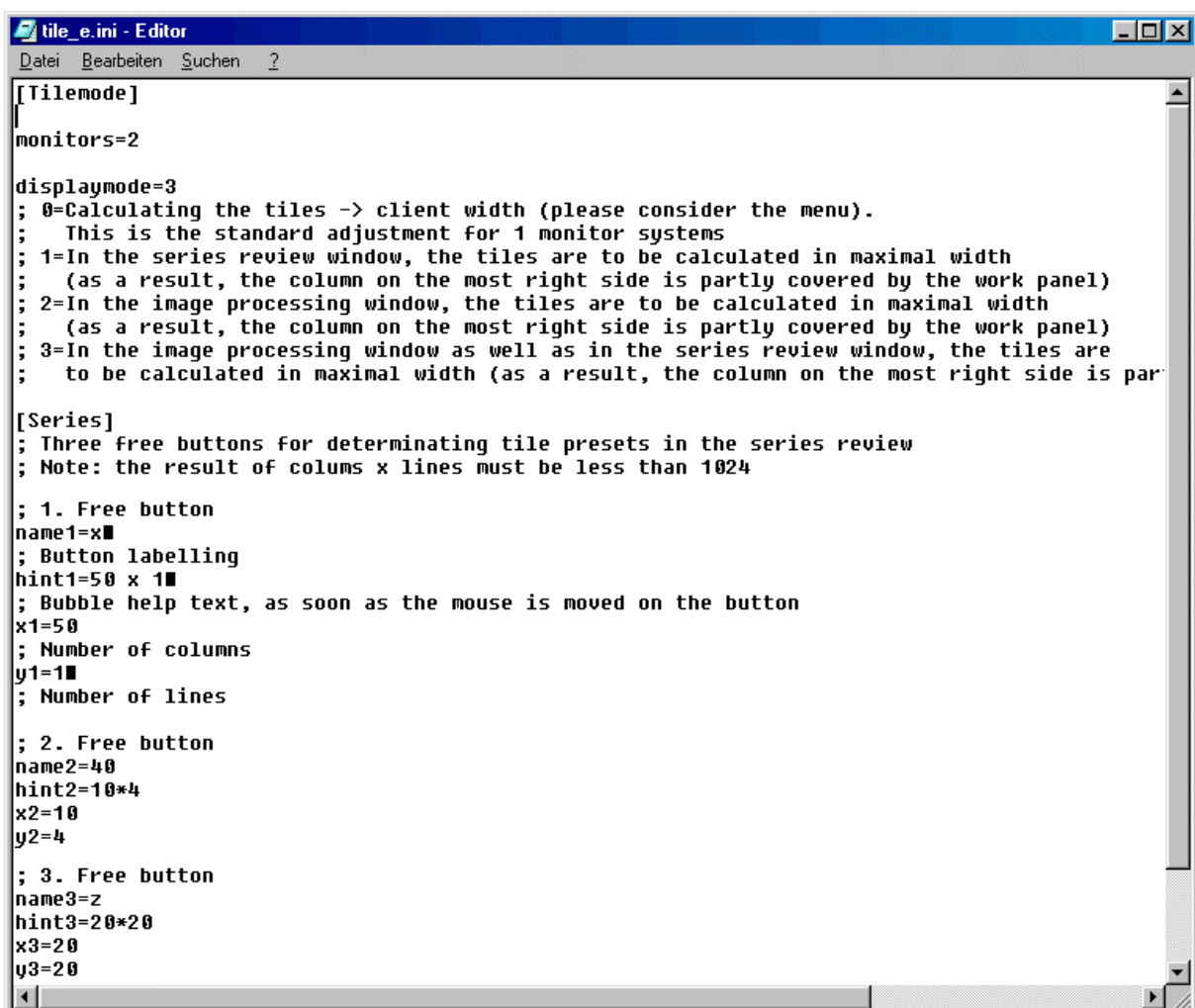
A graphics adapter is needed, which is able split the Windows desktop on different screens. In Hipax, the image distribution on the single monitors can be configured individually, depending on the number of the monitors and depending on the image type.



### 8.9.1 Configuration of the Module

To configure the Multi Monitor module please keep the order of the instruction:

- Step 1: Connect the monitors and start the PC, but not Hipax.
- Step 2: Open the file *tile.ini* in the subdirectory *\Hipax\prg\*.
- Step 3: Enter the number of the used monitors (1–4) into the section [Tilemode] – "**monitors=**".
- Step 4: For "**displaymode=**" we recommend to enter the number "3". As a result, the Hipax user interface will always be exactly distributed on the connected monitors, even if the layout is changed or if a menu strip opened (see *chapters 4.3* and *4.5*).
- Step 5: In the section [Series] three presets for frame layouts can be determined, which later can be used in the Hipax window "Series Review" (see *chapters 8.8.4* and *8.9.5*).



```

tile_e.ini - Editor
Datei Bearbeiten Suchen ?

[Tilemode]
monitors=2

displaymode=3
; 0=Calculating the tiles -> client width (please consider the menu).
; This is the standard adjustment for 1 monitor systems
; 1=In the series review window, the tiles are to be calculated in maximal width
; (as a result, the column on the most right side is partly covered by the work panel)
; 2=In the image processing window, the tiles are to be calculated in maximal width
; (as a result, the column on the most right side is partly covered by the work panel)
; 3=In the image processing window as well as in the series review window, the tiles are
; to be calculated in maximal width (as a result, the column on the most right side is par

[Series]
; Three free buttons for determinating tile presets in the series review
; Note: the result of colums x lines must be less than 1024

; 1. Free button
name1=x
; Button labelling
hint1=50 x 1
; Bubble help text, as soon as the mouse is moved on the button
x1=50
; Number of columns
y1=1
; Number of lines

; 2. Free button
name2=40
hint2=10*4
x2=10
y2=4

; 3. Free button
name3=z
hint3=20*20
x3=20
y3=20

```

**Note:** Please do not change the settings in any of the other sections or sub sections of the file *tile.ini*!

### 8.9.2 Installation of the Module

- Step 1: Start Hipax
- Step 2: Enter the module key into the edit field "**New Key**" in the window "Modules" (main menu "System" – "Setup" (see *chapter 2.3*).
- Step 3: Click on the checkbox "Multi Monitor System" in the same window.
- Step 4: Start Hipax again. As a result, the frames are exactly distributed on the monitors. The window "Patient/Image Administration" appears on the left monitor.
- Step 5: Open the Hipax window "Setup" register "Configuration" using the main menu: "System" – "Setup".  
Use here the drop-down list field "**Scale**" to adjust the values 50, 60, or 70%, depending on the resolution of your monitor. As a result, the **buttons** of the button bar appear in a **normal size**.
- Step 6: Please start Hipax again to adopt these adjustments.

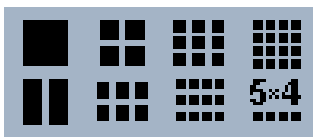
### 8.9.3 Loading Images

The images of a patient now can be loaded into the window "**Image Review**" (see *chapter 6.*), which is appearing on the left monitor. A double click on an image thumbnail loads the corresponding image or series into the image processing user interface. The images always appear on the active monitor.

### 8.9.4 Activating a Monitor

Please use a simple mouse click on the image display area of a monitor to activate it. The active monitor is marked by a **red bar** at the lower margin of the image display area. In the **monochrome mode**, which can be adjusted in the Hipax setup program *Setup.exe* (subdirectory *\Hipax\prg\*), a **white bar** appears instead of the red one (see *chapter 14.2.1.6*).

### 8.9.5 Image Display in a Multi Monitor System



Using these buttons in the "Tools" box of the icon bar, the frame layout can be adjusted independently for each monitor.

In the multi monitor mode, the "**Stack**" menu should be used (see *chapter 8.8*).



This button in the "Processing" box of the icon bar opens the "Stack" menu strip.

We recommend to **display the menu strip** in the multi monitor mode as a movable window. To make this, please use the right mouse button on the menu

strip. As a result, a pop-up menu opens, where the position of the menu strip can be configured (see *chapter 4.5*). Please select here the "**Auto Mode**".

The "Stack" menu offers two possibilities to display image series:

- **Stack mode**: the images are put on one image stack.
- **Spread mode**: the images are displayed side by side in frames.

### Spread Series

The "**Spread Series**" button switches between these two variants (see *chapter 8.8.1*).

Images can be **moved within one monitor or from one monitor to another** using the **drag and drop** feature. To make this, please first press the "**Alt**"-key of the keyboard. Then click with the left mouse button on the image. Let the mouse button pressed until the mouse arrow has been placed on the desired position. The process is finished as soon as the mouse button is released.

### Cine-Loop

For the quick display of video sequences or the quick paging of image series, the "**Cine-Loop**" button is available (see *chapter 8.8.3*).

### Series Review

This button loads the current image series into a **series review** window (see *chapter 8.8.4*). Here, the images are displayed in lines and distributed on all monitors.



These buttons contain three presets for the image distribution, which already have been adjusted manually in the section [Series] of the *tile.ini* file (see *chapter 8.9.1; Step 5*).

## 8.10 Presentation

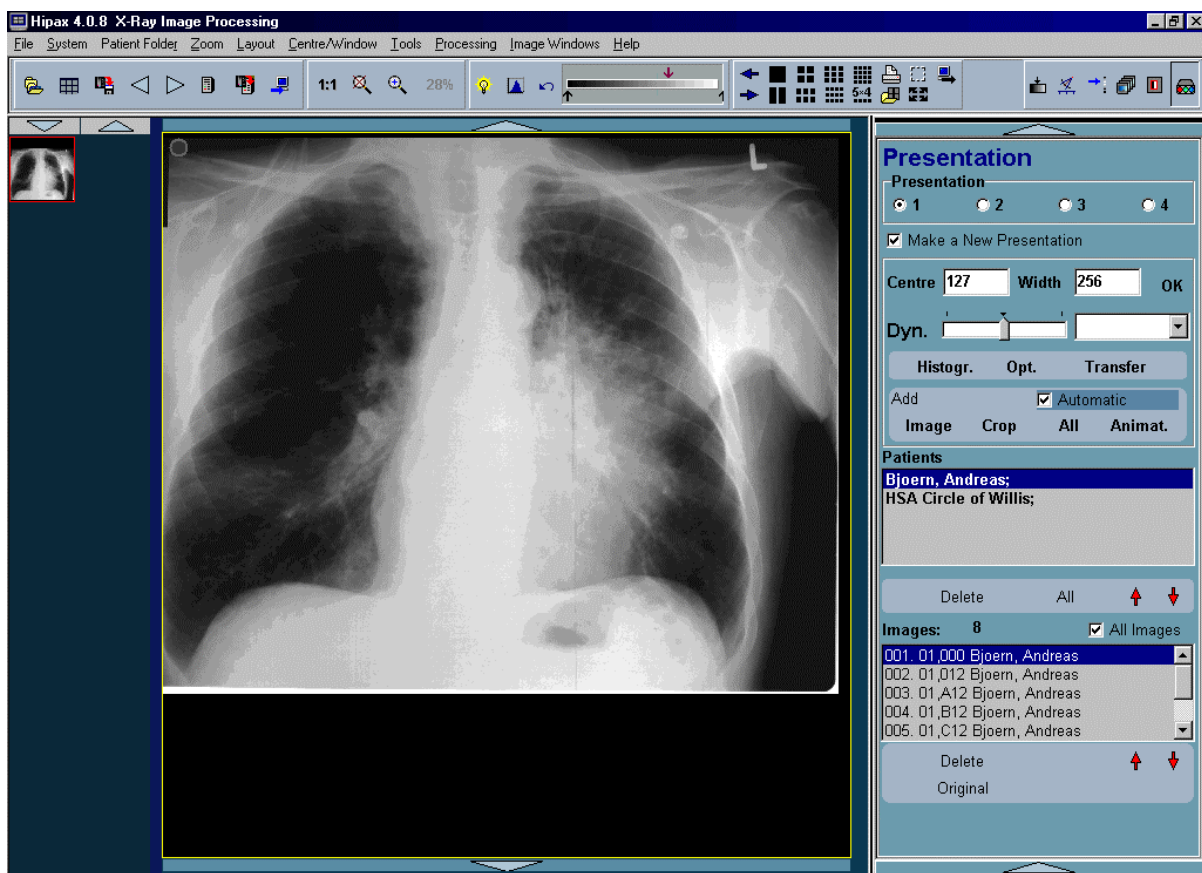


This button in the "Processing" box of the button bar opens the "Presentation" menu strip as well as the submenu "Presentation" in the submenu "Processing".

The Hipax module "Presentation" can be used to demonstrate prepared images. In a conference, for example, images can be projected with a video beamer to a screen. Similar to a slide presentation, the order of the images and the display on the screen is already arranged when the presentation is prepared. As a result, time-consuming operations (e.g. cutting out areas, adjustment of contrast and brightness) must not be carried out during the demonstration.

Up to four presentations can be prepared at the same time. The number of patients and images included into a presentation is unlimited. Patients as well as images are given in own lists.

In order to keep the loading time and the playing time of presentations low, the images included into a presentation are stored in Windows Bitmap format. Grey images are saved as 8 bit images. The display of the lists and the font size are optimized to be played using a video beamer.



### 8.10.1 Preparing a Presentation

Please load the images to be added to the presentation.



Use the radio button to select the number of the presentation (1-4). Then, the checkbox "**Make a New Presentation**" can be activated to open further buttons.

### 8.10.2 Image Processing Preparing a Presentation

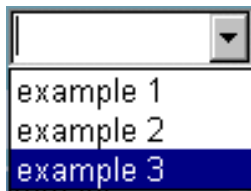
To process images to be adopted into a presentation, it is not necessary to open the processing menus. The "Presentation" menu strip offers some functions to adjust the **dynamics and the window levelling**.



The **centre/window levels** of the active (yellow framed) images can be adjusted entering numbers into the edit fields "Centre" and "Width". The new image is calculated using a mouse click on the "**OK**" button.



The "**Dynamics**" scroll bar changes the brightness and the contrast within the currently visible 8 bits of the image.



The drop down list field besides the dynamics scroll bar contains three **window levelling presets**. *Chapter 8.2.4* describes how to adjust or change the presets.



The "**Histogram**" button opens the "Histogram" window. The histogram shows the grey distribution of an image (see *chapter 8.2.1.5*). Here, the visible window can be adapted manually by moving the scroll boxes and the "Process" button.

The "**Opt.**" button analyses the image automatically and calculates suitable window values. This function can be used for images with 10 bits and more.

Using the "**Transfer**" button, the created presentation can be **sent to another PC** within a network, e.g. to the lecture hall. The destination path can be entered in the configuration file *prziel.dat* in the directory *\Hipax\prg\*. The destination PC has to be connected to the local PC using a mapped drive (see *chapter 8.10.6*).

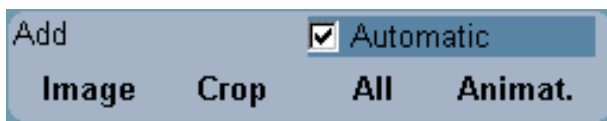
### 8.10.3 Inserting Images into a Presentation

Using the patient name, Hipax proves for each image, if the corresponding patient already exists in the patient list of the presentation. If this is the case, the new image is added to the existing image list of the patient. If this is not the case, the patient is admitted to the patient list.

Thus, the images of only one patient can be added to one image screen of a presentation.



The checkbox "**Automatic**" can be deactivated in order to add any image to any patient.



The active image is inserted into the presentation using the "**Image**" button.

The "**Crop**" button" allows the user to cut out an area of the image using the mouse.

Clicking on "**All**" adds all images loaded to the current presentation.

The "**Animat.**" button can be used to load an image series, which later should be played as a cine loop.

### 8.10.4 Processing the Patient List and the Image List



Selected Patients can be removed from the presentation using the "**Delete**" below the patient list. "**All**" deletes all patients from the presentation.

Using the **red arrow buttons**, the position of the patients in the list can be changed.

A click with the **right mouse button** on a patient entry opens a dialogue, where **notes** (e.g. the name of the ward) can be entered. As a result, the entered text appears in the list, on the right of the patient name.

A **double click with the left mouse button** on a patient entry loads all the images that have been added to this patient into the **presentation review** window (see *chapter 8.10.5*).

**Note:** Excepted are **animations** (cine-loops), which are played separately in the "**Stack**" window (see *chapter 8.8.3*).



Images that have been selected in the image list can be removed from the presentation using the "**Delete**".

Using the **red arrow buttons**, the position of the images in the list can be changed.

The "**Original**" button loads the images of the presentation to the image review user interface.

### 8.10.5 Functions of the Presentation Review



The "**OK**" button closes the series review.



The **red arrows** allow the user to page the series up and down.



The number buttons can be used to adjust the number of frames in the image review.

For example, 10 images of a patient can be arranged for the presentation as follows:

- Image 1: full-screen display
- Images 2-3: 2 images side by side
- Image 4: full-screen display
- Image 5-8: 4 images side by side
- Image 9-10: 2 images side by side



These buttons contain three presets for the image distribution, which can be adjusted manually in the section [Series] of the *tile.ini* file (see *chapter 8.9.1; Step 5*).



Using this button, the running numbers of the images can be shown.



The presentation review can be printed using this button.





The **automatic image analysis** calculates the optimum window parameters of the whole series. Please click again on the button to get the original windows.



The colour remapping assigns a colour to each grey tone.

Single **images can be enlarged** clicking with the right mouse button into this image. Please click again the right mouse button to go back to the series review. A single click on the left mouse button closes the series review.

### 8.10.6 Transferring a Presentation within a Network

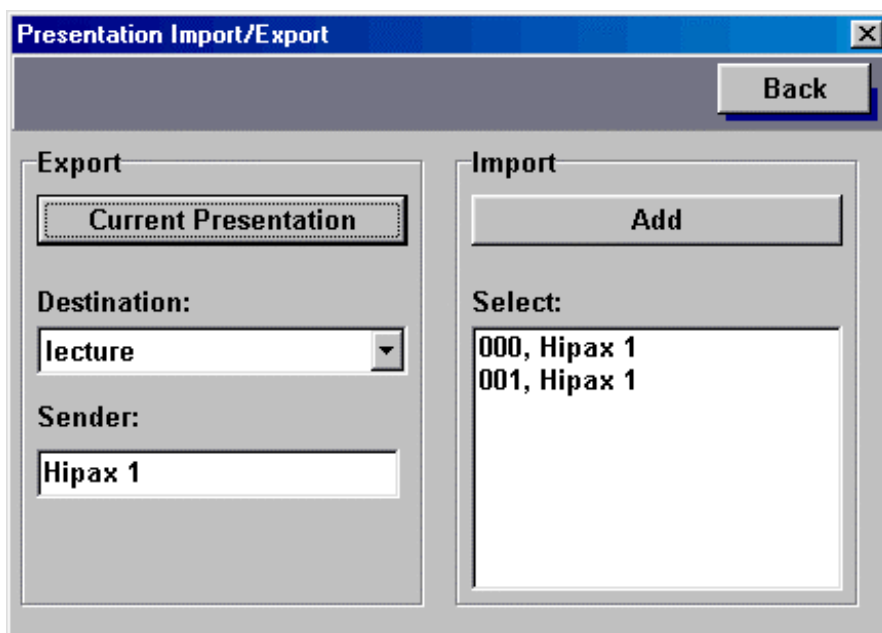
A presentation can be copied to another PC (e.g. in the conference room or in the lecture hall) via the hospital network.

To make this, it is necessary to enter the directory path to the destination computer into the configuration file *prziel.dat* (subdirectory *\Hipax\prg\*).

For example: the hard disk of the destination PC is named "H" and the PC is located in the lecture hall. The indication of the path to the destination PC could then be: *lecture@h:\hipax\import*.

## Transfer

The "**Transfer**" button in the Hipax "Presentation" menu opens the window "Presentation Import/Export".





The "**Destination**" list contains the destination PCs, which have been entered into the configuration file *prziel.dat*. Here, the destination computer, to which the presentation should be transmitted, can be selected.

The copied presentation is displayed in the "**Import**" – "**Select**" list of the destination PC and can be integrated into the currently selected presentation (1, 2, 3, or 4).

As a result, parts of a presentation (e.g. selected patients) can be created at different Hipax stations and put together later.

### 8.10.7 Carrying out a Presentation

At first, the number of the presentation is chosen (see *chapter 8.10.1*). As a result, the patients and the patient names of the current presentation are shown in the corresponding lists.

A double mouse click on one of the patients in the list loads the corresponding images to the presentation review window (see *chapter 8.10.5*).

Using the **arrow buttons**, the presentation can be paged up and down.

The "**OK**" button closes the presentation review. Now, the next patient can be chosen from the patient list.

**Note: Animations** (cine-loops) cannot be played in the presentation review. They are loaded directly into the "**Stack**" window (see *chapter 8.8.3*) using a double mouse click on the entry in the image list.

## 8.11 Telecardiology (Echo Module)

The "Echo" menu is a special tool for telecardiology. It contains all functions to load, display, process, and sent cardiac sequences. The images are encrypted and compressed automatically before the transmission starts.

The sequences can be measured and made anonymous.

**Note:** To use the features of the "Echo" menu, the modules "Echo" and "**DICOM Communication**" have to be installed and activated (see *chapter 2.3*). This module is only running with the **Base Module Standard** (see *chapter 3.2*), and not with the Base Module "light" (*chapter 3.5*).



The "Echo" menu strip can be opened using this button in the "Processing" box of the button bar or using the main menu, submenu "Processing"

### 8.11.1 Loading Sequences

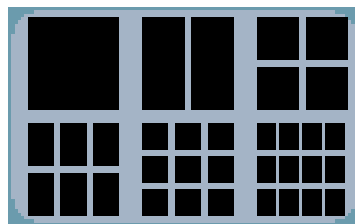


This button opens the "**Patient/Image Administration**" window (see *chapter 5.1*). Using a double mouse click on a entry in the patient list loads the corresponding sequences directly to the image processing user interface.



Using this button, images can be **queried from the server**. To make this, the local PC has to be connected to a Hipax Server.

### 8.11.2 Layout



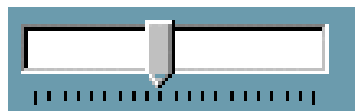
The "Echo" menu offers six different frame **layout** for displaying the sequences (1×1, 2×1, 2×2, 3×2, 3×3, or 4×3).



This button can be used to **page** forwards and backwards within an image stack.



Clicking on these arrow buttons, the sequences can be played in both directions as a **cine-loop**. The button in the middle stops the playing.



The little track bar can be used to change the playing speed.



Please click on this button to **reset** the original speed.



The "**Zoom**" button is available to define any crop using the mouse. The defined area is not only corresponding to the current image but to the whole sequence.

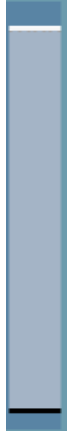
**Note:** Too strong magnification can cause blurring.



Using this button, the current sequence will be reduced to the **original size**.

### 8.11.3 Processing Sequences

The "Echo" menu offers two **scroll bars**: one for changing the window levelling and a second for colour remapping.



This scroll bar is available for **window levelling**.

Using the left mouse button on the central part of the scroll bar, the window centre can be changed.

To change the window with, please move the upper and lower margin of the scroll bar.

All adjustments are calculated immediately for the whole sequence.



Using this button on the top of the scroll bar **resets** the original values.



The **Colour Remapping** scroll bar can be used to assign a colour to each grey tone. Thus, areas with low contrast can be better displayed.

**Note:** The colour remapping is related to the visible 8 bit (256 grey scales) of an image..

### 8.11.4 Anonymize

This function offers to possibility to remove texts that are fixed in the pixels of the images by blackening.

#### Blacken

After clicking on the "**Blacken**" button, the area to be blacken can be selected in the image. To make this, move the mouse arrow to the upper left corner of the desired area. Click then the left mouse button and move the mouse with the pressed button until you have drawn out the rectangle big enough to cover the text to be removed. The process is finished after the button is released.

**Note:** The area blackened is related to **all images** of the sequence.

#### Anonym. Copy

The "**Anonym. Copy**" button makes a copy of the original sequence, where the blackened areas are saved. In this moment, the **original images disappear** from the user interface, but they remain in the database and can be opened again.

**Note:** In contrast to the anonymizing by blackening, the menu item "Anonymize" in the submenu "File" of the main menu creates an image copy where the DICOM header has been deleted (see *chapter 4.6.1.5* and "Send Anonym.").

 Send Anonym.

After the "Send Anonym." checkbox has been activated, the image data are anonymized automatically before the transmission starts. Thus, clicking on the **phone button** in the upper part of the "Echo" menu removes all data with the exception of the patient ID from the DICOM header of the images.

**Note:** Of course, the original images remain in the local database.

### 8.11.5 Measurements

Measurement macros can be selected and carried out in the "**Measure**" area of the "Echo" menu (see *chapter 8.6*).

### 8.11.6 Image Transmission

**Note:** To use this function, the Hipax module "DICOM Communication" has to be installed (see *chapter 11*).



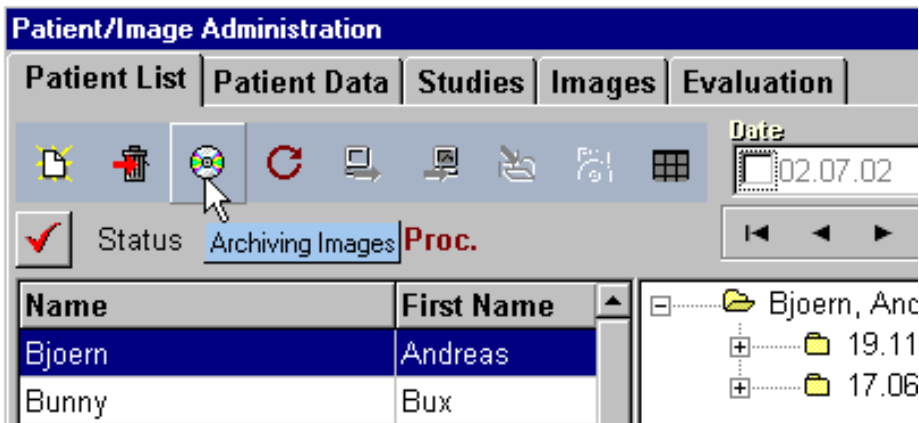
This button in the "Echo" menu is available for image transmission using the DICOM Communication module. The images are sent via ISDN.

The DICOM communication is described in *chapter 7.6.16* and –more detailed – in *chapter 11*).

## **CHAPTER 9: STORING IMAGES ON DIGITAL MEDIA**

## 9.1 Local Archiving System

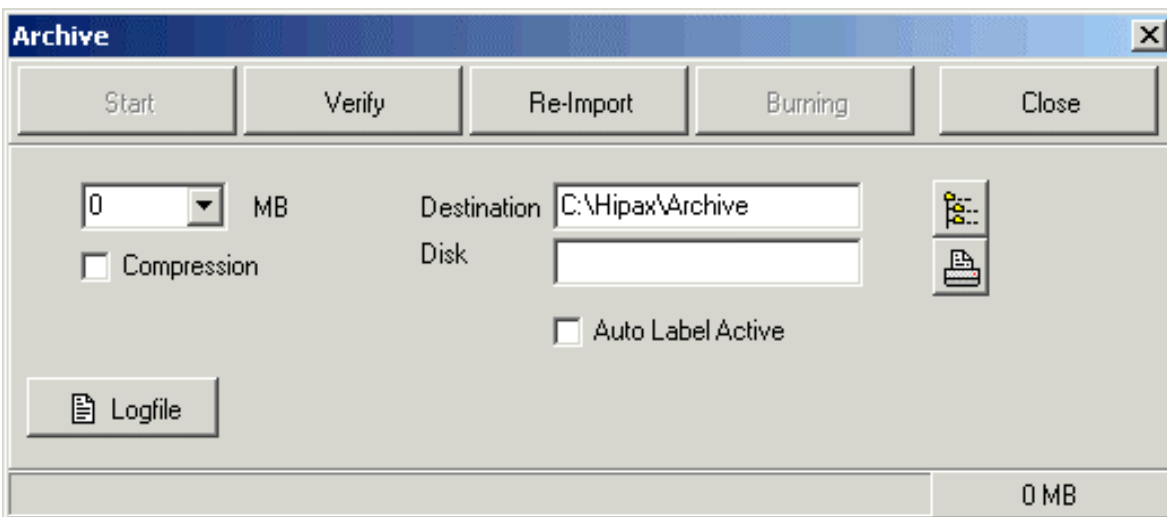
The "Archive" module can be used to store the oldest image data on external storage disks (DVD, CD) of the following types: CD-R, CD-RW, DVD-R, DVD-RW, DVD+RW, DVD-RAM. Each digital disk gets an identification label which is registered in the Hipax database. This allows the database to recognize on which archive medium it has to search for the images. Archived images are still represented in the image review by thumbnails.



### 9.1.1 Archive Dialogue



Clicking on the "Archiving Images" button" in the "Patient/Image Administration" window opens the "Archive" dialogue.



**Note:** The "Archiving Images" button is only available after the archiving module has been installed and freed in the "Setup" window.

### 9.1.2 Presetting

**Note:** For reasons of data security the images are existing twice during the archiving process. Thus, please take care that there is enough memory on the hard disk before the archiving procedure starts.

### 9.1.2.1 Data Volume

A screenshot of a user interface element for setting data volume. It consists of a text box containing the number '100', a small downward-pointing arrow button to its right, and the text 'MB' further to the right.

The data volume to be archived can be adjusted in the drop down list field "MB". You can also enter any value manually. The value depends on the media used.

**Note:** The capacity of the blank CD or DVD should not be exhausted, because besides the images additional files are written on the media (content file and media data). We recommend to leave ca. 1% of the capacity free.

Hipax then collects the oldest images from the database until the data volume defined in the "MB" field has been reached.

### 9.1.2.2 Compression

The Hipax Archiving modules offers the possibility to compress the images to be archived lossless ca. by factor 3, depending on the image type.

A screenshot of a checkbox labeled 'Compression'. The checkbox is checked, indicated by a small black square inside the box.

To make this please set a hook into the "Compression" checkbox.

**Note:** With compression, the archiving process needs significantly more time than without.

### 9.1.2.3 The Temporary Archiving Directory

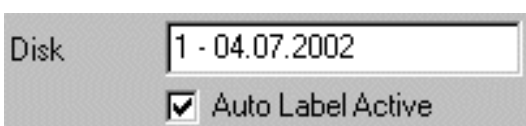
The path of a directory, where the images are copied temporarily, has to be entered into the "**Destination**" edit field. The default for the temporary folder is `\Hipax\Archive\`.

A screenshot of a text field labeled 'Destination'. The text inside the field is 'C:\Hipax\Archive'.

This button opens a dialogue, similar to the Windows Explorer, where the directory path of the temporary archiving folder can be selected.

### 9.1.2.4 Name of the Media

The identification mark of the archiving media can be entered into the "**Disk**" edit box:

A screenshot of a user interface element for setting the disk name. It includes a text box labeled 'Disk' containing the text '1 - 04.07.2002', and a checkbox labeled 'Auto Label Active' which is checked.

Setting a hook into the checkbox "**Auto Label Active**" Hipax inserts automatically an own disk label name using the date and the number of disks already written on this day.

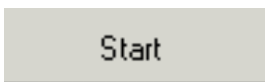
#### 9.1.2.5 Label Print



A mouse click on this button opens the Windows print dialogue. It can be used to select the printer and the corresponding parameters to **print the label** for the archive disk on a Windows printer.

### 9.1.3 The Archiving Process

#### 9.1.3.1 Start



The "Start" button starts the archiving process. It is only active if all necessary adjustments have been made before.

Now, Hipax collects the oldest images from the database, independent of the date of the patient folder. The images are copied into the archiving folder (`\Hipax\Archive\`). The bar in the bottom part of the dialogue shows the success.

The compression starts now, if the "Compression" function has been activated. The images are then stored in a lossless compressed format.

**Note:** To avoid a loss of data the images are not moved into the archive directory, but copied. Thus, the temporary directory needs as many memory as the value that have been adjusted for "MB" in the "Archive" dialogue.

#### 9.1.3.2 Burning Process

The Hipax Archive module includes an own media-writer software. Thus, the burning process starts automatically as soon as the data volume defined has been copied into the archiving folder. Please insert a blank media first.

#### 9.1.3.3 Verification

After the burning process has been completed a verification starts automatically: the data on the CD or DVD are compared with the data still located in the temporary directory. Thus, the CD/DVD drive opens and closes itself. The images are deleted from the archiving folder not before the verify has been completed successfully.

The original images are still located in the `\pic\` directory of the Hipax database.



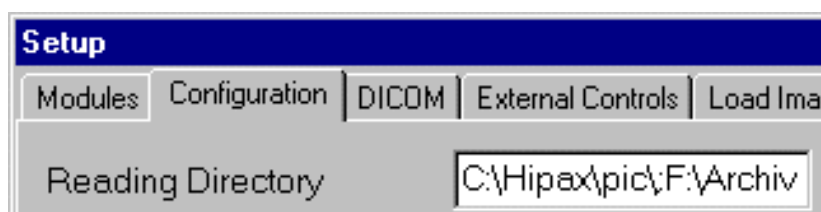


Please use now the "Verify" button. It opens a tree view, where the burning drive can be selected. Start here the *Contents.txt* file. As a result, Hipax checks the images located on the media. All images on the media are deleted from the *\pic\* directory of the Hipax database.



Clicking on this button opens a field in the bottom part of the "Archive" dialogue, where the protocol of the current archiving process is created. Incongruities are marked on the left margin by the following sign: ">>".

### 9.1.4 How to Find Archived Images?



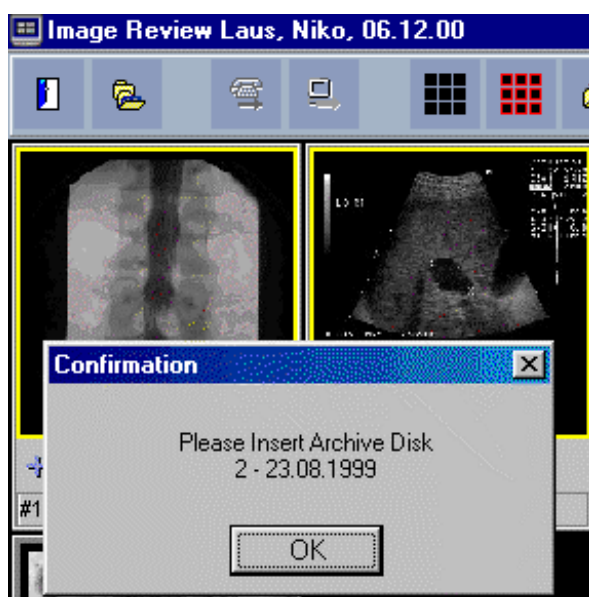
The default directory path for loading images from the hard disk is given in Hipax "Setup" dialogue, "Configuration" register in the edit box "**Reading Directory**": *C:\Hipax\pic\* (see also *chapter 14.1.2.1*).

To enable Hipax also to read archived images directly, an **additional** directory path has to be entered into the same edit box. To make this, use a semicolon to separate the new directory path from the default entry.

**Note:** Even more than one additional directory paths can be entered.

The entered archive directory paths have to correspond exactly with the directory path used for the archiving process (see *chapter 9.1.2.3*).

In the "**Image Review**" window, icons of images which are stored on external disks are framed by a yellow margin. These images cannot be loaded directly.



To **read images from external disks**, please use a double mouse click on the corresponding icon in the image review, or the "+" button.

If the images are not found on the standard reading directory (`\Hipax\pic\`) or on an entered reading directory path, the double click on the icon opens a message box, which notifies that the medium with the corresponding identification mark (in this example "2 – 23.08.1999") should be inserted.


**Note:** Please do not copy images from the external media back to the `\Hipax\pic\` folder. If you like to have single images back on your hard disk, copy them to the `\Hipax\pic\tmp\` folder.

To re-import the content of a whole media please see *chapter 9.1.5*.

### 9.1.5 Ascribing Archived Images

Please do not copy images from the external media back to the `\Hipax\pic\` folder. If you like to have single images back on your hard disk, copy them to the `\Hipax\pic\tmp\` folder.

The "**Re-Import**" function can be used to copy the content of a complete archive media back to the Hipax database.



The button opens a dialogue. Here, the reading drive can be selected, where the current archiving media has been inserted. Please start the file *Contents.txt*. Thus, the re-import process can be started. All images are adopted back into the Hipax `\pic\` directory.

### 9.1.6 Archiving Media

Please take care only to use high quality blank media, specially proved according to the high demands of a medicine product.

**Note:** The following media types are supported by the Hipax media-writer: CD-R, CD-RW, DVD-R, DVD-RW, DVD+RW, and DVD-RAM

### 9.1.7 Backup

Archiving images using Hipax can be made to unload the hard disk. It is not suitable for data protection.

Thus, the complete Hipax installation needs to be backuped regularly. This is of particularly importance for the Hipax directories `\db\` containing the patient database, `\pic\` containing the images, and `\smallpic\` containing the thumbnails.

## 9.2 Patient CDs: The Private Health Disk

This module enables the referring doctor to write the images of a patient on CD. Besides the images, text documents like results or laboratory reports, films or sound files can be written on the Hipax Private Health Disk. Furthermore, even DICOMDIR CDs, e.g. with cardiac cine-loops can be created using the Patient CD module.

The Private Health Disk can be handed out to the patient or directly to another doctor treating the patient. It contains a Hipax viewer easy to operate, which enables each doctor to view the images on any standard PC.

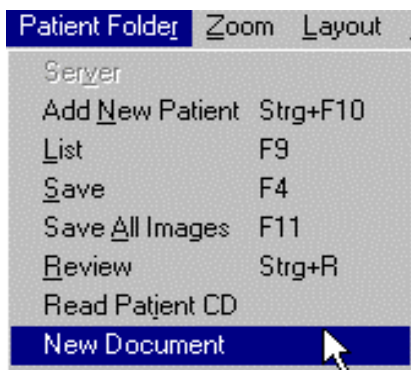


This button in the "Patient/Image Administration" window can only be used if the module "Patient CD" has been installed (see *chapter 2.3*).

### 9.2.1 Relating Documents and Other Files to a Patient

Besides the images also other files can be related to a patient, e.g. documents (results, laboratory reports, etc.), films, or sound files (see *chapter 4.6.3.8*).

The following **file formats** are supported: text (DOC, TXT), film (AVI, MPG), sound (WAV), multimedia (WMV).



To make this, please select the menu item "Patient Folder" in the main menu, and the submenu "New Document".

As a result, a dialogue opens, where the desired file can be selected and marked. The selected file can then be loaded to Hipax using the "Open" button. The file is then entered automatically into the patient folder.



This button opens the "Image Review" window (see *chapter 6.*), where the added files are displayed as symbols, e.g.:



A double mouse click used on a symbol opens the corresponding file.

### 9.2.2 Creating a CD with all Images and Data of a Patient



To write all files of a patient on CD, please open the "Patient/Image Administration" window using this button. Select the desired patient in the patient list. The patient entry is now marked in blue.



After clicking this button, all files related to the selected patient are copied to the directory *C:\Hipax\Export\*.

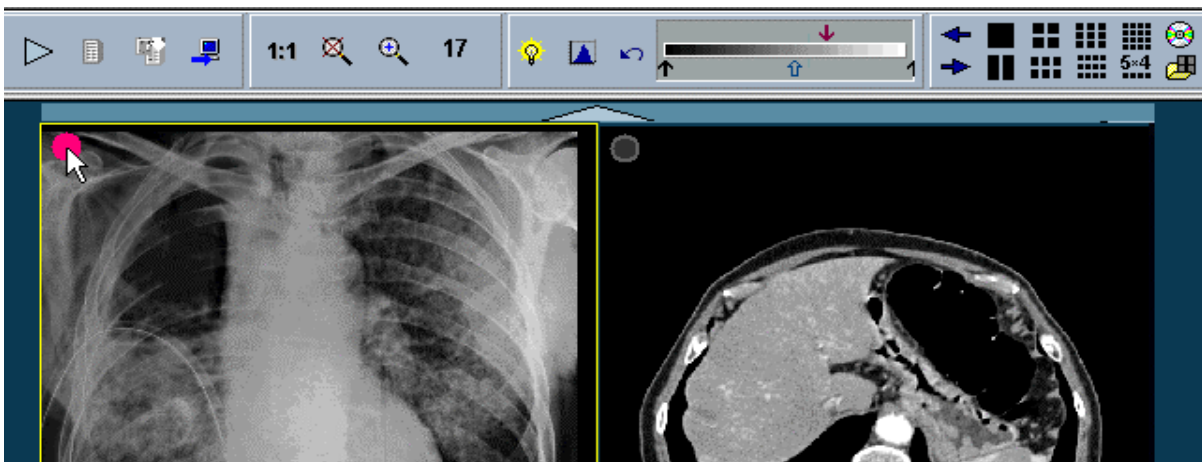
**Note:** First, a control query starts: "Copy all Images of the Patient on CD?" The copy process starts after clicking the "OK" button.

The content of the folder *C:\Hipax\Export\* is not deleted before new patient images are copied there.

### 9.2.3 Creating a Patient CD with Selected Images of a Patient

If you prefer not to write all the files of the patient on CD but only selected images, you can make this using the "Image Processing" screen of Hipax.

Each image loaded carries a **grey spot** in the left upper corner. Using a mouse click on this spot changes the colour of the spot to **pink**. Clicking again on the spot cancels the marking.



Using a **double mouse** click on a spot selects all the images loaded at the same time.



This button in the button bar can be used to copy all the images selected automatically to the directory *C:\Hipax\Export\*.

### 9.2.4 Burning Process

The Patient CD module includes a CD/DVD-writer program (Media-Writer) starting automatically and writing the data content of the Export folder on the CD inserted previously.

The burning procedure is not finished before Hipax has reviewed the CD to be complete.

**Note:** The following media are supported by the Hipax media writer: CD-R, CD-RW, DVD-R, DVD-RW, DVD+RW, DVD-RAM.

### 9.2.5 Content of the Hipax Private Health Disk

On the CD, each study is related to an own folder. The images are stored in **DICOM format**.

Besides the images and documents of the patient, the Patient CD contains a **Hipax-Viewer**, which can be used to open and process the images (see *chapter 9.3*).

Furthermore, the file **DICOMDIR** is added to each CD, which is a table of contents of the CD. Thus, the images can also read using any other DICOM capable viewer.

## 9.3 The Patient CD Viewer

The Hipax Private Health Disk can be read using any standard PC, on which one of the Windows operating systems 2000, NT, or XB is installed.

Please insert the CD into the CD drive. The **Hipax viewer starts automatically** and opens the study list.

### 9.3.1 Studies

Patient Mona Gross 18.01.1928 1911811192

The **patient data** are given in the upper part of the window.



This button opens a visiting card, where the **physician's data** are listed, e.g. name of the institute, name of the doctor, phone number, etc.



In the "**Studies**" field, any study stored on the CD is displayed with an envelope symbol.

The content of the envelopes is shown in the "**Documents**" field. An envelope can contain images as well as text files, video films, or sound files. Each type of file is displayed using another symbol.

A double mouse click used on one of the symbols opens the corresponding file:



Word, Excel, or the Windows text editor are started directly from the Hipax viewer. The corresponding **document**, e.g. results or a laboratory report, is opened.



The selected **film** is played using the installed video audio program (e.g. Windows Media Player).



A double click on this symbol starts the video audio program to play the **sound file**.



Clicking on this button loads all the images related to the selected study to a **review list**:

Serien			
Date	Description	Number	Modality
23.09.1999	AngioRoutine #1 KM	13	CT
23.09.1999	Thorax	1	CR
23.09.1999	Horse	1	CR



Clicking on this button or using a double mouse click on an entry in the list loads the corresponding image to the **Hipax image viewer**. The loading process can take some time, depending on the data volume.



This button can be used to close images that have already been loaded to the viewer.



Please use this button to close the review list.

### 9.3.2 Selecting Images



An image can be selected using a single mouse click on the **grey spot** in the left upper corner. As a result, the colour of the spot changes to **pink**. Another mouse click cancels the selection.

Using a **double mouse click** on the grey button **selects all** loaded images.

### 9.3.3 Scrolling



Clicking on the bars above or below the image frames **pages** the images in the display area **up or down**. The same function can be found in the symbol bar.

### 9.3.4 The Button Bar of the Viewer

On the right side of the screen the Hipax viewer offers a strip, where the different image processing functions are displayed as simple easily understood symbols.



This button opens again the start window with the **studies**.



The **review list** can be opened by this button.



The arrow buttons can be used to load the next or previous image directly.

#### 9.3.4.1 The Viewer Layout Menu

The buttons to select the desired image frames can be found in the **Layout** menu.

#### 9.3.4.2 The Viewer Tools Menu

The **Tools** menu contains several image processing functions:



To **page** forward and backward through the loaded images



To display the single images of a series side by side in the **spread** mode



Maximum magnification of an image with **interpolation**



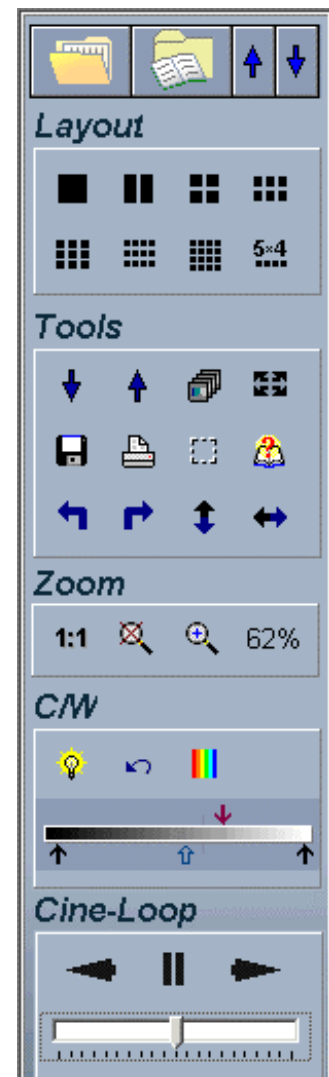
Image **export**



To **print** on a Windows capable printer



**Cropping**







**Help** function



**Rotation** by 90° to the left or right



**Reflection** in horizontal (flip) or vertical (mirror) direction

#### 9.3.4.3 The Viewer Zoom Menu

In the **Zoom** menu the following functions can be found:



Display in **original resolution**



To display the **whole image**



**Magnification**



Display of the **magnification factor**

#### 9.3.4.4 The Viewer C/W Menu

The **C/W** menu offers different possibilities to change the window values



**Automatic** adjustment



Reset

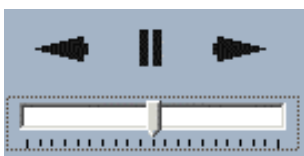


**Colour:** Using this button, the grey scales of the X-ray images can be replaced by randomly selected colours.



Scrollbar to change the **dynamics** (above), **window centre** and **window width** (below).

#### 9.3.4.5 The Viewer Cine-Loop-Menu



The **Cine-Loop** menu enables the user to play e.g. cardiac cine-loops forwards and backwards: The speed can be changed using the corresponding **scrollbar**.



### 9.3.5 Pop-up Menu

A short click with the right mouse button used on an image opens a pop-up menu:

- The menu item **Frame** offers the same layouts as the button bar.
- Clicking on **Reverse** the brightness of an image is reversed. Bright changes to dark, and dark changes to bright.
- Parts of the DICOM header are displayed in the image if the **Text** menu item has been activated.
- **Measurements** of distances can be carried through and deleted.
- The **Window Levelling** can be made for one image or for all images of a series.
- Images can be **Mirrored** or **Rotated**.
- The menu item **Header-Info** opens the DICOM header of the current image.
- Using the **Close** menu item closes the selected images.

### 9.3.6 Mouse Functions

The **window values** of the current image or the series can also be changed moving the mouse while the **left mouse button remains pressed**.

Pressing and moving the **right mouse buttons** activates the **magnification glass**.

The scroll wheel of the mouse can be used to **page** the displayed images **up or down**.

## 9.4 CD/DVD Robot Module

The Hipax module CD/DVD Robot enables the user to connect a Primera Disc Publisher II CD- or DVD robot to a Hipax workstation. Thus, patient CDs or archive media can be produced fully automatic directly from the Hipax viewer. To make this, the Hipax modules Local Archive or Patient CD need also to be installed.

### 9.4.1 Requirements

To use the CD/DVD Robot module you need:

- A Primera Disc Publisher II connected to your computer
- The Primera PT Server software installed on your computer (not included in the Primera package)
- The Acrobat Reader version 4 installed on your computer (available on the Hipax installation CD)

- Hipax software "Base Module Standard" with the "CD/DVD Robot" module, together with the modules "Archive" or "Patient CD".
- User account on the computer with administration authorisation.

### 9.4.2 Installation

1. Make sure you have installed and configured the programs listed above
2. Start the Primera PT Burn Server to create once a freed folder
3. Insert the Hipax installation CD into the CD drive of your PC
4. Use the Windows Explorer to open the directory \Primera\
5. Double click the setup file and follow the setup instructions to install the server and the client software onto the computer
6. After finishing the installation, the two installed programs can be configured following the instructions below

### 9.4.3 Configuration of the Dongle Manager

Please start the dongle manager with Windows: "Start" → "Programs" → "Creator" → "Dongle Manager". Enter the Primera module key and verify that the Primera module is shown in "Active Modules".

### 9.4.4 Configuration of the Creation Server

Use Windows "Start" → "Programs" → "Creator" → "Creation Server Configuration" to configure the "Creation Server".

Possible adjustments in the „PT Settings“ section are:

<i>Setting</i>	<i>Default Value</i>	<i>Description</i>
Shared Folder	\\[Computer-Name]\PTBurnJobs	The path used by the PT-Burn software to communicate with the Creator. This path should be already configured by PT-Burn software.
Acrobat Executable	C:\...\AcroRd32.exe	The full path and filename for the Acrobat Executable. Acrobat is used for printing the labels.
CD-Printer	Disc Publisher	The printer used to print the CD/DVD labels.

The program tries to configure itself automatically using the registry and ini files of the PT Software.

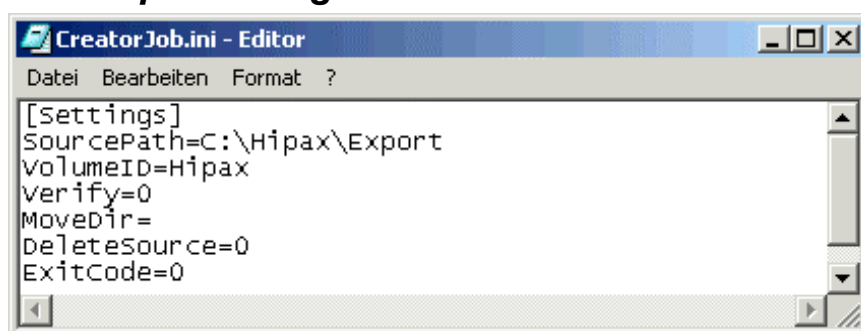
Possible adjustments in the section "**Label-Settings**" are:

<i>Setting</i>	<i>Default Value</i>	<i>Description</i>
Patient Medium Label	[Client-Path]\labels\label.lb3	This label file is used when a <b>patient CD</b> is created. You can design labels using the label editor included in this software package.
Archive Label	[Client-Path]\labels\archive.lb3	This label file is be used when an <b>archive</b> medium is created. You can design labels using the label editor included in this software package.
Demographic Information [Institute ... Tele- Radiology]		Data used for the variable fields in the labels. See also the label editor user's guide.

After all parameters have been configured please click on the "OK" button to save the adjustments and to close the label settings window. Use the "Close" button to close the "Creation Server".

The labels to be printed on the media can be created using the "Label Editor". Please open the "Label Editor" with „Start“ → „Program Files“ → „Creator“ → „Label Editor“.

### 9.4.5 Hipax Configuration

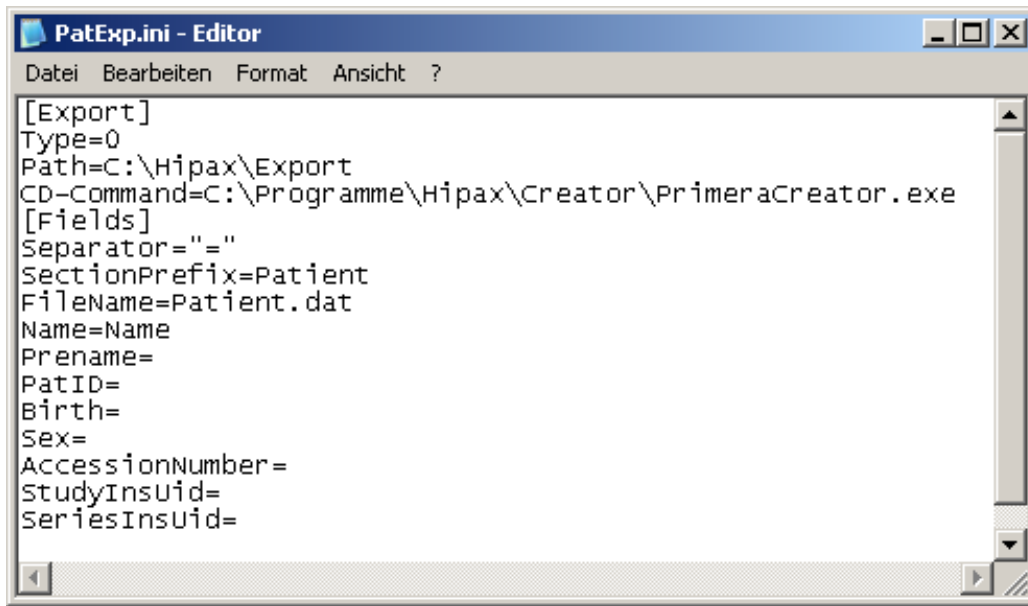


Open the *CreatorJob.ini*, which is located in the same directory where you have installed the creator software.

Set the "SourcePath=" to the directory, where Hipax exports or moves the patient data or images and change the other settings accordingly. The current example contains the entry for the Patient CD. In the case of archive media, the directory path should be "SourcePath=C:\Hipax\Archiv".

Open the file *PatExp.ini* in the directory *\Hipax\prg\* and change the entry "CD-Command=" to:

"CD-Command„[PATH\_TO\_CREATOR\_SOFTWARE]\PrimeraCreator.exe".



If archiving media are to be produced instead of patient CDs, the entry for "Path=" changes from "Path=C:\Hipax\Export" to "Path=CD\Hipax\Archiv"

Now, you have successfully finished the installation. Make sure the PT-Burn Software is running and create a patient or archive medium using the corresponding Hipax modules.

## **CHAPTER 10: ISDN COMMUNICATION**

## 10.1 Review

The ISDN module transmits or receives images. As with a fax transmission, a connection is established and the images are sent from one side to the other.

Please note that only the side that established the connection can send images. The system that has been called can only receive images. For reasons of data protection, it is impossible to call images from an extraneous PC.

**Note:** Using the Hipax **DICOM Communication** module (see *chapter 11.*), image data can be downloaded from a Hipax Telemedicine Server.

The ISDN communication with Hipax can be carried out using different functions:



This button in the "Processing" box of the button bar opens the "ISDN" menu strip as well as the menu item "ISDN" in the submenu "Processing".



This button in the "Tools" box opens the phone book directly. The menu item "ISDN Transmission" in the submenu "Tools" has the same function (see also *chapter 10.4*).

## 10.2 Requirements

The following requirements must be fulfilled:

- The Hipax ISDN module has to be activated and freed (see *chapter 2.3*).
- An ISDN connection must be available (e.g. Euro ISDN). In the most simple case it is an ISDN base connection with its own call number. Telecommunication systems or extension systems normally have to be prepared specially, also if they are ISDN compatible installations.
- An ISDN adapter (Fritz!) with CAPI 1.1 or CAPI 2.0 must be available.

### 10.3 Standby Mode

After the ISDN module has been installed, the Hipax software is automatically in the standby mode when started. The ISDN module will be loaded. It puts the reception capability on standby.



Please use this button in the "Processing" box of the button bar to open the ISDN menu.

In the bottom part of the ISDN menu, you can find the "**Status**" field. Here, the "Standby" message should appear to confirm the standby mode.



**Note:** If this message does not appear, the ISDN module has not been loaded. This may happen if the ISDN module is not active (not activated in the system setup), or if the ISDN adapter is not installed correctly. Another reason may be the incorrectly installed CAPI driver. Already at the start of the software a corresponding message will have been shown.



In this case, please check the installation.

### 10.4 Phone Book

The phone book administrates entered ISDN phone numbers.

#### Phone Book

The "Phone Book" window can be opened using the "**Phone Book**" button in the "ISDN" menu strip.



This button in the "Tools" box of the button bar or the menu item "ISDN Transmission" can also be used to open the "Phone Book", but only if at least one entry has already been made into the list before.

In the phone book, entries can be selected, added, or deleted. The list is sorted alphabetically.

The screenshot shows a window titled "Phone Book" with a standard Windows-style title bar (minimize, maximize, close buttons). Below the title bar is a toolbar with buttons: OK, Delete, New, Edit, Save, Import, and Cancel. Below the toolbar is a search area with a "Search" label and a text input field, and a "Start Number" label and a text input field. The main area contains a table with the following data:

Name	Title	Institution	ISDN	Phone No.
Miller	Prof.	St. Peter Hospital	01234567890	01234567891
Rest		Radiotherapy University Hospital	05673456787	05673456788
Schmidt	Dr.	Radiology University Hospital	05673456777	05673456788
Winter	Dr.	Neurology University Hospital	05673456789	05673456765

Below the table is a vertical scrollbar.

#### 10.4.1 Creating a New Entry and Changing Entries

A close-up of the toolbar from the Phone Book window, showing the following buttons: OK, Delete, New, Edit, Save, and Import.

Please click on the **"New"** button to create a new entry.

To change an entry, please select this entry by a mouse click and press the **"Change"** button. In both cases, a screen mask is opened, where the entries can be made. Entering the receiver name and the ISDN number is obligatory to free the **"Save"** button. The other fields can be left open.

The screenshot shows a form for creating or editing an entry. It has the following fields:

- Name:** A text input field containing "Summer".
- ISDN:** A text input field containing "78354990".
- Title:** A dropdown menu with "Dr." selected.
- Phone No.:** An empty text input field.
- Institution:** An empty text input field.

Clicking on the **"Save"** button, the new data are inserted into the list. The screen mask is closed.

The **"Cancel"** button aborts the input of data and closes the "Phone Book" window.

The **"OK"** button can also be used to confirm the selected phone partner and to close the "Phone Book" (see *chapter 10.4.6*).



### 10.4.2 Deletion of Entries

The **"Delete"** function deletes a selected entry from the "Phone book".

### 10.4.3 Import

The **"Import"** function allows the user to import phone lists. It opens a dialogue box where a telephone DB can be selected, for example from a floppy. The "Open" button of the dialogue box adopts the selected database into the Hipax phone book.

### 10.4.4 Searching

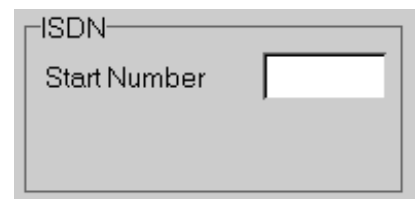
The **"Search"** edit box can be used to find quickly an entry in a long list. Please enter the name of the searched partner.

A graphical user interface element consisting of a rectangular text input box with a light gray border. To the left of the box is the label "Search" in a small, dark font.

### 10.4.5 The Start Number

In some cases, for example after the subsequent installation of a telecommunications system, it could be necessary to add a number (e.g. "0") to the ISDN numbers as a prefix.

To make this, please open the Hipax "Setup" window (main menu: "System" – "Setup") and select the register **"Configuration"** (see *chapter 14.1.2.11*). The "ISDN" field can be found in the upper right part of the window.


A graphical user interface element showing a section of a window. It has a title bar with the text "ISDN". Below the title bar, there is a label "Start Number" followed by a rectangular text input box.

Enter the start number and close the "Setup" window.

As a result, this number is shown in the "Start Number" field of the "Phone Book" window. Furthermore, the number is added automatically to all ISDN numbers in the "Phone Book" list. This is advantageous, because the start number need not to be added to each single entry in the "Phone Book".

### 10.4.6 Selecting the Receiver

The **"OK"** button in the "Phone Book" window selects the designated partner and closes the "Phone Book". The selection can also be carried out using a double mouse click on the desired entry.

A graphical user interface element showing a label "Name" above a rectangular text box. The text box contains the name "Miller".

The name of the selected partner then appears in the "ISDN" menu strip of the image processing user interface.

**Note:** A connection only can be made to one partner at a time.

## 10.5 Selecting Images to be Sent

There are four possibilities to select images for ISDN transmission.



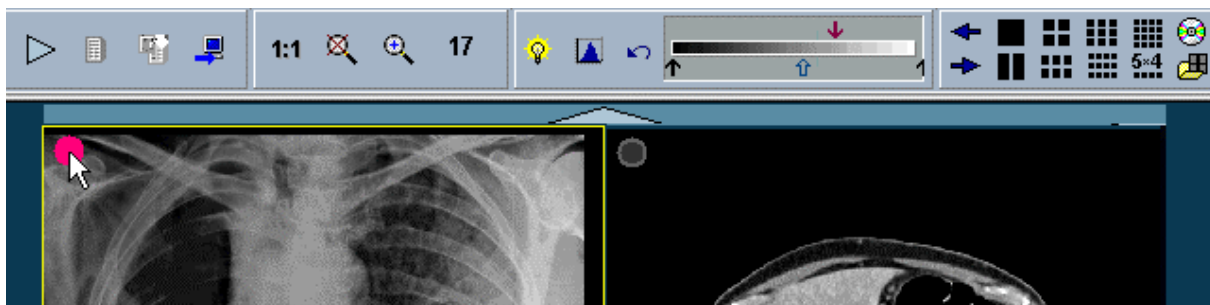
Please check the adjustment of the image selection before starting the ISDN transmission.

### 10.5.1 Active Image

Please click the checkbox of "**Act./Sel. Image**" in the "Images" field of the "ISDN" menu strip. The current image will be transmitted.

### 10.5.2 Selected Images

Please click on the "**Act./Sel. Image**" checkbox. Now, the images or series to be sent can be selected clicking the left mouse button on the grey spot in the upper left corner of the image.



Using a **double mouse** click on a spot selects all the images loaded at the same time.

### 10.5.3 All Displayed Images

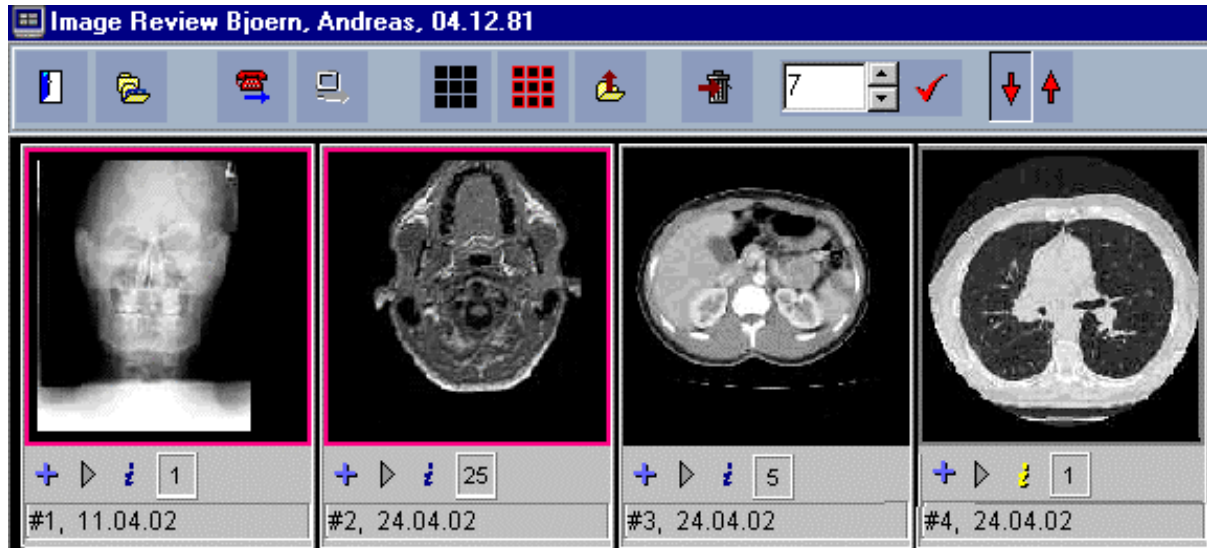
Please click the "**All Images**" checkbox if you want to transmit all images loaded.

### 10.5.4. Sending Images from the Database

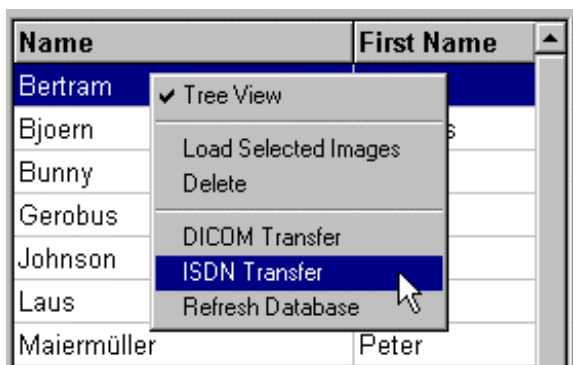
The function "**Review**" selects all those images of the current patient, which have been marked in the image review (see *chapter 6.*). The images do not need to be loaded into the image processing. The images will be transmitted directly from the database without opening the image review again.



Using this button in the "Image Review" window (see *chapter 6.*), the transmission also starts directly from the database. To make this, the image processing screen does not have to be opened.



A click with the right mouse button on the entry of the desired patient in the **patient list** opens a pop-up menu. Please click on the menu item "ISDN Transfer" to send all images of the current patient or the current study via ISDN.



The "ISDN Transfer" menu item opens the "Phone Book" window (see *chapter 10.4*). Here, the desired partner can be selected.

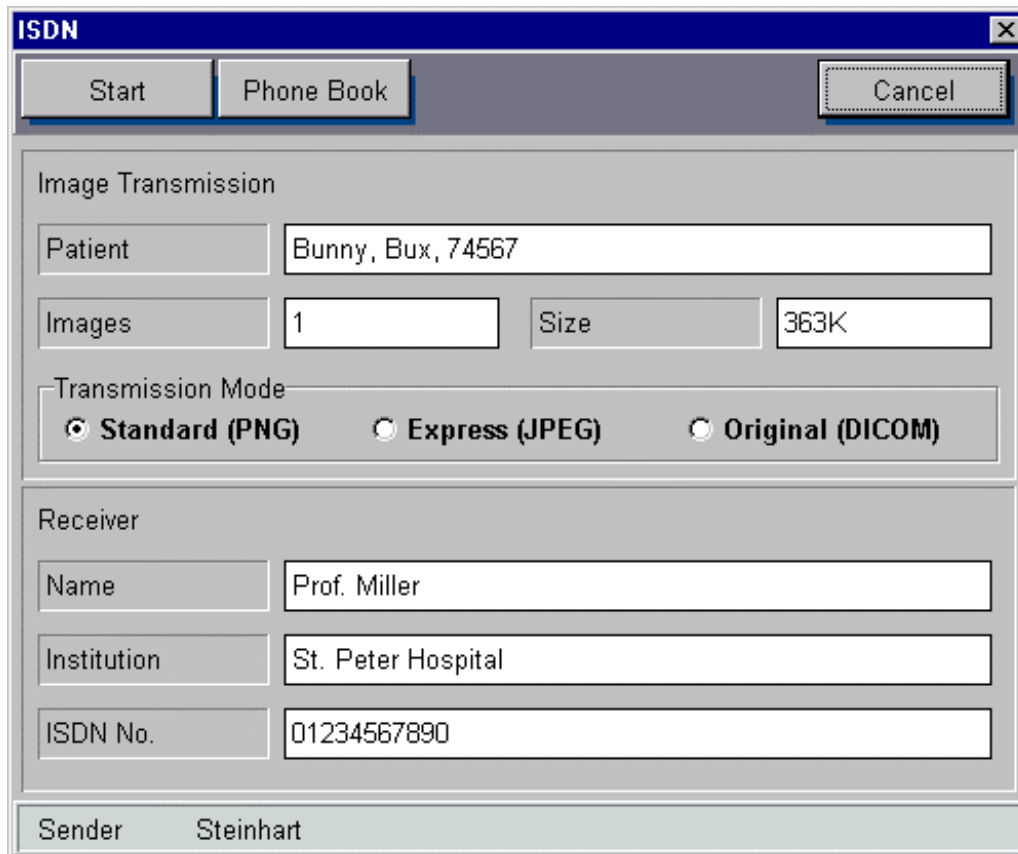
After clicking the "OK" button another dialogue is opened. Here, you can adjust the time, when the selected images are to be sent (see *chapter 10.8*).

**Note:** Using the "ISDN Transfer" menu item from the patient list, images are sent uncompressed in the "Original" mode (see *chapter 10.6.3*).

## 10.6 Preparing the Transmission

### Send

After the partner and images have been selected, the **"Send"** button can be clicked to open the **"ISDN"** dialogue box.



The ISDN dialog box is a standard Windows-style window with a title bar labeled 'ISDN'. It contains several sections for configuring a transmission. At the top, there are two buttons: 'Start' and 'Phone Book', and a 'Cancel' button on the right. The main area is divided into three sections. The first section, 'Image Transmission', contains a 'Patient' field with the text 'Bunny, Bux, 74567', an 'Images' field with the value '1', and a 'Size' field with the value '363K'. Below this is the 'Transmission Mode' section, which has three radio buttons: 'Standard (PNG)' (which is selected), 'Express (JPEG)', and 'Original (DICOM)'. The second section, 'Receiver', contains three text fields: 'Name' with 'Prof. Miller', 'Institution' with 'St. Peter Hospital', and 'ISDN No.' with '01234567890'. The third section, 'Sender', is at the bottom and contains the text 'Steinhart'.

ISDN		
Start	Phone Book	Cancel
Image Transmission		
Patient	Bunny, Bux, 74567	
Images	1	Size 363K
Transmission Mode		
<input checked="" type="radio"/> Standard (PNG) <input type="radio"/> Express (JPEG) <input type="radio"/> Original (DICOM)		
Receiver		
Name	Prof. Miller	
Institution	St. Peter Hospital	
ISDN No.	01234567890	
Sender Steinhart		

The dialogue box displays all information entered and allows the user to check the entries. Please use the **"Phone Book"** button if you want to choose a new partner.

Hipax offers three transmission modes:

### 10.6.1 Standard (PNG)

In the **"Standard Mode"**, the images are transmitted directly from the screen. To make this, the images are lossless compressed in PNG format.

The receiver gets the image in the current processing state, but he has limited processing possibilities. Images with grey resolutions of 10,12 or 16 bit will be reduced to grey resolutions of 8 bit. As a result, the window values of the transmitted image cannot be changed, because the currently adjusted window values have been adopted.

The compression factor is 4.

The "Standard Mode" does not transmit the image parameters of DICOM 3 images which originally had been shown in the header info and in the image itself. The transmission speed is increased about four times, compared with the transmission of original DICOM 3 images.

### 10.6.2 Express (JPEG)

In the "**Express Mode**", the transmission works as in the standard mode. In addition a lossy compression occurs (JPEG). As a result, the transmission speed is increased about 10 times. However, the compression causes a deterioration in the image quality.

### 10.6.3 Original (DICOM)

To ensure that the images are received in their original quality, they should be sent as **Originals** in DICOM format. Thus, the receiver is able to use all image processing functions. However, the transmission using the original mode lasts about four or ten times longer than using the standard or express mode.

Images to be sent directly from the database can not be compressed. They are always transmitted in their original format (see *chapter 10.5.4*).

### 10.6.4 Sending Notes

Hipax enables the user to add a short message to the transferred image. To enter the text, please open the "Patient/Image Administration" window, register "Image". The text can be entered into the edit field "**Image Info**" (see *chapter 5.6*).



The text also could be entered in the "**Image Review**", after using a mouse click on this button (see *chapter 6.2.3*).

## 10.7 Starting the Transmission

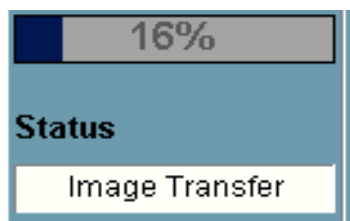


Please click the **"Start"** button in the **"ISDN"** dialogue box to start the transmission. In the **"Standard"** mode as well as in the **"Express"** mode, the images will now be compressed.

### 10.7.1 Establishing a Connection

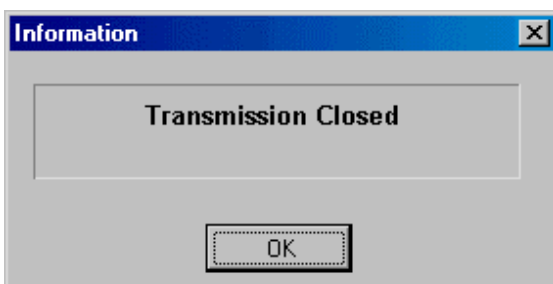


Hipax established the connection and transfers all images. The transmission status can be seen in the **"Status"** box.



The progress of the transmission is given as a percentage.

Finally, **"OK"** is shown in the **"Status"** field and a message appears, which shows the success of the transmission.



Running ISDN send jobs can be queried using a mouse click on the menu item **"ISDN Send Job"** in the submenu **"System"** or pressing the keys **"Ctrl"** (Strg) and **"S"** simultaneously.

### 10.7.2 Connection Problems

Connection problems can be caused by the following reasons:

- the receiver is not ready to receive (e.g., not in standby mode)
- the receiver is busy (e.g. the receiver is communicating with someone else)
- The sender's telephone equipment is busy
- a hardware problem exists, e.g., the ISDN cable is not connected
- the ISDN telephone number is wrong
- the receiver telephone number needs an additional MSN number (e.g. 0 = Global Call) (see *chapter 10.12.1*)
- the ISDN adapter is not installed correctly

**Note:** If your ISDN adapter and telephone equipment support the synchronous sending and receiving of data, you can test your own ISDN connection. This can be made creating a link of *C:\Hipax\prg\Hiisdn.exe /Q*. As a result, the "Hiisdn.exe" icon appears on the Windows screen. The Hipax ISDN module now can be started a second time by double clicking on the icon (the module appears twice in the Windows taskbar). Select an image, use your own telephone number and start the transmission.

## 10.8 Sending Images at Pre-Adjusted Times

The Hipax module ISDN Communication offers the possibility to send images at pre-adjusted times.

**Note:** This feature can only be used to send all images of a selected patient or study, but not to send single images.

**Note:** All images are sent uncompressed in the "Original" mode (see *chapter 10.6.3*).

To prepare the images please open the "Patient/Image Administration" window. Select the desired patient or study (see *chapter 10.5.4*). Using the **right mouse button** on the patient entry starts a pop-up menu.

Please select the menu item "ISDN Transfer" to open the "Phone Book" window (see *chapter 10.4*).

Select the desired partner from the "Phone Book" list and use the "OK" button.

As a result, the "ISDN" dialogue is opened.

The screenshot shows the "ISDN" dialog box with a table of jobs and a "Files to Send" section.

Job	Time	Patient	Mode	Partner	Status	Job Done at	ISDN No.
115	22.10.02 22:00:00	Bunny, Bux / 04.04.0		Rest	Waiting		05673458
112	22.10.02 09:38:22	Laus, Niko / 06.12.0		Miller	Waiting		01234567

Below the table are buttons: Edit, Save, Cancel, Delete.

Start Date: 22.10.2002    This Evening

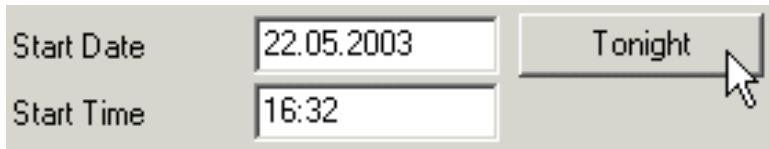
Start Time: 22:00

Files to Send: c:\Hipax\pic\E\6\00001E6.000#486

Here, current ISDN send jobs are listed.



The sending date and time can be adjusted in the bottom part of the window after clicking on the "**Edit**" button.



Clicking on the "**Tonight**" button sets the "Start Time" automatically to 23:00 h of the current day, but "Start Date" and "Start Time" can also be selected individually.



The "**Save**" button can be used to save the settings.



Using the "**Cancel**" button aborts the new adjustments for "Start Date" and "Start Time".

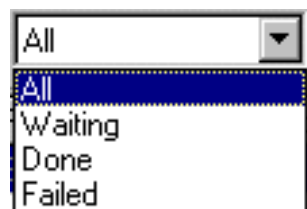


The "**Delete**" button deletes the currently selected entry from the list.



Please use the "**Start**" button in the upper part of the dialogue to enable the sending process. The images will then be sent at the pre-adjusted time.

The "**Refresh**" button is available to refresh the sending list.



The drop down list field contains different filters for the sending list. Here, you can decide whether you want to show all entries or only "Waiting", "Done", or "Failed" sending jobs.

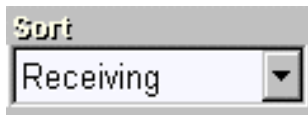


## 10.9 Image Receiving

The images received via ISDN communication are added to the database automatically. They can be loaded and processed.

To find the ISDN entries in the database quickly, please use the "**ISDN Transm.**" filter in the "**Filter**" box of the patient list. Thus, only ISDN entries are shown in the patient list (see also *chapter 5.1.6*).

If the **sorting** is adjusted at "**Receiving**", the most recent entry appears on the top of the patient list (see *chapter 5.1.7*).



In the patient list, the ISDN entries can be changed like any other entry. They also appear in the patient list sorted by name or by patient ID.

## 10.10 Transmission Time

The transmission time for transferring one megabyte (1 MB) is about 2 minutes (1-channel transmission).

The 2-channel transmission (both ISDN channels are used parallel) doubles the transmission speed. To make a 2-channel transmission, both channels of both partners must be free. The transposition of the ISDN module in 2-channel transmission is explained in *chapter 10.12.2*.

## 10.11 Transmission Costs

An ISDN transmission costs the usual telephone charge.

A 2-channel transmission uses two telephone lines. This doubles the transmission speed but also the charge.

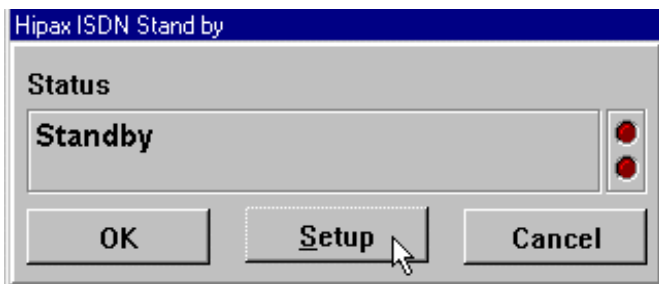
## 10.12 ISDN Configuration

The Multiple Subscriber Number (MSN) and the 2-channel transmission can be adjusted on the user interface of the ISDN module.

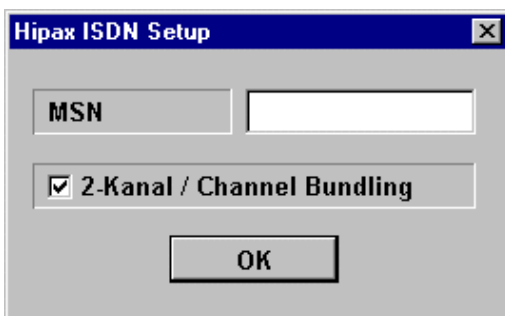
To open the Hipax ISDN user interface, please use a mouse click on the "ISDN" icon in the Windows taskbar.



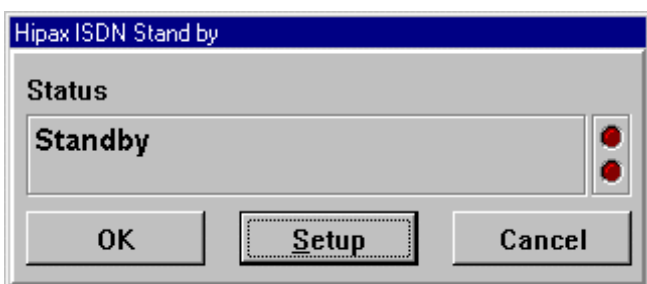
The user interface of the Hipax ISDN module becomes visible.



Please click on the "Setup" button to open the setup dialogue.



Using the "OK" button saves the entries and closes the "Hipax ISDN Setup" dialogue.



Using a mouse click on the "OK" button of the "Hipax ISDN Stand by" window, the module is diminished and set into the Windows taskbar.

**Note:** The "Cancel" button closes the ISDN module. In this case, it has to be loaded again (e.g. using the Windows Explorer) by double clicking on *Hiisdn.exe* in the directory *\Hipax\prg\*.  
Restarting of Hipax loads the ISDN module automatically.

### **10.12.1 Multiple Subscriber Number**

Normally, the Hipax ISDN module works with the Euro ISDN standard. That means that no setup changes are necessary.

If your ISDN environment needs the definition of an **MSN** (Multiple Subscriber Number), please activate the Hipax ISDN module.

The **MSN** can be entered into the "MSN" edit field of the "Hipax ISDN Setup" dialogue.

Valid values are the digits 0 – 9. If you do not know your correct MSN, please use the "0", which is the Global Call number. The MSN is cancelled by deletion.

**Note:** Usually, a MSN is not required. In this case, the "MSN" edit box must be left **free of entries**.

The new MSN is adopted clicking on the "**OK**" button. The "Hipax ISDN Setup" window is closed.

### **10.12.2 Two-Channel Transmission**

The transposition of the ISDN module in 2-channel transmission can also be made in the "Hipax ISDN Setup" dialogue. Please use a mouse click on the checkbox "**2-Kanal / Channel Bundling**".

**Note:** To carry out a 2-channel transmission, both partners need to have made this adjustment.

The 2-channel transmission respectively is adopted clicking on the "**OK**" button. The "Hipax ISDN Setup" window is closed.



## **CHAPTER 11: DICOM COMMUNICATION**

## 11.1 DICOM Functions

### 11.1.1 DICOM Components SCP and SCU

The following DICOM functions are supported by Hipax:

- To receive images (Store Service Class Provider) = SCP.
- To send images (Store Service Class User) = SCU.
- To search patient data and images (Find/Query Service Class User).
- To collect patient data and images (Move Service Class User).

**Note:** The DICOM SCP is needed for the **DICOM Worklist** Management (see *chapter 12.*).

**Note:** Both, the Hipax "DICOM SCU" (to find) and the Hipax "DICOM SCP" (to store) must be active for the search or collection of images (**DICOM Query/Retrieve**, see *chapter 11.10*).

The DICOM Worklist and DICOM Print are described in own chapters (see *chapters 12. and 13.*).

### 11.1.2 Internal and External Communication Using DICOM

The Hipax DICOM communication module can be used to send and receive image data within a **local area network** (LAN) in accordance with the DICOM 3 standard. Thus, images can be received from DICOM capable modalities (e.g. CT, MRI) or sent to other DICOM stations.

Furthermore, the DICOM Communication module can also be used to exchange images with an **external Hipax viewer**. The communication is made using the TCP/IP protocol. As a result, the data transfer can be carried through using different communication techniques (e.g. ISDN, modem, internet, intranet).

For reasons of data security, the data to be sent to an external receiving station are completely **encrypted** before transmission starts. To make this, a DICOM image is taken as a cover to wrap a complete other image or data file. Thus, the whole DICOM infrastructure can be used to transmit even other kind of data. But only Hipax is able to unpack the wrapped data. The DICOM image containing the wrapped data can, for example, be sent from a Hipax viewer to a Radworks station. On the Radworks station, the cover image can be viewed, but the software is not able to see the wrapped data. The DICOM image then can be sent from the Radworks station to another Hipax viewer. Here, the encrypted data can be made visible again. Thus, even a complete other DICOM compatible system can be used to pass the images forward.

## 11.2 DICOM Requirements

DICOM communication requires a PC which is equipped by a **network card**. Communication can be made using the **TCP/IP** protocol. Thus, a TCP/IP address is needed.

To send images to **external stations**, you also need to connect your PC to the telephone or ISDN net, to the internet, a satellite system, or to a private line. The external communication partner also needs to use Hipax, otherwise, images can be sent, but neither encrypted nor compressed.

For internal or external **DICOM communication**, you need to install and activate the Hipax module DICOM Communication (see *chapter 2.3*).

The same module is needed for the **DICOM query/retrieve** (*chapter 11.10*).

To use the **DICOM worklist** module, the Hipax DICOM Communication as well as the DICOM Worklist module have to be installed (see *chapter 12*).

The Hipax DICOM Communication is also necessary to send images directly off the **Vidar** (see *chapter 7.4.7*), the **Video** (see *chapter 7.6.16*), or the **Echo** menu (see *chapter 8.11.6*).

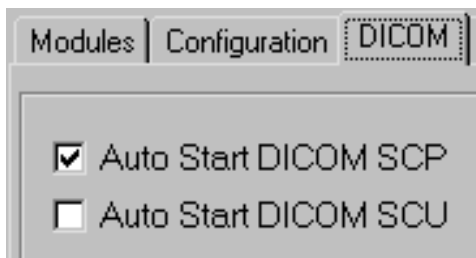
## 11.3 DICOM Configuration

The configuration of the DICOM communication is made in the "**DICOM**" register of the Hipax "**Setup**" window (main menu: "System" – "Setup").

The screenshot shows the 'Setup' window with the 'DICOM' tab selected. The window has a title bar 'Setup' and a close button. Below the title bar are tabs: 'Modules', 'Configuration', 'DICOM' (selected), 'External Controls', 'Load Images', and 'User Administration'. The main area contains two sections: 'Receive Images (SCP)' and 'DICOM Print (SCU)'. In the 'Receive Images (SCP)' section, there are checkboxes for 'Auto Start DICOM SCP' (checked) and 'Auto Start DICOM SCU' (unchecked), a 'Stations' button, and input fields for 'AE Title' (Hipax) and 'Port' (104). In the 'DICOM Print (SCU)' section, there is a dropdown menu for 'Standard', and input fields for 'Printer' (Standard), 'Printer AE Title' (LINX), 'Printer Port' (104), and 'Printer Host' (192.168.2.20). Below these fields are buttons for 'Delete', 'New', and 'Layout'. At the bottom center is a 'Save' button.

Section	Option	Value
Receive Images (SCP)	Auto Start DICOM SCP	Checked
	Auto Start DICOM SCU	Unchecked
Receive Images (SCP)	AE Title	Hipax
	Port	104
DICOM Print (SCU)	Standard	Standard
	Printer	Standard
	Printer AE Title	LINX
	Printer Port	104
	Printer Host	192.168.2.20

### 11.3.1 Activating the SCP and SCU



To be able to **receive** images, please set a hook into the checkbox "**Auto Start DICOM SCP**".

The "**Auto Start DICOM SCU**" can be activated to set Hipax into the **send** standby mode.

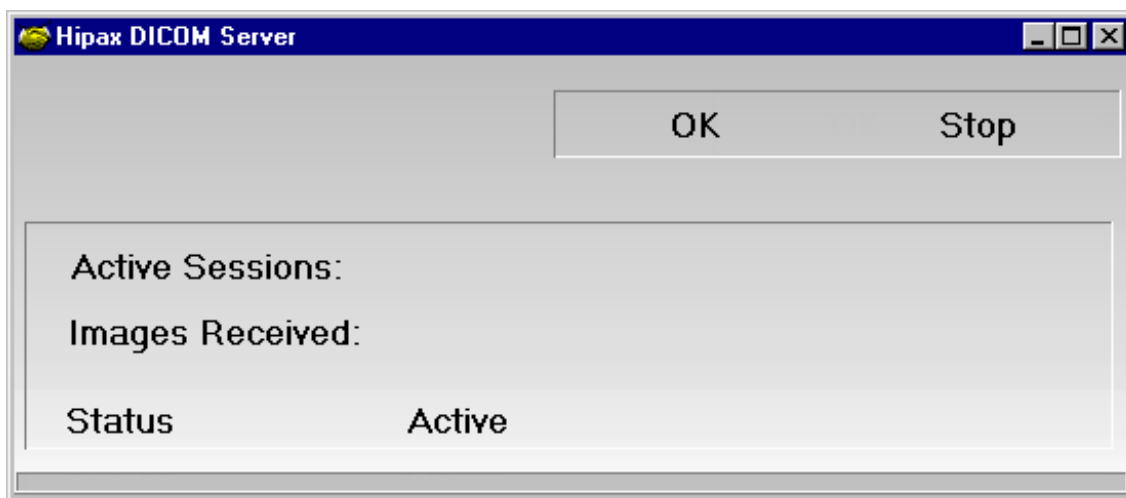
Please activate the "Auto Start DICOM SCP for making **DICOM Worklist Management** (see *chapter 12*).

Both modules must be activated for searching or fetching images (**DICOM Query/Retrieve**, see *chapter 11.10*).

After activating the checkboxes, the DICOM receive or send is in a standby mode immediately. Furthermore, the standby mode is established any time, when Hipax has been started.



One shaking hands button for each DICOM module (SCP and SCU) appears in the Windows taskbar. A double mouse click on the symbols opens the SCU module or the SCP module, respectively.

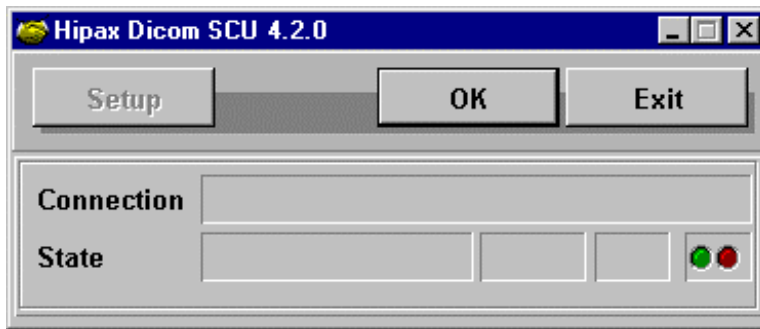


This screen shot shows the **SCP user interface**, where the DICOM activity can be checked after a connection has been established.

The "**OK**" button minimizes the window. The SCP module remains active. The window can be opened again at any time by double clicking on the shaking hands icon in the Windows taskbar.

The "**Stop**" button closes the SCP module. The DICOM standby becomes extinct. It can be reactivated removing and setting again a hook into the "Auto Start DICOM SCP" checkbox of the Hipax "Setup" window, section "DICOM".

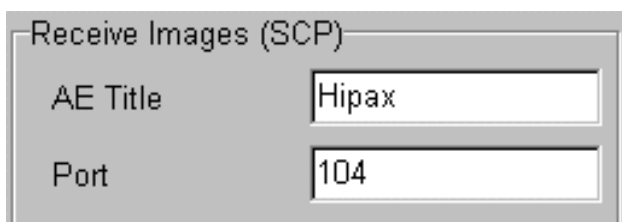




This screen shot shows the Hipax **SCU user interface** for sending images. Using the debug mode on the upper part of the SCU window (a double click on the left mouse button, while the right mouse button remains pressed) increases the user interface to show more details of the sending process.

The SCU user interface can be minimized using the "**OK**" button. The "**Exit**" button closes the window. Thus, the sending stand by can be stopped.

### 11.3.2 Configuration for Receiving Images (SCP)



The field "**Receive Images (SCP)**" in the "DICOM" register of the Hipax "Setup" window contains the edit fields "AE Title" and "Port". Here, the corresponding data of the local PC have to be entered.

The **AE Title** (Application Entity Title) identifies the current Hipax DICOM module against other stations of the network. The AE Title can be selected individually, but it must be unique for each station of a network. The standard adjustment is "Hipax".

**Note:** Please do not enter more than 16 characters for the AE Title.

The **Port** number determines the address of the DICOM receiving service of the local PC. The standard adjustment for the port is 104.

Received images are entered automatically in the database (see *chapter 11.9*).

### 11.3.3 Entering the DICOM Receiving Stations

The "**Stations**" button in the DICOM window opens a dialogue, where the DICOM stations can be entered to which the communication shall be carried out.

Alias	AE Title	Host	Port	Dialing Program
Station X	Hipax 1	111.222.111.222	104	
Server Y	Hipax Server	256.128.35.7	1000	
XS500	CT 1	192.168.45.9	1000	

To enter new stations, the "**New**" button has to be used. The new entries can be inserted into the stations list using the "**Accept**" button

Existing entries can be changed using the edit fields. Click the "**Accept**" button to insert the changed entries into the stations list.

Using the "**Delete**" button deletes the entry currently selected from the stations list.

The receiving stations can be determined using the following parameters:

- **Alias:** individually chosen name to identify the DICOM partner
- **AE Title:** unique name needed by the PC to identify the DICOM partner
- **Host:** TCP/IP address
- **Port:** address of the DICOM receiving service

The drop down list field on the right side of the first line is used for the data receipt. Here, for example, can be chosen, if the data are to be stored in the database or added to a presentation.

Normally, the "**Standard**" adjustment is chosen.

The send mode of the currently selected entry of the stations list can be chosen in the "**Protocol**" drop down list field in the second line:

"**DICOM**" has to be selected to communicate with any DICOM Station within the **LAN**.

"**Server-Protocol**" can be chosen, if the receiving station is a **Hipax Server**.

Select "**Compressed-DICOM (Hipax)**" to send data to an **external Hipax viewer**. As a result, all data are encrypted and compressed before transmission starts.

**Note:** The "Compressed DICOM (Hipax)" send mode is available using DICOM module from version 4.0.10 on.

Sending images to a Hipax viewer, the standard adjustment for "**Port**" is 104. To send images to a Hipax Server, please enter the "Port" number" 1000.

The "**Modem**" button is explained in *chapter 11.3.4*.

After all adjustments have been made, the "**Close**" button can be used to close the "Station" window. Now, the "Setup" window, register "DICOM" appears again.

#### 11.3.4 Connecting the Dial-up Program

**Note:** The configuration of the RAS program differs between the different MS operating systems. Please use your Microsoft user manual of Windows 2000 or XP for customizing the RAS service on Windows level.

**Note:** The RAS service has to be customized on the receiving station to be able to receive the call using the "Compressed DICOM (Hipax)" mode.

The dial-up program can be started manually, e.g. using a short cut on the Windows desktop.

Hipax also offers the possibility to start the dial-up program automatically.

Please use the "**Modem**" button to open the corresponding edit fields.

The screenshot shows a 'Modem' configuration window. It has three input fields: 'RAS Phone Book' with the value 'UH-Rad', 'User' with the value 'Summer', and 'Password' with the value 'amx200'. Below these fields is a table with the following data:

Alias	AE Title	Host	Port	Dialing Program
StationX	Hipax 1	111.222.111.222	104	

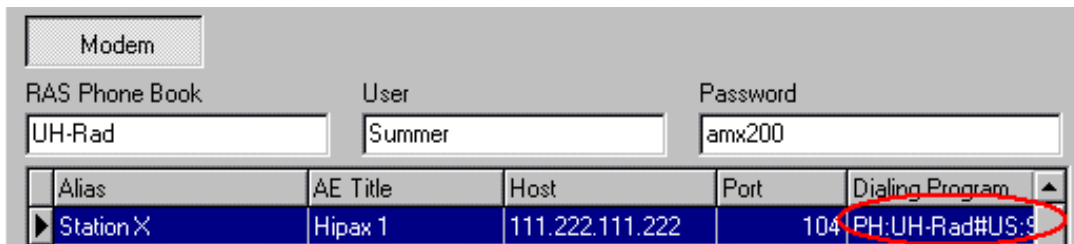
The entries made here are corresponding to the DICOM station currently selected in the Station list.

The same entries have also to be made in the phone book of your dial-up program.

The phone book entry of the current DICOM station that have been made in the RAS program can now to be entered into the "**RAS Phone Book**" edit field. In our example, the entry is "UH-Rad".

Furthermore, the same "**User**" name and "**Password**" as used in the RAS program has to be entered here. In our example, this is "Summer" and "amx200".

After clicking the "**Accept**" button (on the top of the "Stations" window) the entry appears in the column "Dialling Program" of the stations list.



Thus, Hipax is enabled to start the RAS program automatically to establish the connection. After a waiting period of one second, Hipax starts to transmit the image.

## 11.4 Selecting Images to be Sent

There are different possibilities for selecting images for DICOM transmission.

### 11.4.1 Active Image



Clicking on this button in the "Tools" box of the button bar, the currently active image with the yellow margin will be transmitted.

### 11.4.2 Selected Images or all Displayed Images

The selection can be carried out using a mouse click on the grey spot in the upper left corner of the image. As a result, the spot appears in pink and the selected images are pink framed. A second mouse click on the spot cancels the selection.



All images loaded can be selected using a double mouse click on the grey spot of one image.



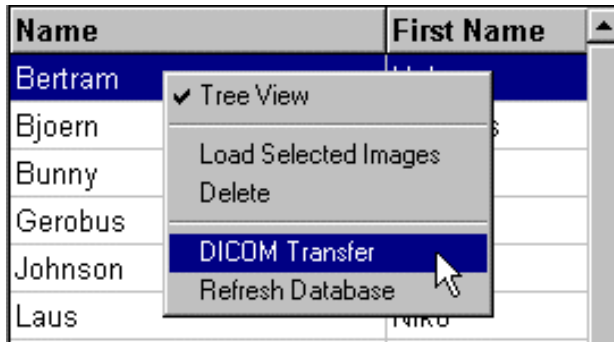
The transmission is then initialized using this button in the "Tools" box of the button bar.

### 11.4.3. Sending Images from the Database

#### 11.4.3.1 Selecting All Images of a Patient

Please open the "Patient/Image Administration" window.

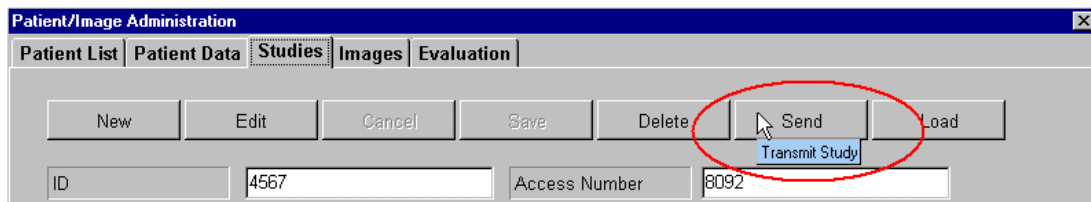
A click with the right mouse button on the desired patient in the patient list opens a pop-up menu, which contains the menu item "**DICOM Transfer**".



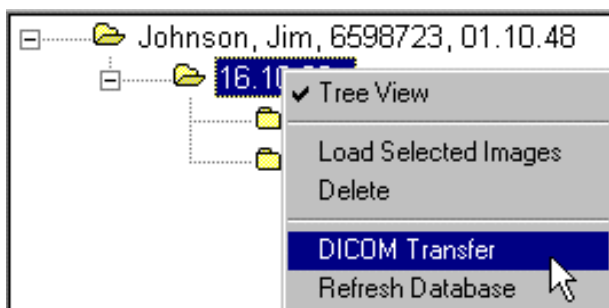
#### 11.4.3.2 Selecting All Images of a Study

To select all images from a study, please open the "**Studies**" register of the "Patient/Image Administration" window.

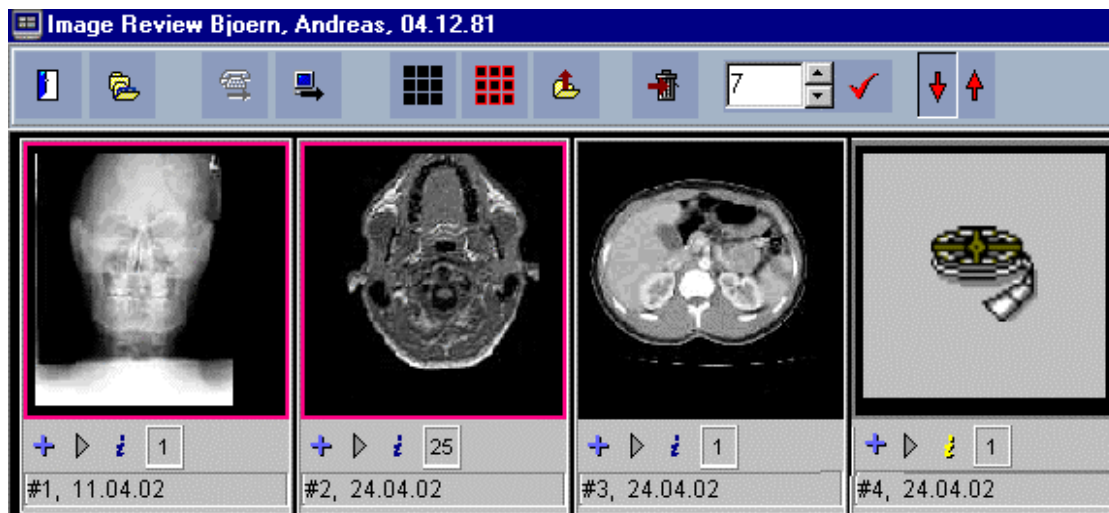
The transmission will be started by a mouse click on the "**Send**" button.



A study can also be selected in the "Patient List" register of the "Patient/Image Administration" window. To make this, click the right mouse button on the desired study in the tree view. This opens a pop-up menu containing the menu item "**DICOM Transfer**".



### 11.4.3.3 Selecting Images from the Image Review

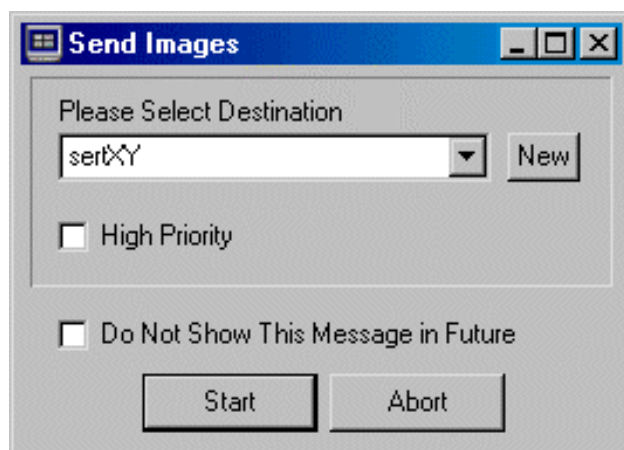


From the "**Image Review**", selected (pink marked) images or series can be transmitted via DICOM using this button (see *chapter 6*.).

## 11.5 Starting the DICOM Transmission



Any of these buttons opens the window "Send Images".



The drop down list field "**Please Select Destination**" opens the list of the destination names that have been entered before into the "Stations" window (see *chapter 11.3.3*).

The "**New**" button opens the "Stations" window, where new destinations can be entered (see *chapter 11.3.3*).

A mouse click on the checkbox "**High Priority**" adds a button to the images that shows the high priority of the current images to the receiver.

If you want to transmit several images to the same address, you can deactivate the "Send Images" window clicking on the checkbox "**Do Not Show This Message in Future**". The window will reappear automatically after a new start of Hipax.

To start the DICOM transmission please use the "**Start**" button.

The "Send Images" window can be closed without starting the transmission using the "**Abort**" button.

**Note:** Running DICOM send jobs can be queried clicking on the menu item "DICOM Send Jobs" in the submenu "System" of the main menu or, directly, by pressing the "Ctrl" (Strg) and "J" keys simultaneously.

**Note:** If only **registered users** can connect to the destination, the "Start" button opens a "**Login**" dialogue, where the user name and the password can be entered.

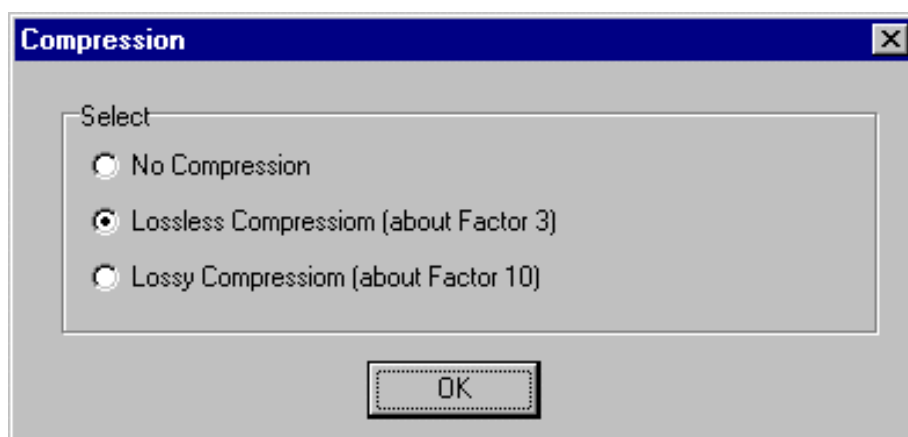
First, the user name and password of the sending station have to be registered on the destination. The access authorisation of each user can be determined individually.

## 11.6 Encryption and Compression

As described in *chapter 11.3.3*, the mode "**Compressed-DICOM (Hipax)**" should be selected in the "**Station**" window ("Protocol" drop down list field), if images are to be sent to an external Hipax viewer station.

The setting "**Server Protocol**" has to be selected, if the images are to be sent to an external Hipax Server.

In both modes, the "Start" button of the "Send Images" window (see *chapter 11.5*) does not start the DICOM transmission directly, but opens the "**Compression**" window.





Please select here, whether the images are to be sent in the original format ("**No Compression**") or **lossless** (ca. factor 3) or **lossy** (ca. factor 10–20) compressed. This reduces the transmission time accordingly.

**Note:** The strength of the compression depends on the image type. Images with big black areas, e.g. CT images, can be stronger compressed than images with mainly grey areas, e.g. chest images.

Clicking on the "**OK**" button starts the compression process.

For reasons of data security, all data are **encrypted automatically** before transmission starts.

**Note:** The lossy compression is not available for data are sent from the "Image Review" window.

## 11.7 Connection Problems

Connection problems can be caused by the following reasons:

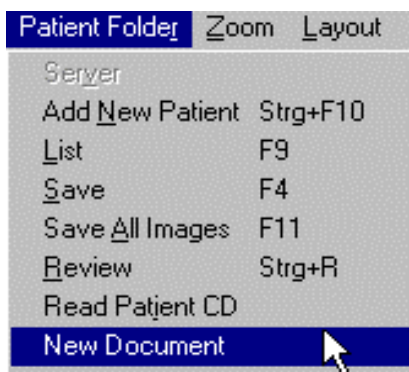
- the receiver is not ready to receive (e.g., not in standby mode)
- the entered identification data (e.g. AE Title, Port, etc., are not correct)
- a hardware problem exists
- the configuration of the RAS program has not been made correctly
- the RAS service has not be customized on the receiving station

## 11.8 Transmitting Documents and other Files

### 11.8.1 Relating Documents and other Files to a Patient

Besides the images also other files can be related to a patient, e.g. documents (results, laboratory reports, etc.), films, or sound files (see *chapter 4.6.3.8*).

The following **file formats** are supported: text (doc, txt), film (avi, mpg), sound (wav), multimedia (wmv).



To make this, please select the menu item "Patient Folder" in the main menu, and the submenu "New Document".

As a result, a dialogue opens, where the desired file can be selected and marked. The selected file can then be loaded to Hipax using the "Open" button. The file is then entered automatically into the patient folder.





This button opens the "Image Review" window (see *chapter 6.*), where the added files are displayed as symbols, e.g.:



### 11.8.2 Opening the Additional Files

A double mouse click used on a symbol opens the corresponding file.



Word, Excel, or the Windows text editor are started directly from the Hipax viewer. The corresponding **document**, e.g. results or a laboratory report, is opened.



The selected **film** is played using the installed video audio program (e.g. Windows Media Player).



A double click on this symbol starts the video audio program to play the **sound file**.

### 11.8.3 Sending the Additional Files via DICOM Communication

Additional files related to a patient can be transmitted between two Hipax workstations (**point-to-point transmission**).

Thus, the "Compressed DICOM (Hipax)" mode has to be selected in the "Station" window (see *chapter 11.3.3*).

To send additional files please open the "**Image Review**" window (see *chapter 6.*). Select the desired files using a mouse click on the corresponding thumbnails. Selected thumbnails are pink framed.



This button in the "Image Review" window opens the "**Send Images**" window (see *chapter 11.5*).

Here, the receiving station can be chosen. Using the "**Start**" button opens the "**Compression**" window. The data can be sent in original format or lossless compressed (factor 2).

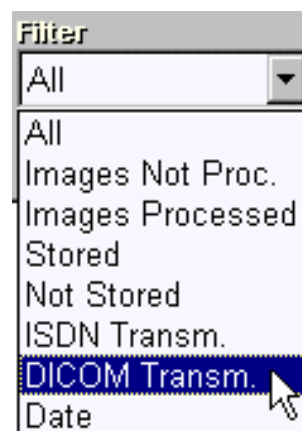
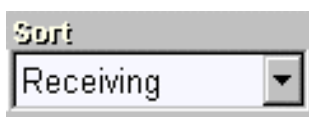
**Note:** The lossy compression is not available for data are sent from the "Image Review" window.

## 11.9 Image Receiving

The Hipax configuration to receive images is described in *chapter 11.3.2*.

The images received via DICOM communication are added to the database automatically. They can be loaded and processed.

To find the DICOM entries in the database quickly, please use the "**DICOM Transm.**" filter in the "**Filter**" box of the patient list. Thus, only DICOM entries are shown in the patient list (see also *chapter 5.1.6*).



If the **sorting** is adjusted at "Receiving", the most recent entry appears on the top of the patient list (see *chapter 5.1.7*).

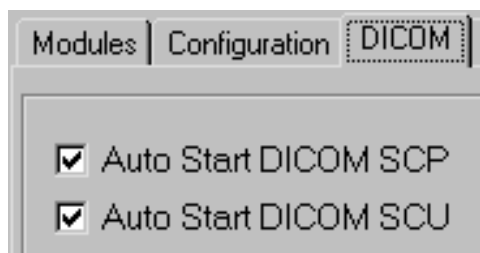
In the patient list, the DICOM entries can be changed like any other entry. They also appear in the patient list sorted by name or by patient ID.

## 11.10 DICOM Query

### 11.10.1 Preparation

The DICOM Query can be used to access to the database of a DICOM server. It is part of the DICOM Communication module, which needs to be installed and activated.

**Note:** The local PC has to be registered as a user of the server to be accessed.



Both DICOM components, the SCP as well as the SCU are to be activated in the "DICOM" register of the Hipax "Setup" window to make a DICOM Query (see *chapter 11.3.1*).

The SCU starts the query to a DICOM server and asks for the desired images. The SCP is in standby mode to adopt the images.

The **modality** or **server** to be queried should be entered into the "**Station**" list before the DICOM query is started (see *chapter 11.3.3*).

### 11.10.2 Adjustments



This button in the "Database" box of the button bar enables the user to make a DICOM query.

The button opens the window "Start DICOM Query".

Please enter the known data of the patient you are searching for.

If you are unsure of the patient name, you may enter a part of the name and substitute the unknown rest using a \*. As a result, the data of all patients with the entered part of the name will be transmitted. Entering nothing else but the \* shows all patient data of the server database.

The **gender** of the patients can be selected using the corresponding buttons.

These buttons can be used to restrict the DICOM query to a defined period of time.

Another possibility to define a period of time is to use the "**From**" – "**To**" checkboxes. The drop down arrows open calendars where the date of the start or end of the period can be selected.

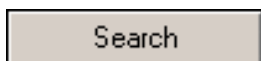
The "**Modality**" list field can be used to restrict the DICOM query to a predefined modality (MR, CT, CR, etc.).



Server  
Server Y

Please choose the partner of the DICOM query in the "**Server**" drop down list field containing all entries of the "Stations" list, which has been entered in the submenu "DICOM" of the Hipax "Setup" window (see *chapter 11.3.3*).

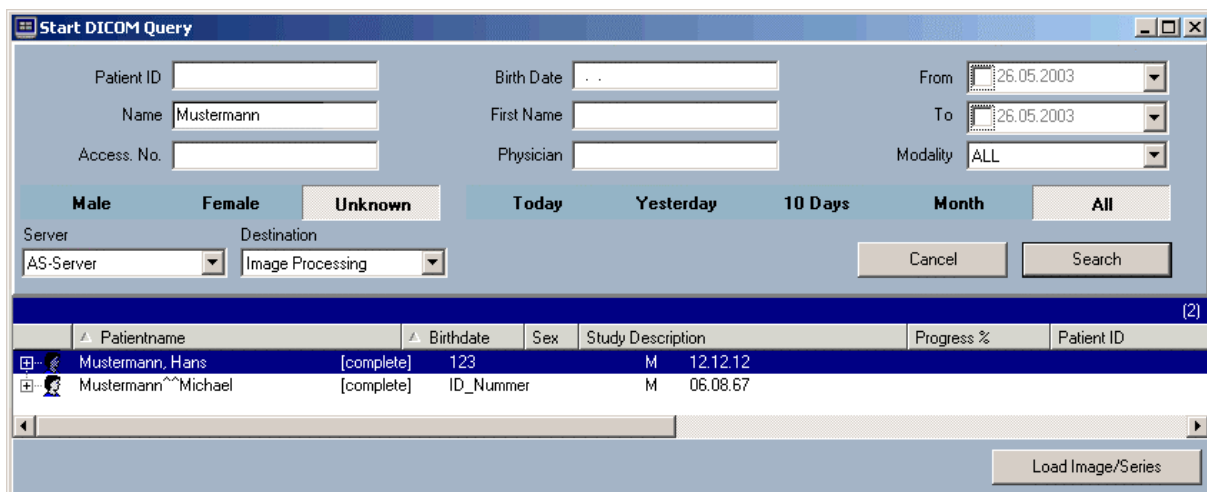
### 11.10.3 Starting a DICOM-Query



Search

Start the DICOM Query using the "**Search**" button.

The result of the query appears a few seconds later in the list field of the DICOM query dialogue.



**Start DICOM Query**

Patient ID:  Birth Date:  From: 26.05.2003  
 Name: Mustermann First Name:  To: 26.05.2003  
 Access. No.:  Physician:  Modality: ALL

**Male** **Female** **Unknown** **Today** **Yesterday** **10 Days** **Month** **All**

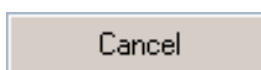
Server: AS-Server Destination: Image Processing

△ Patientname	△ Birthdate	Sex	Study Description	Progress %	Patient ID
Mustermann, Hans	[complete] 123	M	12.12.12		
Mustermann~Michael	[complete] ID_Nummer	M	06.08.67		



Load Image/Series

Use the button "**Load Image/Series**" or double click on the desired study in the list to ask for the corresponding images. The partner station establishes the connection and transmits the images automatically. The DICOM module SCP must be active in order to receive the images.



Cancel

The "**Cancel**" button interrupts the searching and loading process.

### 11.10.4 Sorting the Query Results

The sorting of the received query results can be configured. To make this, the header of the query list can be used.

▲ Patient Name	▲ Birthdate	Sex	Study Description	Progress %	Patient ID
----------------	-------------	-----	-------------------	------------	------------

Clicking on a column title, e.g. "Patient Name" changes the **sorting direction**, which is shown by the **grey triangle** on the left side of the title.

▲ Patient Name	▲ Birth
----------------	---------

The upturned peak of the triangle shows that the sorting will be made **bottom-up** (e.g. patient names from "A" to "Z")

▼ Patient Name	▲ Birth
----------------	---------

If the triangle shows downward the sorting will be made **top down** (e.g. names from "Z" to "A").

Clicking again on the column title **removes the triangle**. In this case, the query list will not be sorted by the current column title.

The **priority of the sorting** is defined by the position of a column in the query list. In our example, the "Patient Name" column is located on the left side of the "Birthdate" column. Thus, the query results will be sorted by the patient name. Entries with the same patient names are then sorted by birth dates.

To configure the header of the query list please use a right mouse click into the list field. As a result, the button "HeaderEditor" appears:

HeaderEditor

Clicking on this button opens the "**HeaderEditor**" window:



These buttons can be used to change the **position of a column** in the query list.



Please click on this button to delete a selected title from the table header.



To create a new header title, this button can be used. The name of the title and the corresponding DICOM tags can be entered into the edit fields on the right side of the "HeaderEditor".

**DICOM Tag Properties**

Description

Patient Name

Group	Element	Value Representation
\$0010	\$0010	PN Person Name

Please take the tags from the DICOM Conformance statement of your server software.

Furthermore, the layout of the header can be defined in the "DICOM Tag Properties" field.

Clicking on the **"OK"** button adds the new entry to the header list. The **"Cancel"** button aborts the entries.

**"Reset to Standard"** restores the default settings of the table header.

The **"Level"** drop down list field contains a list of levels. Each of these levels offers an own table header. Thus, the desired point of view for the query result table can be selected individually.

**Level**

Image Level

- Patient - Study Level
- Patient Level
- Study Level
- Series Level
- Image Level

---

## **CHAPTER 12: DICOM WORKLIST**

## 12.1 The Functions of the DICOM Worklist Module

The Hipax system offers the possibility to import patient data or worklists. As a result, the data have not to be entered manually. This can be important, for example if Hipax is inserted as DICOM modality within a PACS project (X-ray film digitization, video grabbing).

Hipax supports the DICOM worklist management. Furthermore, Hipax is able to evaluate ASCII files containing patient data. Worklists can also be transmitted to Hipax via DICOM.

The data can be read:

- manually, pressing a key.
- automatically using a timer (e.g. every 10 minutes).

Name and path of the files to be imported are given to the Hipax system using a configuration file. In the most simple case, the same name and path is always chosen.

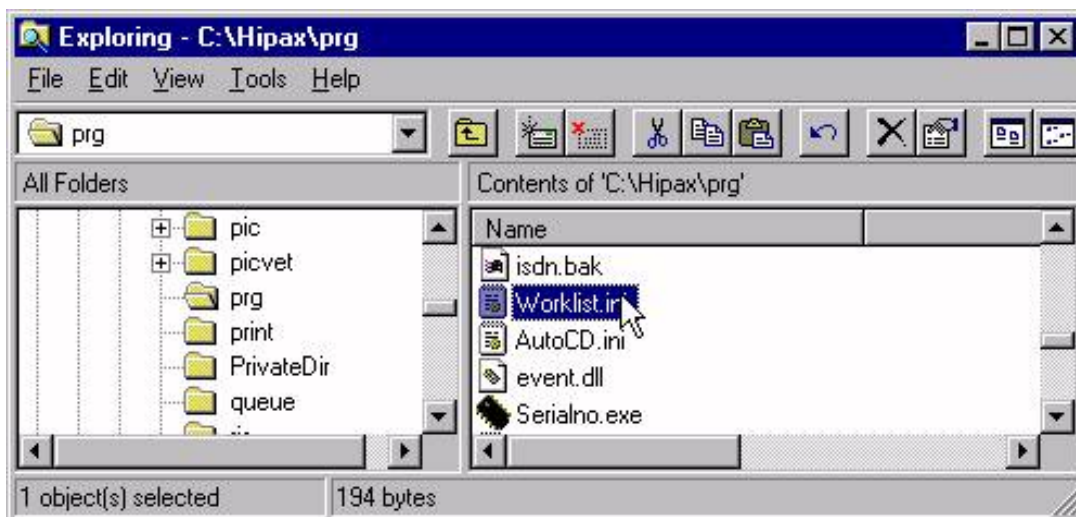
**Note:** To run the DICOM Worklist function, the DICOM Communication module has also to be installed (see *chapter 11*).

## 12.2 Activating the Modules

The DICOM Communication and Worklist modules have to be freed and activated using the main menu: "System" – "Setup" (see *chapter 2.3*).

## 12.3 Worklist.ini File

The DICOM Worklist module is configured using an ini file located in the directory `\Hipax\prg\`. The name of the file is *Worklist.ini*.





Please use the windows explorer to open the *Worklist.ini* file.

The *Worklist.ini* file contains the sections [Server] and [Data] with the following text:

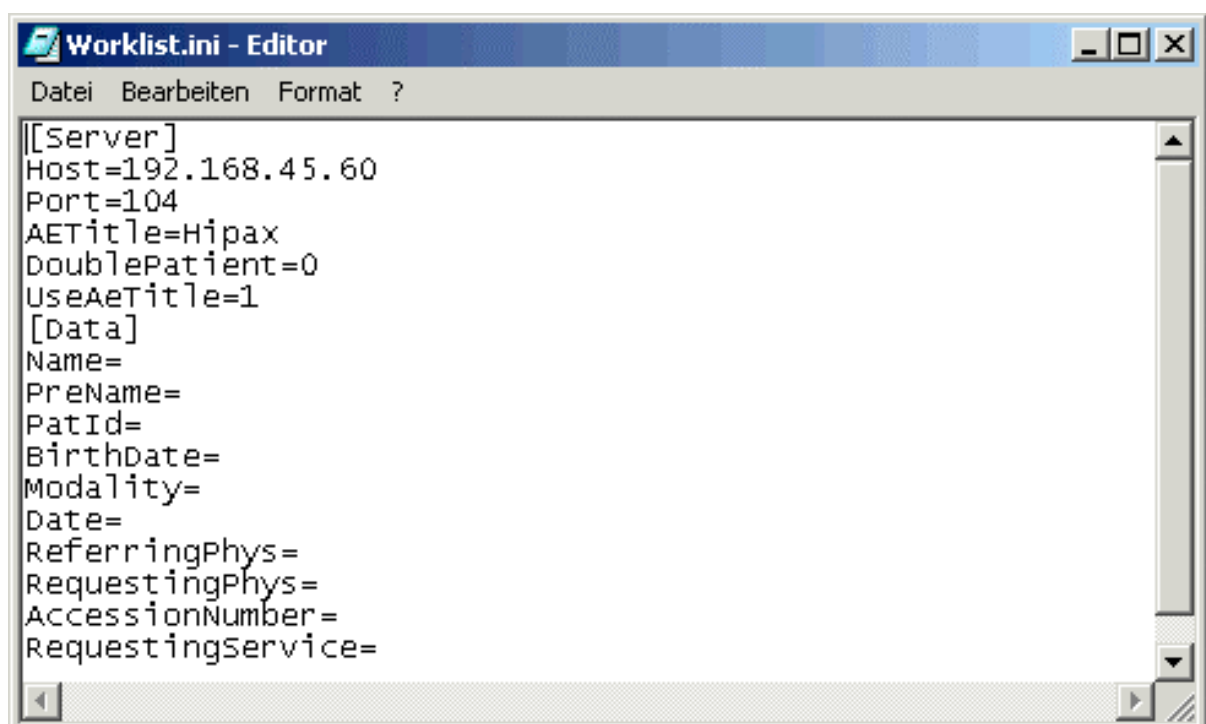
```
[Server]
Host=
Port=
AETitle=
```

```
[Data]
Name=
PreName=
PatId=
BirthDate=
Modality=
Date=
ReferringPhys=
RequestingPhys=
AccessionNumber=
RequestingService=
```

Important for the DICOM worklist function are the entries in the [**Server**] section. Here, the technical details of the worklist server have to be entered: **Host, Port, AE Title**.

In contrast, the [Data] section is not important for the DICOM worklist function.

The following screen shot shows an example:

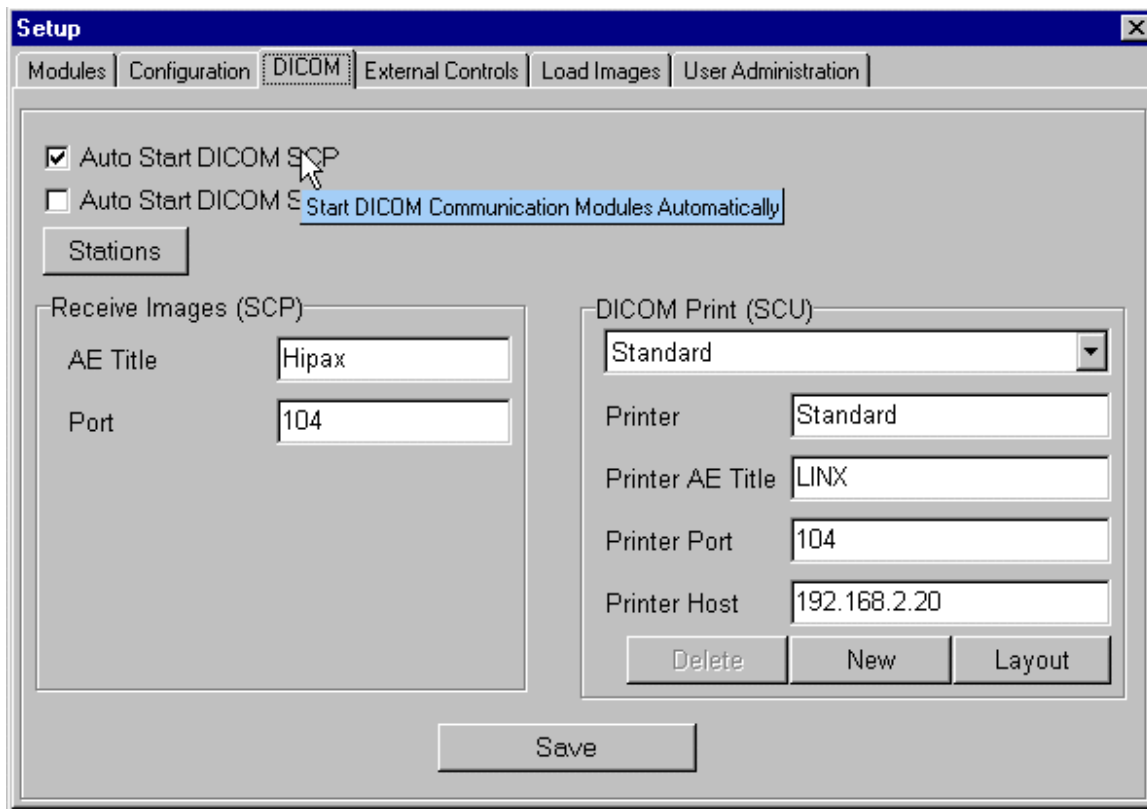




After the new Start of Hipax, this button can be found in the "Patient/Image Administration" window.

## 12.4 Starting the DICOM Receiving Standby

We recommend to auto start the SCP: Open the Hipax "Setup" window, register "DICOM" using the main menu items "System" – "Setup". Here, you find the checkbox "**AutoStart DICOM SCP**" (see *chapter 11*).



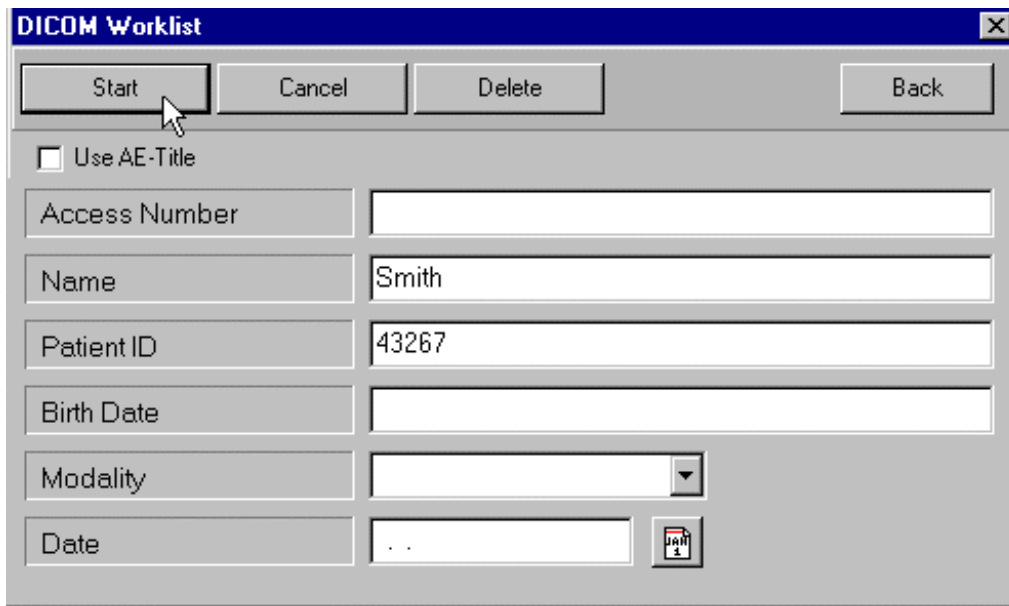
After clicking on this checkbox, the DICOM receiving function is set into the standby mode automatically when Hipax is started.

## 12.5 Starting the Worklist Management Function

Open now the "Patient/Image Administration" window.



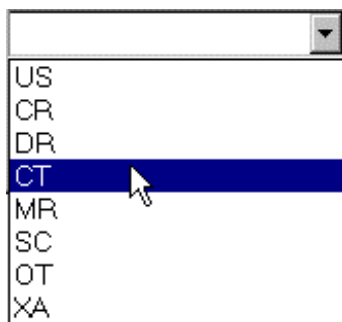
Clicking on the worklist button opens a dialogue, where the data of the searched patient can be entered, e.g. the patient ID or another identifying code.



The image shows a Windows-style dialog box titled "DICOM Worklist". It has a title bar with a close button (X). Below the title bar are four buttons: "Start", "Cancel", "Delete", and "Back". Below these buttons is a checkbox labeled "Use AE-Title". Underneath the checkbox are several input fields: "Access Number" (empty), "Name" (containing "Smith"), "Patient ID" (containing "43267"), "Birth Date" (empty), "Modality" (a dropdown menu), and "Date" (containing "..."). To the right of the "Date" field is a small calendar icon.

**Note:** At least one of the edit fields has to be filled.

The modality can be selected from the "**Modality**" drop down list field.



The image shows a dropdown list for the "Modality" field. The list is open, showing the following options: US, CR, DR, CT (which is highlighted with a blue background and a mouse cursor), MR, SC, OT, and XA.

The "**Use AE-Title**" checkbox is available to include the AE Title of a modality in the query. Thus, all patient data booked on the worklist server for the currently selected modality can be queried. To make this, the data of the DICOM modality has first entered and selected in the "Station" list of the "DICOM" register of the "Setup" window (see *chapter 11.3.3*). Thus, the user is able to select between different modalities of the same type.

Using the "**Date**" edit field, the query can be restricted to a defined date.



This button opens a calendar, where the desired date can be selected.

Using the "**Cancel**" button, the dialogue can be closed without starting the DICOM Worklist query.

The "**Delete**" button deletes all entries from the dialogue.

The "**Back**" button can be used to minimize the "DICOM Worklist" window.

Hipax starts the query after clicking on the "**Start**" button.

The received patient data are automatically added to the patient list. Now, the images of a patient can be digitized and related to the patient.



## **CHAPTER 13: DICOM PRINT**

## 13.1 DICOM Print Configuration

The Hipax DICOM Print module can be used to print medical images on DICOM compatible printers. These are, especially those which can produce films.

Each DICOM printer comes with a "DICOM Conformance Statement" which lists the technical capabilities of the printer (e.g. formats, film types, tiles etc.). The Hipax DICOM Print module can be configured using this DICOM Conformance Statement.

### 13.1.1 Requirement

Communication between Hipax and the printer is made using the DICOM Tcp/IP protocol. To allow communication, the PC must be equipped with a network card.

### 13.1.2 Configuration

The configuration is carried out in the Hipax setup menu "DICOM" ("System" - "Setup" - "DICOM").

The screenshot shows the 'Setup' window with the 'DICOM' tab selected. The window has a menu bar with 'Modules', 'Configuration', 'DICOM', 'External Controls', 'Load Images', and 'User Administration'. The 'DICOM' tab contains the following configuration options:

- ☒ Auto Start DICOM SCP
- ☐ Auto Start DICOM SCU
- 
- Receive Images (SCP)**
  - AE Title: Hipax
  - Port: 104
- DICOM Print (SCU)**
  - Standard (dropdown menu)
  - Printer: Standard
  - Printer AE Title: LINX
  - Printer Port: 104
  - Printer Host: 192.168.2.20
  -
-

The Hipax DICOM Print modules allows to **connect up to eight printers**.

Please use the **"New"** button to **add a new Printer**.

The necessary data establishing the connection to the printer can then be entered into the edit fields "Printer", "Printer AE Title", "Printer Port", and "Printer Host".

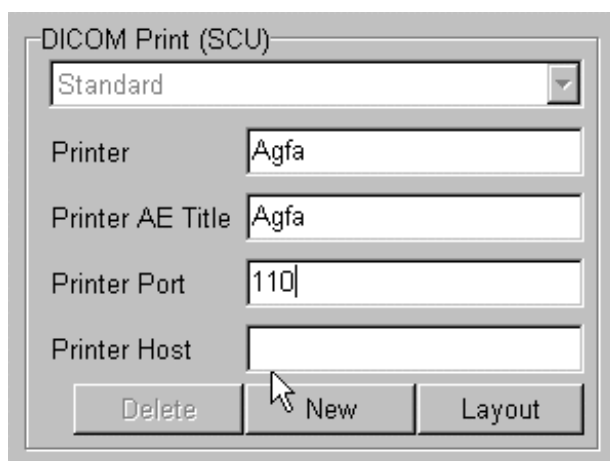
The entry of the **"Printer"** edit field appears later in the **drop down list field**, where the printer to be used can be selected.

The **AE Title** (Application Entity Title) identifies the DICOM printer against other stations of the network. The AE Title can be selected individually, but it must be unique for each station of a network.

**Note:** Please do not enter more than 16 characters for the AE Title.

The **Port** number determines the address of the DICOM Print service of the printer. The standard adjustment for the port is 104.

The TCP/IP address of the printer has to be entered into the **"Printer Host"** edit field.



Please save the entry using the **"Save"** button in the bottom part of the window.

The **"Delete"** button can be used to delete a printer from the drop down list field.

The **"Layout"** button opens the **PrintDef.ini-Editor**. It contains the section [Printer] where the general printer adjustments are defined, and several layout sections ([Default], [1]...[X]) where different layouts can be configured.

The possible adjustments of the section "Printer" and the layout sections are explained in the following *chapter 13.1.3.1*).

### 13.1.3 Architecture of the Layout File PrintDef.ini Editor

#### 13.1.3.1 [Printer]: General Printer Adjustments

**Table 1.** General printer adjustments in section [Printer]

<i>Field</i>	<i>Description</i>	<i>Entry</i>
Bits	Determines if the images are to be transmitted as 8 bit or 12 bit data. Most printers only support 8 bit data.	8 For 8 bit-data 12 For 12 bit-data
Annotation	Determines if texts are printed into an image. Hipax offers three possibilities: <ul style="list-style-type: none"> <li>• No text. Only the image data are transmitted.</li> <li>• Using the text function of the printer. A few printers support this mode.</li> <li>• "Burning" texts into the image. In this case, Hipax writes the texts directly into the pixels of the image.</li> </ul>	0 Text not printed 1 To use the text functions of the printer 2 To use the text into the pixel data (black typeface colour) 3 To burn the text into the pixel data (white typeface colour) 4 To burn the text into the pixel data (white typeface colour with black shadows)
FontSizeInc	Magnification of the font. Hipax independently adapts the font size to the size of the film or the image. In "FontSizeInc" the relation between the font size and the film size can be increased. Usually this adjustment is only necessary for "exotic" film formats.	Number of points by which the font size shall be increased (e.g. 10)
FontName	Adjustment of the fontface.	All Windows fonts (e.g. Arial, Times New Roman)



### 13.1.3.2. [Default], [1]...[X]: Layout Sections

The DICOM Print layouts are defined in the layout sections ([Default], [1], [2] etc.) of the PrintDef.ini Editor. The number of sections corresponds to the number of defined layouts. At least one layout [Default] has to be defined in any case. Additional sections can be created by copying and renaming present sections. A maximum of 16 layout sections can be entered.

Table 2 shows the configuration possibilities offered by Hipax to define the layouts. You should use the DICOM Conformance Statement for the fields which are actually supported by your printer or the values which can be adjusted.

**Table 2.** Configuration possibilities of the layout sections

<i>Field</i>	<i>Description</i>	<i>Examples of entries</i>
Name	The name of the layout is based on user's preference. This name is used to describe the layout. All entered layout names then appear in a list of the DICOM Print dialogue (see <i>chapter 13.2</i> ).	<ul style="list-style-type: none"> <li>• Standard 1×1</li> <li>• 3×3, Blue Film</li> <li>• 2×2, Paper</li> </ul>
MediumType*	Determines, on which medium printing takes place on (film, paper, transparency etc.).	<ul style="list-style-type: none"> <li>• Blue Film</li> <li>• Paper</li> </ul>
Format*	<p>Determines, how many images should be printed on one page, and how the images are to be arranged (number of columns and lines). The number of columns and lines follow the term "STANDARD\".</p> <p>If only one image is printed on one page, the image is printed in the real size. If several images are printed on one page, the images are printed in the maximum possible size.</p>	<ul style="list-style-type: none"> <li>• STANDARD\1,1 prints 1 image on one page</li> <li>• STANDARD\2,1 and STANDARD\1,2 each print 2 images on one page (side by side or one beneath the other, respectively)</li> <li>• STANDARD\2,2 prints 4 images on one page</li> <li>• STANDARD\5,4 prints 20 images on one page</li> </ul>

**Table 2.** Configuration possibilities of the layout sections (continued)

<i>Field</i>	<i>Description</i>	<i>Examples of entries</i>
Orientation*	Determines the film position: vertical or horizontal.	<ul style="list-style-type: none"> <li>• PORTRAIT (vertical)</li> <li>• LANDSCAPE (horizontal)</li> </ul>
FilmSizeID*	The film size is entered here.	<ul style="list-style-type: none"> <li>• 14INX17IN (for 14×17")</li> <li>• 24CMX30CM (for 24×30 cm)</li> </ul>
Magnification Type*	Interpolation type by which the printer magnifies the image in order to fit the image in the image box on film.	<ul style="list-style-type: none"> <li>• REPLICATE</li> <li>• CUBIC</li> <li>• BILINEAR</li> <li>• NONE</li> </ul>
SmoothingType*	Only valid for Magnification Type="CUBIC": Further specifies the type of the interpolation function. The values are defined in the Conformance Statement of the DICOM printer.	<ul style="list-style-type: none"> <li>• 1</li> </ul>
BorderDensity*	Determines the colour of the page margin. The colour usually is chosen black if the images are to be printed on films, and white if the images are to be printed on white paper.	<ul style="list-style-type: none"> <li>• BLACK</li> <li>• WHITE</li> </ul>
EmptyImage Desity*	Determines the colour of the areas on the film that contain no image.	<ul style="list-style-type: none"> <li>• BLACK</li> <li>• WHITE</li> </ul>
MinDensity*	Contrast adaptation of the printer: minimum density, expressed in hundreds of OD (optical density). Variations of this value cause a change in brightness and contrast of the image	2

**Table 2.** Configuration possibilities of the layout sections (continued)

<i>Field</i>	<i>Description</i>	<i>Examples of entries</i>
MaxDensity*	Contrast adaptation of the printer: maximum density, expressed in hundreds of OD (optical density). Variations of this value cause a change in brightness and contrast of the image.	300
Polarity*	Defines the grey tones of the image. Please enter "NORMAL" if the image shall be printed like shown on the screen. The adjustment "REVERSE" causes a reverse video.	<ul style="list-style-type: none"> <li>• NORMAL</li> <li>• REVERSE</li> </ul>
ConfigInfo*	Determines the "Lookup Table" (LUT) to be used by the printer to adapt the brightness and contrast.	<ul style="list-style-type: none"> <li>• CS000</li> <li>• LUT=1,7</li> </ul>
Width	The width of the printed area in pixels. Hipax uses this value to make a correct 1:1 display if only one image is to be printed on one page.	3224
Height	The height of the printed area in pixels. Hipax uses this value to make a correct 1:1 display if only one image is to be printed on one page.	4126
PixelMM	The number of pixels per millimetre. Hipax uses this value to make a correct 1:1 display if only one image is to be printed on one page.	10

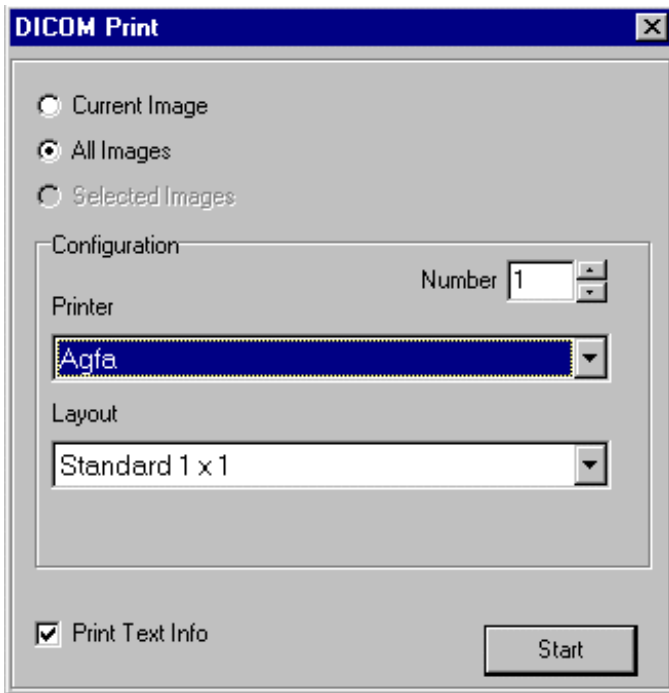
\*) DICOM fields which are described in the DICOM-Conformance Statement of the printer

## 13.2 Printing Images Using the DICOM Print Module

To print images with the DICOM Print module, please first load the images to be printed.



Clicking on this button in the "Tools" box of the button bar opens the "DICOM Print" dialogue.



Please select in the upper part of the dialogue, if you want to print the **currently** selected image or **all images** loaded. The "**Selected Images**" button is only available, if several images have been loaded and selected.

In the case of several images being printed, the sequence of the images on the film corresponds to the sequence of the images on the screen.

If the number of images to be printed exceeds the number of images that can be printed on a single film, a second film will be printed out automatically.

The desired printer can be selected from the "**Printer**" drop down list field.

The "**Layout**" list contains the names of the layouts which have been previously defined in the PrintDef.ini Editor (see Table 2: "Name"). The desired print format can be chosen from this list clicking on the corresponding layout name.

The annotation can be printed on the image activating the "**Print Text Info**" checkbox.

The "**Start**" button starts the print job.

**Note:** A new printout cannot be started before the previous printout is finished.

---

## **CHAPTER 14: SYSTEM CONFIGURATION**

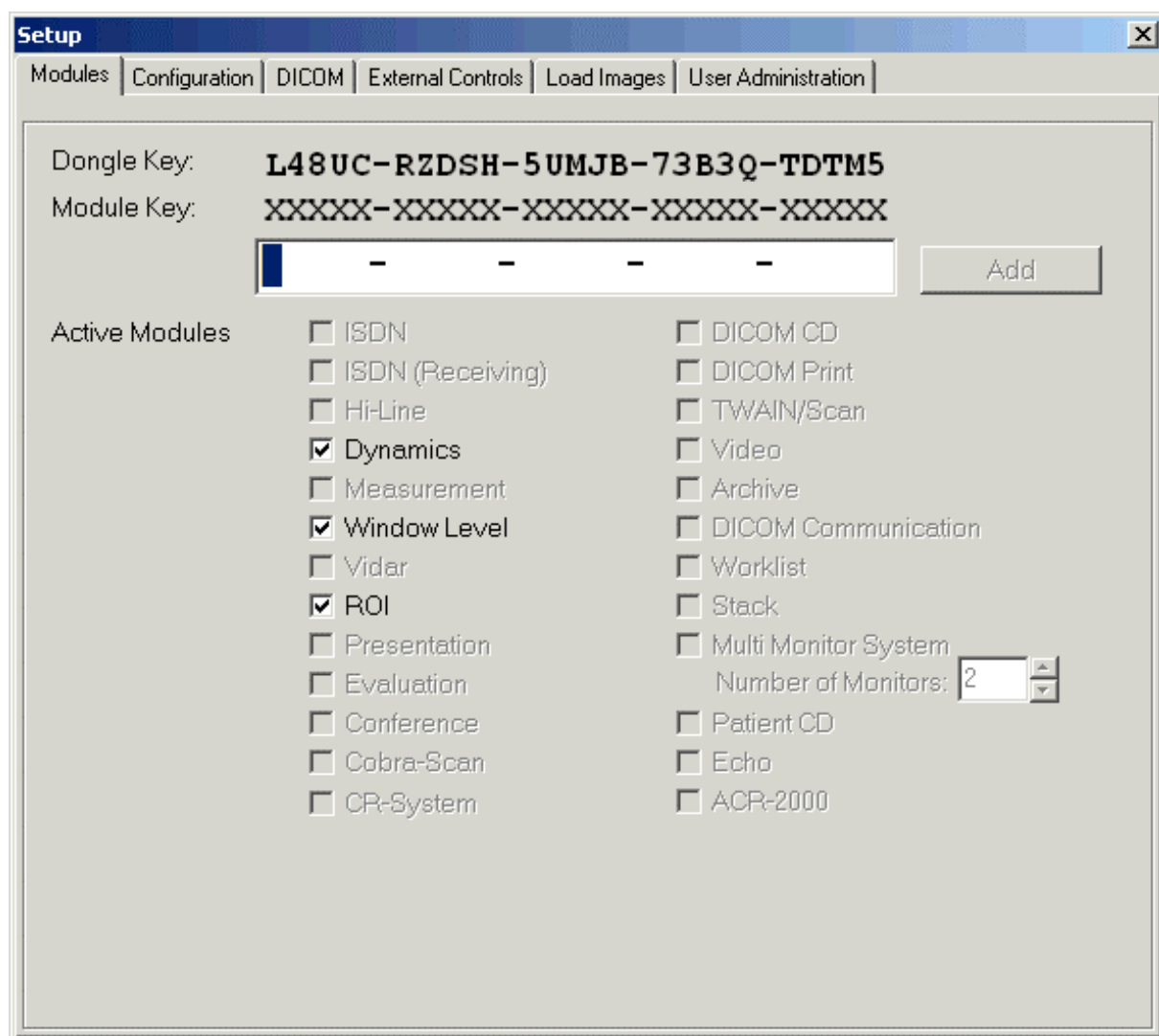
## 14.1 Setup Window

The Hipax "Setup" window can be opened using the main menu item "System" submenu "Setup". Here, six menus are offering different possibilities for system configuration.

**Note:** To disable the user to open the "Setup" window, please use the *Setup.exe* file in the directory *\Hipax\prg\* (see *chapter 14.2.1.3*).

### 14.1.1 Modules

The first menu opened is the "Modules" section, where new modules can be installed and activated (see *chapter 2.3*).



Here, all possible Hipax functions are listed. Freed functions have **white checkboxes** and can be activated. All other modules are shown in **grey**.

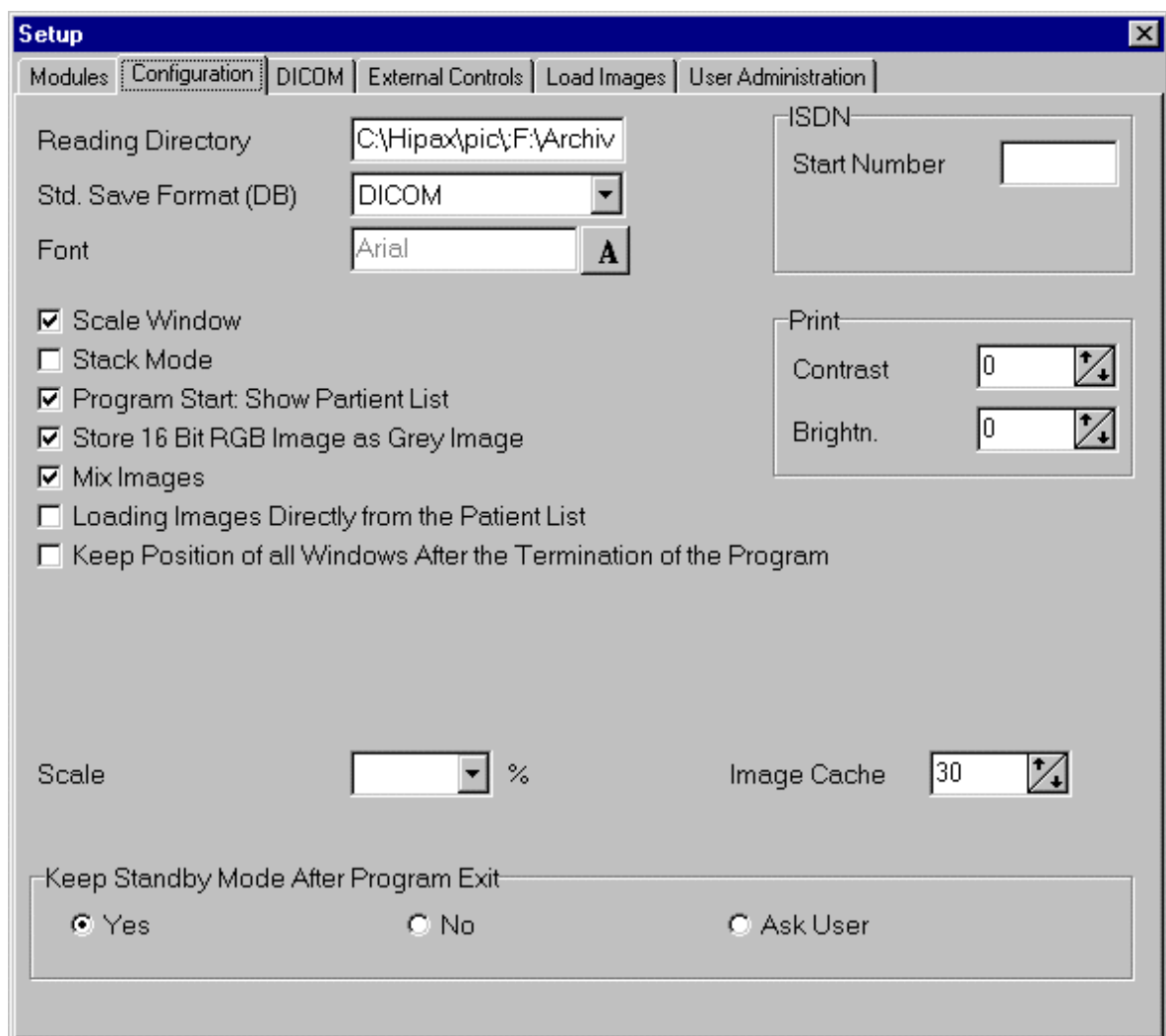
To install additional modules, a new **module key** have to be entered into the edit field "**New Key**". Please contact your Hipax dealer if you want to add new modules. He will then send you the corresponding module key.

After entering the module key, the desired modules can be **activated** using a mouse click on the corresponding checkbox.

The "Modules" menu of the "Setup" window also allows the user to **deactivate rarely used modules**. The module icons disappear from the button bar of the image processing screen as soon as the hooks are removed from the corresponding checkboxes. For example, you can deactivate the measurement button if you do not need to make measurements.

### 14.1.2 General Configuration

General configuration parameters can be adjusted in the setup submenu "Configuration".



#### 14.1.2.1 Reading Directory

The "**Reading Directory**" describes the drive to search **archived images**. It shows the **directory path**, which had been used to store images on an external disk. If several paths are entered, they have to be separated by semicolons (e.g. C:\Hipax\pic\F:\Archiv\) (see also *chapter 9.1.6*).

#### 14.1.2.2 Standard Save Format (DB)

The "**Std. Save Format (DB)**" list can be used to select the standard save format for digitized images. The standard adjustment is DICOM 3 format. Also available are the formats Bitmap, JPEG, PNG, and TIFF.

#### 14.1.2.3 Font

The "**Font**" list offers various font types. The selected font will be used for all texts displayed in Hipax.

#### 14.1.2.4 Scale

Hipax can be used together with a hires (high resolution) graphics card/monitor system or with **multi-monitor systems** (see *chapter 8.9*). The "**Scale**" drop down list field allows to scale the size of the Hipax screen masks and menus using the entered scaling factor. This function prevents the screen masks and menus from becoming too large.

The activation of the checkbox "**Scale Window**" immediately adapts the size of the screen masks to the current screen resolution at the start of Hipax.

#### 14.1.2.5 Stack Mode

If the checkbox "**Stack Mode**" is activated, image series are loaded into the image processing as an image stack (one image behind the other). If the checkbox is deactivated, the series will be loaded in spread mode (all images side by side) (see *chapter 8.8.1*).

**Note:** The "Stack Mode" adjustment in the "Configuration" section is of less priority than the corresponding checkbox in the "Load Images" section (see *chapter 14.1.5*).

#### 14.1.2.6 Program Start: Show Patient List

After activating the checkbox "**Program Start: Show Patient List**", the patient list opens directly after each new start of Hipax (see *chapter 5.1*).

#### 14.1.2.7 Store 16 Bit RGB Image as Grey Image

16 bit RGB images, which have been imported or digitized (e.g. via TWAIN interface), can be stored in RGB format or in 16 bit grey format. To store the images in grey format, please click the checkbox "**Store 16 Bit RGB Image as Grey Image**".



#### 14.1.2.8 Mix Images

The function "**Mix Images**" allows the user to show images of different patients side by side on the screen.

If the checkbox is not active, the screen will be cleaned and all images of a current patient will be closed, as soon as images from a new patient are loaded.

#### 14.1.2.9 Loading Images Directly from the Patient List

Normally, a double mouse click on an entry in the patient list (see *chapter 5.1*) opens the "Image Review" (see *chapter 6.*), where thumbnails of the images of the current patient are displayed side by side.

After setting a hook into the checkbox "**Loading Images directly from the Patient List**", a double mouse click used on an entry in the patient list loads all images of this patient directly into the image processing user interface. The "Image Review" window is not used.

#### 14.1.2.10 Keep Position of all Windows After the Termination of the Program

The size and the position of the different Hipax windows can be kept even after Hipax has been closed and started again. To make this, a hook has to be set into the checkbox "**Keep Position of all Windows After the Termination of the Program**".

#### 14.1.2.11 ISDN Start Number

In some cases, for example after the subsequent installation of a telecommunications system, it could be necessary to add a number to the ISDN numbers as a prefix. This prefix can be defined in the edit box "**ISDN Start Number**". It will be combined automatically with the ISDN numbers in the phone book (see also *chapter 10.4.5*).

#### 14.1.2.12 Print

The "**Print**" settings "Contrast" and "Brightn." can be used to optimize the contrast and the brightness of an image printout automatically.

#### 14.1.2.13 Image Cache

The "**Image Cache**" function can be used for the quick loading of big image series or sequences in the "**Stack Mode**" (see *chapter 14.1.2.5*).

Selecting a small number for "Image Cache", e.g. 30 and activating the "Stack Mode" checkbox, Hipax loads only the first 30 images of the whole series completely. In contrast, only the DICOM header of the rest of the images is loaded immediately.

As a result, the first images of the stack appear immediately, while the rest is loaded step by step, e.g. as soon as the page down function is used or the images are spread on the user interface.

#### 14.1.2.14 Keep Standby Mode after Program Exit

The menu item "**Keep Standby Mode after Program Exit**" contains three radio buttons. If a receipt module (DICOM or ISDN receipt) is installed, you can decide, whether you want to keep the standby mode after you have quit the program ("Yes") or not ("No").

As a result of a hook in the checkbox "**Ask User**", you will be asked every time you terminate Hipax, whether or not you want to hold the standby mode.

### 14.1.3 DICOM Configuration

The "DICOM" menu of the Hipax "Setup" window can be used to make the configuration settings for the modules **DICOM Communication** (see *chapter 11.*) and **DICOM Print** (see *chapter 13.*).

The screenshot shows the 'Setup' window with the 'DICOM' tab selected. The window has a title bar 'Setup' and a menu bar with 'Modules', 'Configuration', 'DICOM', 'External Controls', 'Load Images', and 'User Administration'. The main area contains two sections: 'Receive Images (SCP)' and 'DICOM Print (SCU)'. In the 'Receive Images (SCP)' section, there are checkboxes for 'Auto Start DICOM SCP' (checked) and 'Auto Start DICOM SCU' (unchecked), a 'Stations' button, and input fields for 'AE Title' (Hipax) and 'Port' (104). In the 'DICOM Print (SCU)' section, there is a dropdown menu for 'Standard', and input fields for 'Printer' (Standard), 'Printer AE Title' (LINX), 'Printer Port' (104), and 'Printer Host' (192.168.2.20). Below these fields are buttons for 'Delete', 'New', and 'Layout'. At the bottom center is a 'Save' button.

Section	Option	Value
Receive Images (SCP)	Auto Start DICOM SCP	Checked
	Auto Start DICOM SCU	Unchecked
DICOM Print (SCU)	Standard	Standard
	Printer	Standard
	Printer AE Title	LINX
	Printer Port	104
	Printer Host	192.168.2.20

#### 14.1.3.1 DICOM Communication

Please click on the checkbox "**Auto Start DICOM SCP**" to enable Hipax to **receive** images (see *chapter 11.3.1*).

After activating the "**Auto Start DICOM SCU**" checkbox Hipax is ready to **send** images.

Both checkboxes have to be activated to make a **DICOM query** (see *chapter 11.10*).

After the checkboxes have been activated, the DICOM standby mode is adjusted automatically with each new start of Hipax.

The "**Stations**" button opens a dialogue, where the DICOM stations you want to communicate with can be entered (see also *chapter 11.3.3*).

The "**AE Title**" and the "**Port**" number of "Receive Images (SCP)" are parameters to identify the current Hipax station in a network for receiving images (see *chapters 11.3.2 and 11.9*).

In addition to the adjustments in the DICOM configuration window, the DICOM communication needs an IP address. The IP address will have been determined during the Windows network setup (see also *chapter 11.2*).

Received images will be stored in the database automatically (*chapter 11.9*).

#### 14.1.3.2 DICOM Print

The "**Printer AE Title**", "**Printer Port**", and "**Printer Host**" of the "DICOM Print (SCU)" are necessary to identify a DICOM printer (*chapter 13.1.2*).

The "**Layout**" button opens a file where configuration parameters for the DICOM print can be edited (see *chapter 13.1.3*). Variations in this program should be carried out exclusively by the network service personnel.

#### 14.1.4 External Controls

External controls, e.g. a **foot switch**, can be used to start Hipax functions. This is useful, especially for the video grabbing (see *chapter 7.7.10*), for example with an ultrasonic appliance or an endoscope.

Normally, external controls are attached to the serial interface (COM1 or COM2) of the PC.

In the menu "External Controls" of the "Setup" window different functions can be adjusted after using a mouse click on the checkbox "**Activate External Controls**".

In the "**Switch**" area, two drop down list fields are available to select the functions to be carried through using two buttons:

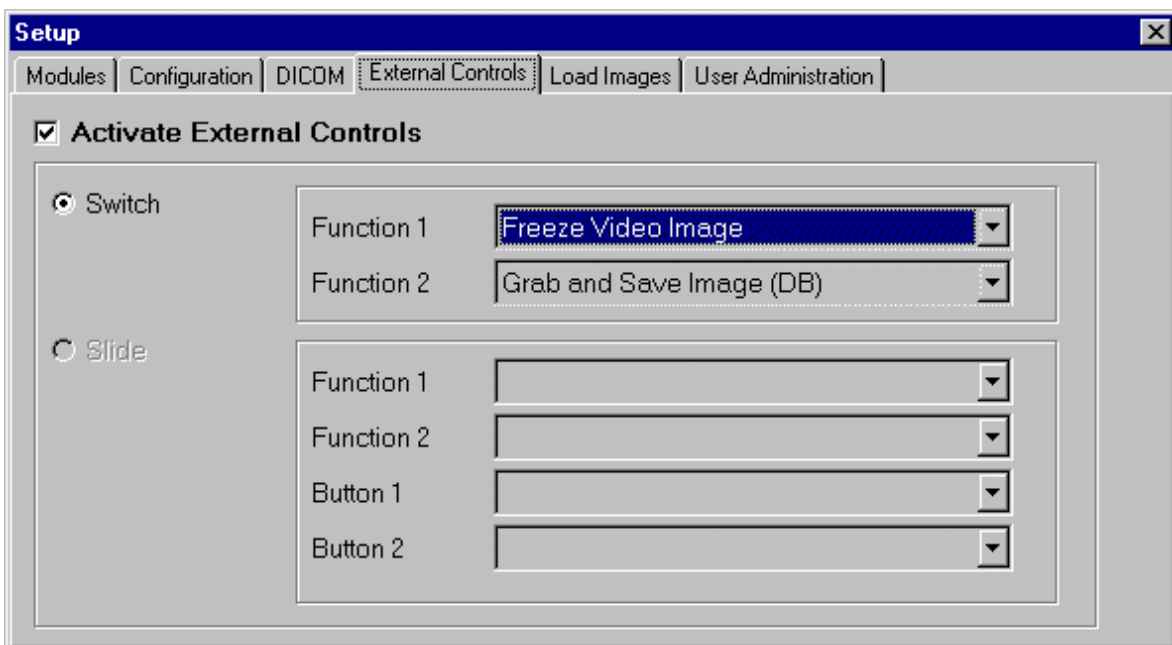
Possible adjustments of "**Function 1**":

- auto mode
- freezing the video image
- grabbing the video image
- saving the image in the database
- grabbing and saving the image

Possible adjustments of "**Function 2**":

- auto mode
- freezing the video image
- grabbing the video image
- saving the image in the database
- grabbing and saving the image in database
- VHS (yellow)/S-VHS (red, black).

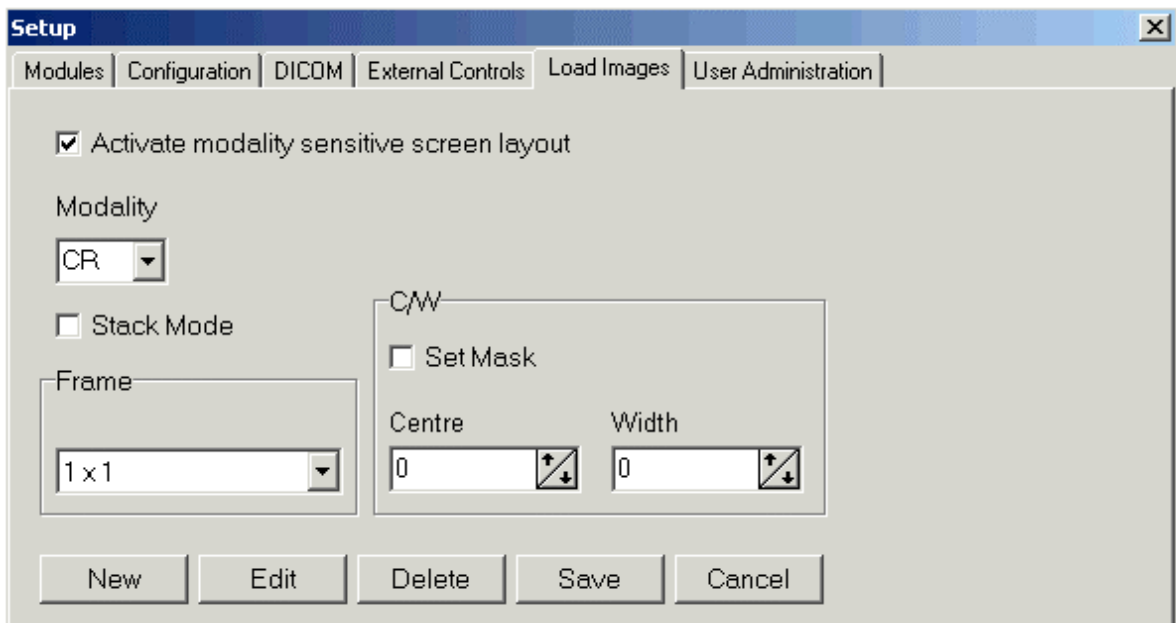
The colours of the cables of the frame grabber card are yellow (VHS), red, and black (S-VHS). This function allows the user to change between two video sources, for example, between an ultrasound appliance and the video camera of an endoscope. In this example, the ultrasound appliance would be connected to the frame grabber card by the VHS cable and the endoscope video camera, which needs a higher image quality, would be connected by the two S-VHS cables.



The configuration in the current example enables the user to display a video image as a still video using button 1 ("Function 1") and to grab and to save the image using button 2 ("Function 2").

### 14.1.5 Load Images

The "Load Images" menu can be used to configure and "Activate the Modality Sensitive Screen Layout". Thus, images can be **loaded automatically in pre-defined layouts**, depending on the modality, where the images have been produced.



The "**New**" or "**Edit**" button have to be used to enter new or change existing entries.

Please select the short cut of the modality from the "**Modality**" edit field, e.g. CT or MRI, or CR, etc.

Using the "**Stack Mode**" you can select, if the images should be loaded in one image stack or side by side in the spread mode.

**Note:** The "Stack Mode" adjustment in the "Load Images" section is of higher priority than the corresponding checkbox in the "Configuration" section (see *chapter 14.1.2.5*).

The number of frames can be selected in the "**Display**" drop down list field, e.g. 1×1, 2×1, 4×4, etc. We recommend, e.g., to display CR images in the 1×1 and CT or MRI images in the 3×3 mode.

The desired values of window centre and window width for the current modality can be entered manually into the "**C/W**" area. However, the function is only used if the "**Set Mask**" checkbox has been activated.

The entries can be saved using the "**Save**" button. The "**Delete**" button deletes the current entries.

To use the automatic layout function, the checkbox "**Modality Sensitive Screen Layout**" has to be activated.

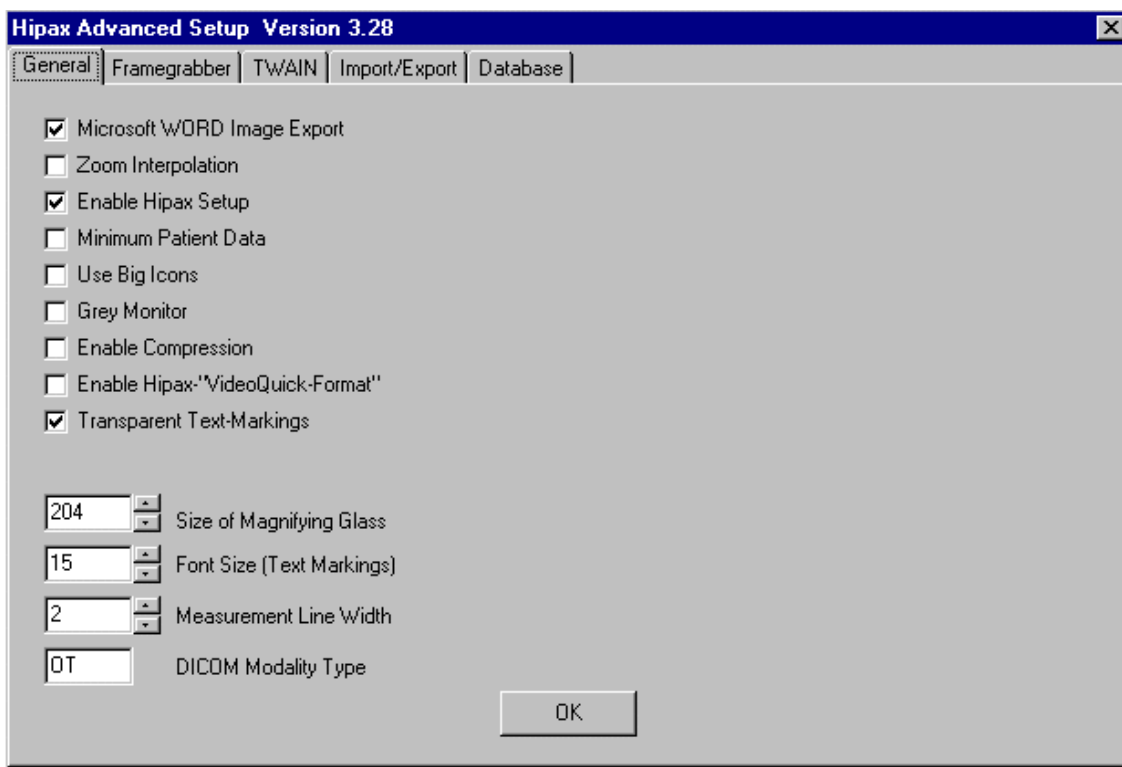
### 14.1.6 User Administration

The **User Administration** is described in *chapter 15*.

## 14.2 Setup.exe File

The Hipax program *Setup.exe* is located in the subdirectory *\Hipax\prg*. Important basic configurations for Hipax can be carried out here. A double mouse click on *\Hipax\prg\Setup.exe* opens the interface of the program ("Hipax Advanced Setup").

### 14.2.1 General Configurations



In the submenu "General", different functions of Hipax can be configured:

#### 14.2.1.1 Microsoft WORD Image Export

Simply by clicking on one icon, images can be transferred from the image processing user interface of Hipax to Word. This function can be used, for example to integrate images into a result letter. In order to save memory, the images are not saved in the Word file but remain in Hipax.

Clicking on the check box "**Microsoft WORD Image Export**" activates the function. Hipax then has to be started again. As a result, the menu item "Send to Word" can be found in the pop-up menu that opens by clicking the right mouse button on the "Tools" box of the button bar. After the menu item has

been activated using a mouse click, the corresponding button appears in the "Tools" box of the button bar (see *chapter 4.4.5*):



Please click on this button to transfer all images loaded to MS Word.

#### 14.2.1.2 Zoom Interpolation

The sharpness of magnified images is adapted automatically if the "**Zoom Interpolation**" check box is activated. Calculating grey scales between black and white pixels carries out the interpolation. As a result, the contours appear softer. The zoom function is described in *chapter 4.4.3*.

#### 14.2.1.3 Enable Hipax Setup

Deactivating "**Enable Hipax Setup**" function, users can be prevented from accessing the setup menu of Hipax (disable Hipax Setup) (see *chapter 14.1*).

#### 14.2.1.4 Minimum Patient Data

If "**Minimum Patient Data**" function is activated, at least the following patient data have to be entered when a new patient folder is created: surname, patient ID, and sex (see *chapter 5.3*).

The new patient folder cannot be saved before these data are entered. This prevents that images are related to an empty patient folder.

#### 14.2.1.5 Use Big Icons

On big screens, the buttons of the button bar often appear much too small. Activating the check box "**Use Big Icons**", the edge length of the buttons are doubled. As a result, the icons are increased by factor 4 (see *chapter 4.4.1.1*).

#### 14.2.1.6 Grey Monitor

Different functions of Hipax are distinguishable by coloured marks. For example active and selected images are given in frames of different **colours**. These marks cannot be distinguished on grey monitors.

For this reason, Hipax offers the possibility to switch over to **grey monitors**. In the "**Image Review**" window of Hipax, marked image icons now are framed by a good visible, broad white margin (see *chapter 6.2.4*).

Using the "Grey Monitor" mode in the **image processing user interface**, active images are framed by a white margin, selected images by a grey and inactive images by a black margin (see *chapter 4.3.1*). On the splitted screen, the active half of the screen carries a grey bar at its lower margin instead of a red bar (see *chapters 8.8.1* and *8.9.4*).

#### 14.2.1.7 Enable Compression

To save memory, images can be lossless compressed – automatically or manually – using the program *ImaComp.exe* of Hipax. The compression factor is about two. To use the compression program, the check box "**Enable Compression**" must be activated in the *Ima.exe*, which is described here. Please find the detailed explanation of the *ImaComp.exe* in the configuration instructions "Hipax Configuration: ImaComp.exe".

**Note:** The *ImaComp.exe* file is part of the Hipax tools box to be purchased separately.

#### 14.2.1.8 Enable Hipax "VideoQuick-Format"

Hipax offers the possibility to import memory intensive image sequences (especially cardiac sequences) from **DICOMDIR CDs** (see *chapter 7.9.6*). The sequences are stored on the hard disk and can be started at once without loading time. Sequences, which can be started at once without loading time are stored unpacked on the hard disk and therefore need a lot of hard disk storage.

Images are imported in standard DICOM format instead of the direct start format, if the check box "**Enable Hipax 'VideoQuick-Format'**" is not active.

#### 14.2.1.9 Transparent Text Markings

After the check box "Transparent Text Markings" is activated, **measurement values** or texts, which have been entered using the Hipax function "Measurements" (see *chapter 8.6*) appear in **white fonts with black shades**. If the check box is not activated, entries are given in black fonts on white background.

*Chapter 8.7.2* describes how texts can be entered into an image.

#### 14.2.1.10 Size of Magnifying Glass

On the Hipax image processing user interface, the magnifying glass is available to magnify a small image area quickly. As long as the right mouse button is pressed, the area around the mouse cursor appears magnified.

The **size of the magnifying glass** can be adjusted by clicking on the arrows besides the edit box "Size of Magnifying Glass", or by inserting a value manually. The size of the magnifying glass is given in pixels. This function can be useful for big screens.



#### 14.2.1.11 Font Size (Text Markings)

The **size of the text elements entered** in the Hipax menu "**Measurements**" can be adjusted here (see *chapters 8.6 and 8.7.2*). This function is usually needed for big screens.

#### 14.2.1.12 Measurement Line Width

The **width of measurement lines** also can be chosen independently. The values are given in pixels (see *chapter 8.6*).

#### 14.2.1.13 DICOM Modality Type

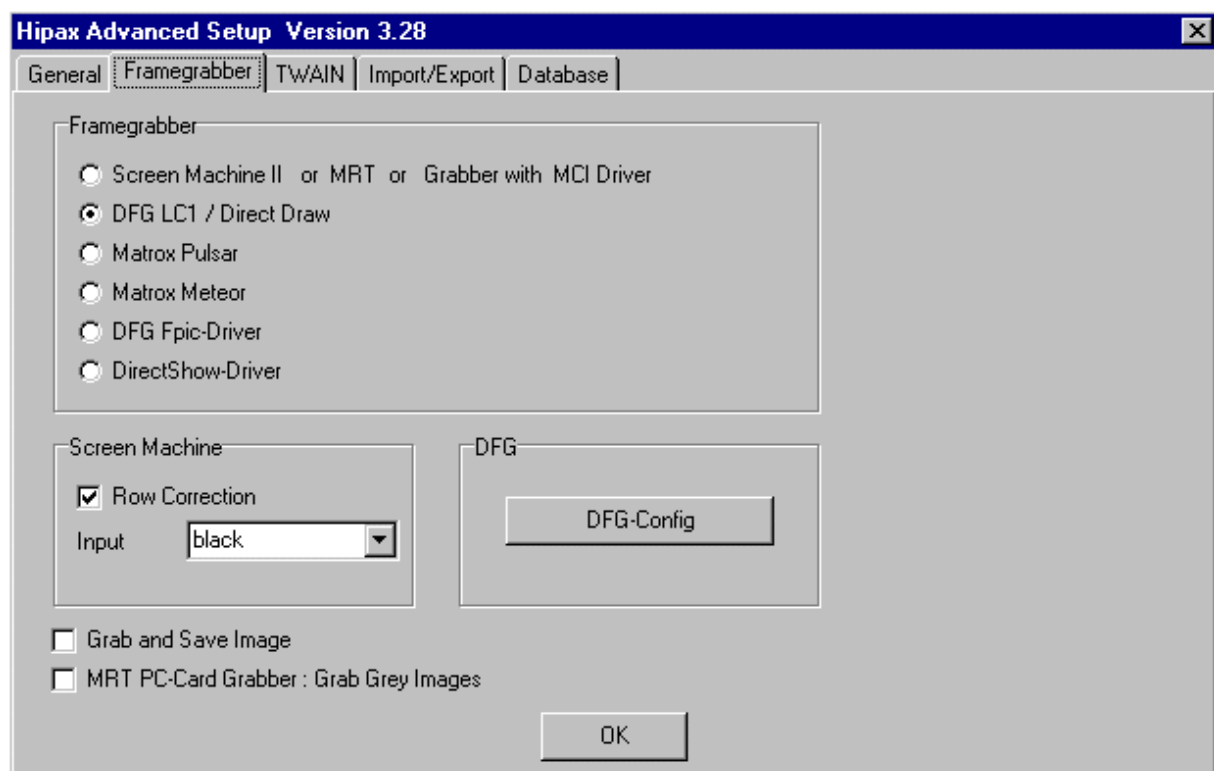
Please adjust here, from which **modality the images are coming**. As a result, the short cut is added to the DICOM header automatically.

Standard adjustments are:

- SC (Secondary Capture; copy of an X-ray film, which has been digitized by scanning)
- CR (Computed Radiography; original data coming from a digital X-ray apparatus, e.g. Lumisys)
- US (Ultrasound)
- OT (Other Type)

### 14.2.2 Video Grabbing

The menu "**Frame Grabber**" contains functions to digitize video images.



#### 14.2.2.1 Frame Grabber

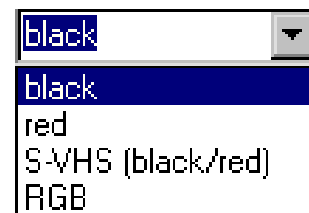
The type of the installed frame grabber card has to be marked in the field "**Frame Grabber**".

- Screen Machine II, MRT, or any other frame grabber card with MCI driver
- DFG LC1 (requires an Direct Draw driver) (see *chapter 7.7*)
- Matrox Pulsar
- Matrox Meteor II (Standard, Multi Channel, or Digital) (see *chapter 7.6*)
- DFG Fpic-Driver (requires the standard BT8 chipset driver)
- DirectShow-Driver (supports different standard frame grabbers for Windows) (see *chapter 7.6*)

#### 14.2.2.2 Screen Machine

The Hipax *Setup.exe* offers the possibility to make special adjustments for the frame grabber card **Screen Machine** of Fast.

- Activating the check box "**Row Correction**", video images are interpolated automatically when they are digitized. As a result, the sharpness of the images can be increased or also decreased, depending on the video source.
- The video source can be chosen in the "**Input**" list. Here, the cable colours of the Screen Machine (black, red) and the video signals are listed, to identify the video source.



#### 14.2.2.3 DFG

The "**DFG-Config**" button starts a **configuration program** *Video.exe* of the DFG LC1 and DFG LC2 frame grabber. In this program, different adjustments can be made (see *chapter 7.7.3*).

#### 14.2.2.4 Grab and Save Image

After the "**Grab and Save Image**" check box has been activated, video images are digitized and shown in Hipax and saved in the selected patient folder using the foot switch or the space bar. As a result, all digitized images are **stored** in the database **automatically**.

The video images are only loaded into Hipax but not saved, if this function is **not activated**. The grabbed images then have to be **saved manually**. This allows users only to save selected images.

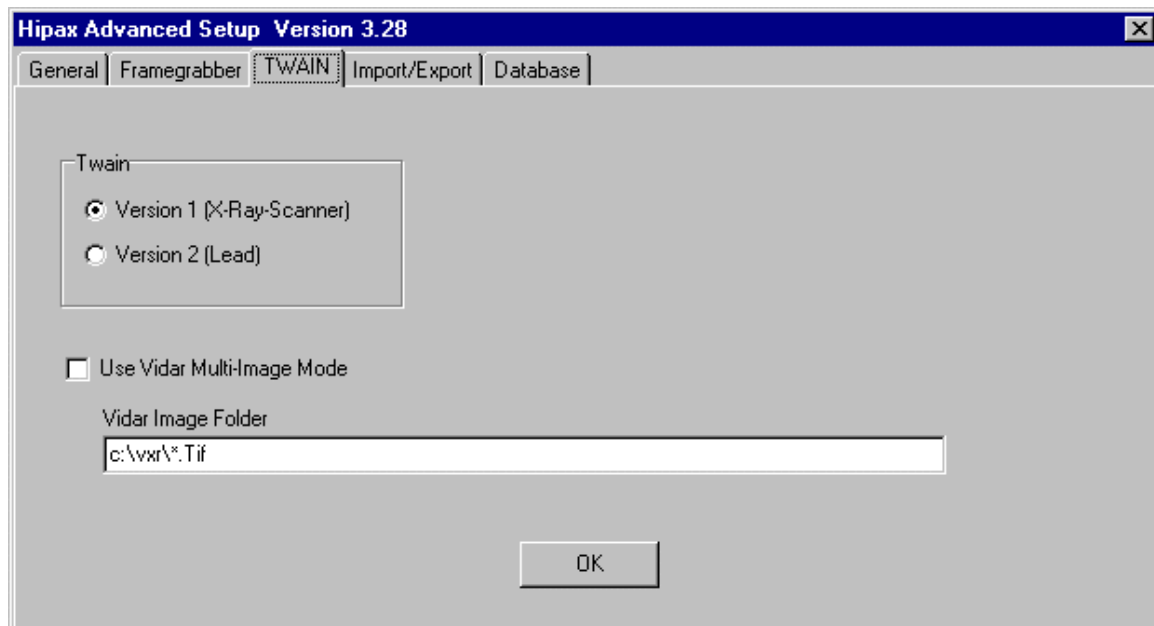
**Note:** The duration of the digitizing process extends by about 50% when the images are saved at the same time.

#### 14.2.2.5 MRT PC Card Grabber: Grab Grey Images

The **MRT PC Card Grabber** function is available for all **frame grabber cards with MCI driver** (e.g. Screen Machine II, MRT): After the activation of the check box, all digitized 24 bit images – also colour images – are converted to 8 bit grey images. Using this function can save a lot of memory.

### 14.2.3 TWAIN

Two different presets are available to digitize images using a TWAIN interface.



#### 14.2.3.1 Version 1 (Standard, X-ray Scanner)

**Version 1** should be activated to digitize X-rays using an **X-ray scanner**. This option allows users to generate 10 or 12 bit grey images. Each image is digitized individually. Therefore, the TWAIN source has to be newly started after each digitizing process.

#### 14.2.3.2 Version 2 (Lead)

**Version 2** is suitable for all **remaining TWAIN sources** (e.g. still video camera, slide scanner, document scanner, even video grabbing using an MRT frame grabber card.) This option allows users to digitize several images at once without starting the TWAIN source for each single image.

The following *chapters 14.2.3.3* and *14.2.3.4* are only of interest, if a **Vidar** digitizer should not be driven directly via ActiveX but **using a TWAIN driver**.

#### 14.2.3.3 Vidar Multi-Image Mode

Activating this checkbox enables the Vidar digitizer to scan image **batches**.

#### 14.2.3.4 Vidar Image Folder

The **directory path**, where the digitized images are to be stored temporary as TIFF files can be entered here.

#### 14.2.3.5 OK

Clicking the "**OK**" button **saves** the new adjustments. The user interface of the *Setup.exe* is closed automatically.

### 14.2.4 Import/Export

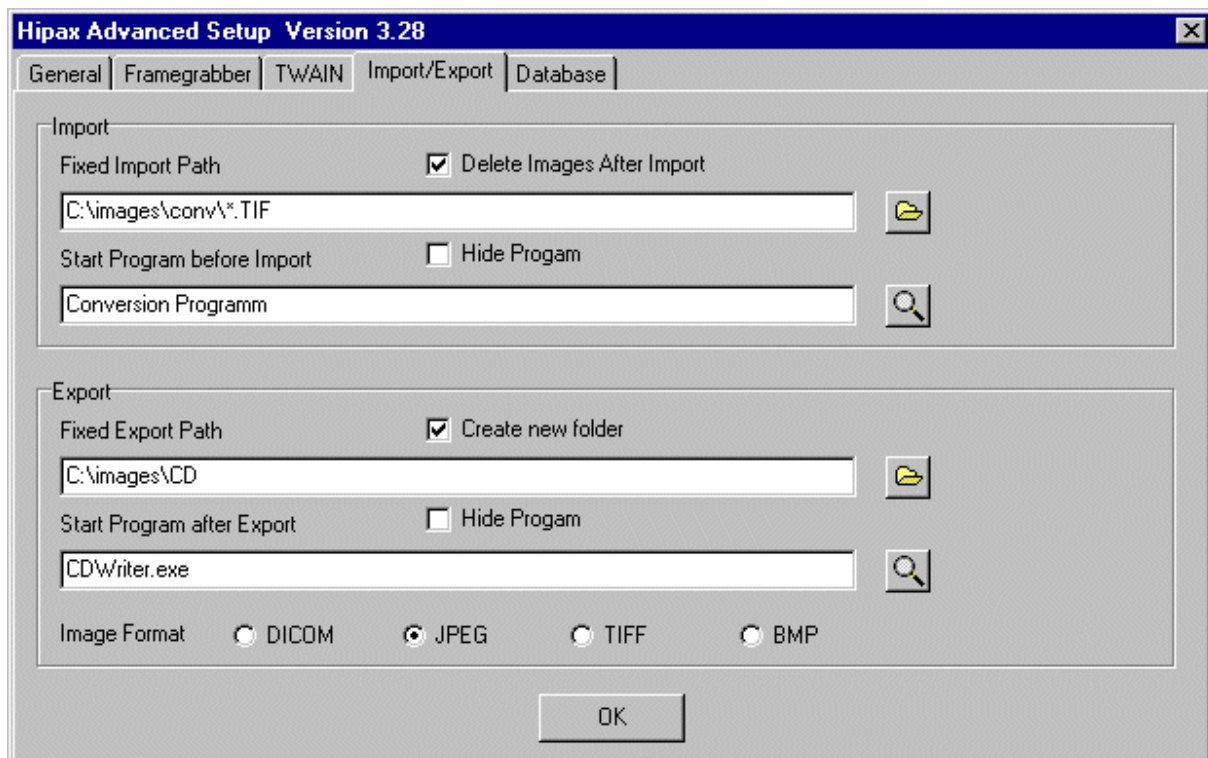
Different presets to speed up significantly the image import and export can be made in this submenu. The presets have an effect on the following buttons in the "Tools" box of the button bar:



Image **import** (see *chapter 4.6.1.4*)



Image **export** (see *chapter 4.6.1.3*)



In our example, images can be converted into TIFF format, imported to Hipax, exported to another directory as a JPEG file and written on a CD – all that by clicking on two buttons.

#### 14.2.4.1 Fixed Import Path

Normally, the button "Image import" in the "Tools" box of the button bar as well as the function "Image import" in the main menu opens the dialogue box "Load Images". This step can be switched off by configuration of the submenu "Import" in the *Setup.exe*.



Using this button besides the "**Fixed Import Path**" edit field of the *Setup.exe* file, a dialogue opens, where the import path can be selected. Another possibility is to enter the import path manually into the edit field.

**Note:** The import directory can contain files (e.g. text files), which cannot be recognized by Hipax. In this case, a hint to the file format, which has to be imported, should be entered into the edit field "Fixed Import Path" (e.g. \\*.TIF or \\*.JPG).

After entering the import path, Hipax can be started again.



Using this button in the Hipax user interface, all images located in the corresponding import directory are imported automatically to Hipax.

Imported images (even those in PC formats) can be saved in DICOM format. The storage has to be made manually.

#### 14.2.4.2 Delete Images after Import

After activation of this check box, the images are deleted automatically from the import directory as soon as they have been imported to Hipax.

#### 14.2.4.3 Start Program before Import

A program (e.g. conversion program or image donor program), which should be started before the images are imported to Hipax, can be entered into the edit field "**Start Program before Import**". In this way, for example any image donor can be connected to Hipax. Then, the directory where the digitized images are to be stored (=import directory) can be set in the image donor program.

Normally, several steps are to be carried out to transfer an image from an image donor program or a conversion program to Hipax. As a result of the described entries, a lot of time can be saved: images are transferred from the donor program to Hipax using only one mouse click.



The image donor program or the conversion program can be entered manually into the edit field "Start Program before Import", or selected in the dialogue box which opens using a single mouse click on the button.

#### 14.2.4.4 Import: Hide Program

The user interface of some **image donor or conversion programs** are very simple (e.g. only a DOS box as a user interface). The *Hipax Setup.exe* offers the possibility to **hide the interface of such a program**. After a mouse click into the check box "**Hide Program**", the Hipax user interface remains on the screen while the images are converted or adopted from an image donor program. Only the hourglass shows that the process is going on. After the procedure is finished, the imported images appear on the Screen.

#### 14.2.4.5 Fixed Export Path



The export path can be selected from a dialogue after clicking on this button besides the "**Fixed Export Path**" edit field. The export path can also be entered manually into the edit field.

After an export path has been entered, Hipax can be started again.



Click on this button in the Hipax user interface, to store all images currently loaded to Hipax in the selected export directory.

#### 14.2.4.6 Create New Folder

A **subdirectory for each patient** is created automatically in the export directory, if this function is activated. The name of the subdirectory is generated using the patient ID. Subsequently exported images of the same patient will be added automatically to this subdirectory. Apart from the exported images, the subdirectory of each patient also contains the patient data.

In this way, DICOM images can be stored space-saving, for example in JPEG format to archive images, or to draw up a teaching collection.

Requirements:

- On Hipax level, images must be given in DICOM format.
- For naming the new folder, the patient data must contain a patient ID.

#### 14.2.4.7 Start Program after Export

A **program to be opened after the image export process is finished** can be entered here. Thus, any program for the further processing of the image data can be linked (e.g. conversion programs, programs of CD writers, telecommunication programs).



The name of the program can be entered manually into the edit field "**Start Program after Export**", or selected in the dialogue box which opens using a single mouse click on this button besides the edit field:

#### 14.2.4.8 Export: Hide Program

Some programs have a quite simple user interface (e.g. only a DOS box). The *Hipax Setup.exe* offers the possibility to hide programs using a mouse click into the check box "**Export: Hide Program**". As a result, the Hipax user interface remains on the screen while the images are processed by the hidden program. Only the hourglass shows that the process is going on.

#### 14.2.4.9 Image Format

Please select here the **format of the image** to be exported: DICOM, JPEG, TIFF, or Bitmap.

### 14.2.5. Database

The submenu "Database", **additional patient databases** can be created, and already created databases can be selected.

The screenshot shows the 'Database' tab of the 'Hipax Advanced Setup Version 3.28' window. The window has a menu bar with 'General', 'Framegrabber', 'TWAIN', 'Import/Export', and 'Database'. The 'Database' tab is active. It contains the following fields and controls:

- Available Databases:** A dropdown menu.
- "Delete" Password:** A text input field.
- Database Privilege:** A dropdown menu with 'All' selected.
- DB Name:** A text input field containing 'Server'.
- DB Alias:** A text input field containing 'Server'.
- PIC - Path:** A text input field containing 'f:\hipax\pic'.
- SMALLPIC - Path:** A text input field containing 'f:\hipax\SmallPic'.
- DB - Path:** A text input field containing 'f:\hipax\db'.
- Buttons:** 'New', 'Edit', 'Save', and 'OK' buttons are located at the bottom.

**Note:** The folders for the new database have to be created manually using the Windows Explorer.

The **configuration** can be made using the file *db.ini* in the directory *\Hipax\prg\*.

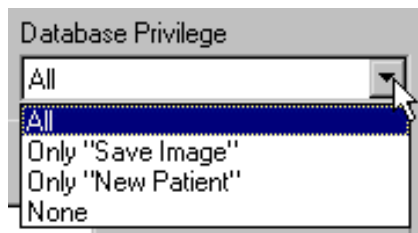
#### 14.2.5.1 Available Databases

Already existing Databases can be selected in the "**Available Database**" list. The original database given by Hipax is entered as "Standard".

#### 14.2.5.2 "Delete" Password

After making an entry into the **"Delete" Password** edit field, a password is needed to delete images or patients from the Hipax database.

#### 14.2.5.3 Database Privilege



The list "Database Privilege" offers different restrictions for Hipax users. The selected restriction applies to the currently selected database.

- **All:** All the actions supported by Hipax can be carried out (e.g. creating a new patient folder, deleting patient folders, saving images, image processing, archiving – if the archive module is installed).
- **Only "Save Image":** With this restriction, the user is only authorized to save image data in patient folders that already have been created.
- **Only "New Patient":** The user is only authorized to create new patient folders.
- **None:** The user can open patient folders and view and process images, but he is not authorized to save his actions (pure viewer station).

Using the following edit fields and buttons, **additional databases can be created or processed**.

#### 14.2.5.4 New

To create a new database, please click first on the **"New"** button. The cursor then jumps automatically into the edit field "DB-Name".

#### 14.2.5.5 DB Name

The **database name** is given individually (e.g. "Server"). This name will later be shown in the patient list of Hipax (see *chapter 5.1*). It helps the user to select the database.



#### 14.2.5.6 DB Alias

The alias is the internal name of the database in the database configuration and is also given individually (e.g. Server). The alias helps the Paradox database machine, which hides behind the system, to identify the database.

**Note:** The creation of the following directories in the new database is obligatory: `\Hipax\pic\`, `\Hipax\smallpic\`, `\Hipax\db\`.

#### 14.2.5.7 PIC-Path

The path of the `\Hipax\pic\` directory is entered into this edit field. As a result, Hipax automatically saves the images in the `\Hipax\pic\` directory.

#### 14.2.5.8 SMALLPIC-Path

The path of the `\Hipax\smallpic\` directory of the new database is entered here. The image thumbnails of the Hipax "Image Review" window are then stored automatically in this directory.

#### 14.2.5.9 DB-Path

The path of the `\Hipax\db\` directory of the new database is entered in this edit field. As a result, all patient data are saved in this `\Hipax\db\` directory, if the corresponding database has been selected.

The *db* directory must contain the Hipax database files! These files can be copied from the subdirectory `\Hipax\db\empty` to the *db* directory of the new database.

**Note:** Holders of older Hipax versions are recommended to copy all files of the directory `\Hipax\db` into the new *db* directory. Apart from the Hipax database files, the directory `\Hipax\db` also contains all data of patients, which already have been stored in the original database. These patients have to be manually deleted from the new database in Hipax before the new database can be put into operation.

**Attention!** To prevent the lost of all patient folders, please make sure that you are currently in the new database, before deleting all data from the patient list.

#### 14.2.5.10 Save

Clicking on the "**Save**" button saves the entries for the new database.

#### 14.2.5.11 Edit

Please click on the "**Edit**" button to edit an additional database that already has been created. The new entries are also saved using the "Save" button.

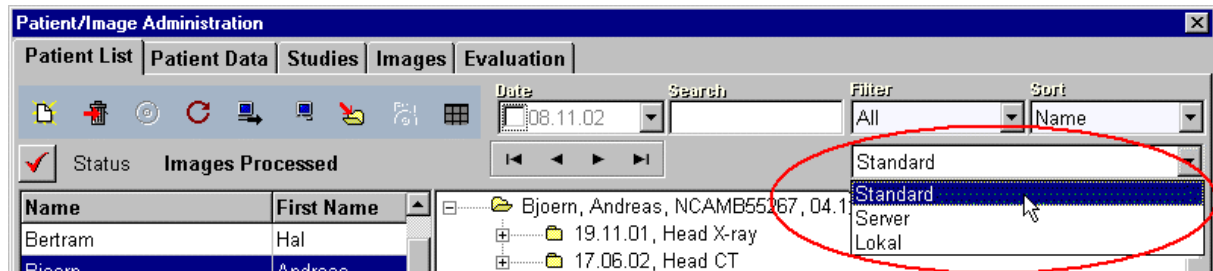
#### 14.2.5.12 OK

The "OK" button closes the program *Setup.exe*.

### 14.2.6 Multiple Database

#### 14.2.6.1 Working with the Multiple Database

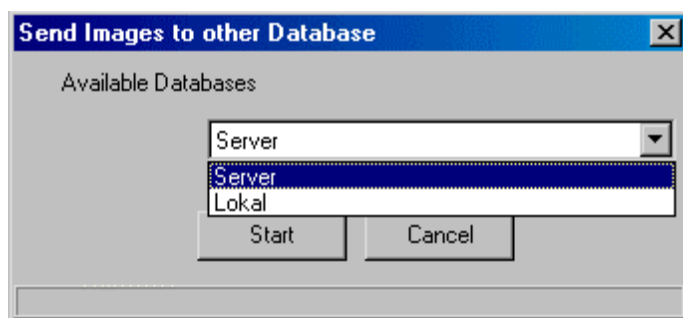
The created databases can be selected in the Hipax patient list (*chapter 5.1*).



The list of databases is only visible if more than one database has been installed.



Images and data of a patient can be transferred to another database using this button. It opens the dialogue "Transfer images to another database".



#### 14.2.6.2 Example for the Use of the Multiple Database

Images are digitized using a mobile PC connected to a mobile image donor. Normally, the mobile PC is not connected to the net at any operating place. Therefore, the images are first saved on the local hard disk:

The mobile PC can be connected to the network in order to transfer the image data to the server. The patients are marked in the patient list.



This button opens the dialogue: "Transfer images to another database" where the database of the server can be chosen.

As a result, all images of the selected patients are transferred to the server. The data copies remain in the local database of the PC and have to be deleted manually.

**Note:** A PC, which has been integrated into a network, can be configured using the Hipax program *Network.exe* in this way, that not the server but the hard disk of the PC is accessed when the PC is started.

### 14.3 Saving Important Hipax Files

Hipax folders, which contain individual data, have to be backed up from time to time. The backup has also to be made before additional Hipax software is subsequently installed (update). This is important in order to avoid the loss of patient and image data.

The folders concerned are:

- *\Hipax\db\* containing all patient data
- *\Hipax\pic\* containing the images
- *\Hipax\smallpic\* containing the thumbnails of the image review

**Note:** Do not install a completely new version of Hipax before the older version of Hipax has been **de-installed**.

After the installation of the software update, the three previously saved folders can be copied back into the Hipax directory.

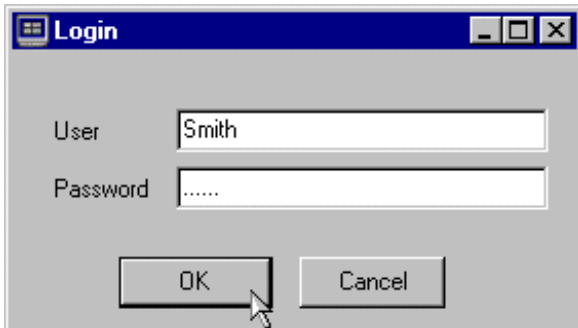


---

## **CHAPTER 15: USER ADMINISTRATION**

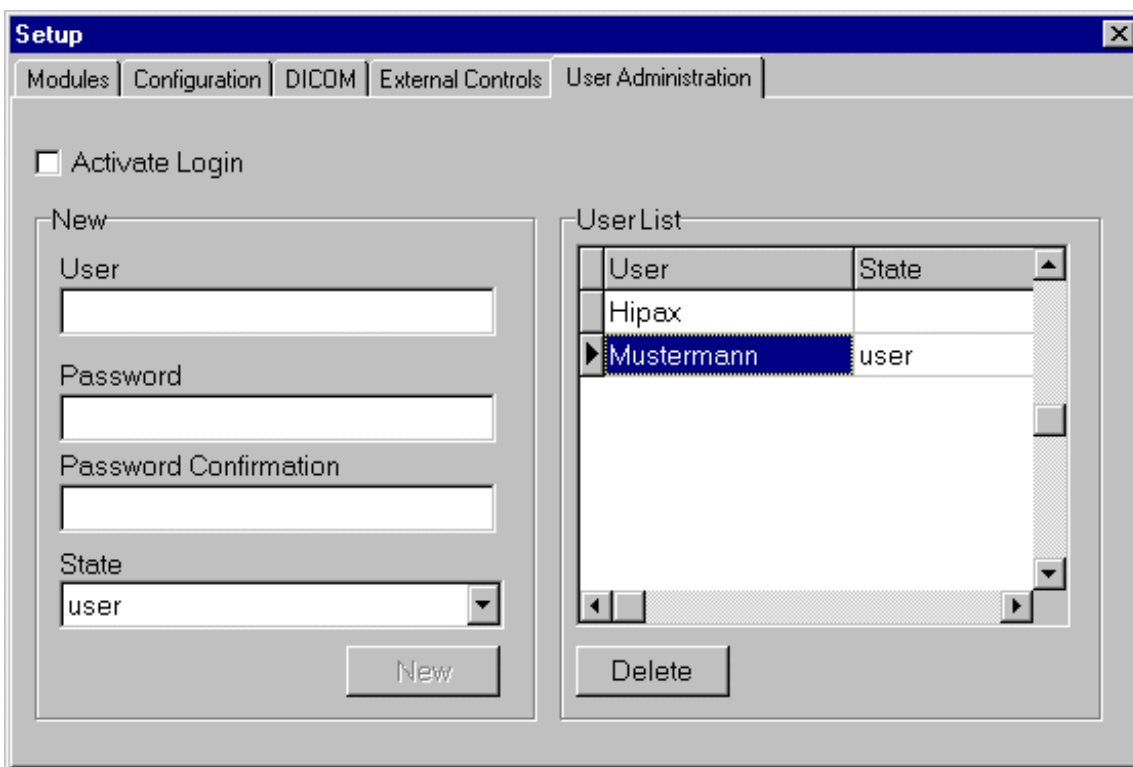
## 15.1 General Information

Optionally a login procedure can be activated. This procedure takes place when the application starts or the Hipax setup functions have to be changed. As a result, the following login dialogue appears at the start of Hipax.



**Note:** After the installation of Hipax on the PC the user name is "Hipax". A password has not to be entered.

Please find the administration of the users in the submenu "User Administration" of the Hipax setup. A login must be entered to open the user administration. The standard adjustment is "Hipax" with no password.



Please click the checkbox "Activate Login" if you want to use the login procedure. In the standard adjustment of Hipax, the login is not active.

New users can be added to the list, edited or deleted. Each user has to enter a user name and a password. Furthermore there are two different states of users available: the administrator and the user.

## 15.2 Administrator

The "Administrator" has authorizations to all processing and access. He can open the user administration and define new users or delete users. Moreover, the setup of the image processing only can be opened by the administrator, if the checkbox "Activate Login" is activated.

## 15.3 User

The "User" also has authorizations to all processing and access, but he cannot open the user administration. If the "Activate Login" is activated, the user has no access authorization to the Hipax setup.

**Note:** The inserted user name "Hipax" can be replaced by an individual user name. After "Hipax" is deleted, it is necessary to enter a password at each start of the program.



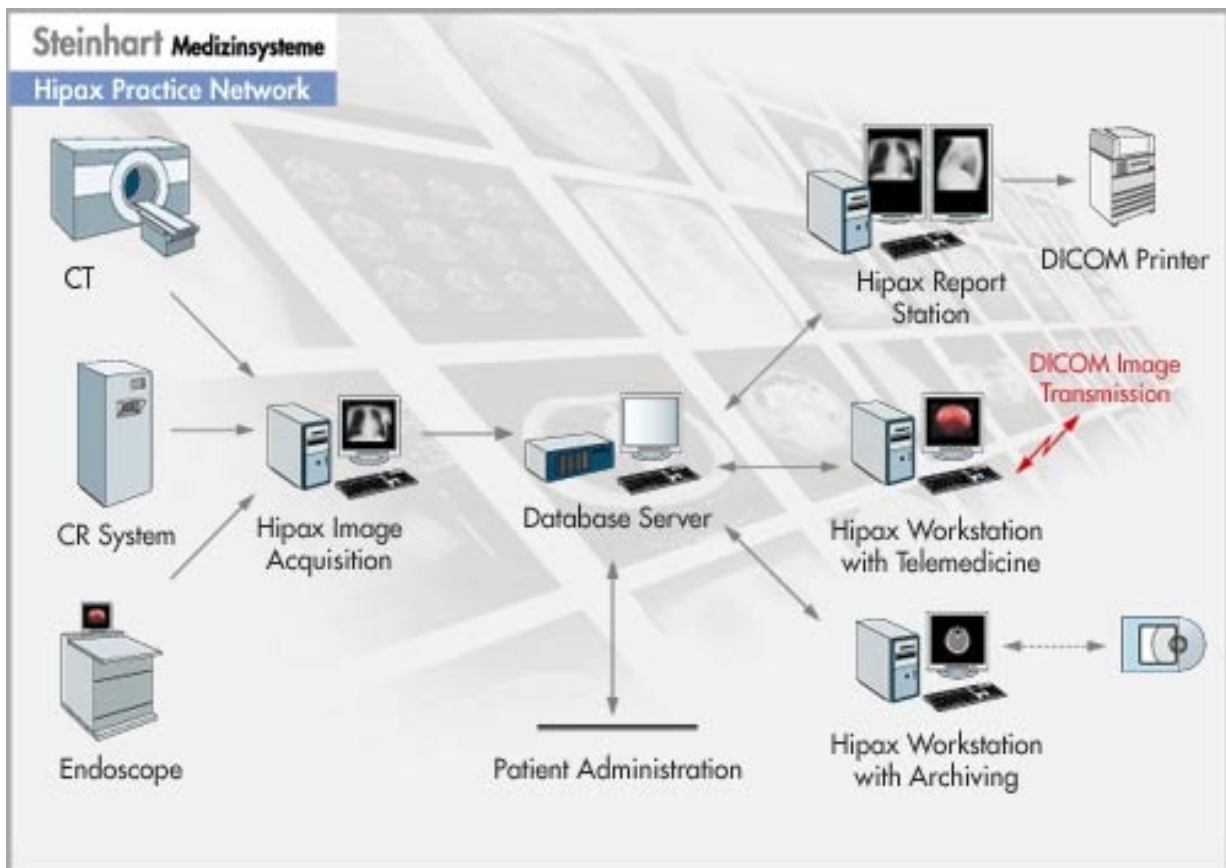


## **CHAPTER 16: NETWORK CONFIGURATION**

## 16.1 Configuration of the Small Network for Consultants

A network configuration enables the single Hipax workstations to access to the images on a central hard disk (server). In the most simple case, the server is a PC, which has opened its hard disk to the other clients (file server).

**Note:** This simple solution can **only** be used **for small networks** with up to three or four clients. For bigger systems we recommend to use the Hipax Server software.



## 16.2 Installing the Small Network

### 16.2.1 Release the Hard Disk

To release the hard disk use the Windows Explorer menu item "Sharing", which appears after clicking on the right mouse button on the hard disk letter (e.g. C:\). The other clients are then connected to the released hard disk by the command "Map Network Drive" (Windows Explorer, main menu, menu item "Tools").

### 16.2.2 Hipax Installation

The Hipax installation on the clients can be in the same way as for single user versions. To make this, Hipax has to be installed on the local hard disks. An own series number should be used for each workstation.

### 16.2.3 Setup of the Server

Three directories have to be created manually on the server: (1) one directory for the **database files**, (2) one directory for the **images**, and (3) one directory for the **thumbnails** (smallpics) to be shown in the "Image Review" window of Hipax. The directories can be called by any name and located on different servers (e.g. with the database and images separated). To prevent confusion, we recommend calling the directories as follows (e.g. using the network drive *F:*):

1. *F:\Hipax\db* for the database data
2. *F:\Hipax\pic* for the images
3. *F:\Hipax\smallpic* for the thumbnails in the "Image Review" window

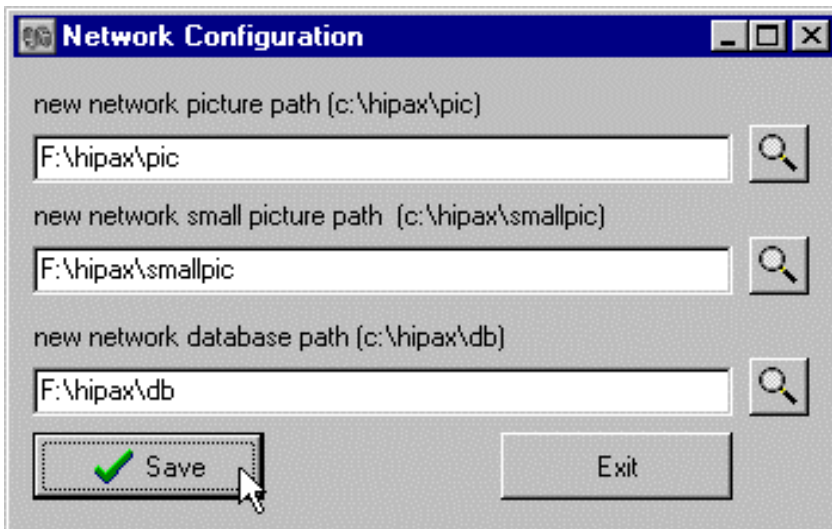
The database data have to be copied manually onto the db-directory. To make this, the db directory of any of the Hipax clients can be used. The directories pic and smallpic need only to be copied if there are images to be used in the network that have already been created on a local PC.

**Note:** If a Hipax client is used as the server (by releasing its hard disk), the directories do not have to be newly created. In this case, the already existing directories can be used.

**Note:** Images and patient data of several workstations cannot be mixed.

### 16.2.4 Configuration of the Workstations

The three network paths have to be introduced to each Hipax client by making the necessary entries in the registry. This can be made using the Hipax program *Network.exe*, which is located in the directory *\Hipax\prg\*. Starting the *Network.exe* opens the window "Network Configuration".



Here, the directory paths of the central database can be entered **manually**.



These buttons open a dialogue, where the desired network paths can be selected.

The entries are saved by clicking on the "**Save**" button.

The "Network Configuration" window is closed using the "**Exit**" button.

### 16.2.5 Example for the Simple Connection of Two PCs

Both PCs are installed with Hipax. The standard paths (*C:\Hipax\*) should be used with both PCs. The PC A is to be the server. PC B is to have access to the images of PC A.

PC A and PC B are connected by a point to point connection (a simple cable connection between the both network cards).

To **release the hard disk** of PC A, use the Windows Explorer. Click the right mouse button on "C:" - menu item "Sharing". PC A now releases its hard disk C:\. The **connection** between PC A and PC B can then be made using the main menu of the Windows Explorer: "Tools" - "Map Network Drive". Thus, the hard disk C:\ of PC A can become, for example, the hard disk E:\ of PC B.

Finally, the Hipax configuration of PC B can be changed to enable Hipax to search the database directly on drive E:\ or PC A, respectively. To make this, start the Hipax program *Network.exe* should be started on PC B, directory *\Hipax\prg\* and enter the new directory paths:

*E:\Hipax\db* for the database

*E:\Hipax\pic* for the images

*E:\Hipax\smallpic* for the thumbnails in the "Image Review" window

From now on, all images created or imported on PC B are saved automatically on PC A.

### 16.2.6 Using the File Server as a Hipax Client

The file server should ideally not be used as a client at the same time. Nevertheless, this might be the case, if there are not enough PCs available. Please note that this system is less stable than a Hipax network using a pure file server.

To prevent index faults in the database tables, it is necessary to adjust the database configuration. To make this, the program *BDEAdmin.exe* should be started. It is usually located in: *Program Files – Borland – Common – Files – Bde*. Set "Local Share = True" in "Configuration" – "Init".

We recommend never to switch off the file server PC. Otherwise database errors can occur.

## 16.3 Important Notes

To prevent mistakes in the functioning of the clients, we recommend **not switching off** the computer which is used as the server. The server should ideally not be used as the workstation but only used for the administration of the image data.

If a server is also used as a client, it is necessary to adjust the database configuration, or index faults in the database tables would occur. To make this adjustment in the database, the program *BDEAdmin.exe* should be started which is usually located in *Program Files - Borland - Common - Files - Bde* and set "Local Share = True" in "Configuration" - "Init".



# INDEX

---

## I

$1 \times 1, 2 \times 2$ , etc. · 59  
 1 to 1 · 43, 57  
 16 Bit Filter · 95, 96, 100, 154  
 16 Bit Grey Resolution · 140  
 16 Bit RGB Image · 246  
 1TR6 · 196

---

## 8

8 Bit Grey Image from RGB image · 130  
 8 Bit Grey Resolution · 140

---

## A

About · 61  
 ACR-2000 · 94  
 Activating Monitors · 168  
 Activation of Modules · 24  
 Active Configuration · 109  
 Active X · 103  
 Add new Patient · 55  
 Administrator · 269  
 All · 57  
 Angle · 158  
 Animation in a Presentaion · 172  
 Animation Speed · 163  
 Anonymize · 177  
 Anonymous · 52  
 Archive Label Print · 182  
 Archive Media Created by a Robot · 191  
 Archive/Image Review · 92  
 Archiving Media · 184  
 Archiving System · 180  
 Area Measurement · 156  
 Ascribing Archived Images · 184  
 Authorization · 269  
 Auto Button · 141  
 Auto Start DICOM SCP · 214, 249  
 Auto Start DICOM SCU · 214, 249  
 Automatic · 172  
 Automatic Image Analysis · 43, 57, 141  
 Available Databases · 262

AVI Codecs · 115  
 AVI Export · 52  
 AVI files compressed · 115  
 AVI files uncompressed · 115  
 AVI Records · 115

---

## B

Backup · 184, 265  
 Base Module "light" · 28  
 Base Module Standard · 28  
 Basic Patient Data · 75, 77  
 Batch Mode · 103  
 Big Icons · 253  
 Big Screen · 255  
 big screens · 40  
 Bitmap · 80, 99, 130, 246  
 Bits · 102  
 Black Margin · 36  
 Blacken · 106, 177  
 Blue Arrow · 36  
 Blue Arrow Button · 39  
 Blue Margin · 152  
 Blue Wedge · 39  
 Brightness · 100, 146  
 Brightness · 43  
 Brightness for Video Grabbing · 130  
 Broad White Margin · 92  
 Button Bar · 40, 48, 245  
 Button Bar Configuration · 40

---

## C

C/W Box · 43  
 Calendar · 71, 86  
 Calibrate · 103  
 Camera · 98  
 CAPI · 20, 26, 196  
 CAPI driver · 197  
 Capture Buffer with DirectShow · 114  
 Capture Buffer with Matrox · 111  
 Capture Parameters Direct Draw · 127  
 Cardiac CD · 51  
 Carrying out a Presentation · 175  
 CD Review · 134

CD/DVD Robot Primera · 191  
 Centre · 141  
 Centre/Window · 57, 61, 140  
 Centre/Window Presets · 144  
 Centre/Window Values · 43  
 Changing the Brightness · 147  
 Changing the Scale · 157  
 Changing the Size of the Icons · 40  
 Changing the Window Values · 141  
 Cine-Loop · 135, 163, 176  
 Clipboard · 53, 65  
 Close · 60  
 Close All · 60  
 Colour Format · 109  
 Colour Format for Video Grabbing · 129  
 Colour Remapping · 146, 147  
 Colour Saturation · 100  
 Coloured Framed Thumbnails · 92  
 Compressed AVI files · 115  
 Compressing Sequences · 136  
 Compressing the Video Sequences · 116  
 Compression · 181, 202, 221, 254  
 Configuration for Servers · 18  
 Configuration for Viewers · 19  
 Configuration Multi Monitor · 167  
 Configuration, DICOM Print · 236  
 Configuration, General · 245  
 Configuring the Button Bar · 40  
 Configuring the Processing Box · 41  
 Configuring the Tools Box · 41  
 Connection Problems · 204, 222  
 Content of the Patient CD · 187  
 Contents · 61  
 Contrast · 43, 100, 146  
 Contrast for Video Grabbing · 130  
 Correcting Measurement Points · 156  
 CR · 18  
 Create New Folder for Export · 260  
 Creating an Image Stack · 105  
 Creating Centre/Window Presets · 144  
 Creating Own Evaluation Macros · 86  
 Crop · 57  
 Cropping with DirectShow · 114  
 Cropping with Matrox · 111  
 CR-Scan Lumisys · 94  
 CR-Scan Orex · 94  
 CT · 18  
 Curve · 97  
 Cut Presets · 106  
 Cut.ini · 105

Cutting Images · 105

---

## D

Dark Enhance · 103  
 Data 1 · 87  
 Data Protection · 184  
 Database Box · 42  
 Database Evaluation · 81  
 Database List · 264  
 Database Manager · 81  
 Database Privilege · 262  
 Database Setup · 261  
 Date · 71  
 DB Alias · 263  
 DB Name of Additional Database · 262  
 DBMacro.ini · 86  
 DB-Path, Additional DB · 263  
 DCF (Digitizer Information File) · 110  
 Defining a ROI · 152  
 Deinterlace Source with DirectShow · 114  
 Deinterlace Source with Matrox · 112  
 Delete All · 157  
 Delete Images after Import · 259  
 Delete Password · 262  
 Density Profile · 145  
 DFG Fpic-Driver · 256  
 DFG LC1 · 256  
 DFG/LC with Direct Draw · 125  
 DFG/LC1 · 108  
 Diagnosis Support · 153  
 Dial-up Program · 217  
 DICOM 3 · 18, 50, 80, 99, 130, 246  
 DICOM CD · 132, 133  
 DICOM Communication · 212  
 DICOM Communication External · 217  
 DICOM Configuration · 213, 248  
 DICOM Conformance Statement · 236  
 DICOM Connection Problems · 222  
 DICOM Functions · 212  
 DICOM Header · 54, 95, 100  
 DICOM Image Receiving · 215, 224  
 DICOM Integration · 21  
 DICOM Modality Type · 255  
 DICOM Print · 236, 249  
 DICOM Print Layout · 237  
 DICOM Query · 225  
 DICOM Receiving Stations · 216  
 DICOM Requirements · 213  
 DICOM SCP Module · 212



DICOM SCU Module · 212  
DICOM Send Jobs · 65, 124, 221  
DICOM Transmission · 220  
DICOM Worklist · 230  
DICOMDIR · 51  
DICOMDIR CDs without Thumbnails · 135  
Digident · 94  
Digital Subtraction Angiography · 18  
Digitizing · 101, 107  
Direct Draw · 125, 128  
Directory Import · 52  
DirectShow · 256  
DirectShow Driver · 108  
DirectX · 108  
Display · 63  
Display Mode · 79  
Display Mode of the Video Window · 116  
Display Multi Monitor · 168  
Displayed Area · 36  
Distance · 158  
Doc.ini · 83, 85  
Document · 56  
Document Scanner · 98  
Document Transmission · 222  
Documents · 185  
Documents on Patient CD · 185  
Dongle · 24, 25  
Double Click · 62  
DPI · 102  
Drag and Drop · 64  
Driving the Vidar Digitizer · 103  
Drucken · 65  
Dynamics · 43, 146  
Dynamics Curve · 105, 147

---

## *E*

Echo · 175  
Edge Enhancing · 155  
Eject · 103  
Ellipse · 155  
Emboss · 155  
Enable Compression · 254  
Enable Hipax "VideoQuick-Format" · 254  
Enable Hipax Setup · 253  
Encryption · 221  
Enhancement · 96  
Enhancement Factor · 155  
Enlarge Icons · 40, 253  
Euro ISDN · 196

Evaluation · 81  
Exit · 53  
Export · 50  
Export to Word · 252  
Export: Hide Program · 261  
Express Mode (JPEG) · 203  
Extension Systems · 196  
External Controls · 131, 249

---

## *F*

Fensterung von Serien · 145  
File Server · 272  
File Submenu · 49  
Film · 56  
Film Placement · 101  
Filter Macros · 96, 100  
Filter Preset · 95  
Filtering · 152  
Filtering the Patient List · 72  
Filtering Video Sequences · 122  
Finding Archived Images · 183  
Fixed Export Path · 260  
Fixed Import Path · 259  
Flip · 96, 104  
Flying Video Window · 116  
Folder Function for TWAIN · 100  
Folder Function for Video · 131, 133  
Font · 246  
Font Colour · 254  
Font Size · 255  
Foot Switch · 131, 249  
Frame Colours · 36  
Frame Format · 37  
Frame Grabber · 25, 108, 256  
Frame Rate with DirectShow · 114  
Frame Rate with Matrox · 111  
Frames · 36, 59, 63

---

## *G*

General Configuration · 245  
Grab · 130  
Grab and Save Image · 256  
Grabbing Sequences · 119, 120  
Grabbing Single Images · 119, 121  
Green Arrow · 160  
Green Margin · 92  
Green Triangle · 134  
Grey Distribution · 142

Grey Image · 98  
 Grey Margin · 36  
 Grey Monitor · 253  
 Grey Resolution · 140  
 Grey Scales · 140  
 Grey Tones · 145, 146

---

## ***H***

Hardware Requirements · 18  
 Header Info · 54, 65  
 HeaderEditor · 52  
 Help · 61  
 High-Pass · 155  
 Hint · 96  
 Hipax Folder · 265  
 Histogram · 43, 58, 142, 146  
 Histogram Equalization · 149

---

## ***I***

Image Administration · 79  
 Image Cache · 247  
 Image Database · 75, 79  
 Image Export · 50  
 Image Export to Word · 28  
 Image Format for Export · 261  
 Image Frames · 36, 59, 63  
 Image Icon · 90  
 Image Import · 52, 64  
 Image Import from CD · 52  
 Image Info · 15, 63, 79, 92, 203  
 Image List · 79  
 Image Optimization for Video · 129  
 Image Optimizing · 153  
 Image Parameters · 54, 65  
 Image Position · 64  
 Image Processing for Video · 130  
 Image Processing Screen · 35  
 Image Receiving · 207, 215, 224  
 Image Review · 79, 90  
 Image Saving Formats · 80  
 Image Selection · 200  
 Image Selection for Transmission · 218  
 Image Series · 161  
 Image Stack · 162  
 Image Window · 60  
 Images Not Proc. · 70  
 Images Processed · 71  
 Import · 52, 64

Import from CD · 52  
 Import of Cardiac Sequences · 254  
 Import of Phone Lists · 199  
 Import of Sequences from CD · 136  
 Import/Export Setup · 258  
 Import: Hide Program · 260  
 Input List · 256  
 Inserting Images into a Presentation · 172  
 Installation · 24  
 Installation Multi Monitor · 168  
 Installation of the ISDN Adapter · 26  
 Installation of the Modules · 24  
 Installation of the Program · 24  
 Integrated Video Window · 116  
 ISDN Adapter · 26  
 ISDN Base Connection · 196  
 ISDN Communication · 196  
     Pre-Adjusted Times · 205  
 ISDN Configuration · 208  
 ISDN Dialogue Box · 202  
 ISDN Receiver · 199  
 ISDN Requirements · 196  
 ISDN Send Jobs · 54, 65, 204  
 ISDN Standby Mode · 197  
 ISDN, 2-Channel Transmission · 207, 209  
 ISDN, Connection Problems · 204  
 ISDN, Establishing a Connection · 204  
 ISDN, Express Mode · 203  
 ISDN, Original Mode · 203  
 ISDN, Preparing the Transmission · 202  
 ISDN, Standard Mode · 202  
 ISDN, Start Number · 199, 247  
 ISDN, Transmission Costs · 207  
 ISDN, Transmission Time · 207

---

## ***J***

JPEG · 50, 80, 99, 130, 203, 246

---

## ***K***

Keep Position of all Windows · 247  
 Keep Standby Mode · 248  
 Kernel · 96  
 Kernel Size · 155  
 Key.ini · 81, 84  
 Keyboard · 64  
 Keywords · 81

---

**L**

L Button · 95, 104  
Layout · 36, 249  
Layout of DICOM Print · 237  
Lead · 257  
Left Mouse Button · 61  
Levels of the User Interface · 34  
Licence · 25  
Line Width · 255  
List · 55  
Live Button Direct Draw · 130  
Live Button DirectShow and Matrox · 117  
Live Mode Direct Draw · 128  
Load Images · 35, 52, 70, 251  
Load Images Directly from the Patient List  
· 35, 247  
Load Images for Multi Monitor · 168  
Load Images in Defined Layouts · 251  
Load Images with defined Window Values  
· 251  
Loading Sequences · 121  
Local Archiving System · 180  
Logfile · 54  
Login · 221, 268  
Look-up Curve · 105  
Lossless Compression · 202  
Lossy Compression · 203  
Lumisys · 94  
LZW Compression · 52

---

**M**

Macro · 156  
Macro Name · 87  
Macro Record · 158, 160, 161  
Magnification · 43, 140  
Magnifying Glass · 64, 140  
Magnifying Glass Size · 254  
Main Menu · 49  
Marking Image Icons · 90  
Matrox · 256  
Matrox Meteor · 108, 110  
Maximum Screen · 39, 64  
MCI Driver · 256, 257  
Measurement Line Width · 255  
Measurement of Areas · 156  
Measurements · 155  
Media-Writer · 182, 186  
Menu Strip Position · 48

Minimum Patient Data · 253  
Mirror · 63, 96, 104  
Mix Images · 247  
Modality Sensitive Screen Layout · 251  
Modular Architecture · 28  
Module Key · 24  
Modules · 244  
Mouse Buttons · 61  
Mouse C/W Sensibility · 58  
Moving an Image · 64  
MRI · 18  
MRT PC Card Grabber · 256, 257  
MSN · 209  
Multi Monitor · 166  
Multiframe Images · 29, 161  
Multiframe Sonography · 18  
Multilayer Images · 29, 161  
Multimedia Patient CD · 185  
Multiple Database · 264  
Multiple Subscriber Number · 209

---

**N**

Name of Macro · 87  
Narrow the Series Review · 38  
Network for Consultants · 272  
New Document · 56, 185, 222  
New Entry into X-ray Journal · 137  
New Image · 83  
New Key · 24, 244  
New Patient Folder · 65, 76  
Next Image/Row · 59  
Noise · 97, 154  
Notes · 15, 79, 92, 203

---

**O**

Open CD · 51  
Open DICOMDIR CD · 133  
Operating Systems · 18  
Optimizing Grabbed Images · 130  
Optimizing Scanned Images · 100, 101  
Orex · 94  
Organ · 95, 102  
Original Mode (DICOM 3) · 203  
Original Window Values · 143

---

**P**

Paging · 59, 162  
 Paging Through Displayed Area · 36  
 Password · 221, 268  
 Patient CD · 51, 185  
 Patient CD Created by a Robot · 191  
 Patient CD Images and Data · 186  
 Patient CD Reading · 56  
 Patient CD Selected Images · 186  
 Patient CD Viewer · 187  
 Patient Data · 75, 77  
 Patient Folder · 55  
 Patient List · 68, 246  
 Pause · 130, 163  
 Phone Book · 197  
 PIC-Path, Additional DB · 263  
 Pink Coloured Margin · 90  
 Pink Margin · 36, 92  
 Play · 163  
 Playing Cine-Loops · 135  
 Playing Cine-Loops within the Frame · 164  
 Plus · 134  
 PNG · 50, 80, 99, 130, 246  
 Pop-up Menus · 62  
 Position of an Image · 64  
 Position of the Menu Strip · 48  
 Preadjusted Dynamics Curves · 149  
 Pre-adjusted Dynamics Curves · 105  
 Pre-Adjusted Times · 205  
 Pre-Defined Window Values · 251  
 Preparing a Presentation · 171  
 Preproc.ini · 154  
 Presentation · 170  
 Presentation, Animation · 172  
 Presentation, Image Processing · 171  
 Presentation, Inserting Images · 172  
 Presentation, Review · 173  
 Presets of Centre/Window Values · 144  
 Previous Image/Row · 59  
 Previous Knowledge · 15  
 Primera Bravo II · 191  
 Print · 44, 49  
 Print Settings · 247  
 Printer AE Title · 237, 249  
 Printer Host · 237, 249  
 Printer Port · 237, 249  
 Printing Images · 242  
 Private Health Disk · 185  
 Processing · 60, 152, 155

Processing Box · 46  
 Processing Box Configuration · 41  
 Program Start · 24  
 Program Start: Show Patient List · 246

---

**Q**

Quadratic Frames · 37  
 Query · 225

---

**R**

R Button · 95, 104  
 Read Patient CD · 56  
 Reading Directory · 183, 245  
 Receiving Images (SCP) · 215, 224  
 Receiving Images via ISDN · 207  
 Record · 117  
 Record Adjustments for DirectShow · 113  
 Record with Flying Video Window · 120  
 Record with Integrated Video Image · 118  
 Red Arrow · 136, 153, 160, 162, 165, 173  
 Red Bar · 162, 168  
 Red Margin · 152  
 Red Scroll Boxes · 143  
 Reducing Images · 43  
 Reflection · 63, 96, 104  
 Refresh Database · 64, 73  
 Registered Users · 221  
 Re-Import · 184  
 Relating Files to a Patient · 56, 185  
 Release the Hard Disk · 272  
 Requirements · 18  
 Reset Maximum Screen · 64  
 Reset Standard Screen Size · 39  
 Reset the Original Window Values · 143  
 Resolution · 102  
 Restrict the Authorization of the User · 69  
 Result of the Evaluation · 86  
 Reverse Video · 148, 154  
 Review · 56  
 RGB Uncompressed · 115  
 Right Mouse Button · 62  
 ROI · 152  
 Röntgenjournal · 137  
 Rotation · 63, 96, 104  
 Row Correction · 256

---

**S**

Save · 55  
Save All Images · 55, 65  
Saving Images · 50, 64, 72, 80  
Scale · 157, 246  
Scan · 98, 99  
Scan and Save · 103  
Scanning Parameters · 102  
Scanning Process · 103  
SCP · 212, 214  
Screen Machine · 256  
SCU · 212, 214  
Search · 71  
Search Images by Date · 71  
Secondary Capturing Devices · 18  
Selected Date · 71  
Selected Images · 200  
Selecting a TWAIN Source · 98  
Selecting Images for Transmission · 218  
Selecting the Video Source · 131  
Selftest · 103  
Send Anonymous · 178  
Send Images at Pre-Adjusted Times · 205  
Send Notes · 203  
Send to Word · 252  
Sensibility Mouse C/W · 58  
Serial Interface · 131, 249  
Serien Fensterung · 145  
Series Review · 38, 165  
Server · 55  
Server Requirements · 18  
Server without Server Software · 273  
Setup · 54  
Setup Disabled · 253  
Setup Window · 244  
Setup.exe · 252  
Setup.exe Video · 108, 125  
Show Patient List · 246  
Size Image Icons in the Series Review · 38  
Size of Magnifying Glass · 254  
Small Network · 272  
SMALLPIC-Path, Additional DB · 263  
Sonography · 18  
Sorting the Patient List · 72  
Sound File · 56  
Speed of Window Levelling · 141  
Split · 162  
Spread Mode · 161, 246, 251  
Spreading · 154

SQL Macros · 86  
Stack Menu · 161  
Stack Mode · 161, 246, 251  
Stack Window · 163  
Standard Mode (PNG) · 202  
Standard Save Format (DB) · 246  
Standard, X-ray Scanner · 257  
Standby Mode · 197, 248  
Start Hipax · 24  
Start Number · 199, 247  
Start Program after Export · 261  
Start Program before Import · 259  
Start SQL · 88  
Start the Dial-up Program · 217  
Stations · 216  
Status Button · 70  
Still Video Camera · 25, 98  
Store 16 Bit RGB Image as Grey Image · 98, 246  
Studies · 75, 78  
Subdividing the Screen · 162  
Suitable Archiving Media · 184  
Switch · 249  
Switching off Whole Button Boxes · 41  
Synchronization Level · 127  
System Memory Live Speed · 129  
System Requirements · 18  
System Submenu · 53

---

**T**

Table · 102  
Tabs · 163  
TCP/IP · 20  
Telecardiology · 175  
Telecommunication Systems · 196  
Text · 54, 65, 157  
TIFF · 50, 80, 99, 130, 246  
Tile.ini · 167  
Tonight · 206  
Tools · 59  
Tools Box · 44  
Tools Box Configuration · 41  
Tools of the Base Module · 29  
Topic Search · 61  
Transfer Images to Another Database · 264  
Transferring a Presentation · 174  
Transmission Costs · 207  
Transmission Time · 207  
Transmit Sequence Directly from CD · 135

Transmitting Documents · 222  
Transparent Text Markings · 254  
Tree View · 63, 68, 74  
TWAIN · 98  
TWAIN Driver · 25  
TWAIN Presets · 257  
TWAIN Source · 99  
Two-Channel Transmission · 209

---

**U**

Uncompressed AVI files · 115  
Unsharp Mask Filtering · 155  
Update · 265  
Use AE-Title · 233  
Use Big Icons · 253  
User · 269  
User Administration · 268  
User Interface · 34  
User Interface for Image Processing · 35  
User Name · 221, 268

---

**V**

VAR 1 · 87  
Verify of Archiving Media · 182  
Vidar · 101, 107  
Vidar Driver · 103  
Vidar Used with TWAIN Driver · 258  
Video Capture Parameters DirectShow · 113  
Video Capture Parameters Matrox · 111  
Video Capture Size · 113  
Video Filtering · 122  
Video Format · 109  
Video Format Direct Draw · 127  
Video Grabbing · 65, 108, 125  
Video Input Direct Draw · 126  
Video Input with DirectShow · 112  
Video Menu Strip · 121  
Video Output Format DirectShow · 115  
Video Output Format Matrox · 112  
Video Record · 117  
Video Sequences · 163  
Video Signals · 25

Video Source · 109  
Video Source Selection · 131  
Video Transmission · 122  
Video Window Type · 116  
Video.exe · 125  
VideoQuick-Format · 254  
VideoSetup.exe · 109  
Viewer Requirements · 19

---

**W**

Wedge Button · 39  
White Bar · 168  
White Fonts · 254  
White Margin · 36, 92  
Widen the Series Review · 38  
Width · 141  
Window Levelling · 61, 140  
Window Levelling in Series · 144  
Window Levelling Pre-Defined · 251  
Window Scrollbar · 142  
Window Values · 141  
Word · 53  
Word Image Export · 252  
Worklist.ini File · 230  
Write Delay with DirectShow · 114  
Write Delay with Matrox · 111  
Writing Conventions · 15

---

**X**

X-ray Digitizer · 18, 98, 140  
X-ray Digitizing · 94, 101, 107  
X-ray Journal · 137

---

**Y**

Yellow Margin · 36, 92, 183

---

**Z**

Zoom · 57  
Zoom Box · 43  
Zoom Interpolation · 253