

**Question 1: Image Extraction at Best Quality**

**Qn.1A, if you used another method:**

Processing steps:

1. Software tool: Defraser 1.4.2 (Full Edition)

Operation: Analysing the questioned file [000001].drv with all detectors current available selected. Detected h.264 video codec stream. The questioned frame (being an I-frame and preceded by a video codec header, see figure below) is exported through Defraser using function ‘Save Selection As...’

Name	Offset (Dec)✓	Length (Dec)	End Offset (Dec)
[-] ✓ SequenceParameterSet	8212	14	8226
[-] ✓ PictureParameterSet	8226	8	8234
[-] ✓ CodedSliceOfAnIdrPicture	8234	24413	32647

2. Software tool: in-house developed software for dumping video frames to images (based on ffmpeg).

Operation: The exported video codec stream from step 1 is converted to an uncompressed TIFF image with the in-house developed software (based on ffmpeg).

3. Saved as resulting image: Q1A\_OtherMethod\_ID08.tif.

**Qn.1B, if you used another method:**

Processing steps:

1. Software tool: X-Ways Forensics 17.9.

Operation: Open the questioned file TestE\_7mDistance\_HighElevation.PAR and recognized jpeg markers in the byte stream.

2. Software tool: Police Image Analyzer (PIA) 2.51.

Operation: Analysing the questioned file with settings: 'current size: 1', 'detailed JPEG-Analysis' selected and 'User info file'. All video frames (stored as jpegs in the raw byte stream) were extracted.

3. Software tool: Supplied replay software DM NetVu Observer 1.18.59.

Operation: Finding the frame number

The questioned frame was extracted as jpg by right clicking on the displayed frame in the player and selecting *save ...* → *JPEG File* → *save*. The extracted image was accompanied by a txt-file containing information regarding the frame number ('FrameNum: 00017031').

4. Software tool: X-Ways Forensics 17.9.

Operation: We noticed that each extracted frame (jpeg format) in step 2 had a byte value sequence in its comment segment corresponding to the ascii text 'FrameNum: ' followed by a numerical value. The questioned file was searched for text string 'FrameNum: 00017031' (X-Ways: *Search* → *FindText...*). Comparing file offset of search hits in questioned file with carved file offset of jpeg images (txt-file in step 2) the questioned frame was located to be the 241st frame from the beginning of the coded video stream.

5. Saved as resulting image: Q1B\_OtherMethod\_ID08.jpg.

**Qn.1C**

**Frame Size of source file recording used in Qn.1A**

720 x 288 pixels

**Frame Size of source file recording used in Qn.1B**

720 x 288 pixels

**What are your conclusions about the raw, encoded quality of the provided video frame/sequence in Q1A and Q1B?**

The video sequence in Q1A is encoded in the h.264 video codec format and the questioned frame (I-frame) is converted to an uncompressed TIFF image. The video sequence in Q1B is encoded in the jpeg format.

In Q1A we converted the raw data of the questioned encoded video information into an uncompressed TIFF image. We consider this to be the best approach with least degradation, if any, on the resulting file.

In Q1B we extracted the raw data of the questioned encoded video information, being encoded as a jpeg. As the encoded video information already is encoded in a viewable image format (jpeg) there is no need to perform any conversion to another format.

Notably the image heights of 288 pixels indicates that the raw format of the video information are only storing one field, i.e. upper or lower field, of the camera video feeds.

**Question 2: Super-Resolution from supplied sequence of 249 .bmp files**

No result due to time constraints and that the lab does not have any specific tool to use for super-resolution, yet.

**Question 3: Focal deblur test**

**125 cm chart:** Processing steps:

1. Software tool: IrfanView v.4.36 Operation: cropping and saving the image Random\_Focus\_150cm\_from\_lens.JPG to selected coordinates:
2. Software tool: SmartDeblur v.1.27 Operation: Loading the cropped image from step 1, using the Out of focus function applying the parameter settings: Iterations: 500 Radius: 20,1 Smooth: 40% Correction Strength: 0% Edge Feather: 20%
3. Saved as resulting image: Q3\_125cm\_ID08.png

**75 cm, 4<sup>th</sup> line:**

Processing steps:

1. Software tool: IrfanView v.4.36 Operation: cropping and saving the image Random\_Focus\_150cm\_from\_lens.JPG to selected coordinates:
2. Software tool: SmartDeblur v.1.27 Operation: Loading the cropped image from step 1, using the the Out of focus function applying the parametre settings:, Iterations: 500 Radius: 12,1 Smooth: 40% Correction Strength: -45% Edge Feather: 20%
3. Saved as resulting image: Q3\_75cm\_Line4\_ID08.png

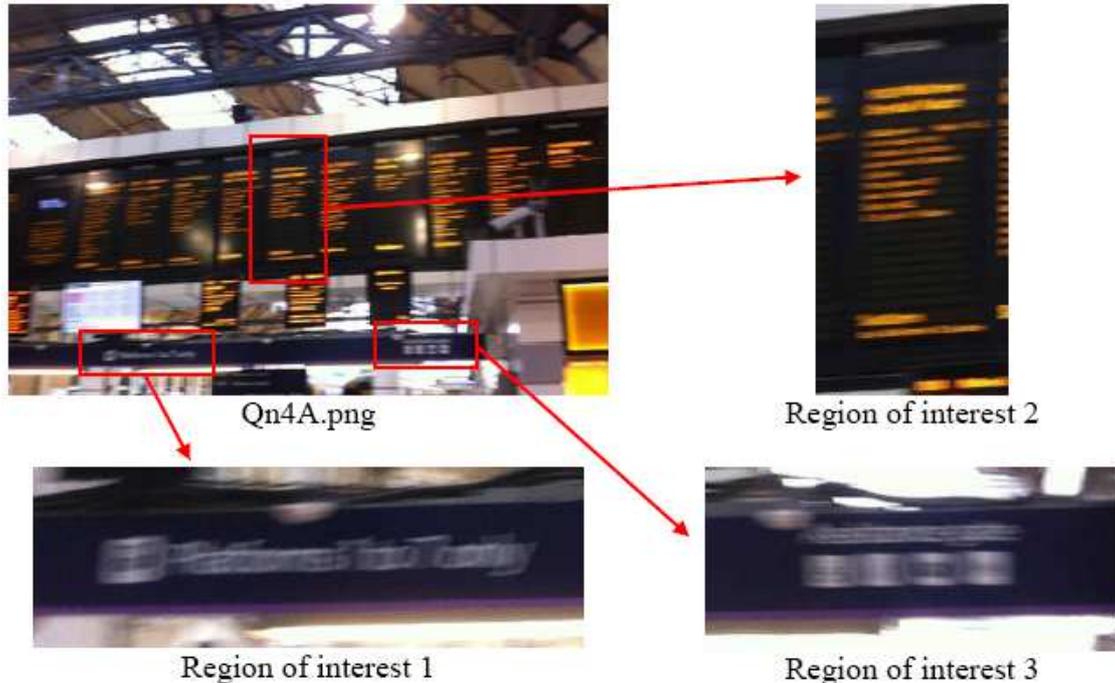
**75 cm, 5<sup>th</sup> line:**

The 5<sup>th</sup> line is listed as optional in the instructions. No attempt to enhance this line or other parts of the image other than the two above has been carried out.

**Question 4: Motion deblur test**

**Qn.4A:**

Region NUMBER: coordinates and/or thumbnail:



**Region 1**

coordinates: top left corner X:350 Y:1441, Size 511x168

Processing steps:

1. Software tool: IrfanView v.4.36 Operation: cropping and saving the image Qn4A.png to selected coordinates and size: top left corner X:350 Y:1441, Size 511x168
2. Software tool: SmartDeblur v.1.27 Operation: Loading the cropped image from step 1, using the Motion blur function applying the parameter settings: Iterations:500 Length:16 Angle:-8° Smooth:60%
3. Saved as resulting image: Q4A\_Region1\_ID08.png

## **Region 2**

coordinates: top left corner X:1056 Y:583, Size 306x628

Processing steps:

1. Software tool: IrfanView v.4.36 Operation: cropping and saving the image Qn4A.png to selected coordinates and size: top left corner X:1056 Y:583, Size 306x628
2. Software tool: SmartDeblur v.1.27 Operation: Loading the cropped image from step 1, using the Motion blur function applying the parameter settings: Iterations:500 Length:14,6 Angle: -5° Smooth:41%
3. Saved as resulting image: Q4A\_Region2\_ID08.png

## **Region 3**

coordinates: top left corner X:1598 Y:1398, Size 420x186

Processing steps:

1. Software tool: IrfanView v.4.36 Operation: cropping and saving the image Qn4A.png to selected coordinates and size: top left corner X:1598 Y:1398, Size 420x186
2. Software tool: SmartDeblur v.1.27 Operation: Loading the cropped image from step 1, using the Motion blur function applying the parameter settings: Iterations:500 Length:15,6 Angle:0° Smooth:50%
3. Saved as resulting image: Q4A\_Region3\_ID08.png

## **Qn.4B:**

No result due to time constraints and that the lab does not have any suitable tool to use for a quick job for this kind of motion blur, i.e. a non-linear motion blur.