# Acquisition Procedure

# Contents

**Preliminary notes**

Throughout this document, the following conventions will be followed:

**"Menu\Function"** designates a menu and the function to be selected or a file access path.

**[Key]** designates the keyboard key referred to.

**"Button"** designates a software button.

The Altair software functions are in English. This procedure refers to English language captions displayed on-screen.

# 1. Introduction

Your camera is a tool for generating high resolution (14 bit) digital data. It is essential to organize the way this data is stored so that it can be managed efficiently. In particular, backing up your data will be made all the more easy and efficient if this storage is correctly organized.

# 2. Definitions

**Film**

Stored data will be viewed in film form. This film is a succession of images over time.

**Image**

A stored image should be considered as a film made up of a single image.

# 3. Defining a Project

Project data is managed by the **Altair** software. The acquisition data is obtained in digital form.

The first step in data acquisition is to open a folder where all the configuration and acquisition files will be stored.

Start Altair.

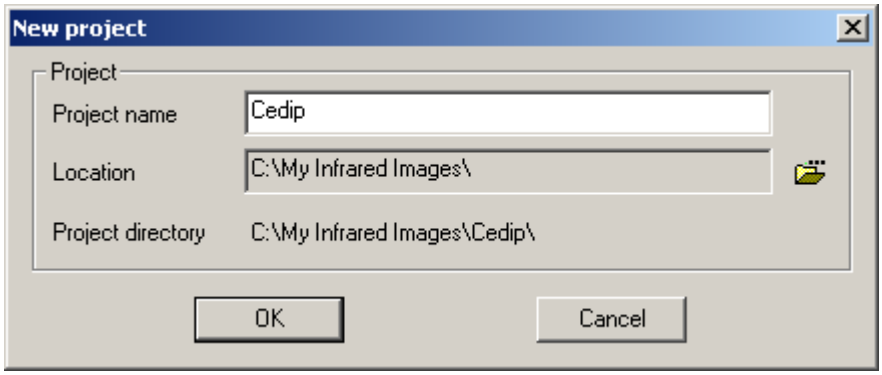
**Warning**

When opening, Altair moves to the last folder that it worked on. It is therefore important to:

- Create a new project, or
- Open the existing project that you wish to work on.

## 3.1. Creating a New Project

Select "File\New Project". The window below opens:

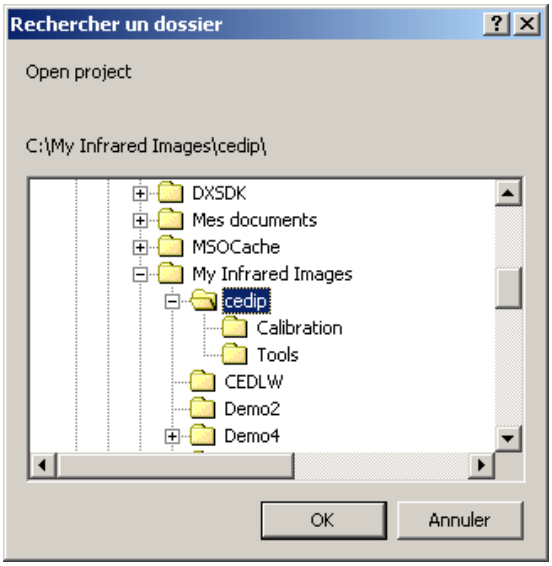



Name your new project. By default, it will be stored in "C:\My Infrared Images". You can however choose to store it in another folder by clicking on 

**Note**

If you choose a folder name that already exists, the "OK" button will be shaded and the create function disabled so that you cannot overwrite the existing folder.

The newly-created folder comprises two sub-folders:




- The "Calibration" sub-folder by default contains the calibration files for the "C:\Program Files\Cedip Infrared Systems\Calibration" folder. These files have an ".exp" extension (refer to the Altair Reference Guide).
- The "Tools" sub-folder that will store the tools files.

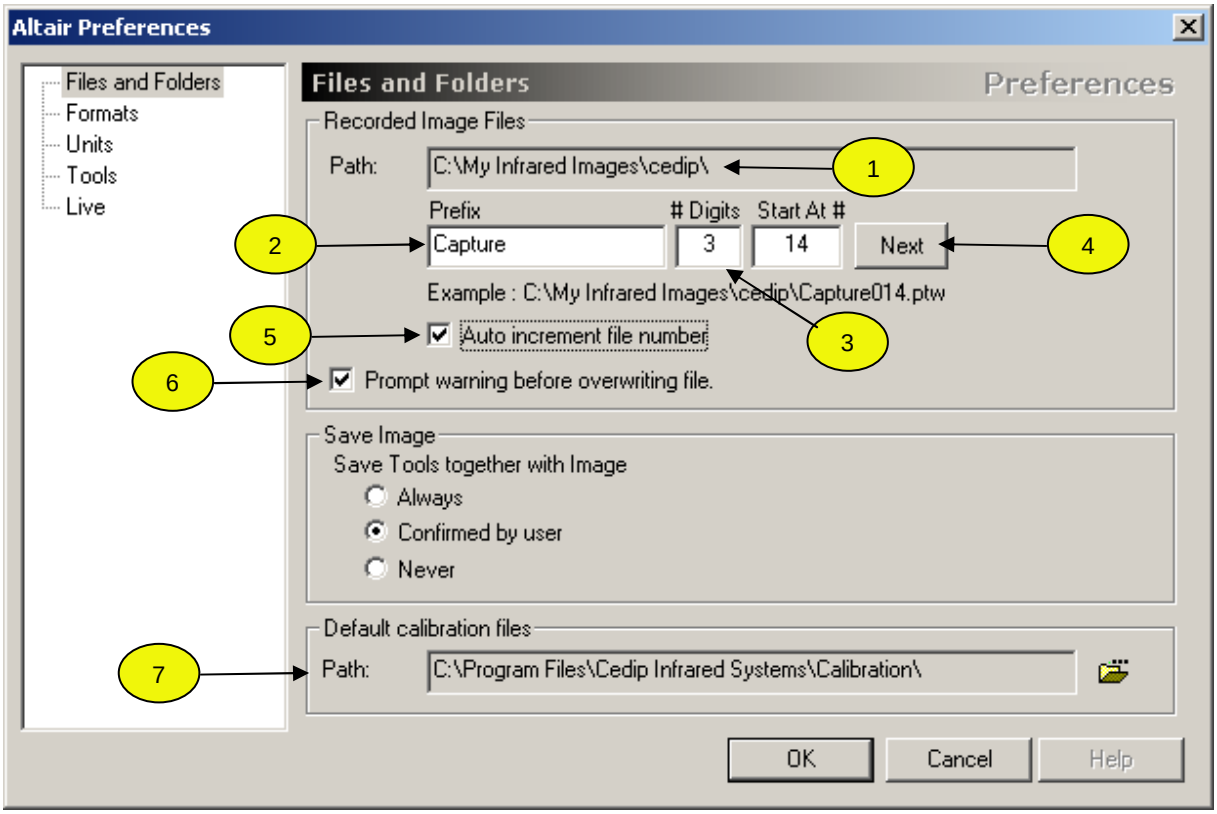
Files containing film digital data will be stored directly in the project's top folder ("cedip" in this example). They will have a ".ptw" extension (refer to the Altair Reference Guide) and will be indexed in line with your preferences (see § 3.3).

## 3.2. Opening a Folder

Select "File\Open", then your project's top folder ("C:\My Infrared Images\cedip" in this example).

## 3.3. Preferences

Before working on your project, you can define your preferences, particularly for file management. To do this, select "File\Preferences". The window below opens:




Point (1) shows you the file's access path.

Point (2) lets you specify filenames. By default, your files will be named "Capture", followed by three digits. You can specify another sequence of digits in (3). Remember, three digits lets you manage 999 files.

The "Start At" field is used to specify the chronological number of the first file. You can set it to the next number available in the folder by clicking on the "Next" button (4).

**Note**

If you choose a start number that already exists, the warning "File already existing" will be displayed to the right of the "Next" button.

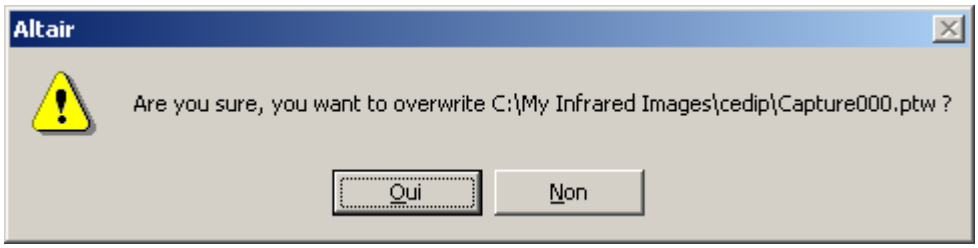
We recommend leaving the "Auto increment file number" box ticked (5).

Tick the "Prompt warning before overwriting file" box (6) if you wish to be warned before overwriting an existing file. This is indicated by a window similar to the one below.

**Warning**

Although this function is a safety feature, its appearance at the time of acquisition may prevent you capturing a fleeting event. It is therefore up to you to set your priorities:

- Preserving files
- Favoring acquisition




The "Save Image" field is not used at this stage. It will serve when interpreting saved data.

The "Default Calibration Files" field (7) lets you choose the calibration fields that will be loaded by default in your project's "Calibration" sub-folder (a camera may call up different calibration files depending on how it is configured).

## *3.4. Project Definition Summary*

A. To work on the current project (the last project used)

- Open Altair

B. To work on a previously created project

- Open Altair
- Open the project

C. To create a new project

- Open Altair
- Define your preferences
- Create a new project

**Note**

A project can be linked to:

- An event
- An experience
- A day
- A user
- etc.

# 4. Preparing the Camera

Depending on your camera, data may be sent via USB 2, Frame Grabber, Camlink, etc.

This stage involves configuring the camera to match the subject being filmed.

You should first of all ask the following questions:

- How fast does the event being filmed move? (to define framing, tracking and also the image format. E.g. an airplane).

High speed motion means choosing a small size to reduce the amount of data in each image and therefore accelerate the acquisition rate.

- What is the thermal behavior speed of the event being filmed? (to define the Integration time. E.g. an explosion).

These elements should allow you to:

- Define the dynamic range
- Adjust framing
- Adjust lens focusing

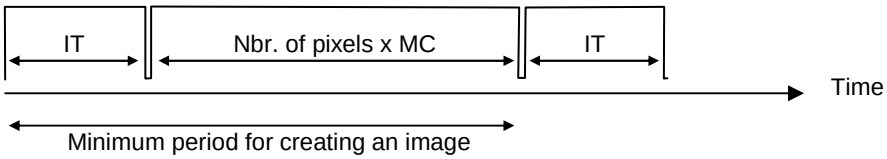
**Tip**

If it is difficult to focus on the object, place a pre-heated, fine metal object (like a screwdriver) at the same distance from the lens as the object. This will make focusing easier.

BEWARE of the depth of field for objects that are only a short distance away from the lens. For example, with a G1 (microscope) lens, the depth of field is only a few millimeters.

**To go further**

Time period diagram




The minimum period required for creating an image equals the Integration Time (IT) to which is added the amount of time required to build the image, i.e. a Master Clock (MC) period multiplied by the number of pixels.

It is easy to understand that these two elements - Integration Time and Image Format - condition the acquisition rate.

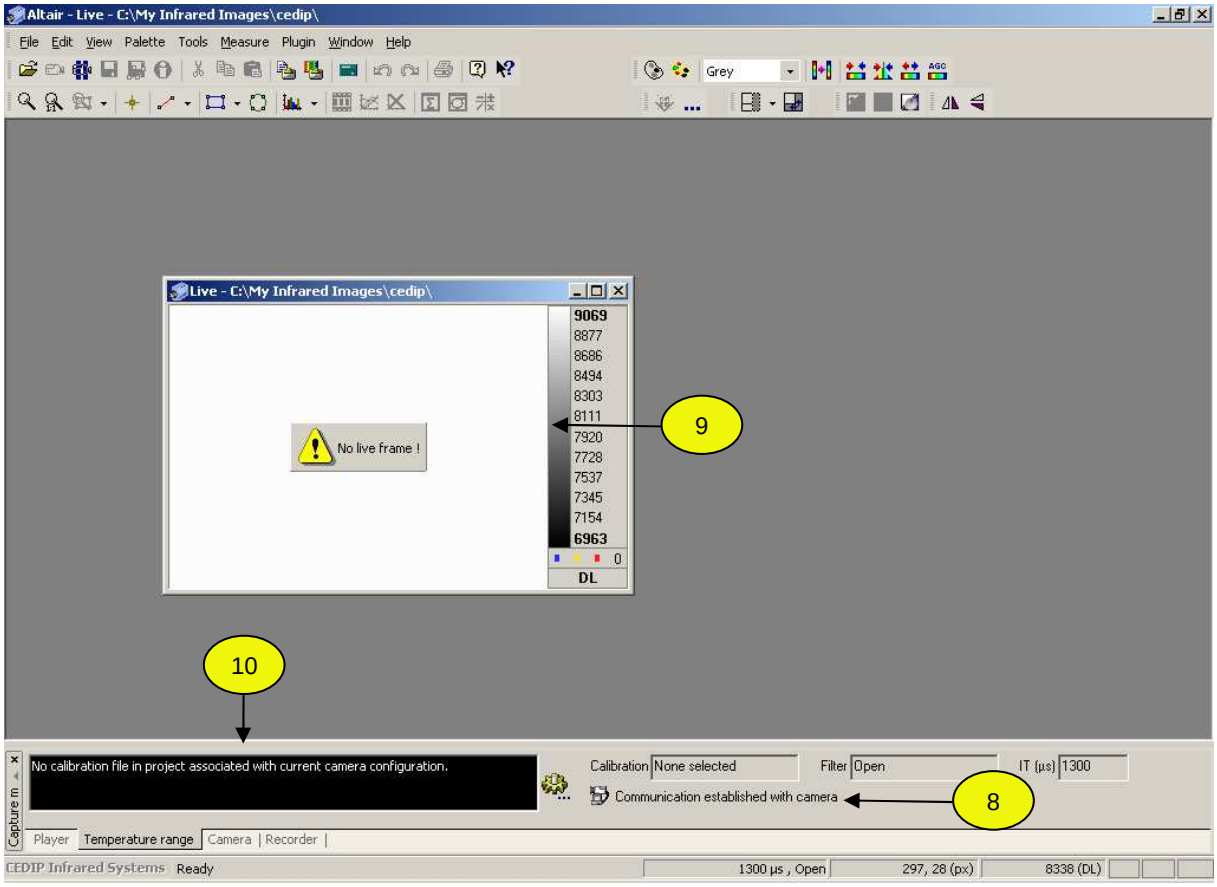
- Reducing the Integration Time reduces the dynamic range (and thus sensitivity),
- Reducing the image format restricts the area displayed.

**Note**

In addition to the time parameters, you will need to pay attention to the risk of "fuzziness" during acquisition. Fuzziness may be caused by physical movement of the target or by a sudden temperature variation.

## 4.1. Calibration

Open the "Live" window using the "File\Live camera" menu or the  button and check that the camera is correctly connected via the "Communication established with camera" message. This should appear in the lower section of the window (8).



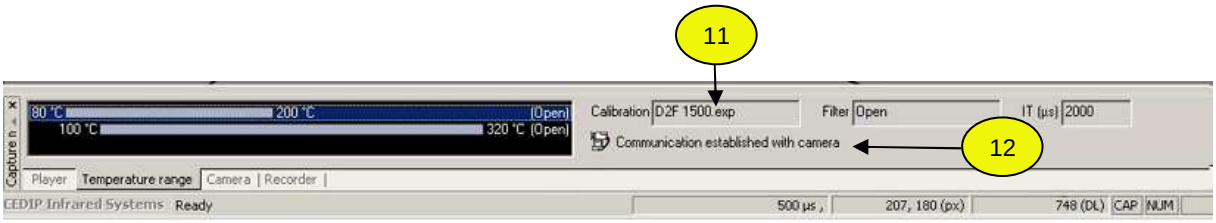

The window (9) shown in the middle of the main window in this example, indicates an acquisition failure. In our example, the acquisition parameters have not been defined.

**"Temperature Range" tab**

How to determine whether calibration has been performed?

Once calibration is performed:

- the area with the black background (10) at the bottom of the screen shows a selected bar (on a blue background) with the two extreme temperatures.




– The "Calibration" field contains a filename (11).

– The "Communication established with camera" message is shown in the right of the banner (12).

When these conditions are not met, you can:

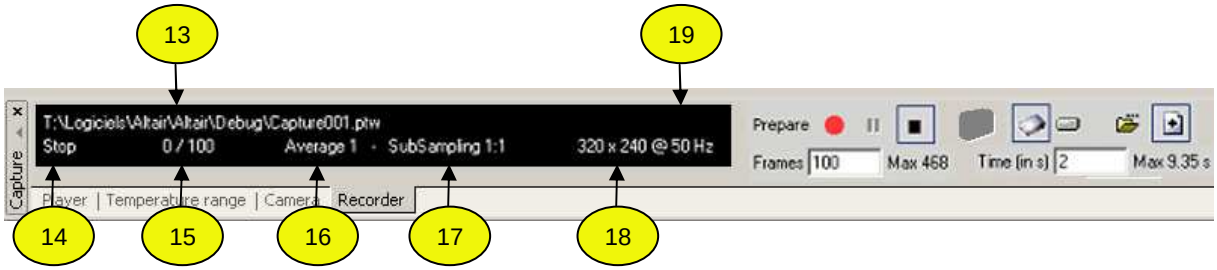
– Look for the calibration that matches the IT/filter combination (especially if you wish to use data converted into temperatures), or

– Perform your acquisition without calibration (the calibration issue can be resolved later, with no effect on the digital data that will be recorded).

# 5. Preparing the Acquisition

**"Recorder" tab**

The left hand part (black background) of the banner restates the active parameters:




– Name of the next acquisition file (13)

– Acquisition status (14)

– Number of images taken compared with the number of images to be taken (15)

– Number of images taken into account for averaging (16): one in this case (no averaging)

– Subsampling ratio (17): here 1/1 (no subsampling)

– Image format (18)

– Frequency (19)

The right hand part of the banner lets you set the parameters:

## *5.1. Standard Settings*

**Notes**

Remember to confirm parameter entry by pressing [Enter].

### 5.1.1. Storage

The data will always be stored on the hard disk drive, in the directory of your choice. There are two storage modes available for you to choose from:

- Temporary data storage in RAM (20).

The data will be stored in your PC's RAM, then transferred to the target directory.

- Direct data storage on the PC's hard disk drive (21).

How to make this choice?

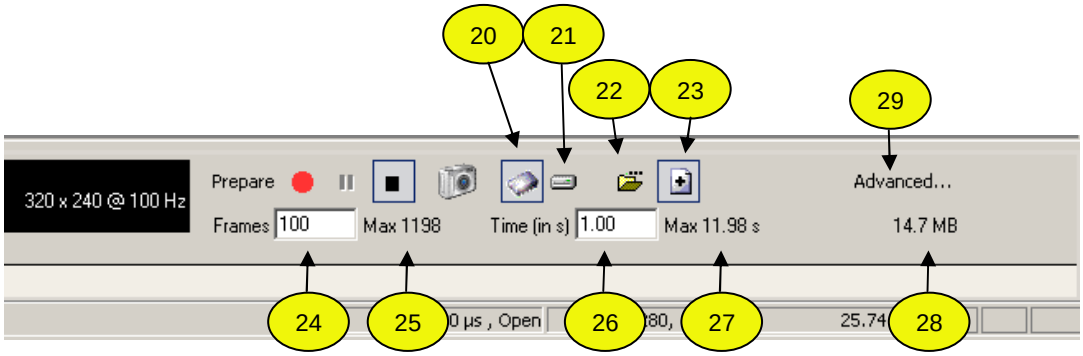
| | **Advantage** | **Disadvantage** |
|---|---|---|
| **RAM** | Fast writing with no discontinuity problems (electronic system). | Limited size. |
| **Hard disk drive** | Size. | A mechanical device that may cause breaks in data acquisition, notably due to write head movements. |

**Tips**

If you opt for direct storage on the hard disk drive, we recommend defragmenting the disk first to prevent the head jumping during acquisition.

In all circumstances, we recommend inhibiting any PC connection to a network during the acquisition phase. Your acquisition performance could be affected as Windows always gives the network priority .

### 5.1.2. Acquisition File Addressing




You can change the access path and the acquisition filenames if you so wish (22).

If necessary, choose whether or not to enable automatic filename incrementation (23). WARNING: if this function is disabled, the file will be overwritten after every acquisition.

### 5.1.3. Number of Images

Choose the number of images to acquire (24). You are limited to the "Max" value displayed (25). This value is calculated according to the format chosen and the capacity of the target media.

Note that these values determine the display of the acquisition duration (26) and the maximum permitted duration, allowing for the capacity of the target media (27).

**Tip**

As the number of permitted images is directly linked to the available RAM, we recommend shutting down any PC application that could (even temporarily) use RAM capacity during acquisition.

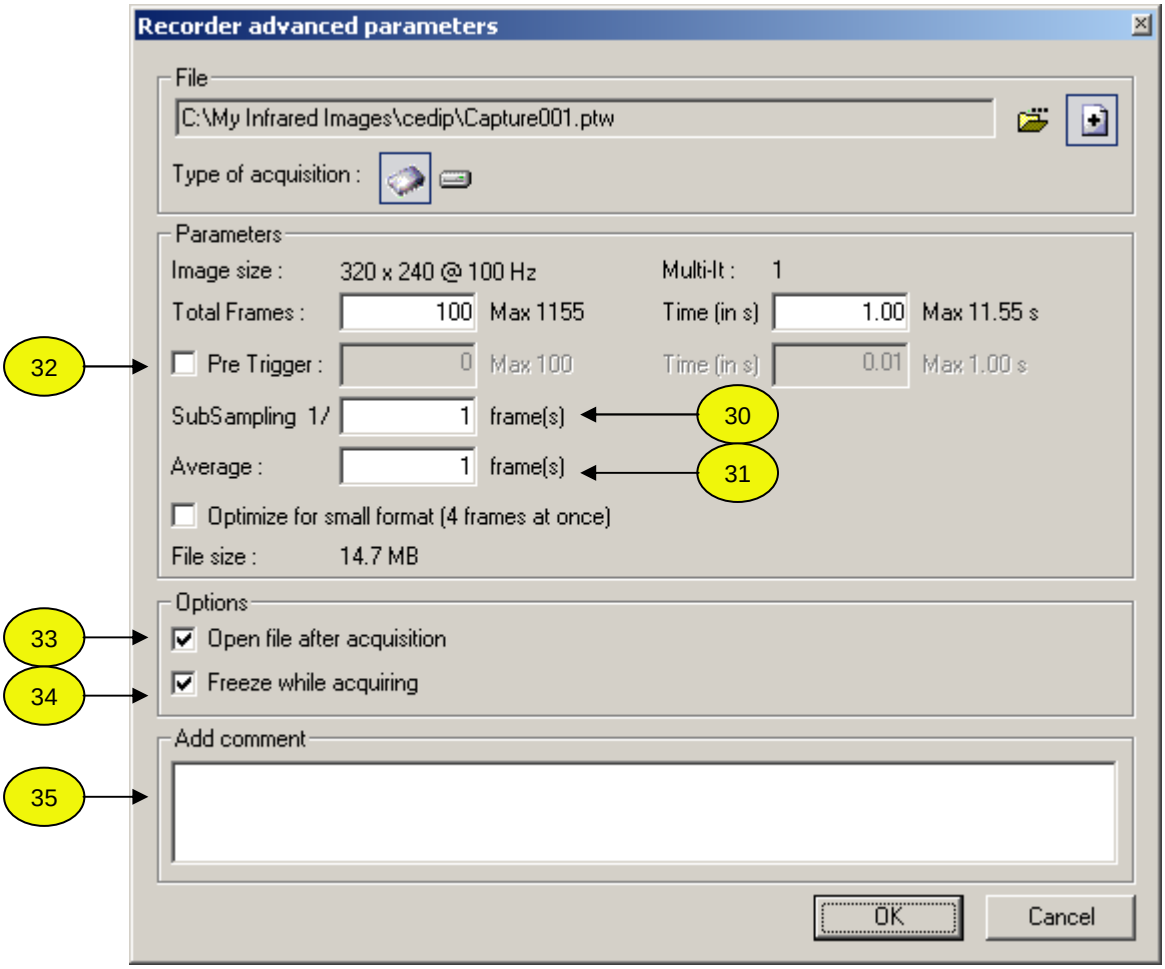
The calculated size of the acquisition files is displayed (28).

**By this stage, you are ready to perform a standard acquisition.**

## *5.2. Advanced Functions*

You will need to access the advanced functions if you wish to apply subsampling, averaging or pre-triggering.

Clicking on the "Advanced …" button (29) calls up the following window:




**Warning**

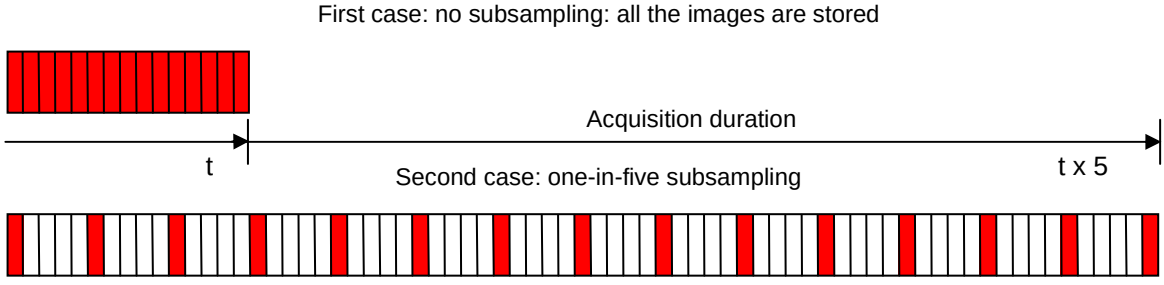
Pressing [Enter] validates and closes this window. Each parameter is confirmed when the user moves on to the next field.

This window displays all of the acquisition parameters. We will not repeat parameters described earlier.

### 5.2.1. SubSampling

You can set an image subsampling rate (30). WARNING: this choice determines the acquisition duration (see example), but not the "max" duration which is only related to the maximum storage capacity.

**Example**



**Note**

The first image in each batch is always retained.

### 5.2.2. Averaging

This function (31) lets you store an image where each pixel takes the average value of the pixels in the same position taken from x images.

**Note**

The acquisition duration is not affected, as all of the images must be memorized to calculate the averages.

### 5.2.3. Pre Triggering

This function lets you retain images acquired immediately before starting acquisition.

- Tick the box (32)
- Choose the number of images to retain

**Notes**

The maximum value equals the size chosen for the film (as these images are an integral part of the film).

Two triggers will be required to start acquisition: the first starts recording images in a loop until the second trigger is received that starts the actual acquisition.

### 5.2.4. Optimizing for Small Formats

This function is automatically ticked when using small formats (very high camera image speeds). It stores images in fours and prevents the image loss during acquisition.

### 5.2.5. Options

The "Open file after acquisition" option (33) opens the file at the end of the acquisition sequence. You can thus view the film directly.

**Note**

This window is in the background as the Live window always takes priority.

The "Freeze while acquiring" option (34) freezes the image during acquisition. Resources are thus freed to optimize acquisition performance. Unticking this box therefore leads to a significant risk of losing data.

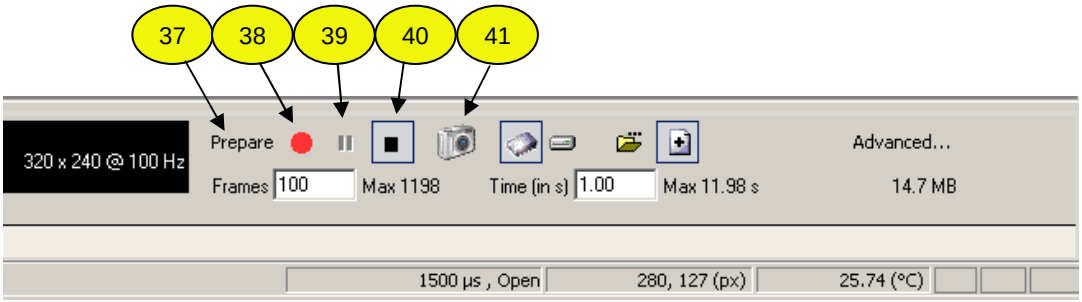
### 5.2.6. Comments

The "Add comments" field (35) is reserved for your comments, for example a description of the experiment and its influential parameters. The comment is included in the film file and will therefore remain with it systematically.

**Tip**

It is possible to enter comments after acquisition. We do however recommend entering them beforehand to avoid omissions.

# 6. Acquisition




The "Prepare" button (37) is used to prepare the acquisition parameters by simulating start up. This makes it possible to ensure that no problems (like the appearance of a warning window) will disturb acquisition start up.

## *6.1. Manual Start*

The Record button (38) starts acquisition.

**Reminder**

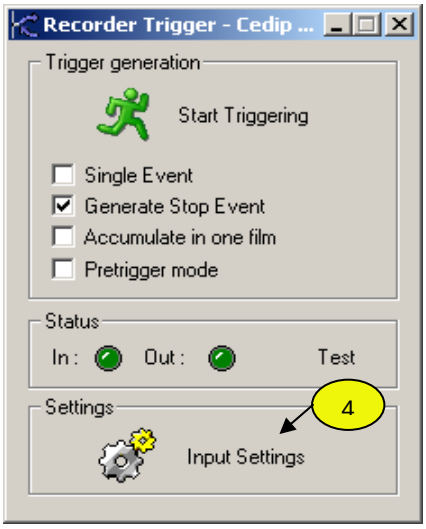
If you have chosen the pre-triggering option, the first press starts pre-triggering, the second starts acquisition.

The Pause button (39) lets you pause manually during acquisition.

The Stop button (40) lets you stop acquisition manually before the end of the programmed sequence (number of images).

## 6.2. Trigger Generation

Trigger generation is handled by the Recorder Trigger software. Load this software to configure the trigger mode. The window below appears:




The purpose of this software is to start acquisition (= ● button) when a specific event occurs.

To configure the trigger, refer to the document supplied with the "Recorder Trigger" software.

**Note**

Trigger management is only possible if the Live screen is active (● button accessible).

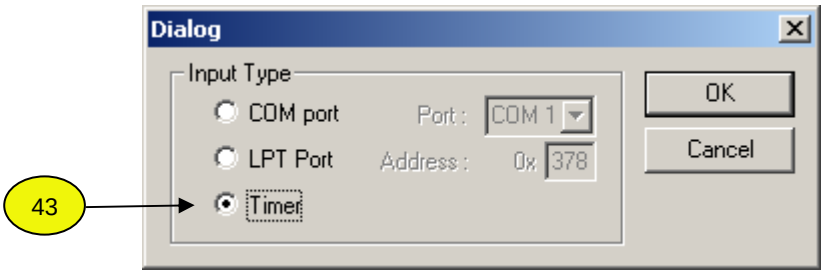
You have two options:

- Trigger generated by the PC,
- Electrical (TTL) trigger connected to the X0149 key inserted into the PC's parallel port.

### 6.2.1. Timer

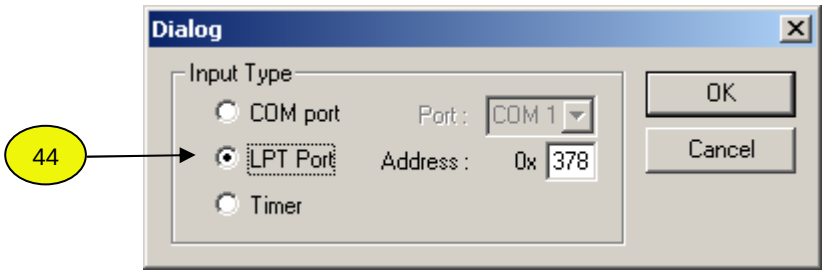
The trigger is selected by clicking on "Input Settings" (42).

The window below opens:




Tick the "Timer" option (43).

### 6.2.2. External Trigger




Tick the "LPT Port" option (44).

You can now choose the trigger control parameters:

Tick "Single Event" (45) to restrict acquisition to just one film, even if other triggers appear (e.g. if the trigger is generated by a cyclic system).

Tick "Generate Stop Event" (46) to stop recording (= ■ button) when the first of the events listed below occurs:

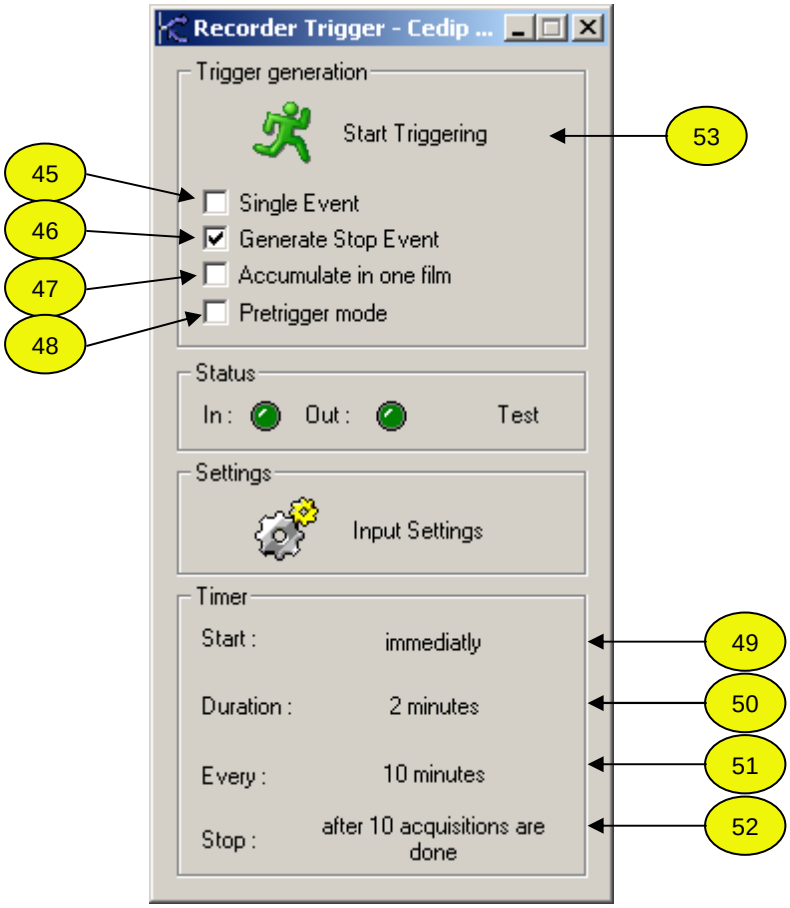
- End of the duration set with the timer
- Falling edge on the external trigger signal

Tick "Accumulate in one film" (47) to store all of the films in a single file.

**Warning**

For a metrological measurement, do not activate this function.

Tick "Pretrigger mode" (48) if you wish to use the Altair pre-triggering function.



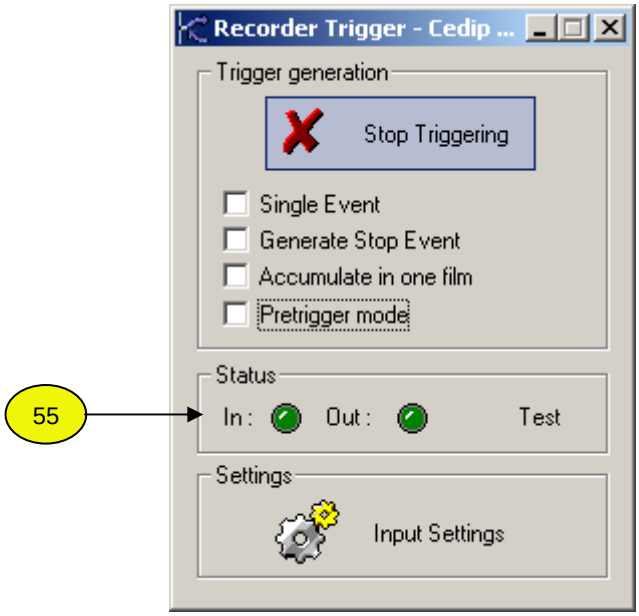

Clicking on buttons 49 to 52 gives you a choice of:

- Start date (49)
- Duration (50)
- Frequency (51)
- Number of successive acquisitions (films) (52)

## *6.3. Trigger Activation*

Click on the "Start Triggering" button (53) to activate the trigger. Acquisition will start as soon as the signal appears.

The "Start Triggering" (53) button changes shape (see picture below) and becomes "Stop Triggering" (54). Click on this newly-displayed button to disable the trigger.




The "Status" field (55) displays:

- In: the trigger status
- Out: the recording status

**Notes**

The event is captured with jitter of 0.1 seconds. The trigger signal must last at least 0.2 seconds to guarantee that it will be acted on.

Remember to leave enough time between two acquisitions to allow the RAM time to transfer the data to the hard disk drive (refer to the next section).

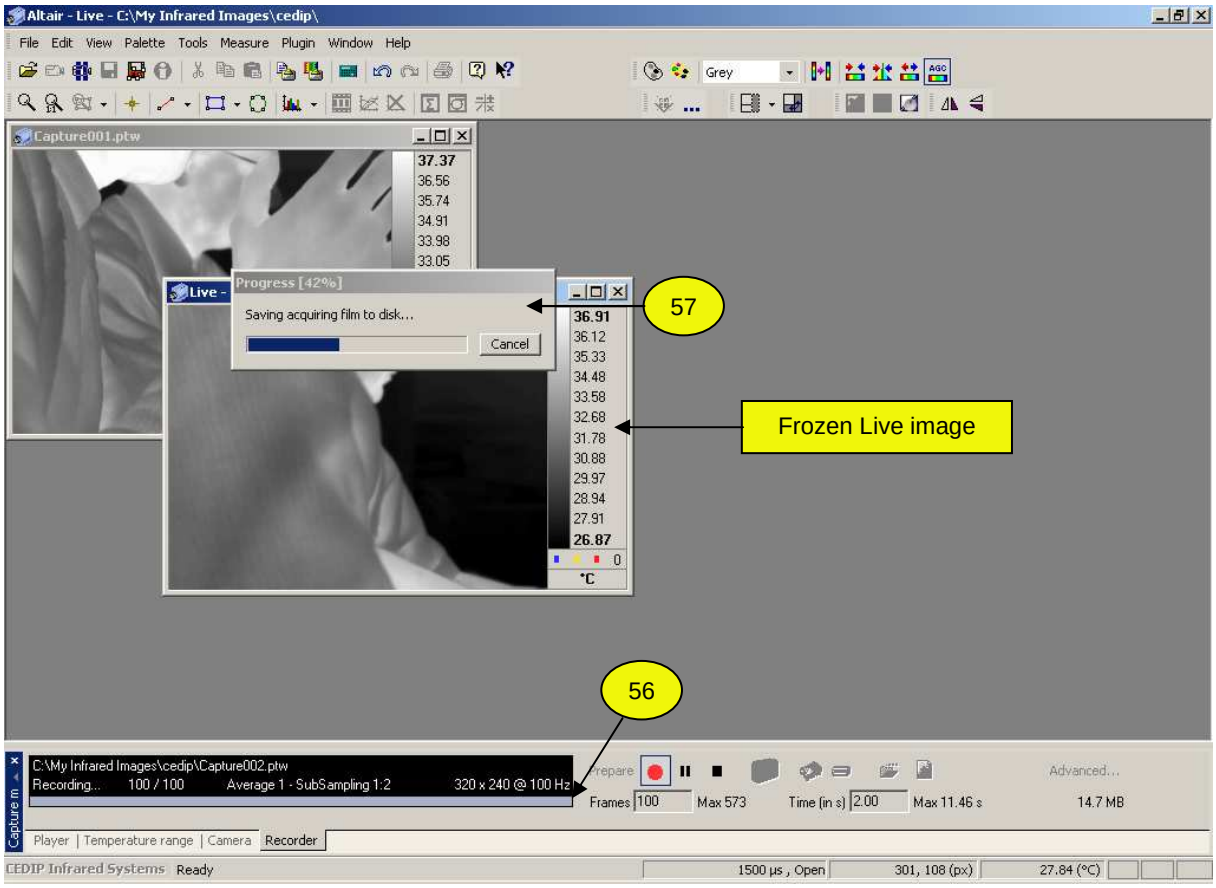
## 6.4. During Acquisition

The following sequence runs during acquisition:

1. The Live image is frozen (releasing RAM), unless you have specified otherwise.
2. A progress bar appears in the black banner frame in the main window (56). This shows acquisition progress.
3. If you have chosen to acquire images in RAM, a second window will then appear (57) showing the progress of the transfer from RAM to hard disk drive.

**Note**

The transfer time is roughly the same as the acquisition time.




# 7. Real-time Capture

An image may be captured "in real-time" by clicking on the  button (41).

# 8. Archiving the Project

Archiving the project is a very simple operation if you have followed the tips provided in subsection 3.1.

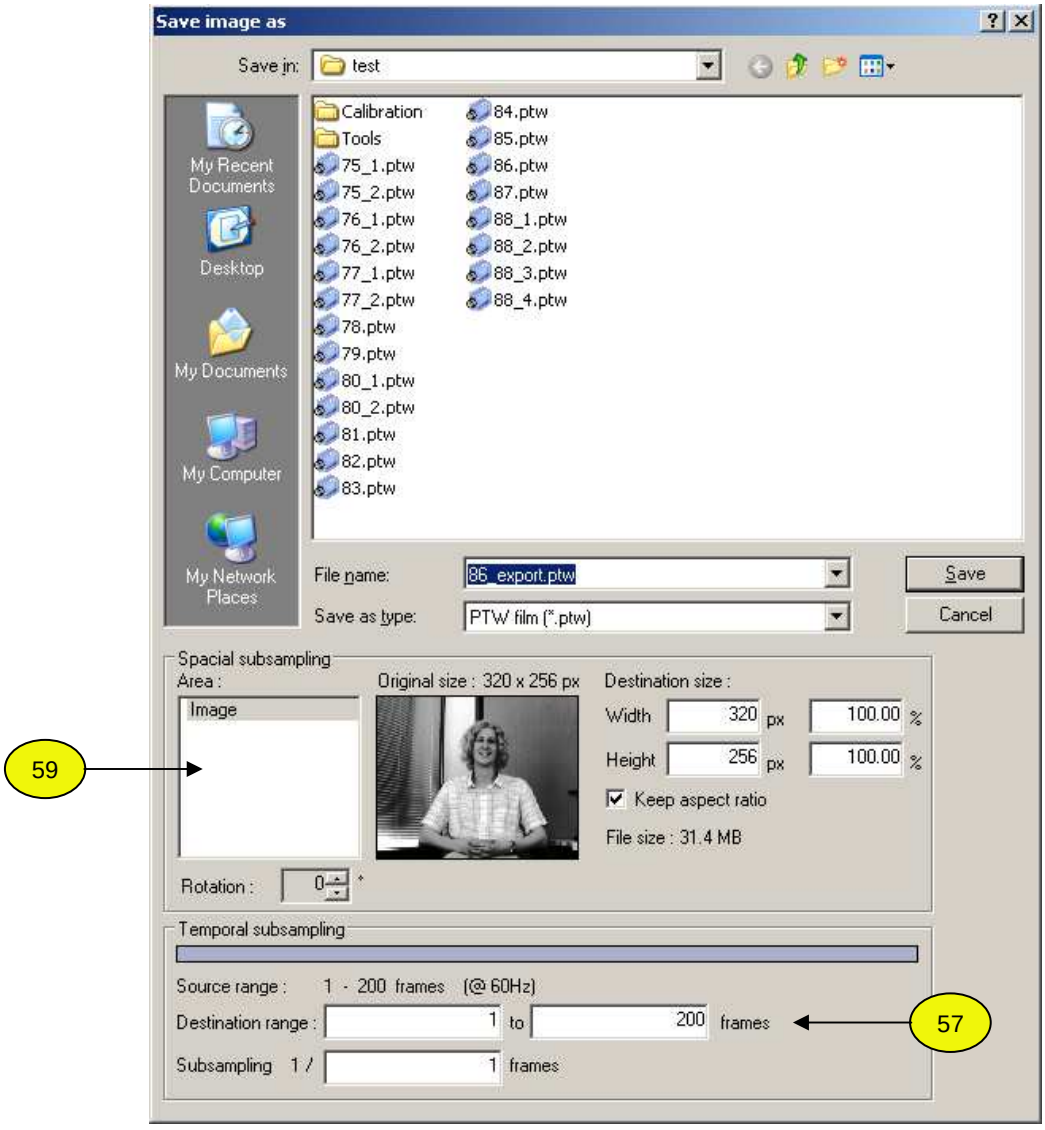
The project is in fact self-sufficient: the folder contains the acquisition files and the subfolders the tools and calibration settings.

A copy can be stored on any media (CD-ROM, DVD-ROM, Server, etc.) as long as it has the capacity.

# 9. Exporting

This function allows the measurement result to be used in an environment other than that of Altair.

To activate the export function, select the "File\Save image As" menu or press [F12]. The following screen appears:



## 9.1. Export Format

The standard export formats used are:

- *.ptw for later use with Altair
- *.avi to display the film in video format using another application

**Warning**

A file exported in .avi format contains video content only, no measurement values.

It is also possible to export to the following formats, if the customized Plug Ins have been installed (refer to the Installation documentation):

**Image formats**

- .bmp
- .jpg
- .gif
- .tif
- .png

**Warning**

These are all "image" formats. The number of files generated will therefore equal the number of images in the film and the total file size may be substantial.

The filename will then be made up of the original filename and a chronological export number.

Example:

Capture004.ptw (containing 100 images) will be converted into 100 files named Capture004_export001.bmp to Capture004_export100.bmp.

**Film format**

- .asc (ASCII film)
- .pfw (Float PTR film)

## 9.2. SubSampling

It may be useful to export only the useful part of the data. This function may be applied using spatial or time subsampling.

### 9.2.1. Time SubSampling

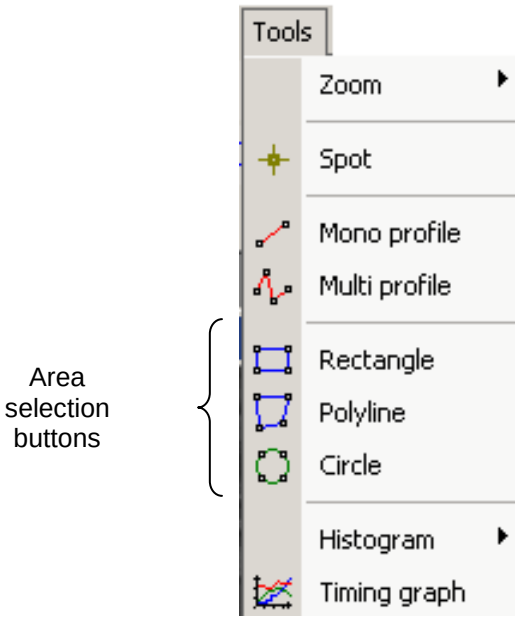
This function is used to restrict the data to that portion of time during which the event to be observed took place.

Using (57), indicate the numbers of the first and the last image to be exported.

You can also choose a subsampling rate to enter in (58) (e.g. to accelerate a very slow event).

### 9.2.2. Spatial SubSampling

From the file image displayed on-screen, select the area of interest using the buttons in the "Tools" menu:




Then start the export by selecting the area from the list displayed subsequently in the "Area" box (59).

# 10. Definition of Time in Files

The time is stored in the image files. The first image is dated (using the PC date or IRG-B time)*. All the other images are dated in relation to the first one with 10 ns accuracy.

* IRIG-B time: universal time used by military organizations.