VICON
MOTION SYSTEMS

This section describes some of the optional capabilities of the system.

Analogue data may be captured with your trials if your Datastation is fitted with an Analogue to Digital Converter (ADC) card. There are three types of ADC: 32- and 64-channel analogue capture cards for general use and a 4-channel analogue audio capture card for recording sound. These are referred to as analogue and audio cards respectively.

There are many types of analogue data you may wish to capture: signals from force plates for gait analysis, electromyography (EMG – the study of nerve and muscle electrical activity), and footplates attached directly to the feet to measure contact data, and more.

The capture of audio data is described in the chapter Capturing Audio Data.

Workflow

- Hardware setup
- Software setup:
    - System configuration
    - Video setup
    - Analogue setup
- Capture the trial

Checklist

In order to capture (non-audio) analogue data you must have:

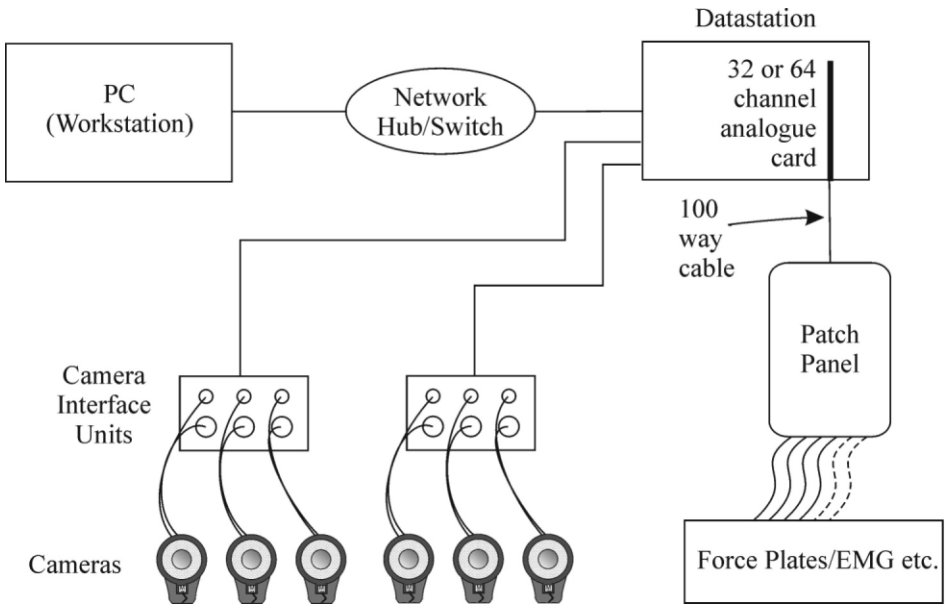
- At least one 32- or 64-channel analogue card installed in your Datastation
- Additional Vicon hardware to connect to your analogue source
- Your analogue source, e.g., force plates, EMG system or foot plates

The analogue card can be recognised as a long thin vertical 100-pin connector on the rear panel of the Datastation. You will have also been supplied with the 100-way cable and patch panel used to connect to the analogue source.

Hardware setup

One or two analogue capture cards should have been pre-installed in your Datastation. You should have already installed the relevant analogue equipment. The analogue equipment is connected to the Datastation via an analogue output cable, the Patch Panel and the 100-way cable. The figure below shows the schematic setup for analogue capture with a single card.

Schematic setup for analogue capture



The Patch Panel

The Patch Panel is housed in a plastic box (approximately 260x160mm) with a 100-way connector on one end and a rectangular inlet at the other. Before opening the Patch Panel box make sure that all equipment is switched off and that power cables are removed. To open the box:

- Remove the four plastic covers on top of the box using a flat blade screwdriver
- Remove the four cross head screws to remove the lid.

You should now see the array of screw down terminals.

- Pass the analogue equipment output cables through the rectangular inlet
- The signal cables should be attached to the screw down terminals labelled CH01 through CH32 or CH64 depending on your system
- Braided ground cables should be attached to the screw down terminals marked SGND (Signal Ground)

When you have completed installation of the cables replace the lid.

You can now connect the Patch Panel to the Datastation using the 100-way cable. If you have two, the 100-way cable for the first patch panel should connect to the 100-pin connector on the rear of the Datastation nearest the network connector.

Workstation setup

Having completed all the connections you can now start Workstation and

connect to the Datastation. Before starting to capture data you must configure Workstation for your analogue hardware. This setup procedure consists of adding information to a number of dialogs: System, Video and Analogue Setup. These are all opened from the System menu in Workstation.

System Configuration

The system configuration allows you to define a profile for your motion capture system. This can be used if you use different setups, or have different users requirements:

- Select System | Configuration

If you connect to different systems you can create a different configuration or profile for each. To create a new profile:

- Click New
- Type a name in the pop up edit box and click OK
- Select your Vicon system from the System Type drop down list
- Enter the IP address of your Datastation

Now add details of your analogue hardware:

- Click Add...
- Select the type of ADC card from the list and click Add
- Repeat if you have two cards
- Click OK to close the System Configuration dialog

It is important to set Camera Mode before analogue capture rate because the frequency of analogue capture must be a multiple of the video rate capture to ensure correlation between the two during processing. Camera Mode is set in the Video Setup dialog; see Preparation for more details.

Analogue Setup

To open the Analogue Setup dialog:

- Select System | Analogue Setup...

The dialog allows you to set all details about the analogue system and individual channels. The following describes input for each section of the dialog.

Datastation ADC Board

Lists the ADC cards present in your system.

Sampling Frequency

Set an appropriate sampling frequency. This is a multiple of the video rate.

The Channels Panel

The Channels panel allows you to set details for each individual channel.

- Select the Channel Number from the drop down list
- Select Capture to enable capture for this channel, clear Capture to disable capture
- Enter a Label to identify the channel – this will be used in graphs and data files
- You may also enter a short description of the channel
- Select an Input range, enter Scale, Offset and Units

Finally, you can scale all channels together using the General Scale. It is recommended that you set this to '1' and scale each channel individually.

The dialog also has a number of buttons:

Reset All

Changes the settings back to their values when the dialog was first opened.

Capture All/Capture None

Click these to capture data on all or none of the channels. The latter is useful if you are only interested in a few channels, since it saves having to deselect each channel individually.

To complete the Analogue Setup you need to add the input range of your analogue equipment. This should be available in the equipment manufacturer's documentation. The input and scaling is described in detail below.

Input, Scale and Offset

The Input, Scale and Offset are all used to produce a readable output for each channel from the analogue device.

Input defines the voltage range expected. You can select from ±1.25, ±2.5, ±5, ±10V, noting that the full scale is therefore 2.5, 5, 10 and 20V respectively. This is actually read as a binary value. For a 16-bit analogue card the scale is 0 – 65535 and the zero level is half way up this scale (Noting, therefore, that there are 65536 values!)

Scale is the scaling factor for the selected channel. It useful to be able to scale individual channels when you have more than one analogue device as their output ranges may be different.

Offset is used to compensate when the zero level is not half way up the input range scale. This should be a binary value.

How to scale the analogue input

It may be more convenient if you can display a physical quantity in the analogue

window in Workstation. For example if you are measuring force from a force plate then you might wish to display a scale in Newtons rather than Volts.

For example a force plate may produce an output of, say, 3mV/N. When digitised by the ADC card this will be scaled within the digital range of the card. For example, a 16-bit card would be scaled, 0 .. 65535.

Thus with an Input value of ±10V, giving a full range of 20V, the actual binary range is 20/65536 Volts per Bit. As the actual input (for this example) is 0.003V/N you can calculate the input as a force by dividing by 0.003. You can then select the required unit from the Units selection box to the right of the Scale and Offset edit boxes.

Force plates

In order to integrate 3D motion with force plate data you must add relevant information for each force plate; type, position, orientation and analogue channels. Do this using the Force Plates Setup dialog:

- Select System | Force Plate Setup

Alternatively you can open the dialog directly from the Analogue Setup dialog.

As with other system settings dialogs you can choose to use the settings for the current hierarchy level or the level above (see Configure the System in Preparation). To define a force plate:

- Click Add

This adds Force Plate 1 to the list on the left of the button

- Select the Force Plate Type from the drop down list

- Select the physical channels that connect the force plate from the Channels panel drop downs

- Enter the coordinates of the origin of the plate

- Enter the coordinates of the corners of the plate

- When complete, click Add, again, to enter details of the next plate or click OK if you are done

The settings are as follows:

Force Plate Type

Force Plate Type lists Vicon compatible force plates. When you select your type of plate the Channels list, to the right, is updated to display the correct number of channels. Select the channels for the force (labelled on the left) of the list.

Origin

The position of the Origin of the plate will always be supplied by the manufacturer but does depend on the type of plate. For AMTI plates it is the point about which the moment outputs of the plate are measured. For Kistler and Kyowa-Dengyo plates it is at the horizontal centre of the plate's four transducers at a distance Z–0 below the surface. The manufacturer supplies the parameters A and B. Enter the coordinates as:
X=A, Y=B, Z=Z0.

Corners

The Corners panel allows you to define the position and orientation of the force plate in the Capture Space coordinate system. The corners are numbered 1, 2, 3 and 4, clockwise starting with the corner with the positive X and Y values in the force plate coordinate system. Please check your force plate documentation to determine the coordinate system for your particular force plate.

To integrate forces, moments and centres of application with the Vicon system you must always place the L-Frame in the same, exact place in your Capture Space. The easiest way to do this is to use the guide shims on the L-Frame to align it with the edges of the force plate. When you do this the corner of the force plate under the corner of the L-Frame will be designated as the origin of the global coordinate system (0,0,0).

You should now enter the coordinates of the other corners according to the size of your plate. You can obtain these dimensions from your force plate documentation.

Zero Sample Range

Zero Sample Range is used to set the zero offset automatically. Enter a range of fields (frames) during which the analogue input is expected to be zero for all force plate channels.

Before capturing a trial select reset the plates to zero using the Trial | Reset Force Plates menu command. This uses data from these fields to set the baseline.

Kyowa-Dengyo force plates

Kyowa-Dengyo force plates require regular calibration to re-calculate analogue channel scale and offset values. This involves the collection of sample data while the plates are provided with accurate calibration signals. First check that the Datastation will send these signals correctly:

- Select File | User preferences
- Set Kyowa-Dengyo Force Plates Calibration Port to 'Timing Board'.

Perform calibration using the Kyowa-Dengyo Force Plate Calibration dialog:

- Select System | Calibrate KD Force Plates

Note that this option is only available if one or more Kyowa-Dengyo plates have been defined in the Force Plates Setup.

- Select number of samples to capture (normally 100)
- Set zero balance pulse width (normally 1)
- Set calibration settling time (normally 5)
- Set calibration range corresponding to the setting on the force plate amplifier.

This is used to calculate the scale factor for each force plate channel, via C2. Only one value may be entered; if you have different settings for each channel then you can compensate for this by using different C1 settings.

- Set sensitivity range

The calibration calculates absolute scaling factors for each force plate channel, without taking the analogue General Scale factor (see Analog Setup) into account; the Sensitivity Range is used to compensate for this. Enter a value equal to 1 divided by the analogue General Scale.

- Set range coefficient (normally 1)
- Select a force plate from the force plates list
- Set C1 values

Appropriate C1 calibration coefficients are provided for each Kyowa-Dengyo force plate channel by the manufacturer and are used to calculate the channel scaling factors. You can adjust the provided values to compensate for different Calibration Range settings on each channel; this is typically used when X and Y ranges differ from to the Z range. For example, if the X and Y ranges are set to 1000 on the amplifier and the Z range is set to 2000 you can set the overall Calibration Range value to 1000, the X and Y channel C1 values to those provided and the Z channel C1 values to those provided multiplied by two (2 * 1000 = 2000).

- Click Calibrate

Data is collected and the results displayed. If the results do not appear to be correct, check the options. If any are incorrect you can adjust them and then click Re-Calibrate to reprocess the data using the revised settings.

- Click OK to update the analogue scales and offsets

Calibrate Analogue Zero Levels

It is usually important to know the ambient zero levels of selected analogue channels (the voltage detected when there is nothing on the force plate, no EMG muscle activity, no pressure on a foot switch). It is important that you are sure the levels are at the ambient value to avoid setting the level incorrectly.

You can measure this automatically using the Analog Zero Level Calibration dialog:

- Select System | Calibrate Analog Zero Levels

As with other System dialogs you can choose to use the settings for the current hierarchy level or the level above (see Configure the System in Preparation).

- Select groups to calibrate

There is one group for each force plate and a further group for remaining channels. When you select a group you can see the current zero values of the physical channels that are associated with it to the right.

- Select number of samples to capture (normally 100)

The samples are averaged together to form a more accurate value than would otherwise be obtained from a single sample.

- Click Calibrate

Data is collected for all channels in the selected groups. This data is averaged to determine ambient zero levels for the channels.

To save the zero level value:

- Click OK

Analogue data capture

Capture the data

Having set up the system for analogue capture you can proceed with the data capture. Within a new session:

- Calibrate the cameras using the Clinical Static Calibration Object and then the wand
- Capture a static trial and calibrate the subject
- Select Trial | Capture to start a dynamic capture
- Select a Trial Type that includes analogue data capture
- Verify that analogue data will be captured by clicking Types to open the Trial Types dialog
- Ensure that Analogue data is selected in the Capture pane and click OK
- Select the subject for the trial and add a description and notes as needed

- Click Capture

You can of course choose any relevant Pipeline options for the trial or edit the Trial Type options e.g., to display both Analogue and Workspace windows after capture.

View the data

Any analogue data may be viewed in the Analogue Data window and in Graph windows. The Analogue Data window is opened from the Windows menu:

- Select Window | New Analogue Data

The window displays the channels in a vertical array. To alter the view:

- Click to select a channel
- Use Up and Down arrows to scroll through the channels
- Press L to reduce the number of channels in view,
- Press Shift+L to increase the number of channels in view
- Press G to increase the vertical scale (the digital gain) of the selected channel only
- Press Shift+G to reduce the vertical scale of the selected channel only
- Press T to expand the X scale
- Press Shift+T to contract the X scale

Numerical data can be more readily viewed using the Graph window. The Graph menu is only available if you have an Analogue Data or 3D Workspace window open:

- Select Graph | Analogue
- Select the channel you wish to view in the Select Analogue Channel dialog
- Click OK

The graph is displayed in a small graph window:

- Drag a corner to resize the window
- Click on the graph to display the cross-hair on the trace and a small window displaying the coordinates of the analogue signal at that point
- Double click to open the Graph Options dialog

This allows you to change the scale of the graph, the title and whether or not to display the mean and standard deviation and grid lines in the graph window.

To print the graph:

- Select File | Print

Audio data can be used as an additional reference when processing motion capture data, for example allowing animators to synchronise voice with facial capture data.

Audio may be included in your trials if your Datastation is fitted with at an Analogue to Digital Converter (ADC) card. Your system may have been supplied with a specific four channel audio analogue card. This can be identified as a group of four RCA phono connectors, labelled Channel 1 through 4, in the rear panel of the Datastation. You may also capture audio data with 32 or 64 channel analogue cards.

Recorded sound is initially stored as an analogue signal. Because this cannot be interpreted directly by your computer's sound card this is converted to Windows WAV format using the 'Generate Audio Wave File' Plug-in.

Workflow

The workflow in capturing sound is similar to other analogue capture and involves some detailed setup processes in Workstation. In order to use your computers hardware to play back sound you must convert the raw analogue data into the recognisable WAV format. This uses the Vicon Plug-in "Generate Audio Wave File". Part of the conversion is the resampling of the analogue data (the input frequency) to match your sound card's frequency (the target frequency). The workflow is:

- Hardware setup
- Software setup:
  - System configuration
  - Video setup
  - Analogue setup
- Capture the trial
- Generate wave file
- Playback

Checklist

In order to capture audio data you must have:

- At least one analogue card installed in your Datastation
- A suitable audio input device, e.g., a microphone with a suitable preamplifier
- A compatible sound card installed in the computer used for playback

You should note the following:

- When the analogue signal is converted to WAV format you may need advanced editing equipment to process a file with more than two channels

- The minimum input analogue range for sound is ±1.25V and so a preamplifier may be used to magnify the microphone output to at least this value

Hardware setup

One or two audio capture cards should have been pre-installed in your Datastation. For audio the only step is to plug your recording device into an appropriate channel in the rear of the Datastation.

Workstation setup

The setup routine for audio capture is similar to the setup for other analogue data – requiring the completion of System, Video and Analogue dialogs. In addition, since conversion of the audio analogue signal uses a Vicon plug-in, the complete setup involves confirming that this is included in your installation.

Installing the plug-in

The Audio plug-in converts raw analogue data into Windows audio (WAV) format so that the sound may be played back using your computers sound card.
First check whether the plug in is already installed:

- In Workstation select Trial | Pipeline

If the plug-in is installed you will see the item *Generate Audio Wave File* in the process list. If the plug-in is not present then you should contact Vicon Motion Systems directly. You will be supplied with the files:

- ConvertSound.vpi

- ConvertSound.hlp

The installation process is the same as any other plug-in:

- Copy the files ConvertSound.vpi and ConvertSound.hlp to the PlugIns sub-folder of the main Vicon installation

- Restart Workstation

- Check the Pipeline dialog again to see if the plug-in is displayed.

The next step, before starting to capture data, is configuring Workstation for your audio hardware.

System Configuration

The system configuration allows you to define a profile for your motion capture system. This can be used if you use different setups, or have different users requirements:

- Select System | Configuration

If you connect to different systems you can create a different configuration or profile for each. To create a new profile:

- Click New
- Type a name in the pop up edit box and click OK
- Select your Vicon system from the System Type drop down list
- Enter the IP address of your Datastation

Now add details of your analogue hardware:

- Click Add...
- Select the type of Audio card from the list and click Add
- Repeat if you have two cards
- Click OK to close the System Configuration dialog

It is important to set Camera Mode before analogue capture rate because the frequency of analogue capture must be a multiple of the video rate capture to ensure correlation between the two during processing.

Analogue Setup

To open the Analogue setup dialog:

- Select System | Analogue Setup...

The dialog allows you to set all details about the analogue system and individual channels. The following describes input for each section of the dialog.

Datastation ADC Board

Lists the ADC cards present in your system.

Sampling Frequency

Set an appropriate sampling frequency. This must be a multiple of the camera frequency. When converting audio data into WAV file format you may need to resample and therefore you should choose a sample rate as close to the target rate as possible. If you wish to view resampling rates:

- Select Pipeline from the Trial menu
- Highlight Generate Audio Wave File from the list of plug-ins
- Click Options...

The Options dialog includes a drop down listing all the available resampling frequencies.

The Channels Panel

The Channels panel allows you to set details for each individual channel.

- Select the Channel Number from the drop down list (1,2,3 or 4 for audio)
- Select Capture to enable capture for this channel, clear Capture to disable capture
- Enter a Label to identify the channel – this will be used in graphs and data files
- If needed you may also enter a short description of the channel
- Select an Input range, enter Scale, Offset and Units

Finally, you can scale all channels together using the General Scale. It is recommended that you set this to One and scale each channel individually.
The dialog also has a number of buttons:

Reset All

Changes the settings back to their values when the dialog was first opened.

Capture All/Capture None

Click these to capture data on all or none of the channels. The latter is useful if you are only interested in a few channels, since it saves having to deselect each channel individually.

To complete the Analogue Setup you need to add the input range of your amplifier. This should be available in the equipment manufacturer's documentation. The input and scaling is described in detail below.

Input, Scale and Offset

If you know the output range of your preamplifier then you can use the information here to complete the Analogue Setup. If you do not know this range then you will need to make an initial estimate and then alter the setup accordingly. This is described below.

The Input, Scale and Offset are all used to produce a readable output for each channel from the analogue device.

Input defines the voltage range expected. You can select from ±1.25, ±2.5, ±5, ±10V, noting that the full scale is therefore 2.5, 5, 10 and 20V respectively. This is actually read as a binary value. For a 16-bit audio card the scale is 0 – 65535 and the zero level is half way up this scale (Noting, therefore, that there are 65536 values!) . With an input value of ±10V, giving a full range of 20V, the actual binary range is 20/65536 Volts per Bit.

Scale is the scaling factor for the selected channel. This is useful to produce a

more readable output display in the Analogue window in Workstation.

Offset is used to compensate when the zero level is not half way up the input range scale. This should be a binary value.

Audio data capture

Capture the data

Within a new session:

- Calibrate the capture volume
- Capture a static trial and calibrate the subject
- Select Trial | Capture to start a dynamic capture
- Select a Trial Type that includes analogue data capture
- Verify that analogue data will be captured by clicking Types to open the Trial Types dialog
- Ensure that Analogue data is selected in the Capture pane and click OK
- Select the subject for the trial and add a description and notes as needed
- Click Capture

View the data

Raw audio data may be viewed in the Analogue window and in Graph windows. The analogue data window is opened from the Windows menu:

- Select Window | New Analogue Data

The window displays the channels in a horizontal array. To alter the view:

- Click to select a channel
- Use Up and Down arrows to scroll through the data
- Press L to reduce the number of channels in view
- Press Shift+L to increase the number of channels in view
- Press G to increase the vertical scale (the digital Gain) of the selected channel
- Press Shift+G to reduce the vertical scale of the selected channel
- Press T to expand the X scale
- Press Shift+T to contract the X scale

To open the Graph window you must have either an Analogue Data or the 3D Workspace window open:

- Select Graph | Analogue
- Select the channel you wish to view in the Select Analogue Channel dialog
- Click OK

The graph is displayed in a small graph window:

- Drag a corner to resize the window
- Click on the graph to display the cross-hair on the trace and a small window displaying the coordinates of the analogue signal at that point
- Double click to open the Graph Options dialog

This allows you to change the scale of the graph, the title and whether or not to display the mean and standard deviation and grid lines in the graph window.

To print the graph:

- Select File | Print

Convert analogue data to WAV

To replay the audio through your computer hardware you must convert the analogue data to Wave file format. This is done using the Generate Audio Wave File plug-in.

As with other pipeline functions you should open the trial containing the audio data. Then:

- Select Trial | Pipeline
- Select Generate Audio Wave File
- Click Options and set the Audio options (see below)
- Click Process Now

You can also do this as part of the pipeline for a single trial or any trial type.

Generate Audio Wave File pipeline options

The first step is to set up the pipeline options for the trial:

- Select Trial | Pipeline
- Select the Generate Audio Wave File item and click Options

The Generate Audio Wave File dialog has five main panels: Channels, Multiple WAVs, Resample Options, Input Range and Initial Sample Offset.

Channels and Multiple WAVS

There are four audio channels available. Select the ones you wish to convert to WAV format. Note that you will need advanced editing equipment in order to play back or edit a file with more than two channels. Alternatively select Multiple WAVs to create an individual file for each channel. This avoids the problem but Workstation will only play back the first channel.

Resample Options

The data should also be resampled to ensure that the frequency of the sound file rate is compatible with your sound card:

- Select Resample
- Select a suitable output frequency from the drop down list

To minimise degradation of sound quality you should choose a sample rate as close as possible to the original analogue sampling rate (see Analogue Setup).

Input Range

The default Input Range is ±2.5V. If you know the output from your audio amplifier then you should select the range accordingly. If the range set is less than the actual input then the analogue signal will be clipped leading to degradation in sound quality.

If you do not know the value then you will be able to estimate it and then assess signal using the Analogue graph (see below).

Initial Sample Offset

On some older computers there may be a delay between the audio signal and the video signal. For most modern computers there will be no delay and the Offset should be set to zero. Otherwise you will need to estimate the delay from the Analogue Window or the Analogue graph.

WAV file replay

Refresh Eclipse

Once created, you need to close and reopen the trial. This ensures that the sound file is correctly linked, through Eclipse, to the trial. Now, when you playback the trial the sound will be heard through your PC sound equipment.

Troubleshooting audio playback

Setup

If you do not know the output range for your audio recording equipment (microphone and amplifier) then you can estimate the correct range as follows:

- During the setup process estimate the range of the input signal and add this to the Analogue setup

- Capture a trial
- Open the trial and view the analogue data in a graph (Graph | Analogue)
- Use the graph to estimate the maximum and minimum voltage input
- Repeat the setup process adding the correct range to the Analogue Setup and Generate Audio Wave File dialogs

Note that if your estimate is too low then the audio data will be clipped and you will need to repeat the setup. It may be better to start with a large estimate to ensure that you can view the full scale of the input.

Set the offset

On older computers there may be a slight but noticeable delay between video playback and sound playback. If so you will need to set an initial sample offset:

- Open a New Analogue Window for the Window menu
- Estimate the delay, in seconds
- Multiply this by the audio sampling frequency

You can check the frequency if necessary by selecting System | Analog Setup.

- Select Trial | Pipeline
- Select the Generate Audio Wave File item and click Options
- Set the Initial Sample Offset to the calculated sample delay and click OK
- Click Process Now
- Replay the trial

If the video and sound are still not synchronised repeat the process; otherwise make sure you update the Initial Sample Offset for the trial type (if you are generating WAV files automatically).

Being able to capture movie data and video data simultaneously provides you with an invaluable reference and presentation tool.

Hardware requirements

Video card

Vicon currently supports the use of the Broadway video card manufactured by the company Data Translation. This card and supporting software should be installed in your workstation PC according to the manufacturer's instructions. You will also need a compatible video camera. This should have S-VHS or composite video (NTSC or PAL).

Check the card works!

Before attempting to use the video camera in conjunction with Workstation check that the camera works with the Broadway software. Note that Workstation and the Broadway card software cannot control the hardware at

the same time and so the Broadway software should be closed prior to starting Workstation.

Capturing movie data

Preparation

Before capturing data you must prepare both the Broadway software and Workstation.

- Start the Broadway software
- Select Capture | Set capture file type
- Select MPEG from the drop down list
- Click OK
- Close the Broadway software
- Start Workstation
- Select System | Movie Setup
- In the setup dialog select Broadway | MPEG Capture/Compression in the Capture Device selection list

This opens the MPEG Capture Options dialog. This is a feature of the Broadway software.

- Select the Compression tab
- Click Options
- Ensure the selection for Audio is clear

- Click OK
- Select High Quality for Type
- Click OK
- Capture File size should be set to some positive integer, Frame rate can be ignored.

Check your moves: the Live Movie window

Before capturing data you can check that all is working and that your camera can view the capture volume using the Live Movie window:

- Select System | Live Movie

This opens the live movie window, displaying a live view through your camera. When you start your trial capture then this window is automatically closed.

Capture Video and Movie data

Once your camera is set up and functioning you can capture your trial including movie data:

- Select Trial | Capture...
- Choose a trial type which includes Movie data
- Click Capture

If you need to create a new trial type for your movie data:

- Open the Trial Types dialog (either from the Trial menu or from within the Trial Data Capture dialog)
- Click New
- Enter a name for your new trial type
- Ensure Movie Data is selected in the Capture panel
- Select Movie Data under Open Windows if you want the movie window to open automatically after the capture
- Add any other settings to complete the trial type definition
- Click OK to close the dialog

Synchronise data

When you capture movie data you will notice, on playback, that there is a delay between the movie and the video or reconstructed data. This occurs due to the MPEG compression process on the video card. Fortunately this is a constant for a given hardware and camera setup and so can be set once and then saved for future captures. Do this using Movie Synchronisation dialog:

- Select System | Movie Synchronisation

The dialog displays a slider and Up and Down buttons allowing you to set the number of fields (frames) to delay. The best way to set this accurately is to capture a separate trial featuring some distinct movement, called a clapperboard movement. For example you could take the wand, hold it vertically at head height and slowly move down until it touches the ground, before pulling back to head height. You need to capture movie and video data of this clapperboard movement.

To synchronise the movie and video data:

- Capture a short video and movie data short trial, including a 'clapperboard' movement,

- Reconstruct the video data and open both Movie and Workspace windows
- Open the Movie Synchronisation dialog from the System menu

- Play the trial, using the Replay Speed control to slow down if necessary

- In the Movie Synchronisation dialog use the slider to change the delay by several fields and the Up and Down buttons to change the delay one frame at a time

- When you are satisfied the delay is set correctly click OK

Because the delay should be a constant for a given hardware setup, you can also select 'Set as base value for new trial captures' to set the delay as a default value for your system.

Timecode and GenLock are features that allow both the synchronising of the Datastation to other equipment and the inclusion of an accurate time reference in an output video image.

Timecode is the equivalent of the readable information printed along the edge of motion picture film but on a video source. In Vicon, a recording of a sequential timecode at the same time as capturing data allows a more precise reference when editing.

Genlocking, an abbreviation for Synchronised Generator Locking, takes a signal from a video source and allows synchronisation of capture with that source. If a timecode is present in the video signal, this can be then added to the output as a burn-in window to provide a visual reference to the scene being recorded. If no timecode is present you can set the burn–in window to display the Vicon frame count.

You can tell that the GenLock card is installed by looking at the System menu in Workstation. If it is installed then the Timecode Setup... command will be available. Otherwise it will be greyed out.

Timecode

Each frame of video data has its own eight-digit code that tells the time in hours, minutes and seconds along with the frame number. Such codes permit very fast and accurate editing.

There are two standards, the *SMPTE* or Society of Motion Picture and Television Engineers standard and the *EBU* or European Broadcasting Union standard. Vicon supports both of these.

One of the significant differences in these standards is that the SMPTE expects cameras to be running in multiples of 30Hz whereas the EBU standard expects the cameras to be running in multiples of 25Hz.

Genlock

In normal circumstances the time reference for the Vicon system is the master PCI Coordinate card installed in the Datastation. If you have the GenLock optional card installed you can maintain the Datastation as the reference or you can lock the Datastation to other video equipment.

This is achieved by introducing a composite video signal from a master source. The master timecode can be a user-supplied timecode generator to tie everything together, but is most commonly a pre-recorded tape with timecode.

Connecting the Datastation

A number of connectors are present on the rear panel of the Datastation for connecting to external video devices. If you do not have the GenLock card installed these will be present but will be inactive. You can tell that the GenLock card is installed by looking at the System menu in Workstation. If it is installed then the Timecode Setup... command will be available. Otherwise it will be greyed out.

Datastation connectors

The Datastation rear panel has the following connectors for use with Timecode and GenLock.

Ref Input

Ref Input takes the reference signal from the video source.

Loop Through

This allows you to pass the signal straight out again to the next device in the chain. If there are no further devices in the chain then this must be terminated with a 75_ BNC terminator.

Ref Output

Two connectors – standard BNC or S-VHS – can be used to carry an output signals. The output is the reference input signal plus the optional burn-in window. If the external source does have timecode then the burn-in window can display this information. If the external source does not have timecode the Vicon system can still display its own frame count for output in the burn-in window.

Timecode

The Ref Input and Reference Output connectors allow for Vertical Inserted Timecode or VITC. The Timecode In and Timecode Out connectors are for use with Longitudinal Timecode (LTC) sources. You must have a Reference Input (Ref Input) video signal even if you are only going to use LTC Timecode.

Timecode setup

Before using Timecode and/or Genlock the system must be configured. The Timecode Setup dialog in Workstation is used to control these features:

- Select System | Start Link to establish a link between Workstation and the Datastation

- Select System | Timecode Setup

Timecode Setup dialog

There are several panels within this dialog. Please check the following settings:

Options

Set the timecode mode. Because the LTC signal is on the audio track of the video and the VITC is a part of the video signal, the options are Slave to Video (VITC) and Slave to Audio (LTC). Alternatively you can select Disable. Ensure that Genlock to external video source is selected.

Video Burn-In

The burn-in window is a small display added to the reference output video signal. The options allow you to display timecode or frame count information. Timecode can be displayed as Hours: Minutes: Seconds: Frames or as a simple Vicon frame count.

You can also select to "Show clapperboard information before capture starts". The source of this clapperboard information is the name of the motion capture trial. When using this option you should be aware of the following limitations for naming trials. The clapperboard will only display numeric characters, only shows up to eight digits. Non-numeric characters will be ignored. For example if your trial is called Walk123 the clapperboard will only display 00:00:01:23 prior to the start of capture.

Additional settings include window size, position, text and background colour.

Triggering capture and timecode

Triggering from timecode

If you require precise synchronisation of a movement with a film scene then you should trigger start and stop from timecode. For example, a CG character's movement may have to be accurately timed within a particular scene. The desired result is that you start a capture sequence using the Data Capture dialog, and the system waits until the correct frame, defined by the timecode, before capture starts.

- Establish connection with the Datastation
- Ensure that timecode has been enabled in Timecode setup
- Select System| Timecode Triggering

This opens the Timecode Triggering dialog. This comprises two rows of four timecode numbers.

- Set the numbers by typing in the space or using the up and down arrows for the Start and Stop timecode
- Click OK to close the dialog

To start capture:

- Start the Reference Input video source

When the timecode in the source reaches the Start Trial timecode setting the capture will begin.

Triggering manually

You can also start the capture manually, using the Data Capture dialog.

- Start the Reference Input video source
- Select Trial | Capture with suitable trial type selected and click Capture
- Observe the timecode displayed on your Reference Out video signal
- At the correct point click Start

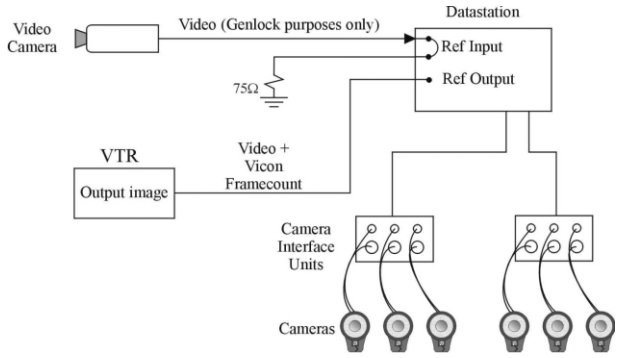
Examples of using GenLock

In these examples a video camera is displayed, but this could be any video source that includes a timecode signal.

Without timecode

The image from a video camera is connected to Ref Input. There are no further devices so Loop Through is terminated. Ref Output is connected to a Video Tape Recorder.

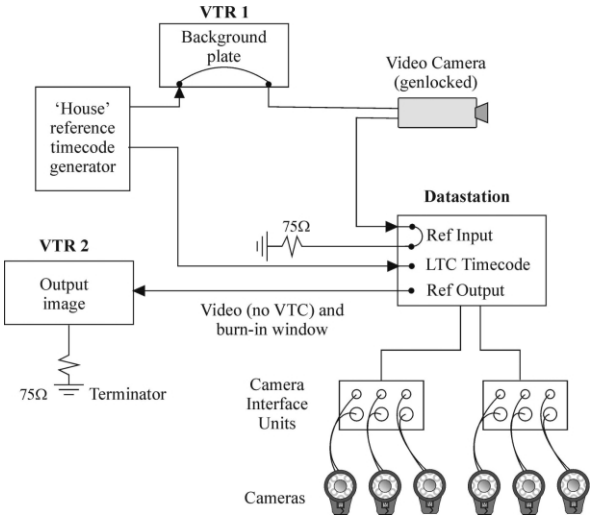
Schematic of GenLock without timecode setup



With timecode

In this example a *House Reference* timecode generator (often used in broadcast facilities) is used. This VITC signal is fed into a first video tape recorder, used to play the scene to which you wish to synchronise – this is called the background plate. The background plate is passed to the genlocked video camera and then to the Ref Input of the Datastation for genlocking. An LTC signal is also fed from the timecode generator into the Datastation. Loop Through is, once again, terminated and the Ref Output is connected to another, output video tape recorder. Here the LTC signal allows genlocking the Datastation to the house reference and to the background plate (film scene).

Schematic of GenLock with timecode setup



If you purchased the Vicon Real-time version 2 software option then in addition to the standard offline capture you will have the ability to reconstruct, label and possibly model motion data in real time. This data can then be visualized using other applications, such as FiLMBOX, Maya, and Vicon Polygon in real time. The Real-time software option also comes with a Software Developers Kit (SDK) that allows you to incorporate Real-time data into any application. You can also capture traditional 'off-line' data at the same time. In other words, Real-time allows for real-time data, real-time visualization, real-time assessment, real-time feedback, and simultaneous 'offline' capture.

Real-time data is produced using an additional application called Tarsus. This is usually installed on a different computer connected to the Workstation and Datastation by a Local Area Network.

Before using Real-time you should be familiar with 'off-line' capture as described in the Essentials of Motion Capture section.

System Setup

Vicon Real-time requires additional hardware and software compared to our standard offline capture.

Tarsus

Tarsus is the application that takes the raw Vicon video data and reconstructs, labels and possibly models it in 'real-time'. It is a separate application from the Workstation software. Tarsus can be run on its own PC, however, it can also be run alongside Workstation on the same PC. If Tarsus and Workstation are to be run on the same PC, it is recommended a high spec dual processor PC is used.

Tarsus is usually installed on an additional PC, connected to the Workstation and Datastation via a network switch (recommended), network hub or your LAN.

Real-time (Tarsus engine) is included as part of the main install of the CD. You will need the correct license from Vicon to run Tarsus, if you do not have the correct license, please contact Vicon Support.

The main install CD also contains a separate installation executable for Real Time version 2.0 (Tarsus Engine). This is located in:

"ProductInstalls\VMSRealTime2.0(Tarsus B27).exe"

To install Tarsus:

- Insert the Vicon CD in the CD drive of the host PC

- If the Vicon Motion Systems Software Suite installer starts automatically click Cancel

Either:

- Using Windows Explorer locate the file "VMSRealTime2.0(Tarsus B27).exe" in the "ProductInstalls" subfolder on the CD

- Double click the file setup.exe and follow the on-screen instructions

Or:

- Select Start | Run from the Windows Taskbar

- Type "D:\ ProductInstalls\VMSRealTime2.0(Tarsus B27).exe", where D is your CDROM drive letter

You will also need a dongle that is licensed to run the extra Workstation components required for Real-time.

Additional files

You will need a VSM (Vicon Skeleton Template) file and a suitable Real-time marker file, from which you can generate a VSK (calibrated Vicon Skeleton) file for each subject. This allows you to track markers in Real-time.

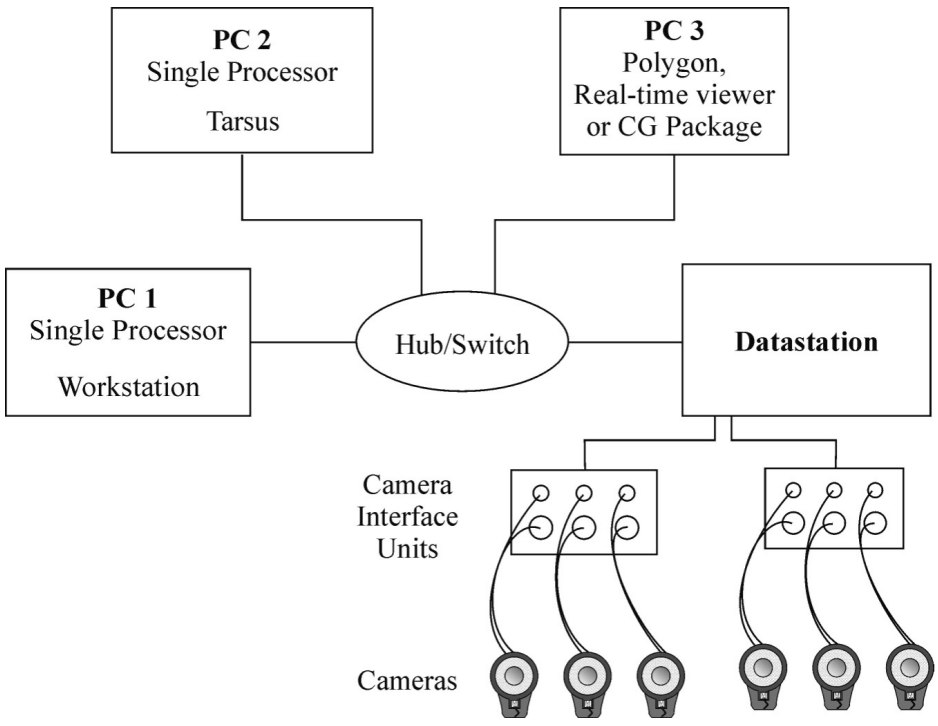
The use of these files is described below.

Hardware

Tarsus is run on a separate computer so that the Workstation can remain available for simultaneous off-line capture. In addition, to view the Real-time output you will need another computer on which your CG package or Polygon is installed. These computers are connected via a network switch (recommended), network hub or your LAN. If possible, these should be the only computers on the network.

If you are not performing simultaneous off-line capture, Workstation may be run on the same computer as your Real-time viewer.

Hardware setup



Real-time file types

Marker File (MKR)

The marker file, as with off-line capture, allows you to identify your markers with labels. For Real-time this marker file must correspond to the markers in the VSM and VSK files. For an example you can look at "HumanRTKm.mkr" in your "Vicon\Models" folder (also found in "Vicon\Realtime\V2.0\Model Templates").

VSM File

The VSM file is a Vicon Skeleton Template. This is processed against a trial called the Range of Motion, in which the subject moves all the joints of the body through their full range of motion (described in detail below). The result is a Real-time subject (VSK), which allows Tarsus to label reconstructions. Thus, after processing the VSM file you are able to track labelled trajectories (markers) in Real-time. Take a look at "RealTimeHumanV1.vsm" in your "Vicon\Models\RT2-Model Templates" folder.

VSK File

The VSK file is specific to each subject, e.g., "Peter.vsk", whereas the VSM file applies to all subjects with a particular skeleton and marker set.

The "RTHuman.*" files are supplied as examples of the files required for tracking a full human body in Real-time. You can also make your own custom MKR and VSM files to track various objects.

Preparing for Real-time capture

Static Trial

Start by capturing and processing a trial with your subject in a static pose. This is used to create an Autolabel calibration.

- Place markers on your subject according to your marker set e.g., HumanRTKm.mkr.
- Position subject in "T" pose
- Capture a 2 second trial with the subject standing still.
- Reconstruct the data.
- Select Trial | Attach Marker Set... e.g., HumanRTKm.mkr
- Manually label your subject
- Select Trial | Create Auto-label Calibration and use the default options.

Range of Motion trial (ROM)

The purpose of the Range of Motion (ROM) trial is to move all of the performer's joints through a full range of motion. From this the system determines the subject's statistics. If your subject has limited mobility then they should simply do the best they can. A more complete range of motion trial will produce a better Real-time kinematic model. A suggested ROM is given below.

Begin from a T-pose; standing straight with the arms out at right angles to the body. Start rolling the head, rotating the shoulders, bending the elbows,

rotating the wrists, twisting the waist, bending forwards and backwards, bending the knees and rotating the ankles.
In general, however:

- Instruct the subject on motion to be performed.
- Emphasize moving each joint through its complete range of motion several times.
- Either do each joint separately or combine the motions depending on your subject's level of coordination and experience.
- The ROM trial should include moves matching any extreme moves that will be included in the capture session

You may wish to rehearse this trial with your subject or simply talk them through as the trial is captured.

The trial processing steps are as follows:

- Capture ROM trial
- Reconstruct the data
- Autolabel
- DO NOT Fill Gaps: **This is very important**

Create the Real-time subject

Finally, in order to create a Real-time subject:

- Select Trial | Pipeline
- Select only VSM Statistics Collector and VSM Calibrator
- With the latter option highlighted click Options...
- Use the VSM Calibration Options to attach the appropriate VSM file to the trial and then close the dialog
- Click Process Now to run the pipeline

In a later step, you will select the subject of the Range Of Motion trial as a "Real Time Subject to Capture," and this is the crucial step that allows Tarsus to label reconstructions in Real-time.

This is all the preparation that is required to run Real-time data into certain applications, such as FiLMBOX (see below).

Modelling in Real-time

If you also wish to model segments or "bodies" in Real-time, you must run the "RT Subject Calibrator" Plug-in on your ROM trial. Use the Options dialog to attach the appropriate VSK file.

Some real-time visualization applications, including Real-time Polygon, require that "bodies" be created to drive the animated meshes.

Check if Preparation is Complete

The steps above create a Real-time subject. The output is a file, <subject name>.vsk, created on your computer in the current session folder. To check that this has been created properly and that the kinematic modelling is complete:

- Select View | Processing Log

The <subject name>.vsk file contains information about labelling and modelling parameters for this particular subject with the current marker placement on their body. This file will only be effective in capturing this subject in Real-time as long as the markers stay in the same positions on the subject.

Real-time capture session

Now that you have finished your preparation you are ready to start capturing, reconstructing, labelling, and possibly modelling 3D data it in real-time.

Start Tarsus

- Start Tarsus by double clicking "RealTime V2.0.exe" or the icon placed on the computer Desktop by the installation process

The only interface you will see for Tarsus is a Command Window. The output text indicates the current functional status of the application. For example, once you have started capturing data it will indicate the number of trajectories being reconstructed.

Select the subject

The subjects available for Real-time capture are listed in the Real-Time Subjects dialog. You must select the subject to be captured by transferring the name from one column, called Available subjects to another column, called Selected subjects This ensures that all the files appropriate to your subject are available:

- Select Real-time | Subjects to Capture

- Double-click the subjects name or highlight the subject and click the appropriate arrow

- Click OK to close the dialog

Check Real-time Parameters

Real-time capture and processing is controlled by a number of parameters. In addition to those analogous to the normal reconstruction and labelling processes other parameters are used to predict the positions of markers in the frame following the current one. Although the Real-time Parameters dialog is large it is divided into sections, as described below. To open the dialog:

- Select Real-time | Parameters

Check that the Real-time parameters are set for your particular needs.

Parameter Set

This allows the creation, storage and management of different parameter sets – in the same way you can create and use different Trial Types.

- Select the Parameter Set for the drop down list
- Use the New, Rename and Delete buttons to manage Parameter Sets
- Click OK to accept changes and accept the current set for your Real-time session

Loading Conditions

Video Rate Limit: controls the maximum frame rate of the real-time engine (Tarsus). You cannot get a higher rate than the rate set in "Camera Mode" in the Video Setup dialog (System menu). Depending on the number of cameras and markers being tracked Tarsus may not reach the rate you set here.

Cameras: allows you to select which cameras to use for real-time capture. You can use all the cameras or you may want to reduce the number to decrease the amount of data Tarsus has to process. More cameras will improve the tracking.

Reconstruction Volume

Minimum and Maximum: sets the three dimensional boundary for reconstruction by Tarsus. The actual volume in which the system can reconstruct data will be the intersection of this volume and your Calibration Volume. You can visualise your Calibration Volume in the 3D Workspace using the Volume Visualization Setting... command in the Workspace menu.

Ray Match SDs: defines an upper limit on the separation between the rays from two cameras that may or may not contribute to the reconstruction of a marker. This is the equivalent of intersection limit in the offline reconstruction parameters, only it is expressed as a factor to be applied to the calibration error. A good default value is 4.0 (4 times the calibration error), but you may need to go as high as 6.0 or even 8.0 if your calibration is producing a lot of ghost trajectories.

Tracking

Tracking controls the prediction of marker positions.

Predictor Order: defines the method used by the Real-time engine to predict where a marker will appear in the next frame. The Constant Acceleration dynamical model is good for general use.

Predictor Error: This represents the maximum deviation in predicted position for a given marker. Using the subject's kinematic model the system will predict a position for a marker, and the predictor error helps to define a radius of uncertainty around that prediction. It works on a per second basis rather than per frame, making the error value independent of frame rate. 400 mm/second usually gives good results for a wide range of moves. Very fast moves need a higher value, and very slow moves need a lower value.

Expansion Factor: controls the rate at which the prediction volume expands when a marker becomes occluded. It represents how many times bigger the prediction volume gets in a second. 2.0 is a good default value.

Operating Lag: allows you to delay the final output from the real-time engine, giving the software a chance to look ahead and refine its calculations. The greater the lag, the better the data quality, but the more obvious the time gap between the performer moving and the Real-time output.

Labelling Tolerances

When Tarsus is activated it will indicate the number of reconstructions it is labelling. In the ideal case the number of reconstructions and labels would equal the numbers of markers placed on your subject. If you are getting the correct number of reconstructions and not the correct number of labels you may need to adjust these parameters.

Fixed and **Proportional** are provided for backwards compatibility with Real-time version 1.

Fixed Marker Slack relates to the fixed amount of variability allowed in the distance ranges between pairs of markers on a segment.

Prop. Marker Slack relates to the variability (as a percentage) allowed in the distance ranges between pairs of markers on a segment.

Event Sounds

Play event sounds: when selected plays the sounds specified when Tarsus is activated or de-activated.

Configuration

Operating Mode: specifies whether you would like Tarsus to reconstruct and label ("Tarsus 2 Live") or to reconstruct, label and model ("Tarsus 2 Live with Kinematics"). This parameter controls which of these two options Tarsus tries to produce. If you have only processed the VST file against your Range of Motion trial then you can only reconstruct and label markers ("Tarsus 2 Live"). If you also process a valid VSK file against your Range of Motion trial then you can reconstruct and label markers and model bodies ("Tarsus 2 Live with Kinematics") in Real-time. "Markers Only" and "Markers and Bodies" are provided for backwards compatibility with Real-time version 1.

Connect Workstation to Tarsus

Once you are satisfied the parameters are suitable you can connect Workstation to Tarsus:

- Select Real-time | Connect

If this is the first time connecting to this particular Tarsus engine the system will ask you to enter an IP address for the computer on which the Tarsus application is running. Tarsus should then indicate that it has downloaded the initialisation parameters from the Workstation and pause with the message

"Awaiting Activation."

- Ensure that the subject is in the capture volume

The subject may leave and return to the volume while Tarsus is running without causing problems, but it is advised that the subject be in the volume when Tarsus is activated. To activate Tarsus:

- Select Real-time | Activate

In the Tarsus display window you will see performance information about the quality of your real-time reconstructions and labels. If you have everything setup correctly the number of reconstruction and labels should equal the numbers of markers placed on your subject.

If the subject leaves the volume you should see the number of reconstructions and labels go to zero. Then when the subject returns Tarsus should start tracking again and you should see the number of labels and markers return to normal.

Visualising Real-time data

Once Tarsus is processing the trial data you can visualise the output in a number of different applications. These applications and Tarsus will both run better if they are on separate machines. You will need to input the IP address of the computer running Tarsus in order to visualize the data with any of these applications.

Some of these applications require Vicon files – "CG plug-ins" – to be copied to the applications own installation folder. You can access these files by selecting them under the Custom Installation option on the Vicon installation CD.

Vicon Real-time Viewer

The Vicon Real-time Viewer comes with your Real-time software. It allows you to see your markers and/or bodies in a 3D workspace. It also allows you to attach OBJ meshes to bodies and drive an actual animated character. A skeleton OBJ file ships with the system as an example. Please refer to Vicon Real-time Viewer documentation for further instructions.

Vicon Real-time Polygon

Vicon Real-time Polygon is an extension to the standard Vicon Polygon application that allows you to visualize your Polygon data in Real-time. Please refer to Polygon documentation for further instructions.

FiLMBOX

FiLMBOX requires a file, Vicon8rt.dll, to be placed in the FiLMBOX plug-ins directory before you can use it to visualize your Real-time data. Copy the file to the fbxplugins subfolder of the main Kaydara\FiLMBOX## folder. If you do not have a copy of this file please contact your Vicon representative.

Maya

There are several files that you must place in your installed Maya folders before you can visualize Real-time data and drive a Maya character in Real-time. The

following files come with a "ReadMe.rtf" that explains where to put them and how to set up Maya for Vicon Real-time data. The following table shows the plug-in files and the location to where they should be copied.

Plug-in file locations for using Maya 4.0 with Real-time

Plug-in file	Location
MayaRTPlugin.mll	Maya4.0\bin\plug-ins
MayaRTProxy.exe	Maya4.0\bin\plug-ins
rtMocapCreateUI.MEL	Maya4.0\scripts\others
rtMocapDeleteUI.MEL	Maya4.0\scripts\others
rtMocapWindow.MEL	Maya4.0\scripts\others
Real-time SDK	Maya4.0\scripts\others

Capturing offline and Real-time data simultaneously

Once you have Real-time capture running you can then also capture offline simultaneously. You capture offline the same way you have learned previously. Real-time simply runs in the background, allowing you to visualize the data as you are capturing it.

Vicon Plug-ins are data processing modules that are run through the Vicon Pipeline. They are programs (similar to DLL files used by many Windows applications) that perform particular functions on your data. To see the Plug-ins

installed with your version of Workstation:

- Select Trial | Pipeline on the menu

Installing Plug-ins

Default Vicon plug-ins

Several Plug-ins are installed with your main Workstation application. If you are unsure whether you have all the available plug-ins you can reinstall the application:

- Insert the installation CD in the drive and select Start | Run
- Use the browse button to locate the file setup.exe on the CD
- Choose Modify in the Program Maintenance window
- Expand the Vicon Workstation Software and select Utility PlugIns for installation
- Ensure that other utilities and applications are not designated to be installed
- Click Next and follow instructions for installation

Additional plug-ins

New plug-ins may be supplied by Vicon from time to time, and you can write your own using the Plug-ins SDK. These require no formal installation routine as they do not need any Windows registry entries. This means that you can simply copy Plug-in files to your hard drive. Some important points about installation are:

- Plug-ins have the file extension .vpi
- In some cases they may need additional files
- Copy all relevant files to the PlugIns subfolder of the main Vicon installation
- If Workstation is running when you copy these files you will need to restart the applications (but not your computer) before they appear in the Pipeline dialog

Currently available plug-ins

The following pipeline processes are provided by the basic plug-ins currently distributed with the Workstation application.

BASIC PLUG-INS

Plug-in	Function
Reconstruct	Reconstruct a trial
Label	Label the subject a trial using autolabeller
Fill gaps	Fill gaps (in selected or al trajectories?)
Save Trial	Save the trial
Save Subjects Separately	When more than one subject in trial save separate c3d file for each subject
Export Data to ASCII	Export c3d trial in ASCII format so that it can be read by spreadsheet
Export CSM	Create file in Character Motion Studio motion capture Format (CSM)
Capture Next Trial	When trial capture complete allow the next trial to be captured immediately
Generate Audio wave file	Convert audio (analogue) data into the WAV format

The following pipeline options are used in preparing a real-time subject and will only be available if you purchased and installed this system option. These pipeline options are used in preparing a Real-time subject and will only be available if you purchased and installed this system option.

REAL-TIME PLUG-INS

Plug-in	Function
RT Subject Calibrator	Perform calibration for the real time system
Distance statistics collection process	Used with Real-time
Kinematic fitter	Used with Real-time

These pipeline options are used for performing basic, full-body biomechanical modelling and will only be available if you purchased and installed Plug-in Gait and Polygon. The functions of these plug-ins are described in the documentation that accompanies this application.

PLUG-IN GAIT PLUG-INS

Plug-in	Function
Apply Woltring Filter routine	Used with Plug-in Gait
Detect gait cycle events	Used with Plug-in Gait
Autocorrelate events	Used with Plug-in Gait
Generate gait cycle parameters	Used with Plug-in Gait
Run static gait model	Used with Plug-in Gait
Run dynamic gait model	Used with Plug-in Gait

These pipeline options are used for running BodyBuilder models from the Workstation pipeline and will only be available if you purchased and installed BodyBuilder. The functions of these plug-ins are described in the documentation that accompanies this application.

BODYBUILDER/PLUG-IN MODELLER PLUG-INS

Plug-in	Function
Perform BodyLanguage static modelling	Used with Plug-in Modeller
Perform BodyLanguage dynamic model	Used with Plug-in Modeller

Using plug-ins

The use of plug-ins varies greatly depending on the functions they perform. In general they have the following in common:

- They are run through the pipeline:
  - After capture as part of a trial type
  - On an open trial
  - Through the Eclipse Data Directory in batch processing mode on multiple trials

- Highlighting the plug-in in the Pipeline dialog allows you to open an Options dialog to set specific parameters (if user-controlled parameters exist for the specific plug-in)

Some of the basic plug-ins are described below.

Export to ASCII

To demonstrate this export of a C3D file to ASCII format (*.CSV):

- Open a trial

- Select Trial | Pipeline

- Ensure that only the Export Data to ASCII plug-in is selected

- With the Export Data to ASCII plug-in highlighted click Options

The ASCII Dump Options dialog allows you to define the output file in terms of the data to be stored (Header, Events, Analysis, Trajectories, Analogue and Force Plate data) and to define an 'invalid coordinate value'. This is blank by default and if a coordinate does not exist, perhaps because a marker was not visible, then a space will be left in the output file. However, some applications require a value to be entered whether or not a marker was in view – the Invalid Coordinate Value. In this case you define this value in this edit box.

- When you have selected the output Click OK to close the dialog

- Click Process Now to run the pipeline

The output file will be <trial name>.CSV. The file will be saved in the same folder as the original trial. A CSV file is a "comma separated value" file. It can be open with a simple text application our in your favourite spreadsheet application.

Create CSM File(s)

To convert the trial into Character Studio Max format (CSM) select this option in the Pipeline dialog. The options allow you to choose either of two file name styles for the export:

- TrialRef.Subjectname.CSM

- Subjectname.TrialRef.CSM

You may also select whether or not to include subject label identifiers in the output.

Having chosen the output options select Process Now to create the file. The file will be saved in the same folder as the original trial file. Note that to use CSM files the capture should be made with the appropriate marker set recognised by the Character Studio application.

Generate Audio Wave File

When capturing audio using the Datastation the data is initially saved as raw analogue data. This plug-in converts the data into a .wav file, a format recognised by common sound cards, allowing you to play it back. It is described in Capturing Audio Data

TITLE	DATE
SYSTEM OPTIONS v1.x	
Document created. v1.0	05.06.02
Document amendments made. No additions. Renamed v1.1	26.06.02
Document amendments made. No additions. Renamed v1.2	28.06.02
Document amendments made. No additions. Renamed v1.3	05.07.02