NaturalPoint®

Insight VCS: Maya

User's Guide

Version 1.4.1

January, 2016

NaturalPoint Corporation

3658 SW Deschutes Street

Corvallis OR 97333

Autodesk
Authorized Developer

NaturalPoint Publication Number: P-OT-056

Printed in the US.

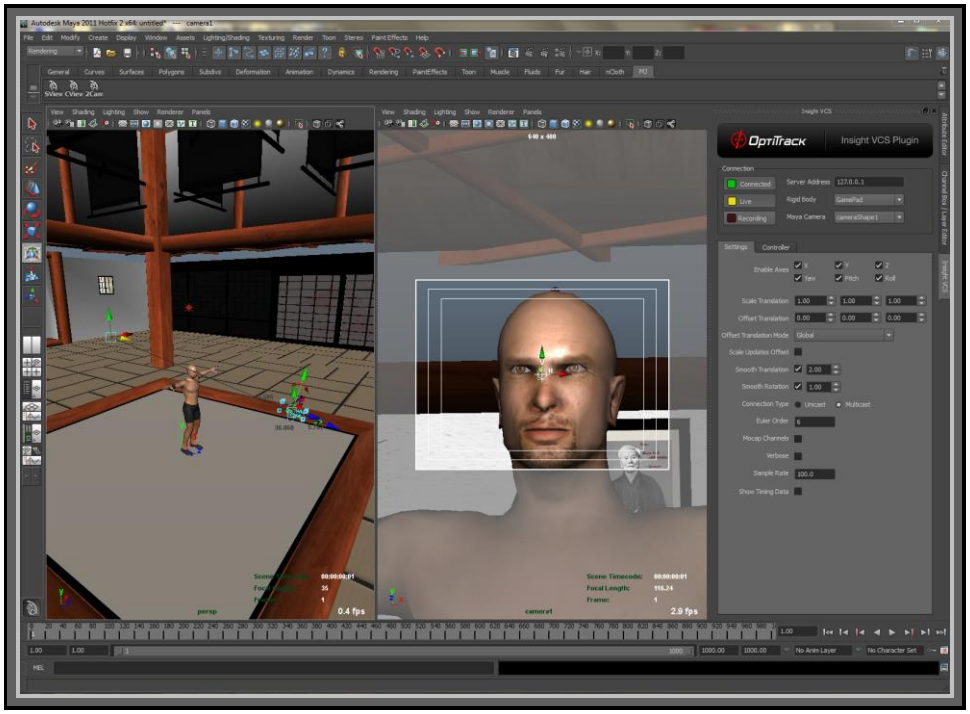
NaturalPoint Proprietary

TABLE OF CONTENTS

OVERVIEW

The **Insight VCS: Maya** plugin is an Autodesk® Maya® plugin designed for live virtual camera work directly within the Maya® environment.

Insight VCS Plugin In Autodesk® Maya® 2011



The Insight VCS plugin works in conjunction with ***OptiTrack ARENA™*** or ***Tracking Tools*** software and the Insight VCS Controllers to provide real-time 6 DOF camera position, orientation, and virtual camera controls, including:

Insight VCS Features

Pan / Dolly / Boom	Use VCS controls to Pan Left/Right and Up/Down. Pan in local, world, or a combination of coordinate systems. Adjust pan speeds on the fly with controls or scripts.
Pitch / Tilt / Roll	Absolute orientation at all times from the OptiTrack optical system.
Free Move	Absolute position at all times from the OptiTrack optical system. Scale movement in real-time with controllers or from script.
Zoom	Fully control camera zoom / FOV and zoom rates using the controller's analog thumbsticks and speed adjusters.
Smooth	Advanced kalman filtering allows for customizing a "steadicam" feeling.
Play / Record	Control common actions like recording and playback using the controller.
Custom commands	Customize the controller by mapping controller inputs to execute scripts for complete control and one-person camera operation.

INSTALLATION AND LICENSING

SUPPORTED PLATFORMS

The Insight VCS Plugin for Maya works on the following platforms:

- Autodesk Maya 2011®, 32-bit for Microsoft Windows®.
- Autodesk Maya 2011®, 64-bit for Microsoft Windows®.
- Autodesk Maya 2014®, 64-bit for Microsoft Windows®.
- Autodesk Maya 2015®, 64-bit for Microsoft Windows®.
- Autodesk Maya 2016®, 64-bit for Microsoft Windows®.

INSTALLATION

1. Within Maya, load the plugin:

   Maya -> Window -> Settings/Preferences -> Plugin-In Manager -> InsightVCS -> Check

2. Within Maya, start the plugin:

   Maya -> Window -> InsightVCS

LICENSING

The VCS:Maya plugin requires a valid Insight VCS:Maya license to run. This license is managed by your OptiTrack server application (ARENA™ or Tracking Tools) and should be installed in the same license folder as that application.

Please refer to your order confirmation and/or Quick Start Guide for specific licensing instructions.

Additional information on licensing can be found in our **Licensing and Activation FAQ**:

http://www.naturalpoint.com/optitrack/support/activate/faq.html

USING THE INSIGHT VCS:MAYA PLUGIN

The following steps outline the basic process for virtual camera work using the Insight VCS plugin within Maya®:

1. Load a Maya scene
2. Create any Maya cameras that will be controlled by the Insight VCS
3. Connect to an OptiTrack data server for 6-DOF data
4. Select or create a "Controller Profile", which controls how buttons and axes on the tracking controller are used
5. Start laying down camera moves!

CONNECTING TO THE MOCAP SERVER

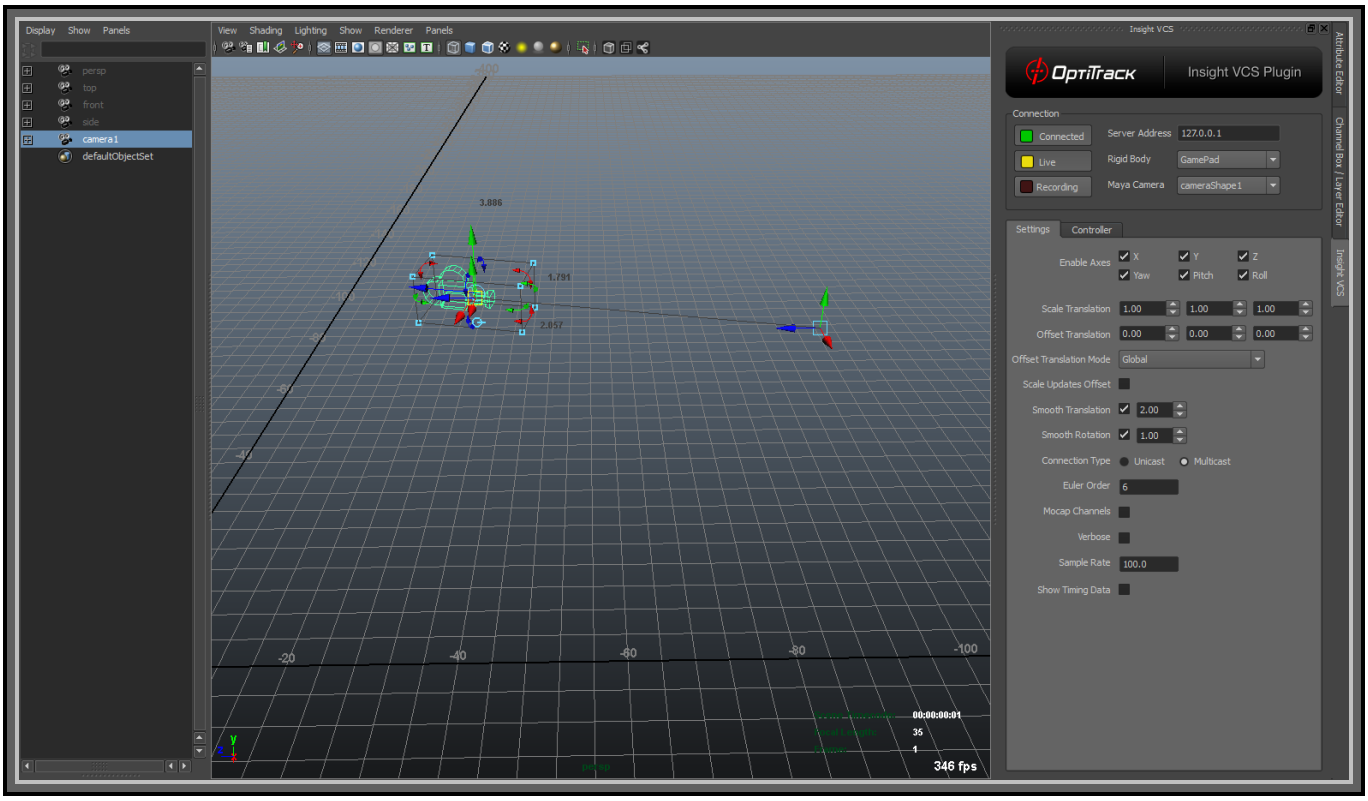
Refer to the following step-by-step for bringing live mocap data in from an OptiTrack Motion Capture server application such as ARENA™ or Tracking Tools.

Connecting to the Mocap Data : Step-by-Step

Application	Step
OptiTrack Server App	Create a Rigid Body from your tracking controller's markers. **Arena** Users : When you create the Rigid Body, be sure to orient your tracking controller down the +Z axis. This will be the camera's "Neutral" position. **TrackingTools** Users : When you create the Rigid Body, be sure to orient your tracking controller down the -Z axis. This will be the camera's "Neutral" position.
OptiTrack Server App	Enable network streaming (make sure rigid body data is streaming).
Maya	Open the Insight VCS Plugin panel by selecting **Window -> Insight VCS** from the Maya main menu.
Insight VCS Panel	Set the IP address of the OptiTrack server app (e.g. 127.0.0.1 for same machine) using the **Server Address Edit Box.**
Insight VCS Panel	Click the **Connected Button**. If a connection was made, the green indicator light on this button will change to bright green.
Insight VCS Panel	Select the mocap source object from the **Rigid Body Dropdown.**
Insight VCS Panel	Select the Maya camera to be controlled using **the Maya Camera Dropdown**.

Insight VCS Panel	Click the **Live Button** to begin streaming data from the mocap rigid body to the Maya camera. If live data is streaming, the indicator light on this button will change to bright yellow.

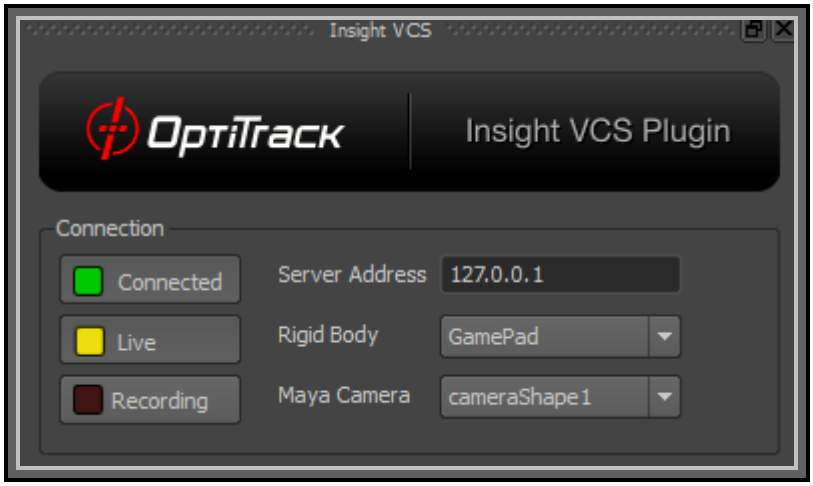
You should now see your Maya camera moving within the Maya viewport:



CONNECTION SETTINGS

Virtual Camera connection settings are managed by the main interface tab on the Insight VCS plugin panel:

Insight Virtual Camera - Connection Settings



Connected	Click this box to connect to the OptiTrack Server (e.g. ARENA™). **Green** Not connected. **Green** Connected and streaming Refer to the Maya status window for details about connection errors.
Live	Indicates whether camera position/orientation data should be coming from a live mocap source (checked) or from a recorded take. Disable this when playing back recorded camera moves. **Yellow** Camera not using live data. **Yellow** Camera using live mocap data
Recording	Starts recording. **Red** Not Recording. **Red** Recording.
Server Address	IP Address of the OptiTrack Server
Rigid Body	Indicates which OptiTrack server application's Rigid Body to use for controlling the camera.
Maya Camera	Indicates which Maya camera to control.

CONTROLLERS

The Insight VCS plugin supports any DirectInput compatible joystick or USB device. Controllers can then be configured to perform actions or control the camera using **Controller Profiles.**

CONTROLLER PROFILES

Virtual Camera controls are managed by a Control-to-Event mapping system called the **Controller Profile**. The controller profile is configured in the **Controller Tab**. The Insight VCS plugin allows you to create and swap between multiple controller profiles, allowing you to create any number of custom button/axis configurations depending upon the scene, particular move types, different physical VCS controllers or HID devices, etc.

Profiles can be saved and then later swapped out using the **Profile Dropdown**.

Profiles are saved into <*VCS Maya install folder*>*Profiles* folder .

The VCS plugin ships with 2 default profiles:

- The 2 controller VCS Pro (<*VCS Maya install folder*>*Profiles**VCSProDefault.xml*).
- The XBox based VCS Mini (<*VCS Maya install folder*>*Profiles**VCSMiniDefault.xml*).

When the Insight VCS plugin is first launched, it will attempt to detect any compatible controllers. It will then attempt to match the detected controllers with an existing C**ontroller Profile**, beginning with the last used ("preferred") profile.

PROFILE SETUP

The VCS plugin supports 2 types of controller inputs and 2 types of actions:

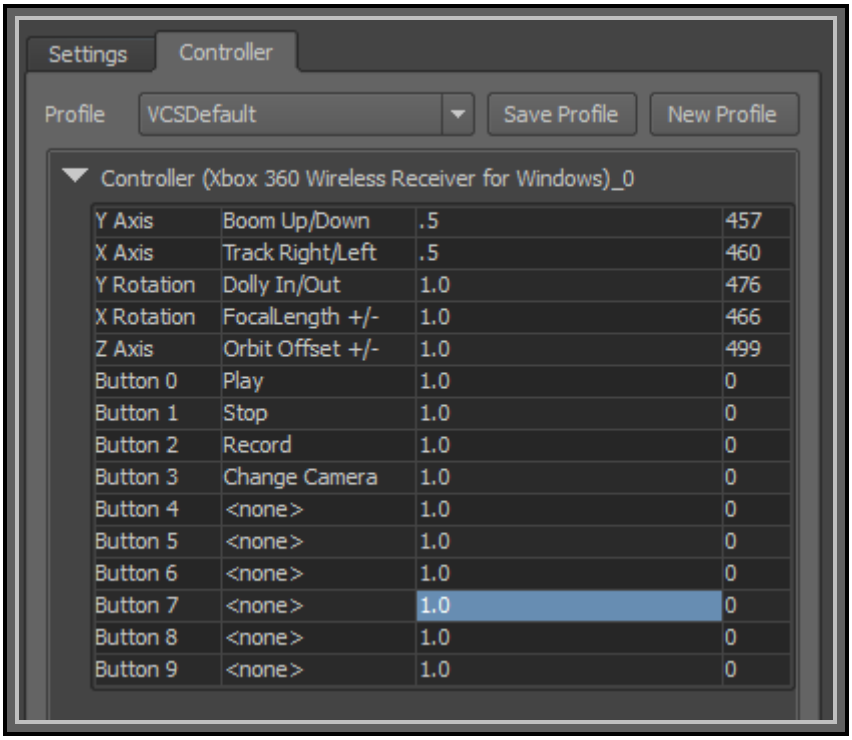
Axis Inputs / Actions: Axis inputs are analog inputs and represent the range of values. This range has been scaled to [0, 1000]. Axis inputs can be assigned to Axis actions. PTZ operations (Pan, Tilt, Zoom) are good examples of typical Axis Actions.

Button Inputs / Actions: Button inputs are the button inputs on the controller. These are “one shot” events that occur when the button is pressed. Timeline commands such as Play, Record, and Rewind are typical examples of “one shot” events.

Note! Some Insight VCS controllers have a dial that is represented in the Axis list as a "Wheel". This is a special form of an axis, and can be used to modify existing actions, such as zoom speed, pan speed, and motion scale amount.

Note! Some Insight VCS controllers have a "Button 7". This is an internal, reserved button, and cannot be directly accessed.

Insight VCS - A Typical Insight VCS Controller Profile



Insight VCS Profile Grid Columns

Axes	Name of the controller's analog input.
Action	Action to take or value to change.
Parameter	Input parameter used by some actions to modify the action in some way (e.g. speed up or slow down zooming).
Value	Current value of the controller input.

ACTION PARAMETERS

Some actions have parameters that modify the way they operate. The following tables list the **axis** and **button** actions, and how the parameter value for that action is interpreted.

VCS controller - Axis Actions

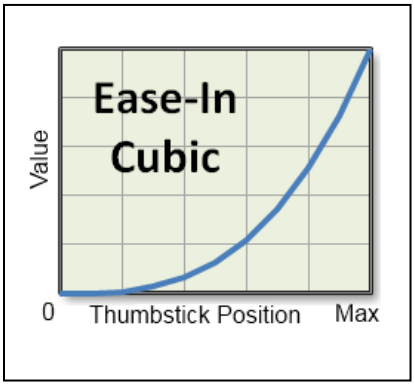
Action	Parameter(s)	Example
Pan Right/Left	[Pan Speed] [Curve Type*]	**1.0** [pan at normal rate, linear curve] **1.0 1** [pan at normal rate, ease-in curve] **0.5 1** [pan at half speed, ease-in curve] **2.0** [pan at 2x speed]
Dolly In/Out	[Pan Speed] [Curve Type*]	1.0
Pan Up/Down	[Pan Speed] [Curve Type*]	1.0
Focal Length +/-	[Focal length change rate] [Curve Type*]	1.0
Orbit Offset	[Orbit offset change rate] [Curve Type*]	1.0
Focal Distance	[Focal distance change rate] [Curve Type*]	1.0
Wheel Modifier	[VCS Dial controls only] Modify an axis' parameter value (e.g. zoom speed, pan speed, translation scale) by a specified increment. *Format:* [axis name] [increment]	Examples: **X Axis .1** (+/- the X Axis parameter by 0.1) **Y Axis .2** (+/- the Y Axis parameter by 0.2) Z **Axis .1** (+/- the Z Axis parameter by 0.1) **Scale All .5** (+/- all translational scale by .5) **Translate All 1.0** (+/- all pan speeds by 1.0)

*** Curve Type**: See explanation below for a definition of the supported curve types.

Curve Types

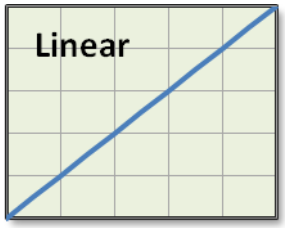
When mapping a controller thumbstick axis to an animatable camera parameter (pan, zoom), you have the option of specifying how the Insight VCS plugin should interpret controller axis movement as a standard animation curve. Instead of modifying the value over time, however, the motion curve modifies the value over the controller span, from neutral/center position (0) to maximum position (Max). The following diagram describes this relationship:

Controller value modifier curve



The VCS plugin offers the following built-in curve options:

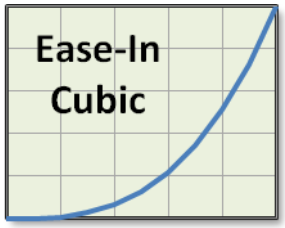
Linear Curve



Description : Y = X

Parameter Value : 0

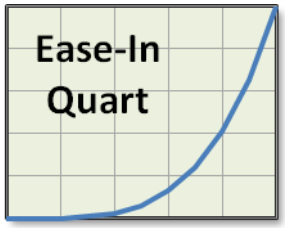
Cubic Curve



Description : $Y = X^3$

Parameter Value : 1

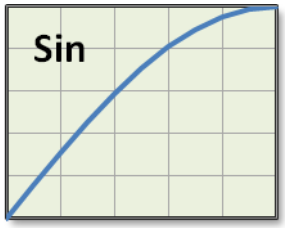
Quartic Curve



Description : $Y = X^4$

Parameter Value : 2

Sine Curve



Description : Y = sin(X)

Parameter Value : 3

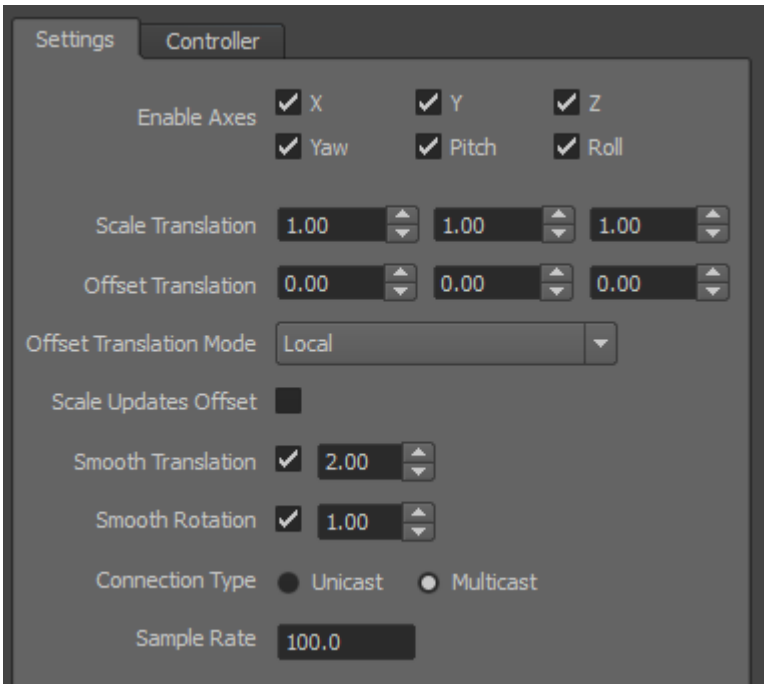
VCS Controller - Button Actions

Action	Parameter	Example
Record	none	
Play	none	
Rewind	None	
Scale Translation	Amount to increment/decrement current translation scale	**1.0** [scale up by 1.0] **-1.0** [scale down by 1.0]
FOV +/-	Amount to increment/decrement current Focal length	**1.0** [increase focal length by 1]
MelCommand	Runs a Maya Mel command or script.	**NatNextPrimeLense.mel**
ResetOffset	[x y z] Optional - specifies the position to reset camera to, otherwise camera is reset to (0.0,0.0,0.0)	**10.0 10.0 0.0** [reset camera offset t o10,0,0]
ToggleAxisAction	Toggles a specified axis between 2 actions. [Axis name],[Action1 Index], [Action1 Params],[Action2 Index],[Action2 Params] The example at right toggles the Y Axis behavior between Dolly In/Out at speed 1.0 with a Cubic Curve and Focal Length at 0.1 speed with a Quartic curve. This action can be used to extend axis functionality without swapping profiles.	**Y Axis, 3, 1.0 1, 4, 0.1 2**

VIRTUAL CAMERA SETTINGS

The Insight VCS plugin has several properties that can be used to customize its behavior. The **Settings Tab** can be used to set these:

VCS General Settings



VCS General Settings

Setting	Description
Enable Axes	Selectively enable/disable individual mocap movement channels.
Scale Translation	Scale the physical movement (when tracking controller is moved).
Offset Translation	Can be used for 2 purposes : 1. To adjust the center of the physical volume to the virtual scene. 2. To effectively pan/truck/dolly the camera. This value is updated by the thumbstick controls for the Pan/dolly/truck operations
Offset Translation Mode	Affects how Offset Translation is applied to the camera: 0 : **Global** Translates the camera according to the Maya global coordinate system (global). 1 : **Local** Translates the camera according to the camera's coordinate system (local). 2 : **LocalOnStart** Translates the camera according to the camera's coordinate system when the camera first moves (stick first moves), then keeps that axis (Does not continuously update the coordinate system).

Scale Updates Offset	Instructs whether changes to Scale Translation update the Offset Translation value in order to keep the camera in the same position (true) or does not affect Offset Translation, resulting in camera position moving to new scaled amount.
Smooth Translation	Applies smoothing to the camera position values.
Smooth Rotation	Applies smoothing to the camera rotation values.
Connection Type	Indicates connection interface to use when connecting to an OptiTrack server application. Options are Multicast and Unicast. This setting must be the same as your OptiTrack server application. Default is Multicast.
Sample Rate	Indicates the rate, in frames-per-second (fps), the VCS should sample the mocap server application for 6 DOF position/orientation value updates. Use this if necessary to match the playback speed of your scene to ensure consistency of controller pans during timeline playback and non-timeline playback.

MAYA CAMERA SETTINGS

A Maya Camera controls how you see the 3D scene. Maya's Camera object allow users the ability to model real-world cameras, including settings such as Focal length, aspect ratio, film format, etc.

Refer to the Maya documentation for more information on Camera Settings.

APPENDIX A : INSIGHT VCS:PRO QUICK START GUIDE

1. Review Components & Assemble Rig

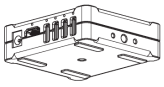
The following Insight VCS:Pro items are included:

Rig Components
- 1 x microShoulderMount Deluxe Bundle
- 1 x microMount
- 1 x microHandle
- 2 x 8" Grip Rod w/ clamp
- 2 x 4" Grip Rod w/ clamp
- 1 x VCS HD Monitor
- 2 x VCS USB Joystick
- 1 x VCS Mux assembly
- 1 x VCS Demux assembly

Cables
- 1 x 50' or 100' custom 15-pin VCS cable
- 1 x 36V power brick/cable
- 1 x 5m A to B USB Uplink cable
- 1 x 10' DVI-HDMI cable
- 2 x 24" MiniUSB B Up Angle USB cable
- 1 x DC Plug Cable, 2.1mm, 24"
- 1 x 18" HDMI M / M cable

Markers and Posts
- 1 x VCS Markers & Posts
- 4 x Reflective Marker : 7/16" Hard
- 1 x 40mm mounting post
- 2 x 60mm mounting post
- 1 x 80mm mounting post

VCS Mux assembly



VCS Demux assembly

VCS HD Monitor

Note: The VCS Mux should sit near the PC. The USB, DVI-HDMI and power cables go to/from the Mux and PC. The Demux assembly is attached to the rig. See rig diagrams at right.

2. Connect Cables

Connect the 50' or 100' custom 15-pin VCS cable to the Mux and Demux BEFORE connecting any other cables. Then apply power and connect Mux to PC and Demux to assembled VCS:Pro rig. See diagrams at right.

3. Setup Monitor & Video Display

The HD monitor has five buttons on the back. You may need to select HDMI input for proper display, using the SEL button (second button from the bottom).

Based on your software/usage preferences, you can choose to extend or duplicate your Windows desktop onto the VCS:Pro's HD LCD display screen (using Display Properties in Windows).

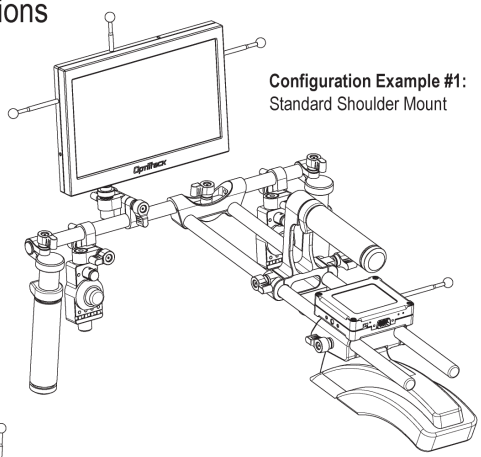
Native resolution of the VCS:Pro's HD LCD display is 1280x768, but the resolution can be scaled up to 1920x1080. If you are duplicating your desktop, you will want to match your primary PC monitor's resolution to one of these two dimensions.

On the side of the Demux there is a rotary switch, with settings from 0 to 7, to set the gain for the video. The default setting will typically result in minimal gain (noise). However, when the system is used with a 100' 15-pin cable, the gain switch might need to be adjusted to improve video quality.

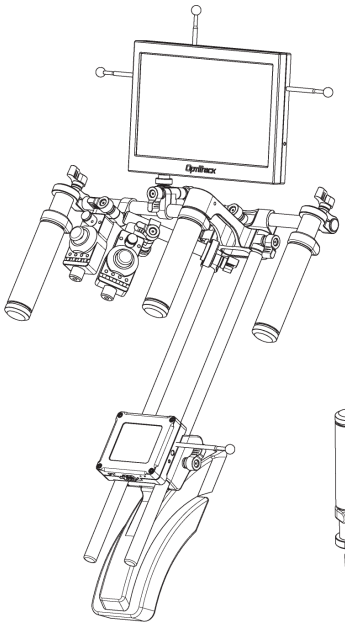
* Rig Configurations

The orientation of the VCS:Pro rig components can be adjusted to fit your body and shooting style.

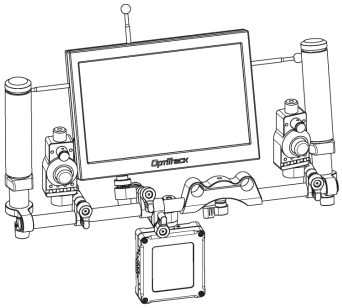
(See back page for marker configurations.)



Configuration Example #1:
Standard Shoulder Mount



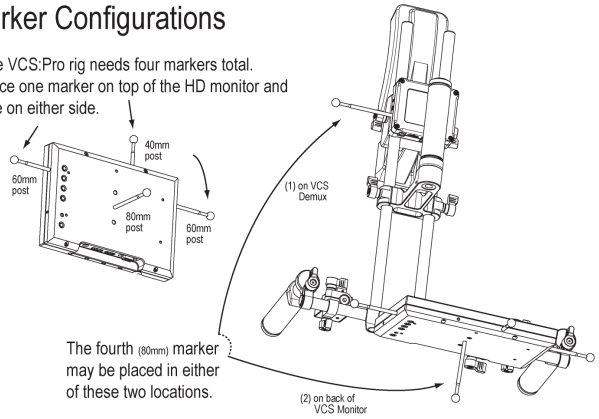
Configuration Example #2:
Low Profile / Down Low



Configuration Example #3:
Flying / Without Shoulder Mount

* Marker Configurations

The VCS:Pro rig needs four markers total. Place one marker on top of the HD monitor and one on either side.



4. Software Compatibility & Usage

Windows 7 is preferred. Windows Vista and XP operating systems are supported.

The Insight VCS system is intended for use with NaturalPoint's MotionBuilder and Maya VCS plugins. Buttons and joysticks can be mapped for extensive camera control. See the MotionBuilder and Maya plugin manuals at OptiTrack.com for additional information.

Friendly Customer Service

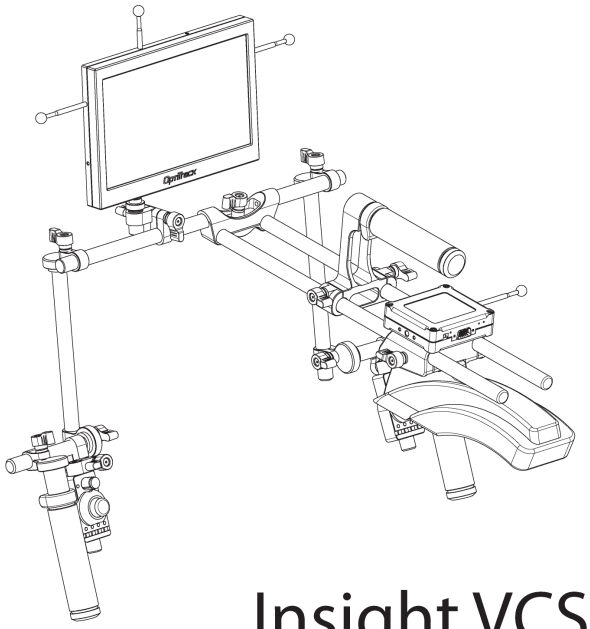
If you have any difficulties after reviewing the documentation, visit our website or call 1.541.753.6645 between 9AM-5PM PT.

Visit www.OptiTrack.com for the latest software support, sample code and product news.

OptiTrack.com

P-OT-107.1011

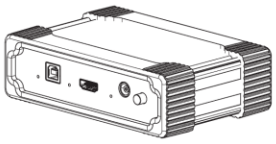
OptiTrack™ by NaturalPoint®



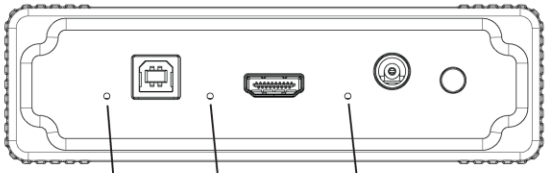
Insight VCS:Pro
quick start guide

APPENDIX B : INSIGHT VCS:PRO LED IDENTIFICATION KEY

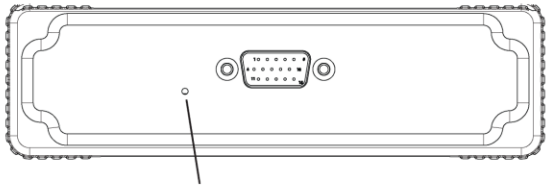
* Insight VCS:Pro LED Identification Key: Mux



VCS Mux assembly



Green LED	Green LED	Red LED
Uplink-USB (Mux and Demux) connection is good	*HDMI connection from PC detected*	*36V Power has been applied to the DC Power Jack*

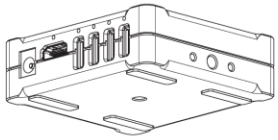


Blue LED

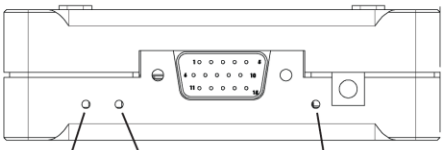
Valid connection to Demux detected

P-OT-109.1102

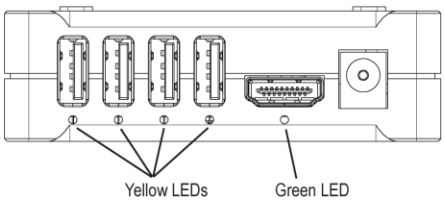
* Insight VCS:Pro LED Identification Key: Demux



VCS Demux assembly



Green LED	Blue LED	Red LED
USB Hub detected by PC - hub is now active	*HDMI connection from Mux detected*	*Power from Mux detected*



Yellow LEDs	Green LED
Downlink-USB port is active	*HDMI connection to Monitor detected*

P-OT-109.1102

TECHNICAL SUPPORT

NaturalPoint is committed to providing best-in-class technical support.

In order to provide you with the most up to date information as quickly as possible, we recommend the following procedure:

1. Update to the latest software. For the latest versions of OptiTrack software, drivers, and SDK samples, please visit our downloads section:

   http://www.naturalpoint.com/optitrack/support/downloads.html

2. Check out the OptiTrack FAQs:

   http://www.naturalpoint.com/optitrack/support/opti-faq.html

3. Check the forums. Very often a similar issue has been reported and solved in the forums:

   http://forum.naturalpoint.com/

4. Contact technical support:

   Phone: 541-753-6645

   Fax: 541-753-6689

   Email Form: http://www.naturalpoint.com/optitrack/support/contact/

   Mail: NaturalPoint Corporation
   3658 SW Deschutes Street
   Corvallis, OR 97333