

# Free-D

## 3D Camera Tracking System

8 axes of motion tracking



All virtual studio systems must know the precise position and orientation of each studio camera in order to render a virtual set from exactly the right viewpoint. **Free-D** is a unique camera tracking system that uses an advanced image analysis technique to measure the position of a camera. As the system does not require any physical mechanical sensors, the camera can be used on traditional pedestals, operated handheld or mounted on a crane.

The Free-D system, uses a number of passive coded targets placed in the studio lighting grid. The targets are constantly illuminated and viewed by a small CCD camera mounted on the studio cameras. Each target is uniquely identified by a circular bar code and the use

of narrow band LEDs and retro-reflective material ensures a sufficient number remain visible under normal studio lighting conditions.

The image from the tracking camera is processed by a Free-D unit to calculate the exact position and orientation of the studio camera. This is done by real time analysis of the image to identify each target. Knowing the physical location of the targets, Free-D calculates the position of the camera to a very high accuracy. The zoom and focus axes are monitored by high resolution optical sensors mounted on the lens. This data is combined with the video from the small camera CCD as ancillary data.

The Free-D processor then calculates the Pan, Tilt, Roll, X, Y, Height, Zoom and Focus parameters to accurately pin-point the studio camera position.

The complete data package is transmitted via a high speed serial data link to the 3D VR system. The protocol for this link is based on the Vinten Radamec Serial Position Interface protocol already supported by 3D virtual studio system suppliers.

### Operations and Advantages

- + Measurement of the camera position to better than 1mm and orientation to 0.010° ensuring precise matching of the real and virtual worlds
- + Operation with a wide variety of camera supports including manual pedestals, cranes and even hand held cameras
- + Consistent smooth tracking even when moving between real and virtual areas in a studio
- + No in-vision pattern interfering with the chroma-key process, enabling shadow and reflection effects to be more easily created
- + No need for any additional sensing mechanisms to achieve consistent 360° tracking
- + Unrestricted movement of multiple cameras even in large studios, including full 360° pans
- + No restriction on depth of field of the studio lens, allowing normal lens aperture and studio lighting conditions
- + Virtual character insertion
- + Film set pre-visualisation via video-assist

### Key Features and Benefits

- + **8 axes of motion tracking**
- + **Unlimited number of cameras**
- + **Multiple studios**
- + **Minimal daily set-up**
- + **Passive target infrastructure**

### Principle Features

- + **Pedestal, crane or handheld operation**
- + **Compatible with large, small and tall studios**
- + **Position resolution 1mm, orientation 0.010**
- + **Introduces only 1 frame of delay**
- + **Unrestricted movement of multiple cameras 360°**