APS Scanner

Part No. V4109-0001
V4109-0002

www.vinten.com
Safety

Important information on the safe installation and operation of this product. Read this information before operating the product. For your personal safety, read these instructions. Do not operate the product if you do not understand how to use it safely. Save these instructions for future reference.

Warning Symbols Used in these Instructions
Safety cautions are included in these instructions. These safety instructions must be followed to avoid possible personal injury and avoid possible damage to the product.

⚠️ WARNING!
Where there is a risk of personal injury or injury to others, comments appear supported by the warning triangle symbol. Where there is a risk of damage to the product, associated equipment, process or surroundings, comments appear supported by the word ‘Caution’.

⚡️ ELECTRIC SHOCK
Where there is a risk of electric shock, comments appear supported by the hazardous voltage warning triangle.

Intended Use
The Fusion Absolute Positioning System (APS) scanner is designed to be installed by a qualified engineer onto a Fusion pedestal. It is designed to provide accurate positional information used to control the pedestal in television studios where APS targets have been installed.

Electrical Connection
⚠️ WARNING! Risk of electric shock. Always check cables for signs of damage. Damaged cables can cause personal injury and/or damage the equipment.

CAUTION! All connections to other devices must be made using shielded cables.

Mounting and Installation
⚠️ WARNING! Installation of this product must only be performed by qualified and trained electrical engineers.

⚠️ WARNING! Always ensure that all power and auxiliary communications cables are routed so that they do not present any danger to personnel. Take care when routing cables in areas where robotic equipment is in use.

Water, Moisture and Dust
⚠️ WARNING! Protect the product from water, moisture and dust. The presence of electricity near water can be dangerous.

CAUTION! The product should not be used outside the operating temperature limits. Refer to the product Technical Specifications for the operating limits for the product.

Cleaning
⚠️ WARNING! Risk of electric shock. Always disconnect and isolate the product from the power supply before cleaning.

⚠️ CAUTION! Do not use solvent or oil-based cleaners, abrasives or wire brushes. Only use detergent-based cleaners.
Safety and About this Guide

Maintenance

WARNING! The fitting of non-approved parts and accessories, or the carrying out of non-approved alterations or servicing can be dangerous and could affect the safety of the product. It may also invalidate the terms and conditions of the product warranty.

Safety when Working with Robotic Equipment

In normal operation remote-controlled equipment can move suddenly and without warning. Since audible warnings are not suitable for use within the studio environment, it is recommended that only trained personnel be allowed to work in the active areas where remote-controlled heads and pedestals are located. The safe operating zone is a minimum of 1 m (3 ft).

Safety Notes for Operators

Operators must familiarise themselves with the working footprint of the robotic head, including all associated equipment (lens, zoom and focus controls, viewfinder, prompter, etc.) to prevent inadvertent collisions or injury to personnel.

If personnel are too close to a head or pedestal that is about to move, the operator should prevent the motion from starting or stop the motion if it has started.

We strongly recommend that the operator verifies visually that the active area is clear of hazards and personnel, both before and during remote operation.

About this Guide

The APS scanner is supplied either pre-installed onto the pedestal by a service engineer in the studio, or pre-installed from the factory fitted onto a new pedestal. This manual covers the operation and configuration of the APS scanner and important safety instructions.

The APS scanner will only function in a studio with APS reflective targets installed. For more information on the correct installation of the APS reflective targets, refer to the APS Reflective Targets Installation Guide, publication part No. V4109-4981.

Using this Guide

In some sections this guide uses zoomed screenshots to display the relevant area of the screen or window. The user is guided to the relevant area by a series of navigation icons which indicate the portion of the screen being zoomed. Two examples are shown below:

Top right hand quarter of the window

Bottom half of the window

A specific feature is further highlighted using a red outline ring.
Components and Connections

Left Side View

1. RS232 Socket
2. LCD display
3. Power switch
Components and Connections

Right Side View

4. Rotating laser scanner head
5. Ethernet ports
6. Power interconnecting cable
7. Data interconnecting cable
APS Scanner Function

When operational, the APS scanner provides absolute positioning data for the pedestal. This is achieved with a rotating infrared laser scanner head. When the infrared beam is reflected back from the APS reflective targets installed in the studio, the absolute position of the pedestal on the studio floor can be established and sent to the control system.

APS Scanner Safety

The laser scanner rotates at a rate of eight revolutions per second and therefore the following safety points must be adhered to:

<table>
<thead>
<tr>
<th>WARNING!</th>
<th>Risk of personal injury. Do not hold the steering ring in the proximity of the laser scanner when the pedestal column is in a lowered position.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WARNING!</td>
<td>Risk of personal injury or injury to others. Do not attempt to touch the laser scanner on the APS scanner unit while it is in motion. Warn other personnel and visitors in the studio to the potential risk.</td>
</tr>
</tbody>
</table>

| CAUTION! | Risk of product damage. Do not route cables or place objects near the rotating laser scanner head. |
Installation

Electrical Connections

WARNING! Disconnect power from the pedestal before attempting any electrical connections.

Power Interconnection

Data Interconnection

Powering Up

Before powering up the APS scanner, ensure that all external cable connections are secured correctly. The pedestal must also be powered up.

1. To power up, operate the on/off push button switch.

2. The power switch and LCD display will illuminate and the laser scanner head will rotate.
Configuring the APS Scanner

Before the APS system is fully operational, reflective targets must be correctly installed into the studio environment and the APS scanner must be configured to work with them. For configuration purposes, the APS scanner has a built-in user interface which is accessed by connecting up a computer with compatible network settings running a web browser such as Internet Explorer.

Reflective Target Installation

The APS scanner will only function in a studio with APS reflective targets installed. For more information on the correct installation and use of the APS reflective targets, refer to the APS Reflective Targets Installation Guide, publication part No. V4109-4981.

The APS Scanner User Interface

The network settings of the computer must be changed for successful connectivity with the APS scanner. The procedure for changing the settings differs between Windows XP and Windows 7.

Changing the Network Settings Using Windows XP

1. From the Windows Start menu navigate to Control Panel > Network Connections to open the Network Connections window.

2. Right-click on the Local Area Connection icon and select Properties from the menu.

3. Scroll down and select Internet Protocol (TCP/IP) and click the Properties button.


   a) Make a note of any current configuration settings in this window so that they can be restored when required.

   b) Click to select the Use the following IP address option.

   c) Enter 192.168.1.5 (or an address appropriate for the device or system) into the IP address field.

   d) Press the Tab key to automatically populate the Subnet mask field.

5. Click Ok to save the changes and exit the window.

6. Click Close to exit the Local Area Connection Properties window.
Changing the Network Settings Using Windows 7

1. From the Windows Start menu click to select Control Panel.

2. Click to select Network and Internet.

3. Click to select Network and Sharing Center.

4. Click on Change adaptor settings.

5. Right-click on the active local area connection and select Properties from the menu.


7. Click the Properties button.


   a) Make a note of any current configuration settings displayed, so that they can be restored when required.

   b) Click to select the Use the following IP address option.

   c) Enter 192.168.1.5 (or an address appropriate for the device or system) into the IP address field.

   d) Press the Tab key to automatically populate the Subnet mask field.

9. Click Ok to save the changes and exit the window.

10. Click Ok again to exit the Local Area Connection Properties window.
Configuration

Creating a Landmark Map

The APS user interface is used to scan the locations of the reflective targets in the studio to create a landmark map. This map is then stored by the APS scanner and used to provide accurate pedestal positional data anywhere on the studio floor.

Starting Up

1. Connect the configured computer to a spare network port on the APS scanner using an Ethernet cable.

2. Power up the pedestal. If the pedestal has previously been used and has pre-stored shots referenced to a floor target, perform the standard floor targeting procedure.

3. Power up the APS unit. The LCD display will initially show a boot up screen and then change to the main display screen. Positional values are displayed with a # symbol indicating that mapping is required.

4. Launch the web browser and type http://192.168.1.70 in the address bar.

5. The user interface home page opens, with information displayed about the firmware and hardware versions of the APS scanner unit. Links to the other main pages of the user interface are also provided here.
Target Type Selection

Before a landmark map can be created, the type of reflective targets used in the studio installation must be programmed into the APS scanner.

1. From the home page, click to select **Landmark Detection** from the row of page links above the information table.

2. On the landmark detection page, select the reflector type being used in the studio:
   - Select if the studio is using the wall mounted flat reflectors
   - Select if the studio is using the cylindrical bollard reflectors
   - The size of the installed reflectors can be changed if required (default sizes are 76 mm diameter for the bollard and 75 mm width for the flat targets)

   ![Configuration](http://192.168.1.70/settings2)

   Click to store any changes to the target settings

Landmark Map Scanning

1. Click to select the **Landmark Mapping** link.

2. Check that the option **Replace in current layer** is selected.

3. Click the **Map Landmarks** button to begin the scanning process.

4. When the scan has been completed, the landmark mapping page updates with the following information:
   - The position of the pedestal
   - The number of scans performed to create the landmark map
   - The number of landmarks (reflective targets) detected during the mapping process

![Landmark Map Scanning](http://192.168.1.70/mapping1)
Configuration

5. Click the **Save Landmark Map** to store the scanned information. A confirmation page opens.

6. This returns the APS scanner unit to normal operation. The LCD display will now show the following information:

   ![LCD Display Example]

   - **Current position of the pedestal**
   - **The number of landmarks (reflective targets) currently visible to the APS scanner unit**

**Adding Additional Targets to a Landmark Map**

Additional reflective target locations can be added to the current landmark map at any time. Common scenarios for this requirement are:

- Additional reflective targets have been installed in the studio
- Previously obscured reflective targets have come into view of the APS scanner at the current pedestal location in the studio
- Additional previously unmapped reflective targets have come into view at a different position in the studio

The APS scanner can be instructed to scan for previously unmapped targets and add them to the current landmark map.

1. Click to select the **Landmark Mapping** link from any page in the APS user interface.

2. On the landmark mapping page, tick to select **Negative Mapping** and **Append to current layer**.

3. Click the **Map Landmarks** button. The APS scanner unit will only scan for previously undetected targets. When the scan is complete:

   - **The number of new targets detected**
   - **Click to store the new targets to the current landmark map**
Adding Additional Landmark Maps
Additional landmark maps can be scanned and stored in the APS scanner. This is useful if the APS pedestal is used in several different studios. Any additional landmark maps are stored as different layers in the memory of the APS scanner and can be recalled at any time. The APS scanner can store up to 320 layers.

Creating a New Layer
1. On the landmark mapping page, change the Layer from the default value of 0 to a number between 1 and 319.
2. Follow the procedure described in the section Landmark Map Scanning on page 11 to scan and store a new landmark map to the new layer number.
3. The LCD display also indicates the new layer number and number of landmarks (targets) currently detected.

Managing Layers
To change between stored layers:
1. Click to select the Positioning link from any page in the APS user interface.
2. On the positioning page change the Current Layer field number to the layer required and click Save.

Replacing a Landmark Map
The currently selected landmark map can be completely replaced. This can be particularly useful if many of the installed reflective targets in the studio have been moved.
1. On the scanner mode page, click the Standby Mode button and then click to select the Landmark Mapping link.
2. On the landmark mapping page select Replace in current layer.
3. Check that Negative Mapping is not selected.
4. Click the Map Landmarks button. The APS scanner unit will create a new landmark map using all the available reflective targets.
5. Click the Save Landmark Map button to overwrite all previous mapping data stored on the selected layer.
Advanced Settings

CAUTION! Only competent trained personnel should make changes to setup options or parameters using the APS user interface. Changing these settings could affect the reliability of the system.

The APS user interface can be used to configure advanced system settings to enhance performance and positional accuracy in an installed location. Adjusting the default settings can also help the operator if problems are being experienced during basic operation.

If the APS system is performing accurately and consistently, there is no need to change any default settings.

To restore the APS scanner to the factory default settings, see Default Settings on page 17 in the Troubleshooting section.

Landmark Settings

The following parameters used by the APS scanner when scanning for reflective targets in the landmark map can be changed:

**Action Radius** - The APS scanner can detect targets between a minimum distance of 0.5 m and a maximum distance of 70 m from the laser scanner head. However, in some installations it may not be desirable or necessary to detect targets in such a large field of view, so the range can be reduced to suit the studio size.

**N closest reflectors** - This parameter limits the number of targets the APS scanner uses during scanning, starting with the closest targets first. This can help to improve accuracy because only the closest targets in the map will be scanned. The default setting is 0, which is a special case allowing all available targets to be detected. A minimum detection of three targets is required for the APS scanner to produce positional information.

**Reflector Threshold** - This parameter changes the sensitivity of the APS scanner when detecting targets. If the APS scanner is interpreting other reflective surfaces in the studio as targets, the threshold percentage can be increased to help minimise the effect of false readings on system performance.

1. Click to select the Landmark Detection link from any page in the APS user interface.

2. On the landmark detection page the following detection parameters can be adjusted:

   - Increase the minimum, or decrease the maximum field values. The APS scanner will then only detect targets within the reduced range.
   - Set a value to limit the number of targets the scanner will detect (closest only).
   - Adjust the percentage to change the sensitivity of the scanner.
   - Click to store any changes to the detection settings.

Defaults

To restore the APS scanner to the factory default settings, see Default Settings on page 17 in the Troubleshooting section.
Position Settings

The following positioning settings that the APS system uses during normal operation can be changed:

**Sliding Mean Depth** - This setting relates to the number of scans (rotations) performed by the APS scanner to detect the positions of mapped targets. The default setting is one scan, however if this is set to a multiple number the target data results collected from each scan is averaged out. Increasing the number of scans can help to improve target detection if scanning errors often occur due to other moving objects in the studio.

The APS scanner performs eight scans (rotations) per second.

**Radius of landmark detection window** - This parameter affects the APS scanner’s ability to accurately resolve precise target locations. The default is set to a radius of 300 mm. This means that the APS system will assume that a true landmark position has been resolved if a reflective object has been detected within 300 mm of a known target position in the landmark map. If two targets appear very close together due to a particular angular line of sight, or there is a known reflective object other than a true reflective target close by, the window radius could be reduced. This would have the effect of narrowing the focus for target detection and help to separate close reflective objects in problem scenarios, thus improving positional accuracy.

The radius of the landmark detection window can be set independently at the minimum and maximum ranges of the detection field.

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1. Click to select the **Positioning** link from any page in the APS user interface.

2. On the positioning page the following parameters can be adjusted:

   **Increase the number of scans made to detect targets**

   **Increase or decrease the detection window at both ends of the scanning range**

   **Click to store any changes to the positioning settings**
Maintenance

Routine Maintenance
The APS scanner requires minimal routine maintenance, apart from checking the connections and overall operation periodically.

Routine Checks
During use, check the following:

• Check cables for signs of wear or damage. Replace as necessary.
• Check that all cables are connected properly.

WARNING! Risk of electric shock. Always check cables for signs of damage. Damaged cables can cause personal injury and/or damage the equipment.

Cleaning

WARNING! Risk of electric shock. Always disconnect and isolate the product from the power supply before cleaning.

APS Scanner
During normal use the only cleaning required should be a regular wipe over with a dry, lint-free cloth. Dirt accumulated during storage or periods of disuse may be removed with a vacuum cleaner. Particular attention should be paid to all connection ports.

Laser Scanner Window

CAUTION! Potential performance reduction due to contamination of the window in the laser scanner. The window must be regularly cleaned as described.

WARNING! Switch off the APS scanner before cleaning the laser read head window.

Static charges cause dust particles to be attracted to the window of the laser scanner.

To clean the window, proceed as follows:

1. Use a clean and soft brush to remove dust particles from the window.
2. Carefully wipe the window using a clean and damp lens cloth.
## Default Settings

The following table lists the factory default setting values for the APS scanner.

<table>
<thead>
<tr>
<th>Landmark Detection</th>
<th>Default Value</th>
<th>Positioning</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylindrical Reflector Size</td>
<td>76 mm</td>
<td>Reflector Threshold</td>
<td>50%</td>
</tr>
<tr>
<td>Flat Reflector Size</td>
<td>75 mm</td>
<td>Sliding Mean Depth</td>
<td>1</td>
</tr>
<tr>
<td>Action Radius (Min)</td>
<td>500 mm</td>
<td>Radius of landmark detection window at (distLow)</td>
<td>300 mm at 500 mm distance</td>
</tr>
<tr>
<td>Action Radius (Max)</td>
<td>70000 mm</td>
<td>Radius of landmark detection window at (distHigh)</td>
<td>300 mm at 70000 mm distance</td>
</tr>
<tr>
<td>N closest reflectors</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### APS Scanner Function

<table>
<thead>
<tr>
<th>Fault</th>
<th>Check</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>The APS scanner is switched on, but the power switch and LCD display</td>
<td>Check that all the interconnections on the APS scanner are secure.</td>
<td>See Electrical Connections on page 7.</td>
</tr>
<tr>
<td>display are not illuminated and the laser scanner head is not rotating.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Check that the Fusion pedestal is connected to the power source supply</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and switched on.</td>
<td></td>
</tr>
<tr>
<td>The pedestal is not maintaining consistent and accurate absolute</td>
<td>Check that the APS scanner has a clear view of the reflective target</td>
<td>See the APS Reflective Targets Installation</td>
</tr>
<tr>
<td>positioning during normal operation.</td>
<td>positions (no obstructions) and they are in the correct installation</td>
<td>Guide, publication part No. V4109-4981.</td>
</tr>
<tr>
<td></td>
<td>positions.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The APS scanner needs contact with at least three reflective targets.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Repeat the landmark map scan procedure, appending any new or moved</td>
<td>See Adding Additional Targets to a Landmark</td>
</tr>
<tr>
<td></td>
<td>reflective targets to the current landmark map.</td>
<td>Map on page 12.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# LCD Display Messages

If the APS scanner detects a problem or fault during use, it is shown on the LCD display.

<table>
<thead>
<tr>
<th>Display</th>
<th>Fault/Check</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unable to open link to Nav350 scanner: Error 200</td>
<td>Communication or power problem with the APS scanner. Check all interconnections and that the pedestal is powered up.</td>
<td>See Electrical Connections on page 7.</td>
</tr>
<tr>
<td>NextMove e100 comms test failed, link closed: Error 101</td>
<td>Communication has not been established between the APS scanner and the pedestal. Check that the pedestal is powered up and working with the control system.</td>
<td></td>
</tr>
</tbody>
</table>

For help with a laser scanner window contamination or damage, please see the Laser Scanner Window section on page 16.

For assistance with managing layers, refer to Managing Layers on page 13.

For information on navigating the APS system, consult the Navigation Mode button to return the APS system to normal operation.
### Troubleshooting

<table>
<thead>
<tr>
<th>Display</th>
<th>Fault/Check</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pedestal positional information not displayed. The APS scanner requires the landmark mapping procedure to be carried out.</td>
<td>See <a href="#">Landmark Map Scanning</a> on page 11.</td>
</tr>
<tr>
<td><img src="image" alt="" /></td>
<td>The APS scanner has not booted correctly. Try power cycling the scanner and the pedestal.</td>
<td>If the problem persists, contact Vinten.</td>
</tr>
<tr>
<td><img src="image" alt="" /></td>
<td>The APS scanner has not located the memory card, or the memory card is incorrectly formatted.</td>
<td>Contact Vinten.</td>
</tr>
</tbody>
</table>
General Notices

Technical Specification

Dimensions
- Weight: 3.7 Kg (8.2 lb)
- Height: 257 mm (10.1 in.)
- Width: 177 mm (7.0 in.)
- Length: 211 mm (8.3 in.)

Power
- DC power input: 24V DC (supplied directly from the pedestal)

Environmental
- Temperature range (operation): 0°C to +40°C (32°F to +104°F)

Pedestal Accuracy
- X/Y accuracy: ±25 mm
- Angular accuracy: ±0.1°

Laser Scanner Specification
- Laser light wavelength: 905 nm, infrared, eye safe

Laser Compliance
- Complies with laser class 1 in accordance with IEC 60825-1
- Complies with 21 CFR 1040.10 and CFR1040.11 except for deviations pursuant to laser notice No.50 dated June 24th, 2007

FCC Certification

FCC Notice
This product complies with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/television technician for assistance

FCC Warning
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
FCC Declaration of Conformity
This product complies with Part 15 of the FCC Rules, Operation is subject to the following two conditions:

1. This product may not cause harmful interference.
2. This product must accept any interference received, including interference that may cause undesired operations.

Declaration of Conformity
Vitec Videocom Limited declares that this product has been manufactured in accordance with BS EN ISO 9001:2008 and is in compliance with the essential requirements and other relevant provisions of the Machinery Directive 2006/42/EC. A copy of the Declaration of Conformity is available upon request.

Environmental Considerations
ROHS Compliance Statement
Vitec Videocom Limited is compliant with the European Union Directive 2002/95/EC Restrictions of Hazardous Substances (RoHS) that restricts the use of hazardous substances in Electrical and Electronic Equipment.

This symbol marked on the product or its packing indicates that this product must not be disposed of with general household waste. In some countries or European Community regions, separate collection systems have been set up to handle the recycling of electrical and electronic waste products. By ensuring this product is disposed of correctly you will help prevent potentially negative consequences for the environment and human health. The recycling of materials helps conserve natural resources.

Visit our website for information on how to safely dispose of this product and its packaging.

In Countries Outside the EU:
Dispose of this product at a collection point for the recycling of electrical and electronic equipment according to your local government regulations.

Pollution Statement
This equipment is designed for operation in Pollution Degree 2 environments.