APS
Reflective Targets

Part No. V4109-1012
V4109-1013
V4109-1014
V4109-1015

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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’.

Intended Use

The reflective target products are designed to be installed in television studios for use with the Fusion Absolute Positioning System (APS). When correctly installed, the targets provide mapping information for the accurate positioning of pedestals with an APS scanner fitted on the studio floor.

Health and Safety

WARNING! Risk of personal injury or injury to others. All personnel must be fully trained and adhere to correct manual handling techniques and Healthy & Safety regulations. It is the responsibility of the local organisation to enforce safe working practices at all times.

Cleaning

CAUTION! Do not use solvent or oil-based cleaners, abrasives or wire brushes. Only use detergent-based cleaners.
The APS reflective targets have been designed to provide critical positioning information for the correct and accurate operation of a Fusion pedestal with an APS scanner unit installed. This manual covers the correct positioning and installation of the reflective targets in a television studio environment to ensure the performance of the system is optimised.

**Illustrations Key**
Many sections in this manual use studio layout illustrations to describe the positioning of the targets.

The key objects used are:

1. Detectable flat target
2. Undetectable flat target
3. Detectable cylindrical target
4. Undetectable cylindrical target
5. Fusion pedestal with APS
6. APS scanner unit
7. Reflective object or surface
8. Wall or solid object
9. Path of laser beam (invisible I/R)
The APS System

System Requirements
The Fusion APS system operates by using reflective targets in the studio to determine the absolute position of the Fusion pedestal(s). When these have been installed, the Fusion pedestal equipped with an APS scanner unit uses a spinning infrared laser read head to locate the positions of the targets and store them as a mapping file in memory.

If the targets have been correctly positioned, the APS scanner unit can accurately resolve the position of the pedestal anywhere on the studio floor.

The Fusion pedestal with APS requires contact with a minimum of three reflective targets to resolve a position.

However, it is recommended that the Fusion pedestal with APS can maintain contact with six targets at any one time to maintain reliable absolute positioning.

APS Scanner Unit Field of View
Although the sweep of the laser beam from the APS scanner unit is partially blocked by the column of the pedestal, it is still capable of detecting targets in a large field of view of 270°. This means that targets can and should be placed to the rear of the studio.

The columns of other pedestals and tall solid objects in the studio will also block the laser beam and this should be taken into account during target installation.
Reflective targets are available in two different types, flat or cylindrical, depending on the requirements of the studio environment. Both types of the target are available pre-assembled or in kit form so they can be coloured prior to assembly to blend in to the studio set or surroundings.

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<thead>
<tr>
<th>PART NO.</th>
<th>TARGET REFLECTOR TYPE</th>
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<tbody>
<tr>
<td>V4109-1012</td>
<td>Cylindrical target kit (for colouring)</td>
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<tr>
<td>V4109-1013</td>
<td>Standard pre-assembled cylindrical target</td>
</tr>
<tr>
<td>V4109-1014</td>
<td>Flat target kit (for colouring)</td>
</tr>
<tr>
<td>V4109-1015</td>
<td>Standard pre-assembled flat target</td>
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**Flat Reflective Targets**

The flat targets are designed to be installed onto walls or other fixed objects at a specific height above the studio floor.

**Reflective properties**

The entire front surface area of the flat target is reflective.

When using flat targets in an installation, it is important to take into account the maximum angles at which the targets are capable of reflecting the laser beam back to the APS scanner unit.

**Installing Flat Reflective Targets**

The flat targets must be installed at a height of 420 mm to the bottom edge of the target, as measured from floor level.
Reflective Targets

It is recommended that either self-adhesive pads or Velcro strips are used to attach the targets. Use generous amounts of adhesive material to ensure the targets stay in the correct position.

Cylindrical Reflective Targets

The cylindrical targets are designed to be mounted on the floor of the studio, particularly in instances where there are no suitable walls or fixed objects to mount the flat targets.

Reflective properties

Unlike the flat targets, the cylindrical targets have the advantage of being reflective at any angle.

The height of the reflective area on the cylinder has been optimised to assume that the base of the target will be mounted on the same studio floor level as the Fusion pedestal with APS installed.
Installing Cylindrical Reflective Targets
The cylindrical targets can be mounted to the floor permanently or temporarily, depending on the requirements of the studio.

Permanent Mounting
Using three 6 or 8 mm floor bolts, attach the base of the cylinder to the floor through the holes provided. The target must be mounted on a level surface.

Temporary Mounting
To avoid the cylindrical targets becoming a permanent obstacle on the studio floor, they can also be positioned free standing or with self adhesive pads. However, if the targets are subsequently removed, it is critical they are positioned back accurately for the APS scanner unit to function correctly. Mark the studio floor with an outline of the base footprint of the target so that they can be easily placed back into position.
Colouring Targets

The targets are also supplied in kit form for self-assembly, so that they can be coloured if this is a requirement of the studio environment.

Lighting Gel Filters

The reflective surface of the target has to be covered with a coloured lighting gel filter with the correct lighting properties. The gel filters are commonly available in a wide variety of colours. The gels have optical filtering properties that allow light to pass in a specific narrow colour range, but also in the invisible infrared spectrum. The optical properties graph shown below is for a blue gel filter.

This filter characteristic to pass invisible infrared light means that the laser beam from the APS scanner unit can still be reflected back through the filter with minimal loss of signal.

Flat Target Colouring and Assembly

The flat target kit comes with the reflective material and a layer of optically clear adhesive tape already fitted to the base plate. The coloured gel filter is then applied on top.

1. Cut the coloured gel filter sheet slightly larger than the size of the reflector plate.
2. Peel off the backing on the optically clear tape and carefully apply the coloured gel filter to the reflector plate.

3. Trim back any excess filter material from around the reflector plate edges and remove any air bubbles trapped behind the filter.

**Cylindrical Target Colouring and Assembly**

The cylindrical target kit consists of the following parts:

1. Target bollard (unpainted)
2. Optically clear adhesive tape, 25 mm x 2
3. Self-adhesive reflector material, 300 x 241 mm

The target bollard can be painted as required before the reflector material is applied. This is then covered by the coloured gel filter.

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<tbody>
<tr>
<td>1</td>
<td>Bollard paint finish</td>
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<tr>
<td>2</td>
<td>Coloured gel filter</td>
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<td>3</td>
<td>Double-sided optically clear tape</td>
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<tr>
<td>4</td>
<td>Reflective material</td>
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</table>
Colouring Targets

1. Paint the target bollard the required colour and ensure the surface has completely dried before proceeding.

2. Peel the backing from the self-adhesive reflector material and carefully apply it to the bollard cylinder. The long edge of the sheet (300 mm) must be in line with the bollard cylinder, 5 mm down from the top of the tube.

3. Carefully wrap the reflective sheet right around the bollard cylinder, maintaining a spacing of 5 mm from the top of the tube.

4. Cut the coloured gel filter sheet to the dimensions shown below.
5. Apply strips of the 25 mm optically clear tape to the long edges of the gel filter sheet.

6. Peel the backing from one strip of the optically clear tape on the gel filter sheet and carefully apply it to the bollard cylinder. The taped edge of the sheet must be in line with the bollard cylinder, 2.5 mm down from the top of the tube, so that the gel filter sheet overlaps the reflective material on both edges by the same amount.

7. Carefully wrap the gel filter sheet tightly around the bollard tube, maintaining an overlap of 2.5 mm over the edge of the reflective material.

8. Peel the backing from the other strip of the optically clear tape on the gel filter and press it down to secure the gel filter sheet in position. Remove any air bubbles trapped in the tape joins.
Positioning Targets

Incorrect Target Layouts
The APS scanner unit uses a map of the target positions in the studio to resolve an absolute position for the pedestal. Targets that are located at the same or very similar positions around the studio create a very uniform map that can confuse the APS scanner unit and make establishing an absolute position unreliable.

Examples of uniform and repetitive target layouts to avoid are:

Even with a variation in spacings, avoid ‘mirror image’ target positioning layouts:
Correct Target Layouts
The APS scanner unit performs accurately with an asymmetric layout of target positions. The spacing between targets should be varied by at least 500 mm. This makes the target map more random and unique, meaning that the Fusion pedestal with APS can always maintain an accurate absolute position.

Examples of good asymmetric target layouts are:

- Wherever possible, maintain an even number of targets on each side of the studio when introducing an asymmetric target layout.
- If possible, introduce more random spacing between targets:
Positioning Targets

Minimum Detection Range
The APS scanner unit is not able to detect flat or cylindrical targets within a radius of 0.5 metres of the laser read head. Take this into account in a small installation area, or circumstances where the pedestal is likely to be driven close to target positions.

Maximum Detection Range
The APS scanner unit can detect flat or cylindrical targets up to a maximum distance of 70 metres from the read head.

If a detection range longer than 70 metres is required, reflective targets with a larger surface area can be used.
**Positioning Targets**

**Target Overlap**
Avoid installing targets where it is likely that they will appear too close together from the point of view of the APS scanner unit. If the angle between the targets as seen from the laser read head is less than 0.6°, the system will not be able to resolve them as individual positions and both targets will be discounted.

**Reflective Surfaces**
Other reflective objects in the studio such as wall pipes and furniture legs can be mistaken as targets by the APS scanner unit. This is not normally an issue because the APS controller can be instructed that these are not true target positions during the configuration process. However, if a reflective object is within a proximity field of 300 mm from a real target, the system cannot establish an accurate position. This distance also applies to real targets being placed too close together.

Avoid installing targets near reflective objects, or cover the object with a material with low reflective properties.

If required, the proximity field can be reduced during the APS configuration process.
Positioning Targets

Example Layouts
The following diagrams show examples of correctly positioned targets in studio environments, taking into account all of the guidelines described in this manual.

Studio One

- Flat targets used in this installation
- More than six targets in view in any position
- Assymetric / random target spacing
- Even target numbers on each side of the studio
- Flat targets installed onto studio furniture

Studio Two

- Cyclindrical targets used in this installation
- More than six targets in view in any position
- Assymetric / random target spacing
- Even target numbers on each side of the studio
- Cylindrical targets chosen due to the absence of suitable installation walls
Disguise targets on studio sets by colouring

Where close target proximity to reflective objects cannot be avoided (<300 mm), apply a non-reflective material or paint.

Both pedestals can make contact with at least six targets in any position. This is despite the potential for the columns of each pedestal to mask targets.
Maintenance

Routine Maintenance
If correctly secured in position, the reflective targets require no routine maintenance other than regular cleaning.

Cleaning
To maintain the optimum performance of the targets, clean the reflective surfaces regularly with a dry, lint-free cloth. If necessary, use a mild detergent based cleaner.