

有關在貨車上安裝 倒車裝置的指引

A Guide for the installation of Devices
to Assist Reversing of Goods Vehicles



運輸署
Transport Department

引言

Introduction

良好駕駛行為是達致道路安全的關鍵。在倒車時，司機如能全神貫注、關顧別人，及保持良好的行為和態度，都有助保障司機本人、其他車輛的司機和乘客以及行人的安全。

Good driving behaviour is the key to road safety. When reversing a vehicle, a driver's full attention, care for others, good behaviour and attitude are crucial to enhancing the safety of himself, the drivers and passengers of other vehicles, as well as pedestrians.

一些輔助裝置可協助貨車司機在倒車時更清楚了解到車尾的情況。常見的倒車裝置有：

Drivers of goods vehicles may benefit from supplementary devices that help them to better detect the condition at the rear of the vehicles when reversing. The common types of reversing devices are:

(a) 泊車感應器 parking sensor ;



(b) 凸面照地鏡 Cross-view mirror ; 及 and



(c) 倒車視像裝置 reversing video device



這些裝置的效用因車輛的類型而異。本文提供有關在貨車上安裝倒車裝置的資料及指引。

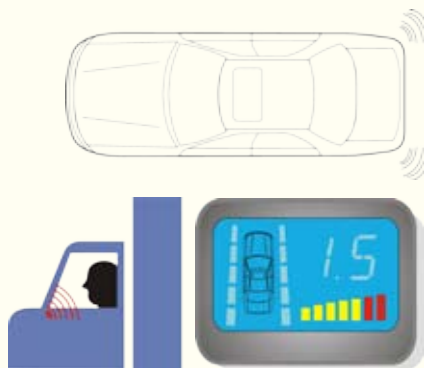
The effectiveness of these devices varies for different vehicle types. This Guide provides information and guidelines for installing reversing devices on goods vehicles.

泊車感應器

Parking Sensor

泊車感應器是利用超聲波或電磁技術來探測附近是否有物體。若附近有其他物體存在，感應器會以聲音(有時連同視覺影像)提醒司機注意。

Parking sensors make use of ultrasonic or electromagnetic technologies to detect the presence of objects in the vicinity of the sensor. They send audio (sometimes also with visual display) to alert the driver of the proximity of other objects.



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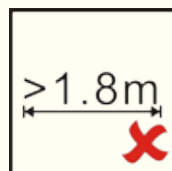
- 有效感應較大型和停留不動的物體，例如牆壁和其他車輛，故常用以協助泊車時避免碰撞物體。
- 相對上便宜和易於安裝。
- 無須依靠周圍環境照明，在黑暗地方仍可操作。
- 當探測到障礙物時，會自動發出聲響警示。警示信號會按障礙物的距離而改變。

Advantages

- It is effective in sensing large and stationary objects such as walls and other vehicles and hence are mostly used to assist vehicle parking.
- It is relatively cheap and easy to install.
- It does not depend on ambient lighting, and may still function in darkness.
- It gives an audio alarm actively when an obstacle is detected. The warning signal changes in proportion to the proximity of the obstacle.

局限性

- 不能可靠地感應移動中的物體，例如走動的行人。
- 就設有高身防撞槓的貨車而言，安裝於防撞槓上的感應器未必探測到高度少於0.3米的物體，例如小童。
- 水平向的有效感應範圍短小（通常少於1.8米）。
- 不同的產品發出警示信號的反應時間各異。
- 感應器可能因旁邊的物體、路徑上的凸坡，或被泥濘雨水遮蓋而誤鳴。
- 感應器失靈時沒有任何顯示讓司機得知。

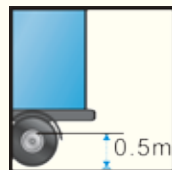


Limitations

- It is not reliable in sensing moving objects such as walking pedestrians.
- For goods vehicles with high bumpers, the sensors installed at the bumpers might not be able to detect objects of $< 0.3\text{m}$ height, e.g. small children.
- The effective horizontal range is short (usually less than 1.8m).
- Different products vary in their response time in sending the alarm signals.
- There may be false alarms due to proximity of objects on the sides, road ramps on the path, and sensors being covered with mud or rain.
- There is no indication to the driver if the sensors do not function.

安裝指引

- 最好採用有效感應範圍最遠和能夠作出最快反應的泊車感應器。
- 感應器應安裝於距離地面約0.5米高的位置。
- 所安裝的感應器應可於車輛使用「後波」時自動啟動操作。



Installation guidelines

- A parking sensor with the farthest effective detection range and quickest response should best be used.
- It should be installed at around 0.5 m height above ground.
- It should be installed to the effect that it will automatically come into operation when vehicle is in reversing gear.

凸面照地鏡

Cross-view Mirror

凸面照地鏡基本上是安裝在車尾高處位置的倒後鏡，用途是讓司機看到車尾難以看見的範圍。司機可從所安裝的一般倒後鏡或側鏡，看到照地鏡所反映車尾部分的影像。

Cross-view mirror is basically a convex rear view mirror to be mounted at an elevated point at the rear of the vehicle for catching the view of the vehicle blind spots at the rear. The image of the rear part of the vehicle is reflected to the driver through a normal rear view mirror or side mirror installed.

倒後鏡 Rear view mirror

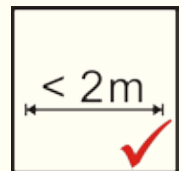


側鏡 side mirror



優點

- 照地鏡可讓司機更清楚看到車尾的範圍。大部分照地鏡的視線範圍為車身後2米。
- 相對上便宜和易於安裝。
- 無需使用能源。



Advantages

- Cross-view mirror can improve the driver's view of the rear area. Most mirrors can provide a rear view up to 2 metres.
- It is relatively cheap and easy to install.
- There is no power requirement.

局限性

- 車輛載滿貨物時，照地鏡可反映到倒後鏡或側鏡的視像可能受阻。對於車身最尾部分沒有高處位置可供安裝照地鏡的貨車（例如，農夫車、傍板貨車），照地鏡並不合用。
- 基於影像扭曲和影像大小的問題，照地鏡未能為全長超逾5米的車輛提供可靠的影像。因此，對大部分總重3.5公噸以上的貨車，照地鏡都不合用。
- 如照地鏡安裝在車輛的中間位置，便可能無法看到車輛兩邊的物體。
- 在照明度低的環境中，效果欠佳。
- 污垢、雨、霧、眩光以及倒後鏡和照地鏡的震動，都可能降低照地鏡的性能。



Limitations

- The views provided may be blocked if the vehicle is fully-loaded. It is not suitable for goods vehicle that have no high mounting point at the vehicle rear most, e.g. pick up, drop-side platform.
- Because of image distortion and size, it fails to provide reliable images for vehicles with overall length above 5m. Hence, it is not suitable for most goods vehicles exceeding 3.5 tonnes.
- If the mirror is mounted at the center of the vehicle, it may fail to detect objects on the two sides of the vehicle.
- It is not effective in an environment where illumination level is low.
- The performance may be adversely affected by dirt, rain, mist, glare, and vibration of the rear view and cross view mirrors.

安裝指引

- 如果可能，安裝照地鏡的位置應距離地面2米或以上。
- 照地鏡不可突出車身太多。



Installation guidelines

- If possible, the mounting point should be 2 m or above from the ground.
- The mirror should not protrude from the vehicle body excessively.

倒車視像裝置

Reversing Video Device (RVD)

倒車視像裝置是在車尾裝設攝影機以拍攝車後情況的閉路電視系統，而用以展示有關影像的顯示屏通常安裝於司機前面。

RVD is a closed circuit television (CCTV) system with its camera being mounted at the vehicle rear to capture the rear view of a vehicle. The image is displayed on a monitor usually installed in front of the driver.



倒車視像裝置的性能要求

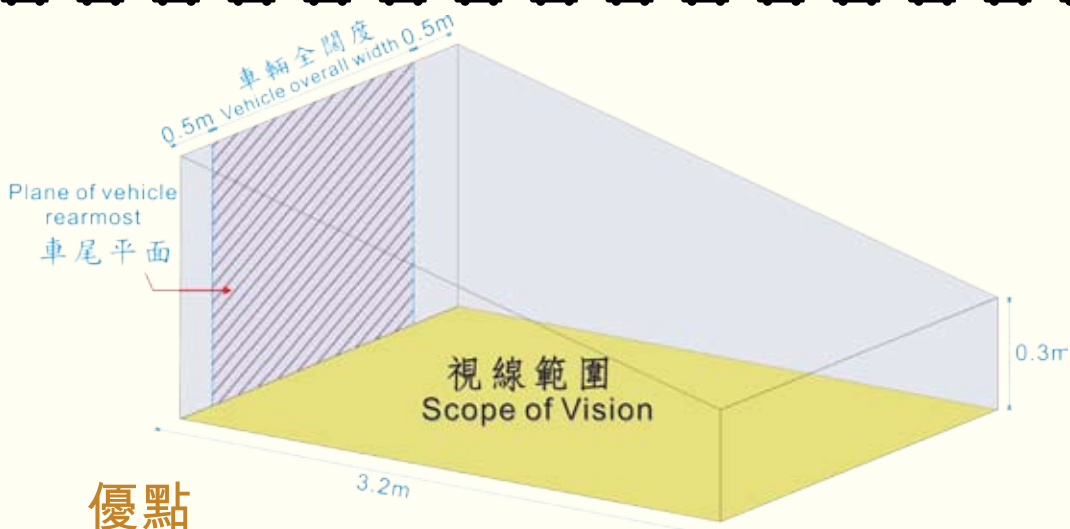
Performance Requirements of an RVD

考慮到市面供應的倒車視像裝置款式、不同貨車的結構、本港的環境和海外的經驗，我們建議，有效的倒車視像裝置須達到下列性能要求：

- 縱向距離 - 車尾後3.2米
- 橫向距離 - 車輛全闊度 + 左右各0.5米
- 探測物件的高度 - 離地0.3米

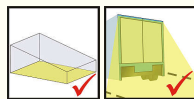
Having considered the range of available reversing video devices in the market, structures of different goods vehicles, the local environment and overseas experience, the recommended performance requirements of an effective RVD are as follows:

- Longitudinal distance - 3.2 m from rearmost of the vehicle
- Transverse distance - overall width of vehicle plus 0.5 m on each side of the vehicle
- Height of object detected - 0.3 m above ground



優點

- 倒車視像裝置能讓司機看到車尾的整體情況，因此較泊車感應器和凸面照地鏡有效。
- 能即時向司機傳送影像。



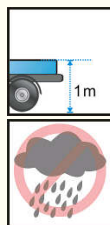
- 倒車視像裝置若有故障，顯示屏便不顯示任何影像，司機可因而知道該裝置失靈。

Advantages

- RVD is more effective than parking sensor and cross-view mirror because it gives the whole picture of the rear.
- There is no time delay in conveying the information to the driver.
- When RVD fails, the driver will know readily because the image would not be displayed.

局限性

- 倒車視像裝置的性能與安裝的高度有很大關係。
- 在周圍昏暗的環境下需要輔助照明，才可傳送可靠的影像。
- 攝影機上的灰塵和雨點或會影響所顯示影像的質素。



Limitations

- The performance depends very much on installation heights.
- Auxiliary illumination will be required to facilitate capturing of reliable images in an environment of low ambient illumination.
- Dirt and rain drops on the camera may affect quality of images captured.

安裝指引

Installation guidelines

■ 閉路電視系統

The CCTV system

市面供應的多款閉路電視系統都能符合建議的性能要求。合適的倒車閉路電視系統通常包括以下組件：

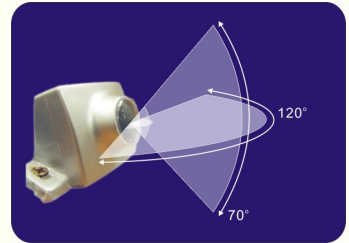
Various CCTV systems available in the market are capable of achieving the recommended performance requirement. A suitable reversing CCTV system usually consists of:

(a) 廣角攝影鏡頭：

- 橫向有效視線角度約120度或以上；以及
- 縱向有效視線角度70度或以上。

a wide angle camera lens of:

- horizontal angle of vision about 120 effective angle or more; and
- vertical angle of vision 70 effective angle or more.



(b) 顯示屏對角長130毫米或以上

a monitor screen with diagonal size of 130 mm or more

■ 安裝高度

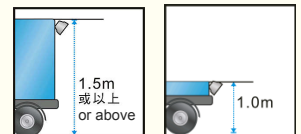
(a) 攝影機如可安裝於車尾離地1.5米或以上的位置，閉路電視相信不難符合上述的性能要求。

(b) 攝影機如因車身高度或其他原因而須安裝於離地少於1.5米高的位置，則或須使用超過一部攝影機，才可達到上文規定的性能要求。

Installation Height

(a) If the camera can be installed on the vehicle rearmost at a height of 1.5m or above, the CCTV would likely be able to achieve the above performance requirements with no major difficulties.

(b) If the camera has to be installed at a height less than 1.5m above ground due to body height or other reasons, then more than one camera may need to be deployed, in order to achieve the performance requirements stipulated above.



■ 其他一般的建議安裝規定列於附錄。

Other general recommended installation requirements are listed in the Appendix.

安裝倒車視像裝置的建議規定

一般要點

1. 倒車視像裝置 / 閉路電視系統應於車輛正在倒車或準備倒車時自動啟動。司機須要待屏幕清晰顯示監察範圍後才開始倒車。
2. 當車輛正在倒車或準備倒車時，所監察範圍(視線範圍)內的情況應自動完全清晰展現於顯示屏上。若車輛並非正在倒車或準備倒車，該系統應保持關閉。
3. 所有電線和喉管應妥為保護，避免磨損或出現短路。
4. 顯示屏的最下邊緣應可看到車尾邊緣，以確保完全在顯示屏上展現建議視線範圍的情況。

攝影機

5. 閉路電視攝影機應妥為安裝在車尾，而攝影機鏡頭的方向在正常駕駛情況下不應受到影響，並建議安裝在車身外。
6. 如有需要及可行的話，可使用合適的支架。
7. 攝影機應該防水及防塵。

顯示屏

8. 顯示屏應安裝在司機於駕駛時容易看見的位置(通常在一米範圍內)，但不應妨礙察看路面情況。
9. 一般在車內倒後鏡附近位置安裝，展示視線範圍的反方向影像，情況跟透過倒後鏡觀看一樣。
10. 顯示屏的寬度與高度的比例如為4比3或16比9，其對角尺寸應不少於130毫米(當安裝在1米的位置)。顯示屏的對角尺寸須隨著司機的視距按比例改變，使視覺角度保持不少於7度。
11. 顯示屏應妥為安裝，而其性能應不受一般駕駛情況及環境(例如震盪及猛烈陽光照射)所影響；其邊緣應呈圓角，半徑為2.5毫米，而堅硬的部分應以25毫米厚及堅硬程度不多於60 Shore A的物料包裹。
12. 顯示屏的亮度應自動調校至與車外環境的光度配合，以便容易認清影像。因此建議顯示屏在不同光線情況下的最低對比度應如ISO 15008:2003所訂定者。
13. 顯示屏在用電及磁性上應可配合及不得干擾車內其他設備。

附註

14. 在光線昏暗的環境例如停車場內或夜間在郊區，攝影機未必能在沒有外來光線情況下偵測影像。因此，應安裝具備以下條件的倒車燈 –
 - 符合《道路交通(車輛構造及保養)規例》(第374A章)第105條所列規定；
 - 光度足夠；以及
 - 隨倒車警號自動亮著。

Recommended requirements for installing Reversing Video Devices

General

1. The RVD/CCTV system shall be turned on automatically when the vehicle is reversing or about to reverse. Drivers should wait until the space to be monitored being fully and clearly displayed on the screen before reversing.
2. The images within the space to be monitored (scope of vision) shall be totally displayed on the monitor screen with adequate clarity automatically when the vehicle is reversing or about to reverse, and shall be turned off otherwise.
3. All wiring and conduits shall be adequately protected from chafing and short-circuit.
4. The vehicle rear edge line should always be visible on the lower edge of the monitor display, such that the recommended scope of vision could be fully captured and displayed on the monitor.

Camera

5. The CCTV camera shall be installed securely on the vehicle rear such that orientation of the camera will not be affected under normal driving conditions. It is recommended that the camera be installed in the rearmost wall of the vehicle.
6. Appropriate mounting brackets may be used if required and feasible.
7. The camera shall be water and dust proofing.

Monitor

8. The monitor shall be installed in the driver's cabinet at a position easily visible to the driver in driving position (usually within 1m), but shall not impair the usual visibility of the road conditions.
9. The usual place for installation would be near to the position of the internal rearview mirror. As such, it will show the image of the scope of vision in a reverse manner as if it were viewed through a rear-view mirror.
10. The monitor diagonal size shall be no less than 130 mm (when installed at 1 m) for either 4:3 or 16:9 monitor width to height display ratios. The monitor diagonal size shall change in proportion to the visual distance of the driver so as to maintain a visual angle of not less than 7 degrees.
11. The monitor shall be securely mounted, and its performance shall not be affected by the usual driving conditions and environment, e.g. vibration and sun glare. Edges should be rounded to 2.5 mm radius, and hard objects should be covered with 25 mm thickness material of hardness no more than 60 Shore A.
12. The brightness of the monitor should be adjusted automatically to match the external illumination conditions, to facilitate easy recognition of images by the viewer. As such it is recommended a minimum lighting contrast as required under ISO 15008:2003 be specified.
13. The monitor shall be electrically and magnetically compatible with and shall not interfere with all other vehicle instruments.

Note

14. When used in environment of low illumination such as in a car park or in a rural area at night time, the camera may not be able to detect images reliably without external illumination. Reversing lights that could -
 - meet the requirements of regulation 105 of Road Traffic(Construction & Maintenance) Regulations (Cap. 374A);
 - with sufficient brightness; and
 - be turned on automatically with the reversing alarm should be provided.