

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

2009年9月修訂
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RVD made possible for low body vehicle types with 170° camera

低車身車輛可使用170度的攝影機安裝倒車視像裝置



運輸署

Transport Department

引言

Introduction

良好駕駛行為是保持道路安全的關鍵。在倒車時，司機能否全神貫注、關顧別人以及保持良好的行為和態度，對保障司機本人、其他車輛的司機和乘客以及行人的安全來說，至關重要。

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看到車尾的情況。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:

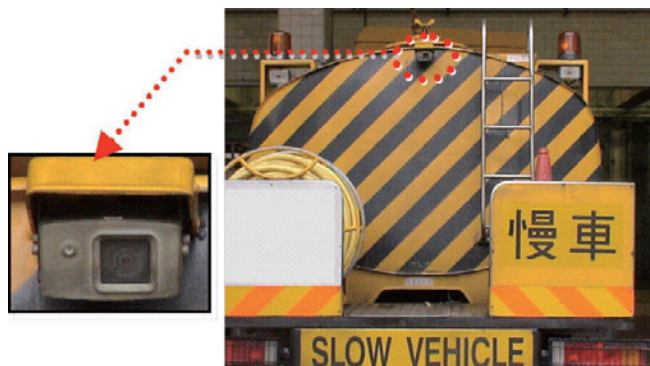
(a) 泊車感應器 parking sensor :



(b) 凸面照地鏡 Cross-view mirror; 以及 and



(c) 倒車視像裝置 reversing video device (RVD)



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

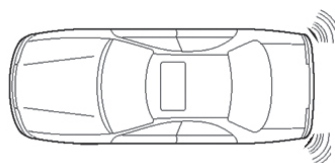
The effectiveness of these devices varies for different vehicle types. This Guide provides information and guidelines for installing reversing devices on goods vehicles.



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感應器附近是否有物體存在。若附近有其他物體存在，感應器會以聲音(有時連同影像)提醒司機注意。



Parking sensors make use of ultra-sonic 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.



優點

- 有效感應較大型和停留不動的物體，例如牆壁和其他車輛，故常用以協助停泊車輛。
- 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。

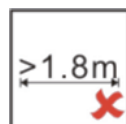
Advantages

- 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



- 不能可靠地感應移動的物體，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）。
- 不同產品發出警示信號的反應時間各異。
- 感應器可能因兩旁附近的物體、路徑的凸坡或被泥濘雨水遮蓋而誤鳴。
- 並無任何顯示令司機得知感應器失靈。

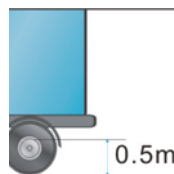


Limitations

- 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 less than 0.3m height, e.g. 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反應最快的泊車感應器。
- 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凸面倒後鏡，作用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，看到凸面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

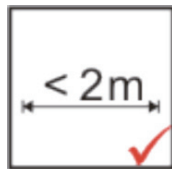


側鏡 Side mirror



優點

- 凸面照地鏡可讓司機更清楚看到車尾的範圍。大部分凸面照地鏡的視線範圍均可達車身後2米。
- 相對上便宜和易於安裝。
- 無須使用電源。



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

- 車輛載滿貨物時，凸面照地鏡所反映的景像可能受阻。對於無法在車身最尾部分較高位置安裝凸面照地鏡的貨車（例如農夫車及傍板貨車）而言，凸面照地鏡並不合用。
- 由於會出現影像扭曲和大小有異的問題，凸面照地鏡不能為全長超逾5米的車輛顯示可靠的影像，因此不適合用於大部分總重3.5公噸以上的貨車。
- 如凸面照地鏡安裝在車輛的中間位置，可能無法顯示車輛兩側的物體。
- 在照明度低的環境中，效果並不理想。
- 污垢、雨、霧、眩光以及倒後鏡和凸面照地鏡本身的振動，都可能降低凸面照地鏡的性能。

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，安裝凸面照地鏡的位置應距離地面2米或以上。
- 凸面照地鏡不應突出車身太多。



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.

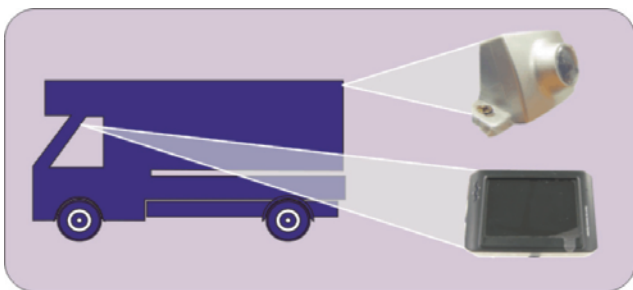


倒車視像裝置

Reversing Video Device (RVD)

倒車視像裝置是在車尾裝設攝影機以拍攝車尾情況的閉路電視系統，而用以展示有關影像的顯示屏，一般安裝於司機前面。

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

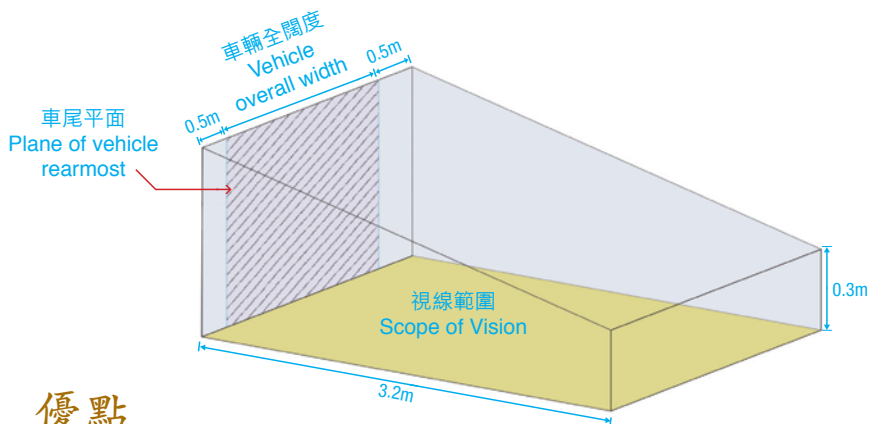
Performance Requirements of RVD

考慮到市面供應的倒車視像裝置的款式、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應符合下列性能要求：

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

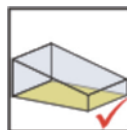
Having considered the range of available reversing video devices in the market, structures of different goods vehicles, the local environment and overseas experience, the recommended performance requirements of an effective RVD are as follows:

- 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。
- 如倒車視像裝置發生故障，司機可馬上知悉，因為顯示屏不會顯示任何影像。

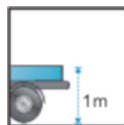


Advantages

- 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

- 性能是否良好，與安裝高度和攝影機鏡頭的角度有很大關係。攝影機的安裝位置越低，其橫向角度便須越廣。
- 在四周昏暗的環境下，必須有輔助照明，才可攝得可靠的影像。
- 攝影機上的灰塵和雨點或會影響所拍攝影像的質素。



Limitations

- The performance depends very much on installation heights and scope of vision of the camera. The lower the installation point of the camera, the wider the horizontal angle of camera is required.
- 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

■ 適用的車身類型 Suitable Body Types

由於市面上已有橫向視線角度達170度或以上的廣角攝影機，凡可在離地1米或以上位置安裝攝影機的車輛，均可安裝倒車視像裝置。該等車輛包括大部分重型、中型和輕型貨車。

With the availability of wide-angle camera of horizontal vision 170° or more, installation of RVD has become feasible for vehicles which provide a camera mounting point at 1 m or higher above ground. That includes most heavy, medium and light goods vehicle types.

■ 閉路電視系統 The CCTV system

市面上多款閉路電視系統都能達到建議的性能要求。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) 廣角攝影機，例如符合下述規格者：

- 橫向視線範圍一般由90度至170度不等，視乎安裝高度和所需的影像清晰度而定；以及
- 縱向視線範圍達80度或以上。

a wide angle camera of, e.g.:

- horizontal scope of vision ranges from 90° to ~170°, is usually adopted to suit different mounting heights and image clarity required and;
- vertical scope of vision 80° or more.

(b) 對角尺寸達130毫米或以上的顯示屏。

a monitor screen with diagonal size of 130 mm or more.

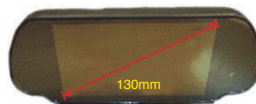
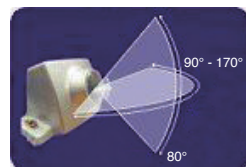
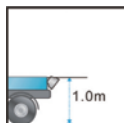
■ 安裝高度 Installation height

如能在車尾離地1.0米或以上的位置安裝攝影機，應可在市面上購得具備適當廣角鏡頭攝影機的閉路電視系統，及不難符合上述性能要求。如安裝的位置較高，或可使用鏡頭角度較窄的攝影機。

If the camera can be installed on the vehicle rearmost at a height of 1.0 m or higher above ground, CCTV with suitable wide-angle camera would likely be available in the market and be able to achieve the above performance requirements with no major difficulties. If the mounting height is higher, cameras with lens of narrower angles may be used.

■ 其他建議的安裝規定載列於附錄。

Other 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。
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展現在顯示屏上，並具足夠的清晰度。若車輛並非正在倒車或準備倒車，顯示屏應保持關閉。
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時刻顯示車尾邊緣，以確保完全拍攝到及在顯示屏上展現建議視線範圍內的情況。

攝影機

5. 閉路電視攝影機應穩妥地安裝在車尾，使攝影機鏡頭的方向在正常駕駛情況下不會受到影響。我們建議把攝影機安裝在車尾的外壁上。
6. 如有需要及可行的話，可使用合適的托架。
7. 攝影機應該防水及防塵。

顯示屏

8. 顯示屏應安裝在駕駛室內司機於駕駛時容易看見的位置(通常在一米範圍內)，但不應妨礙司機察看一般路面情況。
9. 安裝位置一般在車內倒後鏡附近，以便展示視線範圍的反方向影像，情況猶如以倒後鏡觀看。
10. 顯示屏的對角尺寸不應少於 130 毫米。
11. 顯示屏應妥為安裝，而其性能亦應不受一般駕駛情況及環境(例如震盪和被太陽的眩光照射)影響。顯示屏的邊緣應呈圓角(例如半徑不少於 2.5 毫米)，而堅硬的部分則應以防撞物料(例如 25 毫米厚及堅硬程度不高於 60 Shore A 的物料)包裹。
12. 顯示屏的亮度應能自動調校至與車外的光暗情況融合，利便清楚看見影像。因此，我們建議，顯示屏在不同光線情況下應有足夠的對比度(例如 ISO 15008:2003 所指明者)。
13. 顯示屏在用電及磁性上應可配合及不會干擾車內其他設備。

附註

14. 在光線昏暗的環境(例如停車場內或夜間的郊區)中，攝影機未必能在沒有外來光線的情況下可靠地偵測影像。因此，應安裝符合以下規格的倒車燈 —
 - 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
 - 能隨倒車警號自動亮着。



Recommended requirements for installing Reversing Video Devices

General

1. The RVD/CCTV system should be turned on automatically when the vehicle is reversing or about to reverse.
2. The images within the space to be monitored (scope of vision) should be totally displayed on the monitor screen with adequate clarity automatically when the vehicle is reversing or about to reverse, and should be turned off otherwise.
3. All wiring and conduits should 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 should 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 should be water and dust proofing.

Monitor

8. The monitor should be installed in the driver's cabinet at a position easily visible to the driver in driving position (usually within 1m), but should 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 rearview mirror.
10. The monitor diagonal size should be no less than 130 mm.
11. The monitor should be securely mounted, and its performance should not be affected by the usual driving conditions and environment, such as vibration and sun glare. Edges should be rounded (e.g. minimum 2.5 mm radius), and hard objects should be covered with impact absorption material (e.g. 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. An adequate contrast under various light conditions (e.g. as specified under ISO 15008:2003) is recommended.
13. The monitor should be electrically and magnetically compatible with and should 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.