



Transport &
Infrastructure



Specifications for Taxi Security Systems

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INTRODUCTION

In consultation with the taxi industry and camera suppliers, the NSW Government has reviewed all NSW taxi security system specifications and combined them into one document. This document contains the updated security system specifications required for taxis to operate in NSW.

An approved duress alarm system, an approved vehicle tracking device or an approved security camera system installed on or after the 1st July, 2010, in a taxi-cab as provided for in clauses 3, 112, 113 and 114 of the Passenger Transport Regulation 2007, is one that complies, respectively, with the relevant requirements set out in this Order. For the purposes of this paragraph, "installed" means a system or device installed for the first time on or after the 1st July, 2010, in a vehicle used, or to be used, as a taxi-cab and includes a system or device referred to above that is re-installed in or transferred to another taxi-cab or vehicle that is to be used as a taxi-cab.

Notwithstanding the implementation requirements in the paragraph above, any security camera system installed or reinstalled in or transferred to a taxi-cab or vehicle that is to be used as a taxi-cab before the 1st July, 2010, is required to comply with the relevant requirements of this Order on or before the 1st July, 2015.

NSW Transport and Infrastructure through the use of Authorised Taxi Inspections Stations (ATISs), regulates compliance with these specifications.

CAMERA SYSTEM

Camera System Construction

1. The internal camera head(s) shall not have any sharp edges and shall be positioned such that passengers or drivers cannot come into contact with the housings during normal operations.
2. The main housing of the camera system shall be indelibly inscribed or imprinted with a unique serial number and the year of its manufacture.
3. The camera system shall have a real time clock function which is able to be

synchronised with a GPS derived time stamp message.

4. The camera shall time tag all images with UTC, or RTC when no GPS signal is available.
5. The camera system shall either have an in-built GPS receiver, or a serial port for acceptance of NMEA defined GGA and RMC sentence reports.

System Environmental Requirements

6. The camera system shall function over a temperature range of -5°C to +60°C at 0 to 85% relative humidity non-condensing.
7. The camera system shall conform to the following relevant EMC standards
 - a) AS/NZS CISPR 25:2008
 - b) ISO 10605:2001
 - c) ISO 7637-2:2004
8. Images from the camera system shall be capable of being recovered following submersion in 5% saline water at a depth of 6 metres for a minimum period of 72 hours.
9. Images from the camera system shall be capable of being recovered following 5 minutes exposure of the DRU unit within a furnace operating at 538 °C.
10. The camera system shall be impact and shock resistant, sufficient to withstand a typical car accident and withstand the regular vibration expected to be experienced by a taxi.
11. Images from the camera system shall be capable of being recovered following loss of power from the vehicle electrical system.

System Power

12. The camera system shall be powered and fully operational whenever the vehicle is being hired or available for hire.
13. The camera system shall not include a switch, plug, fuse or any other device in the cabin of the taxi, that would allow the system to be turned off or in any way disabled by a driver or passenger.
14. The boot time for the camera system to operating mode from a powered off mode shall be no more than 30 seconds.

15. The time for a camera to attain operating mode from power save mode shall be no more than 3 seconds.
16. The camera system shall be able to maintain operating mode without interrupting continuous image capture, with an input voltage range of 8 volts DC up to 16 volts DC, and shall be protected against reverse voltage, short circuits, and high voltage transients likely to be encountered in the vehicle's electrical system.
17. The camera system may enter a power save mode if no door, ignition or meter activity is sensed in a period of 30 minutes. During a power save mode, no images are taken, but all trigger events shall be monitored. If any trigger event occurs, the camera system shall be fully operational within 3 seconds.
25. The internal camera head(s) shall be fitted such that a clear and unobstructed view is available of the taxi driver and the head and shoulders of a passenger in any seating position.
26. Two externally mounted camera heads shall separately provide a view of any person approaching between 300mm and 5m distant from both the driver's and front passenger's window within an angle of approach of 120° from the centre of the door.
27. All camera heads shall be mounted in such a manner so as to readily prevent misalignment of the field of view, except in the case of a vehicle accident or other severe impact.
28. The field of view of any camera head shall not be obscured, or be capable of being obscured either permanently or temporarily, by any sun visor, wind shield or any other fitting or equipment installed inside or outside the vehicle.

Interface Requirements

18. The camera system alarm and tracking system alarm shall use common alarm switches such that operation of either switch will initiate alarm processes in both camera and tracking systems.
19. The camera system shall have necessary vehicle interfaces to sense a door open including any passenger entry door, driver door, sliding door, boot or tailgate.
20. The presence or absence of a lamp bulb, and the state of any manual lighting control for the illumination of the cabin, must have no effect on the operation of the camera system.
21. The camera system shall detect the ignition and meter "on" and "off" states.

Installation

22. The installation of the taxi camera system shall not affect the compliance with all relevant requirements of the Road Transport (Vehicle Registration) Regulation 1998 and the Australian Design Rules.
23. The camera system components shall be installed in such a manner that the entire system is resistant to vandalism and/or degradation of the recorded image through intentional or accidental damage.
24. The internal camera head(s) shall be readily visible to passengers in the vehicle.

Camera System Operational Indicators

29. When the camera system is operating in conjunction with the alarm there must be no overt indication given to any passenger that the alarm has been activated.
30. The driver shall have a visual indicator showing when the system is operational and when there is a malfunction. This indicator shall incorporate the following features:
 - a) Normal display state – green LED and red LED not illuminated unless valid image capture in progress.
 - b) Valid image capture – green LED flashing with 250 ms duration.
 - c) All alarm memories locked – alternating red and green LED flashing not greater than 500 ms duration for each colour.
 - d) Camera system fault – green off, red LED flashing once per second with 250 ms duration.
31. The visual indicator shall not be used for any other purpose.

Image Recording Events

32. The camera system shall have provision to store at least 120,000 images or, if using a continuous recording system, shall be able

to record non-stop, and store images for at least 168 hours.

33. The recording system shall be configured for event based recording using triggers from the taxi, unless a continuous recording system is used where the same outcome from a trigger based system must be achieved.
34. Every camera head must be capable of taking an image within 1 second at the same time, or in a sequence not exceeding the combined time of 1 second.
35. The camera system shall take at least 1 image (non-trigger) every 10 seconds whilst not in power save mode.
36. The camera system shall retain in memory any pre-trigger images captured within a period of 10 seconds before any trigger.
37. The camera system shall retain in memory images taken in the following specified time period, from each trigger type and each camera head fitted, at a frame rate of at least 1 image per second:
 - a) Door open – 20 seconds
 - b) Meter on – 1 second and then every 10 seconds thereafter whilst engaged.
 - c) Meter off – 20 seconds
 - d) Ignition on – 20 seconds
 - e) Ignition off – 20 seconds
 - f) Alarm on – 20 minutes
38. The alarm trigger shall be given priority over all other triggers.
39. Where sequential events cause overlap or contention of image capture requirements, such as “door open” event followed by “meter on” event prior to the door event capture sequence being completed, the image recording specifications of the later event shall override the earlier event, and the uncompleted image count from the earlier event can be disregarded.
40. Pre-trigger image capture shall not apply to the images resulting from a trigger which restores normal operation after power save mode.
41. Memory for image storage shall be logically partitioned such that the oldest images shall be overwritten first.
42. No part of the memory shall be overwritten unless it is necessary to make provision for an impending image storage action.

43. When an alarm trigger occurs, the images shall be locked in memory. In addition, all images in memory captured 1 hour prior to the alarm trigger shall be included in the memory lock.
44. Five (and no more than 5) locked memory partitions shall be provided before the camera system indication depicts the “all alarm memories locked” state (see *paragraph 30 (c) above*).

Image Appearance

45. The minimum number of internal camera heads shall be that required to comply with Australian Standard AS4806.2 for facial identification of the driver and all passengers in the taxi.
46. The stored image from all internal heads shall record a minimum of 360 pixels per metre both horizontally and vertically for any seated passenger or driver.
47. The stored image from the external camera heads shall record a minimum of 360 pixels per metre both horizontally and vertically of a person standing 1m from the driver’s or front seat passenger’s window.
48. The camera system shall store images with a minimum of 256 greyscale levels.
49. The camera system shall capture and store monochrome images in memory. The use of colour image devices is permitted, subject to the camera providing an equivalent image resolution and quality to that of a monochrome camera in both normal daylight and night time infrared supported conditions.
50. The resolution and clarity of the recorded image from the camera(s) shall be maintained under all lighting conditions from darkness (no light in the visible spectrum) through to bright sunlight.
51. Imaging techniques and focal attributes shall be optimised for use with infrared light.
52. The camera lenses shall have an auto iris or electronic iris facility such that image clarity is not adversely affected by light fluctuations.
53. The images shall be in focus at any distance from the lens between 300 mm and 3m for internal camera head(s) and 300 mm to 5m for the external camera heads.

54. All images shall have imprinted on them the following image metadata:
- a) Vehicle Registration Number
 - b) Date and time in UTC within 1 second
 - c) The event which triggered the image capture
 - d) The location in coordinates of latitude and longitude accurate to within 10m 95% of the time.
55. The images stored shall be stored within the camera system on a non volatile media of robust construction. Where a compact flash storage device is used, it must be of an industrial quality.
56. Camera system image information shall be stored such that any generic business or home computer using generic picture viewing or editing software cannot extract, copy or display images stored by the camera or the files downloaded from the camera.

Camera System Self Test and Alarms

57. The camera system shall employ a self test methodology to automatically detect and report functional faults, which must include a test for lack of image from any camera head due to external interference or obstruction.
58. Any camera fault shall be displayed by the red LED as prescribed in the camera system operational indicators section (see *Paragraph 30 (d) above*).

VEHICLE TRACKING DEVICE AND DURESS ALARM SYSTEM

Scope

The vehicle tracking device and duress alarm system have the purpose of alerting and providing a network with the position, speed, direction of travel and identification of a taxi anywhere in its licensed area of operation.

Vehicle Tracking

59. The vehicle tracking device system, if required to be fitted, shall operate in conjunction with the duress alarm system, and may use the same GPS system used by the taxi security camera.
60. Upon actuation of either alarm button by the driver, the vehicle position report must be

transmitted to the taxi network at the highest priority transmission. On receipt of a vehicle position report the tracking device shall identify the duress alarm as a priority over any other transmission traffic calls and issue a persistent audible and visual alarm until acknowledged by a network operator.

61. The vehicle position report update must be re-sent every 5 seconds or less, or until the taxi alarm is negated.
62. The vehicle position report must include the vehicle's registration number, its position, speed, direction of travel, and the time each report is sent.
63. A "listen in" period shall allow sound from within the taxi to be monitored by the network operator. At the end of the listen in period, the vehicle position report shall resume being sent at least every 5 seconds.
64. The vehicle position report shall use current GPS positioning data each time it is sent.
65. The vehicle tracking device system must also be capable of sending a vehicle position report from any taxi irrespective of the taxi duress alarm status.
66. The speed is to be provided in kilometres per hour and is to be accurate within 10 kilometres per hour, in 95% of instances.
67. The heading shall be expressed in degrees clockwise from true North and for a vehicle moving at greater than 5 km/h, the accuracy shall be within 10 degrees, in 95% of instances.

Duress Alarm

68. The debounce period for the activation of the tracking system and camera system alarm shall be the same, and be 1 second \pm 10%. It is acceptable practice for the alarm to be wired to one device only, if that device then forwards the alarm condition to the other device.
69. Two alarm switches shall be provided, each with identical function, one dashboard mounted and the other floor mounted.
70. The dashboard alarm switch shall be located to the right of the steering column in a position which is not in the direct vision of any passenger.
71. The floor alarm switch shall be located on the left side of the driver's foot well

Definitions

The following terms used in this document have the meaning given below:

Term	Definition
Camera Head	The imaging device (containing a lens) which is mounted inside or outside the taxi, and is connected to the main camera system.
Camera System	A collective definition for camera heads, camera consoles and all the components, assemblies, cables and interfaces that make up a taxi security camera system.
Camera System Modes	Camera System shall have three operating modes: 1. Powered off mode. This is where the camera system has no power and needs to boot when power is first connected to become operational. 2. Operating mode. This is where the camera system is operating normally and is capturing images that meet image quality requirements at the prescribed image capture rate. 3. Power save mode. This is where all camera system functions have temporarily shut down except for monitoring the door sensors, meter and ignition.
DRU	Digital Recording Unit, used to record and retain images.
EMC	Electromagnetic conformance - standards associated with the emission of undesired radio frequency energy by devices and the level of susceptibility of a device to similar energy.
Debounce Time	The amount of time a button such as the alarm button must be pressed and held before the alarm is considered to be triggered.
GGA and RMC sentence reports	Commonly supported NMEA messages being GGA for GPS position, time and fix, and RMC for transit specific output.
GPS Receiver	Global Positioning System receiver. This specification uses this term as a receiving device which reports position, speed, heading, and time in UTC.
HDD	A hard disk drive as used in a computer for file storage.
J-Peg	An image file compression format adopted by ISO 10918-1. Metadata may be included in the file header.
LED	Light emitting diode used for indication. In this specification any equivalent device of suitable colour can be used for this function.
LED Flash	A illumination burst from an LED of not less than $\frac{1}{4}$ second and not more than $\frac{1}{2}$ second duration.
Listen Period	The period of time that an open radio channel to the taxi network control centre is provided, for transmission of audible sounds from a covert microphone located in the cabin of a taxi, following the activation of the vehicle duress alarm
NMEA	A United States based marine communications body, and a de-facto standard for GPS devices to communicate with other devices.
MDT	Mobile Data Terminal, is a computerised device used to communicate with a central dispatch office.
Memory	In this specification the term memory refers explicitly to the media used to store images within the camera system.
Memory Lock	Following alarm activation a portion of the memory containing images from the most recent trip are "locked" and as such these images cannot be overwritten by

	normal taxi operation.
Meta Data	In this specification, the meta data is an information header attached to each image, and contains vital information relevant to the image such as taxi ID, trigger tag, time and other details.
Monochrome	This term describes an image which contains pixel illumination information only. This represents black and white or varying shades of grey with no colour information.
Network	An organisation as defined in section 29A of the Passenger Transport Act 1990, but in the case of a taxi's licensed area of operation within which there is no authorised network, means the accredited operator of the taxi concerned, or his agent.
Open Collector NPN Transistor Junction	A commonly used method used to indicate the means of interfacing logical signal or equipment state to be transmitted from one piece of equipment to another. This is an output device specification suitable for low voltage, low current switching applications.
Pixel	The smallest component of an image, generally represented by a small dot or square which has properties of illumination (brightness) and optionally colour.
RTC	Real Time Clock
TIFF	An image file format owned by Adobe Systems. It can contain a variety of image content, including compressed or uncompressed image data. Metadata may be included in the file header.
Trigger	An "on-off" type of input to a camera sensor for the purposes of triggering an image capture. Typical trigger inputs are door open, meter on and alarm pressed.
UTC	The time reference used by GPS receivers. This time relates almost precisely to Greenwich Mean Time. Cameras will store time in UTC.
Vehicle Position Report	A packet of data transmitted from the taxi-cab and received at the taxi network that must include the vehicle's registration number, its position, speed, direction of travel, and the time it provides those reports.