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PSV Condition 2010



# PSV Fleet Condition Check 2010

Final Report

In House Analytical  
Consultancy

March 2011

Department for  
**Transport**

The logo for GORS (Government Operational Research Service) features the acronym 'GORS' in a bold, blue, sans-serif font, enclosed within a blue oval shape. Below the oval, the full name 'GOVERNMENT OPERATIONAL RESEARCH SERVICE' is written in a smaller, blue, sans-serif font.

GOVERNMENT OPERATIONAL RESEARCH SERVICE

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## Chapter 1: Management Summary

### 1.1 Introduction

The aim of the 2010 PSV Fleet Condition Check (FCC) was to determine the level of roadworthiness defects in the GB PSV Fleet. It was the 11<sup>th</sup> such survey carried out; the last was undertaken in 2008.

The In House Analytical Consultancy (IHAC) within the Department for Transport (DfT) developed the methodology, designed and planned the survey and analysed the results of the checks.

The Vehicle and Operator Services Agency (VOSA) carried out the survey of buses and coaches (PSVs) between September and December 2010.

VOSA vehicle examiners carried out the PSV checks at randomly selected operators' premises; recorded basic details of the vehicles checked on paper and entered other check data into the electronic Mobile Compliance System. This report contains the analysis of that data.

### 1.2 PSV Condition

Of the 1,499 PSV checks carried out, 1,450 could be matched to electronic records<sup>1</sup> and analysed. Of these:

- 67.0% had no defects
- 6.9% had prohibitable defects
  - 3.4% immediate prohibition
  - 3.5% delayed prohibition
- 26.1% received an inspection notice

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<sup>1</sup> Electronic check data recorded in the Mobile Compliance system.

The confidence intervals on the prohibition rate show that the true rate of prohibitions lies between 5.6% and 8.2% (i.e. 6.9% +/- 1.3%)<sup>2</sup>.

Comparing the 2010 defect rates with all previous years, no significant trends were found. However, the proportion of vehicles with prohibitable defects in 2010 (6.9%) was significantly lower than in 2008 (9.0%).

Faults on 'Seatbelts' were the most common prohibitable defects detected, accounting for 16.1% of all prohibitions.

The main factors affecting vehicle condition were age and operator location. Older vehicles were more likely to have prohibitable defects, as were vehicles based in North Scotland. Vehicles based in Merseyside and Cheshire were less likely to have prohibitable defects.

The prohibition rate was affected by the survey containing a higher proportion of older vehicles than the underlying PSV fleet<sup>3</sup>. If this effect were removed, then the prohibition rate would drop from 6.9% to 6.0%.

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<sup>2</sup> At the 95% confidence level.

<sup>3</sup> Checks were performed on vehicles that were in the operator's premises. It is likely that vehicles left in the operator's premises and hence more likely to be checked were older vehicles.

## Chapter 2: Introduction

### 2.1 Background

The 2010 PSV Fleet Condition Check is the 11th such check that VOSA has carried out. Checks have been carried out annually since 1997 (except 2006 and 2007) and biennial since 2008. The checks are carried out to determine the level of roadworthiness across the GB PSV Fleet.

VOSA's three main objectives from the check are:

- To determine trends in roadworthiness to examine the effects of changes in legislation;
- To examine the effectiveness of VOSA's targeted enforcement operations;
- To discover potential areas for targeting.

In total, 1,499 PSV checks were performed. Of those, 1,450 were matched to data captured in the mobile compliance system and analysed.

### 2.2 Methodology

The In House Analytical Consultancy (IHAC) within the Department for Transport (DfT) developed the methodology, designed and planned the survey and analysed the results of the checks.

The checks were performed at operators' premises rather than at the roadside, due to the impracticality of stopping and checking in-service vehicles full of passengers.

It was not possible to check compliance with traffic regulations during these

checks; these are performed as part of another survey.

The list of operators whose vehicles were to be checked was randomly generated in order to provide a representative mix of vehicles from large and small operators.

Basic vehicle details were recorded on paper forms, whilst all other details were recorded in the Mobile Compliance System. The data from the paper forms was then matched to the mobile compliance records.

### 2.3 Definitions

#### *Defects*

Roadworthiness defects fall into three categories:

- Immediate Prohibition – issued when any of the defects are such that further driving would involve a risk of injury to a person;
- Delayed Prohibition – issued where defects render the PSV either unfit, or likely to become unfit, for use, but pose no immediate risk of injury. Delayed prohibitions come into effect not later than ten days from the date of inspection;
- Vehicle Inspection Notice – issued where advisory items or minor defects are found which are not serious enough to warrant prohibition. The notice is advisory only, and does not in itself prevent further use of the PSV.

When a prohibition rate is stated, this is immediate and delayed prohibitions combined.

Where no defects are found, a 'clear' Vehicle Inspection Notice is often issued, but these are not included in this report.

### ***Cherished Registration Numbers***

If a PSV's recorded year of first manufacture did not match the vehicle age given by the VRM, they were considered to have a British cherished plate.

PSVs were considered to have a Northern Ireland cherished plate if the vehicle age could not be detected from their vehicle registration mark (VRM).

## **2.4 Accuracy**

### ***Inspection type***

In all cases, Vehicle Examiners were asked to carry out the fullest possible inspection. It should be borne in mind that the different inspection types could influence the results.

### ***Significance***

Each of the headline statistics that is quoted in this report has an associated uncertainty. That uncertainty is unavoidable and arises from the random sampling techniques that were used to carry out the survey. This report expresses that uncertainty in terms of two parameters: an accuracy level, plus a corresponding level of confidence.

Wherever a difference is described as being 'statistically significant', this means that it can be said with 95% confidence

that the difference was not due to random sampling factors (i.e. the chance that the observed difference is not due to real, underlying difference is less than one in twenty). Details on the accuracy of the results can be found in Annex B.

It is possible that differences may be large and yet not significant; this is due to sample sizes. Small samples can have large differences without being statistically significant.

### ***Sampling method***

The 2010 sample checked a higher proportion of vehicles belonging to single-vehicle operators than the national PSV fleet, and several of the age categories were over- or under-sampled. Chapter 4 discusses the effects of this.

It should be borne in mind that the checks were performed on vehicles that were in the operator's premises. It is possible that operators with multiple vehicles would use their newest vehicles more regularly. This would mean that those vehicles left in the operator's premises and hence more likely to be checked were older and less likely to be compliant. If this were true, the defect rates mentioned in this report may overestimate those in the overall PSV fleet. It is thought that this might account for some of the over-sampling of older vehicles.

## Chapter 3: Results

### 3.1 Main Results

This chapter gives the results of the PSV condition check by most severe defect and prohibitable defects, and a yearly comparison. Detailed tables of the results are given in Annex D.

#### Defect Rates

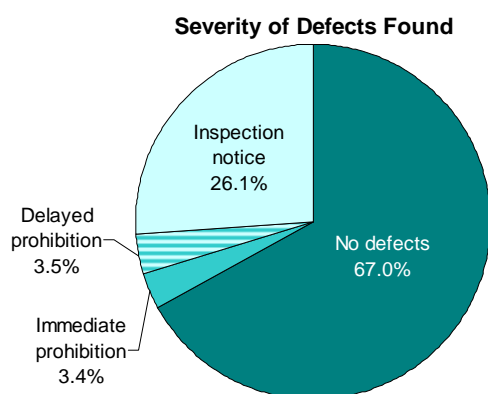
1,499 PSVs were examined in the 2010 survey. Details for 49 could not be found in the Mobile Compliance System, which meant 1,450 vehicle checks were analysed.

6.9% (100) of these PSVs had at least one prohibitable defect; 3.4% (49 vehicles) were issued with an immediate prohibition, 3.5% (51 vehicles) were issued with a delayed prohibition<sup>4</sup>.

26.1% of vehicles received an inspection notice<sup>5</sup>, and 67.0% had no defects – illustrated in the chart below.

#### Key findings

- 6.9% of vehicles were issued with prohibitions (3.4% immediate, 3.5% delayed) - significantly fewer than in 2008 (9.0%)
- 26.1% received an inspection notice.
- 67.0% had no roadworthiness defects
- Faults on ‘Seatbelts’ were the most common prohibitable defects found, accounting for 16.1% of all prohibitions
- The main factors influencing defect rate were:
  - Age (older vehicles tended to have more prohibitions)
  - Location (North Scotland had more defects, and Merseyside and Cheshire had fewer)



<sup>4</sup> Vehicles with both an immediate and delayed prohibitable defect are issued with an immediate prohibition (most severe). There were 5 such vehicles in the 2010 analysis.

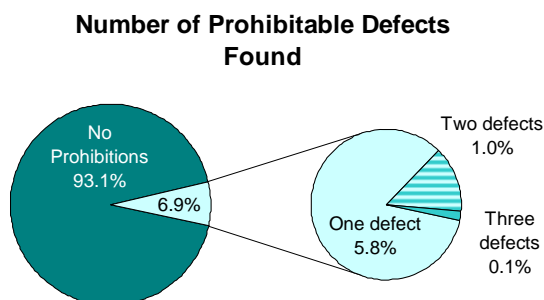
<sup>5</sup> Vehicles with both a prohibitable and an inspection notice defect are classified as receiving a prohibition. There were 43 such vehicles.

We would expect that 6.9% of the national PSV fleet to have at least one prohibitable defect, and can be 95% confident that this figure will be between 5.6% and 8.2%.

**Number of Prohibitable Defects**

118 prohibitable defects (immediate or delayed) were found across 100 vehicles. The chart below shows the number of prohibitable defects per vehicle.

6.9% of vehicles (100) had a prohibitable defect. Of these, 5.8% (84 vehicles) had one defect, 1.0% (14 vehicles) had two defects and 0.1% (2 vehicles) had three.



53 immediate prohibitable defects were found on 49 vehicles; 45 vehicles had one defect and four vehicles had two.

**Type of Prohibitable Defects**

Annex D contains a full list of the categories of prohibitable defects found on vehicles. The top five categories accounted for over half of the total prohibitions (immediate and delayed):

- Seatbelts (19 defects, 16.1% of total prohibitable defects)
- Brake Systems & Components (14 defects, 11.9% of total)
- Passenger Doors, Driver Doors & Emergency Exits (13 defects, 11.0% of total)

- Suspension (11 defects, 9.3% of total)
- Condition of Tyres (11 defects, 9.3% of total)

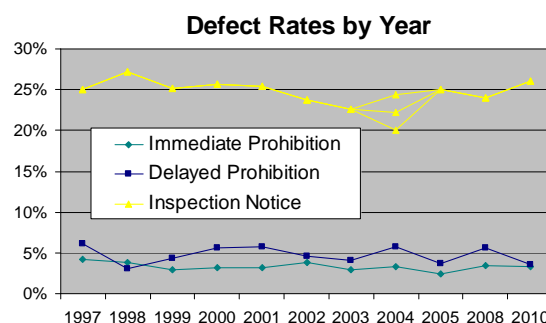
Two categories accounted for over a third of the immediate prohibitions:

- Passenger Doors, Driver Doors & Emergency Exits (11 defects, 20.8% of all immediate defects)
- Interior of Body, Passenger Entrance, Exit Steps & Platforms (8 defects, 15.1% of all immediate defects)

In 2008, the most common defect was Brake Systems & Components (second most common this year), and again the most common immediate defect was Passenger Doors, Driver Doors and Emergency Exits.

**3.2 Year on Year Comparison**

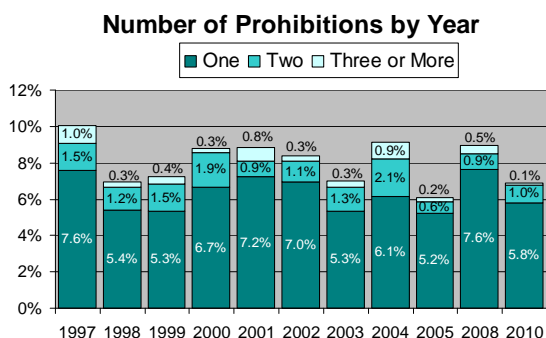
Comparing the 2010 defect rates with all previous years, no significant trends were found.



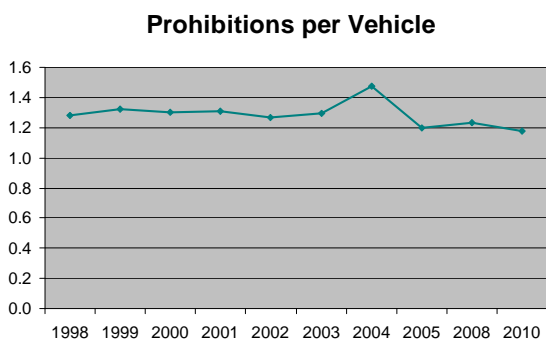
The chart above compares defect rates for PSV checks over the years. For 58 vehicles in the 2004 check it was not possible to determine whether an inspection notice had been given, hence three possible scenarios have been provided.

The proportion of vehicles with prohibitable defects is significantly lower than in 2008, with 6.9% having prohibitable defects in 2010, compared with 9.0% in 2008.

The chart below shows the proportion of checks with one, two and three or more prohibitable defects over the years.



There have been no significant changes in the average number of defects per prohibited vehicle over the years. The graph below shows the trend since 1998<sup>6</sup>.



### 3.3 Significant Factors Predicting Prohibitable Defects

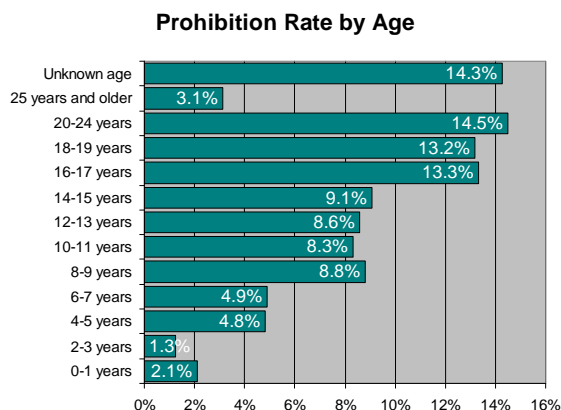
When all check and vehicle details were analysed together, vehicle age and VOSA area were significant factors influencing prohibitable defects. Listed below in decreasing order of significance are the significant variables that affected

<sup>6</sup> Whilst the graph shows a peak for 2004, this was not statistically significant.

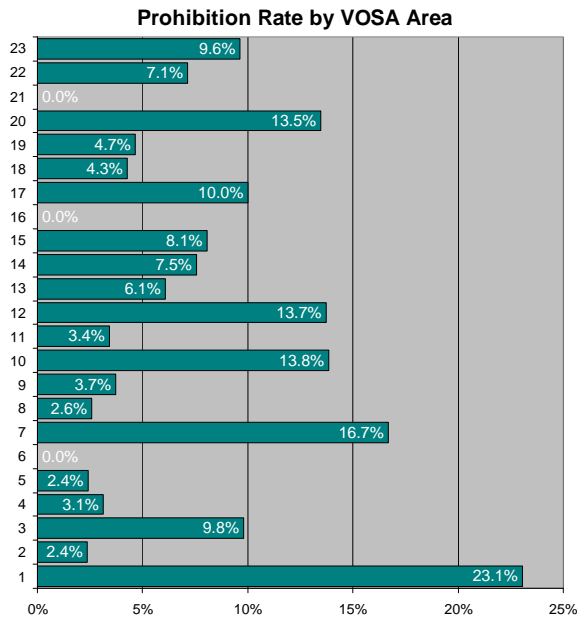
prohibitable defects. Together these variables formed the best model for predicting the prohibition outcome of a vehicle check.

- **Age: 2-3 years.** Vehicles of this age were less likely to have prohibitable defects than others.
- **Area 1: North Scotland.** Higher prohibition rate for vehicles checked in this area than others.
- **Area 6: Merseyside & Cheshire.** Lower prohibition rate for vehicles checked in this area than others.
- **Age.** An underlying trend that older vehicles were more likely to have prohibitable defects, even after the effect of vehicles aged 2-3 years was accounted for.
- **Age: 25+ years<sup>7</sup>.** Vehicles aged 25 years or older had proportionally fewer defects than expected, given their age.

The graphs below show the defect rates split by vehicle area and age<sup>7</sup>.



<sup>7</sup> The most common prohibitable defect category was Seatbelts. Some vehicles aged 22 years old or over are subject to different seatbelt requirements. Seat belts are required to be fitted to: driver's and specified front passenger seat on minibuses first used before 1 October 1988, with not more than 12 passenger seats; all front seats on minibuses first used on or after 1 October 1988, with up to and including 16 passenger seats and not exceeding 3500Kg design gross weight; forward facing exposed seats on coaches first used on or after 1 October 1988; all seats in buses, coaches and minibuses first used from 1 October 2001 which are not authorised to carry standing passengers. Large buses, except coaches, are not required to be fitted with belts.



### 3.3.1 Individual Factors

The analysis above considers all factors together. The table below shows the results of looking at each factor in turn, and testing to see if it was linked to prohibitable defects.

Note that the variables in this section are related, but this is not taken into account in the table.

| Factor            | Significantly more prohibitions   | Significantly fewer prohibitions                                |
|-------------------|---|---|
| Age Category      | 20 -24 years  | 0 -1 year<br>2 -3 years   |
| Traffic Area      |   | North Western<br>Eastern  |
| VOSA Area         | Area 1: North Scotland<br>Area 7: Staffordshire & Shropshire<br>Area 10: Bristol & Gloucester | Area 6: Merseyside & Cheshire<br>Area 16: Hertfordshire & Essex |
| Vehicle Type      |   | Double Deck Bus   |
| Registration Type | Northern Irish<br>Cherished   | Normal  |

The following factors were not significant in predicting prohibitable defects:

- Size of operator’s fleet
- Type of inspection

## Chapter 4: Sample Analysis

A random sample of PSV operators was selected in order to estimate the overall compliance of the national PSV fleet.

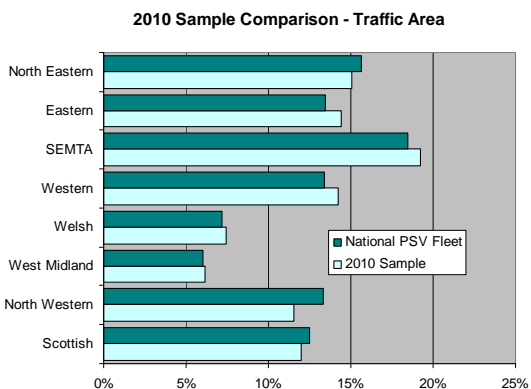
The sample of 1,450 vehicles was investigated to check how representative it was of the national PSV fleet.

### 4.1 Traffic Area

The total number of discs registered to operators licensed in each Traffic Area was used to determine the national fleet by area.

The sample was not significantly different from the national PSV fleet, as no Traffic Area was either over- or under- sampled.

The graph below compares the sample and the national PSV fleet by Traffic Area.



### 4.2 VOSA Area

Similar to Traffic Area, the sample was not significantly different from the distribution of the national PSV fleet across VOSA areas.

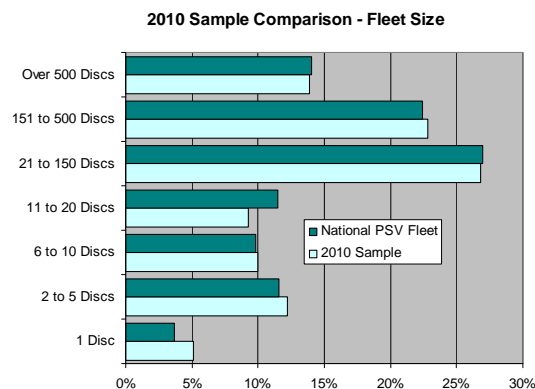
### 4.3 Fleet Size

The size of the operator’s fleet was known for all but one of the vehicles checked. The unknown vehicle was excluded from the sample comparison.

One significant difference was found between the sample and the national fleet; single-vehicle operators were a higher proportion of the sample than would be expected.

If the effect of over-sampling single-vehicle operators were removed, the overall prohibition rate would increase from 6.9% to 7.0% and the immediate prohibition rate would increase from 3.4% to 3.5%.

The graph below compares the sample and the national PSV fleet by fleet size.



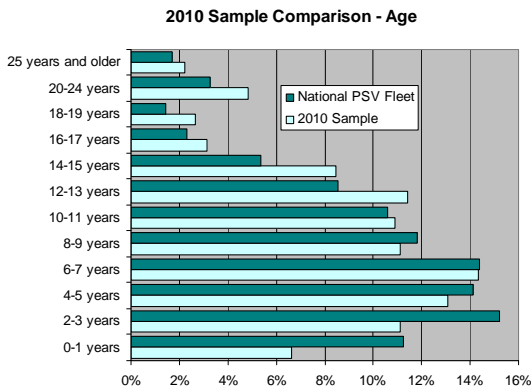
### 4.4 Age

The age of 1,429 vehicles in the sample was known; these vehicles were compared with the national PSV fleet. The age profile of the national fleet was taken from taxed PSVs.

There were significant differences between the age profile of the sample and the national PSV fleet, namely under-sampling younger vehicles and over-sampling older vehicles.

The sample contained significantly fewer vehicles aged 0-3 years and significantly more vehicles aged 12-15 years and 18-24 years than would be expected<sup>8</sup>.

The graph below compares the sample and the national PSV fleet by age group.



As older vehicles were more likely to have prohibitable defects, if the effect of over-sampling older vehicles was removed, the overall prohibition rate would drop to 6.0%, and the immediate prohibition rate from 3.4% to 3.0%.

<sup>8</sup> Checks were performed on vehicles that were in the operator's premises. It is likely that vehicles left in the operator's premises and hence more likely to be checked were older vehicles.