



EUROPEAN SECURITY
Vauxhall Zafira smart key evaluation
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SAMPLE



The Author(s)
Matthew Rhodes

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Overview

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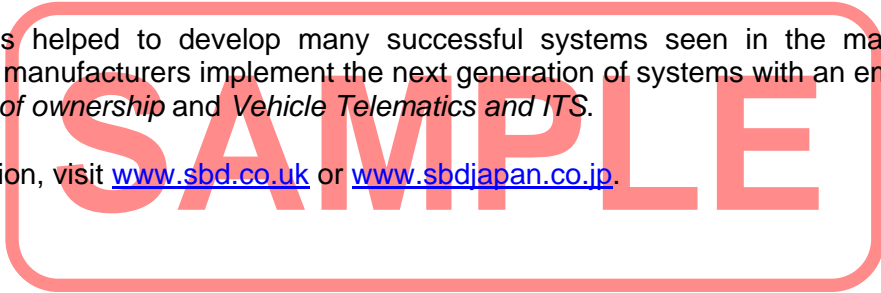
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- Strategic Planning**
- Program Management**
- Product Development.**

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The company has helped to develop many successful systems seen in the market today and is continuing to help manufacturers implement the next generation of systems with an emphasis on *Vehicle Security and cost of ownership* and *Vehicle Telematics and ITS*.

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1. Executive Summary

ヴォクスホールの Zafira は、GMの欧州車としては、スマートキーシステムを装備した最初の車であり、また接触感知ハンドルのスマートキーを採用した車としても、Cクラス初である。ヴォクスホールは、このスマートキーシステムを「オープン&スタート」と呼び、欧州向け右ハンドル、左ハンドルの Astra と Zafira のほとんどのグレードにオプション装備できるようにしている。

The Vauxhall Zafira is the first xxxxxxxx vehicle from General Motors to be equipped with a *smart key system*; it is also the first “C” segment vehicle to feature a smart key system with xxxxx xxxxxxxx xxxxxx. Vauxhall refer to the *smart key system* as “**Open&Start**” and it is available on the Astra and Zafira as an option on most grades within the RHD and LHD European markets.

1.1 Conclusion

このスマートキーシステムは、概して自然に無理なく操作でき、又顧客に高級感を感じさせることができるが、リモコンや車のバッテリー切れの場合には、このシステムの利便性と安全性に問題が生じる。

Overall the *smart key system* is xxxxxxxx to operate and offers the customer a xxxx xxxxx of xxxxxxxx xxxxxxxx. However, if the remote control or vehicle xxxxxxxx becomes xxxxxxxxxx the system’s xxxxxxxxx and xxxxxxxx are compromised.

スマートエントリー

☐ **Smart entry**

SBD believe that the combination of a xxxxx xxxxxxxx xxxxx on the handle to xxxx the vehicle and the xxxxx xxxxxxxx xxxxx of the system when xxxxxxxxx, give the customer a high perceived quality. In **normal operation** the system is well thought out and simple to use; with only a slight inconvenience in the functionality of the xxxxxxxx. xxx xxxx xxxx xx xxxxxxxx xx xxx xxxxxxxxxx xxxxx-xx xxxxxxxxxx. xxxxxx xxx xxx xxx-xx xxxxxx xxxxxxxxxx xxx xxxxxxx xxx xxxxxxx xxx xx xxx xxxxxx xxxxxxxx xxx xxxxxxxxxx xxxxxxxxxx xxxxx xxxxx xxxxx xxxxxxxxxxxxxxxx xxxxxx xxx xxxxxxxx xx xx xxxxxxxxxx xxxxxx.

スマートスタート・システム

☐ **Smart start system**

The *smart start system* is operated by a ‘start / stop’ button which gives the customer a xxxx xxxxxxxxxx image. The interior detection range of the smart start system is xxxx xxxxxxx and there is no excessive leakage outside of the vehicle that would give rise to concern. However, xxxx xxxx xxxxxx xxxxxx xxxxxx, xx xx xxx xxxx xx xxx xxxxxxxxxx xxxxxx xxxxxxxxxx. xxx xxxxxxx xx xxx xxxxxxxxxx xxx xxxxxx xxxxxx xxxxxx xxxxxxxxxx xxxxxx xxx xxxxxx xxxxx xx xxxxxx xxx xxxxxx xxxxxx xxx xxxxxxxxxx.

1.2 Summary of performance

Figure 1 below summarises the performance findings from SBD’s investigation. Both *Smart entry* and *Smart start* were judged in three main areas of Convenience, Features & Security. The evaluation is based on SBD’s experience of customer expectation, competitor systems, and vehicle security. In the area of security the vehicle was assessed against Thatcham’s smart key criteria and against additional items judged by SBD as potential security issues.

Figure 1. Summary of performance

Criteria	Smart entry	Smart start
Convenience	★★★★ Excellent	★★★ Good
Features	★★★ Good	★★ Average
Security	★★★ Good	★ Poor

Source: SBD 2007

1.3 Smart *Entry*



The Zafira's handles are supplied by xxxxxxx and unlock the vehicle by utilising a xxxxxxx xxxxx to detect when the handle is pulled. The vehicle can be locked by xxxxxxx a xxxxxxxxxxx xxxxxxx xxxx located on the outer surface of both *front door* handles. The xxxxxxx xxxxx is body coloured and is integrated seamlessly into the handle. xxxxxxx xxxxx xx xx xxxxxxx xxxxx xxxxx xxxxxxxxxx xxx xxx xxx xxxxxxxxxxxxxx xxxxx xxx xxxxxxx xxxxxxx xx xxxxx xxxxx xxxxxxxxxx, xxxxx xxxxx xx xxx xxxxxxxxxx xxxxxxxxxxx xxxxxxx.

When a handle is pulled with a valid remote control in the external smart operating range, the system always xxxxxxx xxx xxxxxxxxxx xxx xxxxx xxx xxxxx xx xxx xxxxxxx, xxxxx xx xxx xxxxxxx xx xxxxxxx xxxxxxx.

In **normal operation** the *smart entry* functionality is well thought out, xxxxx and xxxxxxxxxx to use. Distinct actions are required to xxxx and xxxxx the vehicle and this gives the user confidence in the system's xxxxxxx.

Immediately after the vehicle is locked there is a xxxx xxxxxxx xxxxxxx xx xxxxxxx xxx xxxxx xxxxxxx xx xxxxxxx. xxx xxxxx xxxxx xxxxx xx x xxxxx xxxxxxx xx xx xxxxxxx xxx xxxxx xx xxxxx xxx xxxxxxx xx xx xxxxxxxxxxx xxxxx xxxxx xxx xxxxxxx xxx xxxxxxxxxx xx x xxxxx xxxxxx.

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*The entire vehicle can be smart unlocked from the tailgate release switch but there is xx xxxxx xxxxxxx on the tailgate. If the user wishes to **smart lock** the vehicle after operating the tailgate they are required to xxxx xxxxxxx xxx xxxxxxx xxx xxxxxxx xxx xxxxx xxxxx xx x xxxxx xxxxx, which is an inconvenience.*

The vehicle has two distinct *back-up locking procedures* for vehicle battery discharged and remote control battery exhausted. The procedures are xxx xxxxxxx and are likely to xxxxx xxxxxxxxxx xxxxxxxxxx. xxx xxxxxxxxxx xxxxxxx xxxxxxxxxx xxxxx xxxxxxxxxx xxx xxxxxxxxxx xxxxxxxxxx; xx xxx xxxxxxxxxx xxxxxxxxxx xxx xxxxxxxxxx xxxxxxxxxx xxxxx xxx xxxxxxxxxx xxxxxxx xx xxxxx xx xx xxxxxxxxxx xxxxxxx.

The driver's door can be locked by rotating the mechanical key blade in the driver's door key cylinder. If the vehicle battery xx xxx xxxxxxxxxx then the door will xxxxxxxxxx xxxxxxxxxx when the handle is subsequently pulled, even if there is no valid remote control within the *exterior smart operating range*.

*In the event of a discharged **remote control** battery the mechanical key **must** be used to unlock the vehicle. SBD believe xxxxx xxx xxxxxxxxxx xxxxxxx xxxxx xxxxxxxxxx xxxxxxxxxx xx xxx xxx xxxxxxxxxx xxx xx xxxxx xxx xxxxxxxxxx. Doing so would leave the vehicle in an **unsecured** state.*

1.4 Smart Start



The inclusion of a *start / stop* button defines a significant difference in how the system operates in comparison to a non-smart key vehicle. SBD feel that the majority of customers xxxxx xxx xxxxx xx xxxxxx x xxxxx xxxxxxxx starting method; therefore increasing xxx xxxxxxxx xxxxxxxx xx xxx xxxxxxxx.

To start the Zafira the *start / stop* button must be pressed whilst the xxxxxx or xxxxx xxxxxxx is xxxxxxx and the remote control is located within the *internal smart operating range*. If the user does not xxxxx the xxxxxxx or xxxxx xxxxxxx then the system will alternate between ignition ON and ignition OFF states.

A xxxxx warning xxxxx located in the xxxxxxxx xxxxxxx flashes in conjunction with an audible tone to alert the user of a xxxxx xxxxx system fault. When an error or warning occurs there is **xx** xxxxx xxxxxxxxxxxxxx in the xxxxxxx provided by the smart start system, this xxxxxxxx could cause customer confusion.

When the user pushes the start / stop button to switch OFF the engine, the system checks the internal smart operating range for a valid remote control. If a valid remote control is xxx xxxxxxxx the system xxxxx xxx xxxxx and a deliberate action of xxxxxxx xxx xxxxx /xxxxx xxxxxxx xxx x xxxxxxxx xxxxxxxx xx xxxxxxx xxx xxx xxxxxxx. xxxxx xx x xxxxx xxxxxxx xxxxxxxx xx xxxxx xxx xxxxx xxx xxx xxxxxxx xxxxxxxx xx no longer within the internal smart operating range xxxxx xxxxx xxxxx xxx the engine.

To start the vehicle when the remote control battery has become exhausted, the system requires the remote control to be held up to the steering column for verification. This *emergency start* method is an efficient engineering solution as it xxxxxxx xxxxxxx xxxxxxx xxxxxxx xxx system cost. xxxxx xx xx x xxxxx xxxxxxxxxxxxxx xxxxxxx xxx xxxxxxxxxxxxxx xxxxx xxxxxxxx xx **xxx xxxxxxxxxx** xxx xx xxxxxxx xx xxxxx xxxxxxxxxx xxxxxxxxxx.

If the user is aware of the *emergency start* procedure they may still have difficulty starting the engine because the xxxxxxx xxxxx used for the *emergency start procedure* has a xxxxxxx xxxxx xxxxxx. This means that the remote control must be xxxxx xx xxx xxxxxxxxxx xxxxxxxxxx and in a xxxxxxx xxxxx xx xxxxxxx xx xxxxxxx xxx xxxxxxxxxx. xxxxx xx xxx xxxxx xxxxx xx xxx xxxxxxxxxx xxxxxxx xxx xxx xxxxxxxxxx xx xxx xxxxxxxxxx xxxxx xxxxxxxxxx.

*SBD believe that if the smart start does not function correctly the vast majority of customers would be **xxxxxx** xx xxx xxxxxxxxxx xxxxx xxxxxxxxxx and would **not** be able to start the vehicle.*

It xxxxx xxx xx xxxxxxx whether it was possible to lock a remote control inside the vehicle xxx x xxxxx xxxxx xxxxxx (Thatcham requirement) because only xxx xxxxxxxxxx xxx available for the test vehicle. In terms of security the smart start system xxxxx xxx xxxxxxx xxxxxxx requirements and in addition does xxx xxxxx xxxxxxxxxx xxxxxxx xxxxxxxxxx xxxxxxx xx xxx xxxxx xxx xx xxxxxxx xxx xxxxxxxxxx xxxxxxxxxx.

1.5 Thatcham smart entry / smart start criteria issue 3

第1版発表以降、Thatchamは、自動車メーカーとの協議を経て、より実効性のある要件へと内容の修正を図った。しかし、SBDがZafiraの評価を行った当時は、この変更点を反映させた要件更新版はまだ発表されていなかった。その後Thatchamは要件の更新を行い、2007年の第2四半期にそれが発表されることになっている。更新版は、「スマート・エントリー/スマート・スタート・システム評価要件第3版」と名づけられている。

第2版の要件書は存在しないことに留意された。自動車防犯システム評価要件と同じ発行版数にあわせるため、Thatchamは第3版とすることに決めたのである。

Since the original document (issue 1) was issued, Thatcham have modified their requirements to be more workable following consultation with the vehicle manufacturers. However, at the time of SBD's evaluation of the Zafira, Thatcham hadn't updated the published criteria document to reflect the changes. Thatcham have since produced an updated criteria, which is expected to be issued in Q2 2007. The update is titled "smart entry/smart start system evaluation criteria issue 3".

Please note that no issue 2 criteria exists. Thatcham have decided to use issue 3 to bring the criteria in line with the same issue level of the *Vehicle Security System evaluation criteria*.

Table 1. Thatcham smart entry / smart start criteria - Issue 1 to Issue 3 main changes

Section	Item	Issue 1	Issue 3	Comments
Technical	Perimeter bleed (side windows)	<100mm	<200mm	Guidelines issued for taking bleed measurements
	Perimeter bleed (front & rear screen)	<100mm (front & rear screen)	<200mm (rear screen only ①)	
Locking/unlocking function	confirmation signal	Audible or visual signal	Visual signal only	
Interior detection when locking	Key left in vehicle	Disable device for 1 cycle	Disable smart function for 1 cycle	
		OR warn user by mis-lock	OR warn user by mis-lock (may lock after 3 consecutive attempts)	

Note: ① This is excluded from testing if the bottom of the glass is more than 300mm from bumper outline)

Source: SBD 2007

スマートキーの性能は新車防犯性評価点 (NVSA) には直接関係無いものの、車にスマートキー装置を取り付けたことによって、大きな防犯上の問題点が生じないことの確認を行う。Thatchamがスマートキー装置に何か防犯上の問題点があると認めた場合は、ThatchamからABIに連絡が入り、ABIが保険グループのペナルティーを課すかどうかの決定を行う。

Although Smart key performance does not form part of the *New Vehicle Security Assessment* scoring system (NVSA) it serves as a performance check to ensure that no significant security weaknesses exist as a result of a vehicle having a smart key system fitted. If Thatcham identify any security weaknesses in a smart key system they will inform the ABI who may choose to impose an insurance group penalty.

2. Introduction

Vauxhall refer to their smart key system as 'Open&Start[®]'. It provides both *smart entry* (locking and unlocking) and *smart start* (engine starting and stopping) functions. The system is available throughout the European market on most Zafira variants except the lowest grade models. The option cost varies across Europe xxx xx xxxxxxxx xxxx x xxxx.

The Vauxhall Astra and Zafira are the first models from General motors to be equipped with a smart key system. The Vauxhall smart key system is also the first to feature xxxxx xxxxxxxx handles.

This report covers a detailed investigation into the *functionality, performance and features* of the smart key system as fitted to the Vauxhall Zafira test vehicle shown below in Figure 2. Test Vehicle

Figure 2. Test Vehicle



- Model ~ Zafira
- Grade ~ Design
- Specification ~ UK RHD
- Engine ~ 1.9 CDTI
- VIN ~ xxxxxxxxxxxxxxxx

Source: SBD 2007

The UK test vehicle was a high specification 'Design' model which featured double-locking but was not equipped with an alarm system. The Vauxhall Zafira smart key vehicle is supplied with two remote controls. To purchase an additional remote control for the system from a UK dealer would cost xxxx, which includes programming it to the vehicle.

3.3 Summary of UK insurance prediction

At the time of testing this vehicle, Thatcham’s new “Smart entry / smart start system evaluation” (issue 3) criteria was in draft form. SBD were aware of the requirements within the criteria and have made a prediction of the performance of the Zafira against the new criteria.

Overall the system performs xxxx xxxxxx xxx Thatcham requirements. The exterior side leakage slightly exceeded the requirements but xxxx xxxx xxxxxxxx when the remote control was held at a xxxxxxxx xxxxxxxx at a certain position on the rear window and this may be the result xx x xxxxxxxx xxxxxxxx. SBD judge the real-life risk of this situation xx xx xxxxxxx xxxxxxxx xxxx xxx xxxxxxxx xxxxxxxx xxxx xxx xxxxxxxxxx xxxxxxxx.

It should be noted that the smart key system on the Zafira is only available as a customer *option* and as such it would not be required to be tested by Thatcham. SBD’s prediction is for reference only.

Figure 3. Performance prediction against the new Thatcham criteria (issue 3)

Criteria			Test result
Section	Requirement	Value	Vauxhall Zafira
Technical	Lock and unlock range	<2m from perimeter	
	Exterior leakage	Side	<200mm with windows closed
		Rear	<100mm with trunk / tailgate open
Immobiliser unset	Remote in interior range only	Including allowable leakage	
Locking function	Locking signalled	Audible or visual	
	Mis-lock signalled	Audible or visual	
	Passive double-lock	Not allowed	
Unlock function	Unlock signalled	Audible or visual	
Device detection	Device locked in car	Disable smart device or mis-lock	
	Valid means to reinstate	If disabled	
Steering lock	Warning if unset	Audible or visual	

Source: SBD 2007

❑ **Location of Components**

Figure 15 below shows the location of the major user-interface components relating to the **smart start** system.

Figure 15. Location of smart start system components

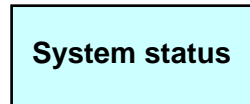


Source: SBD 2007

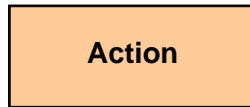
7. Smart key system functionality

The system functionality is explained in flowcharts and tables. Figure 30 (below) gives an explanation of the basic colour scheme used throughout the flowcharts.

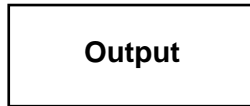
Figure 30. Explanation of *flowchart* colour scheme



A blue box represents a status of the vehicle locking system.



An orange box represents an action performed by the user.

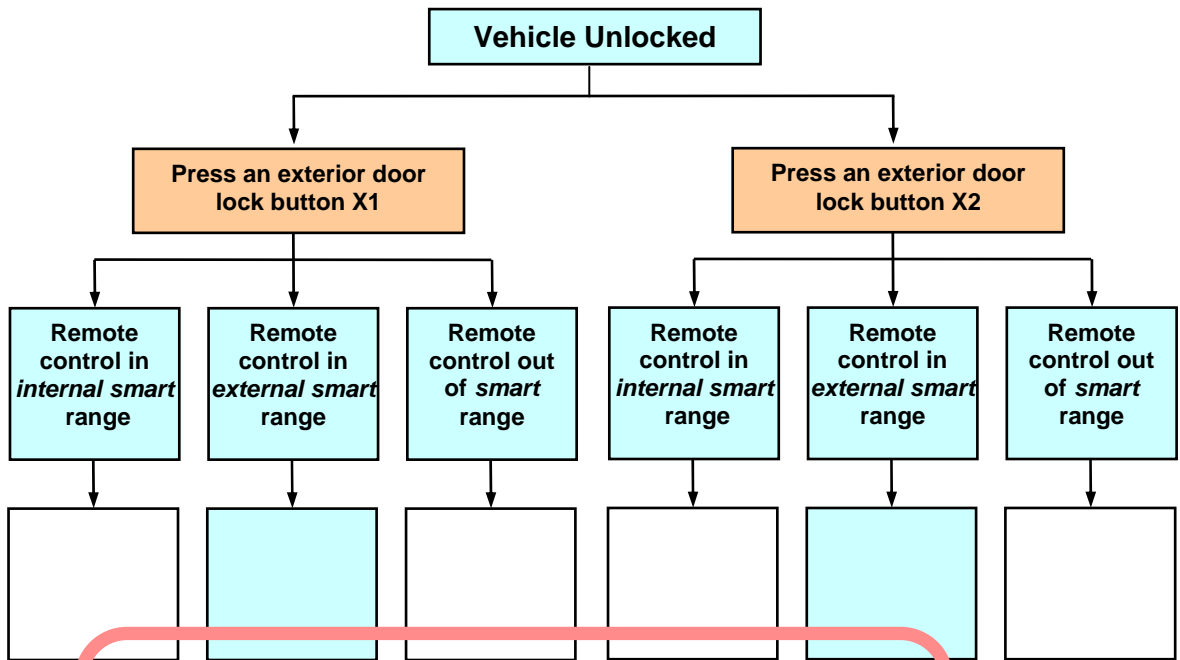


A white box represents an output. **Red text** represents a warning or an output other than that which the user intended.

Source: SBD 2007

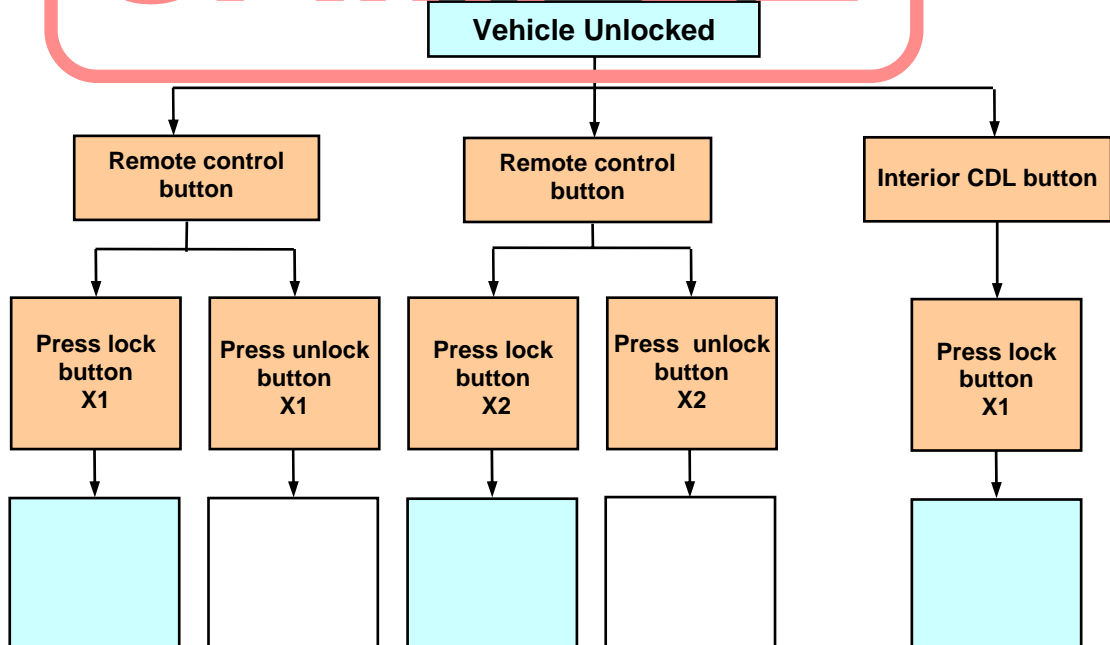


Figure 31. *Lock* ~ smart entry



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Figure 32. *Lock* ~ keyless entry



Source: SBD 2007