

**EUROPEAN SECURITY
Nissan Micra smart key
system evaluation**
October 2004



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The Author

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SBD Ltd.

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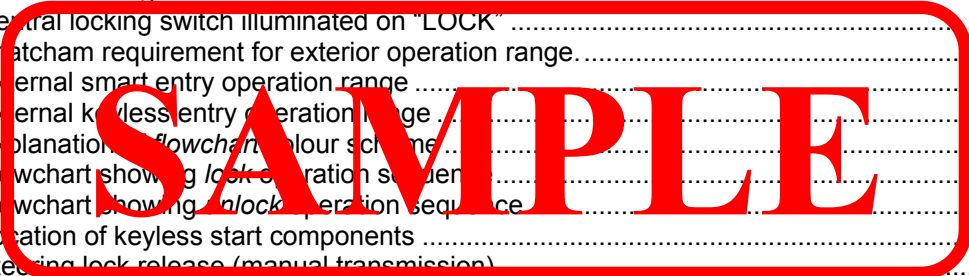
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1. Executive summary

1.1 Introduction

The Micra is the first car from Nissan to be fitted with a smart key system. Nissan are unique in offering the system as a standard fit on certain grades. Other manufacturers offer smart key as customer option.

Nissan are unique in offering a smart key system as standard fit on higher grade models.

In addition, the Micra is also the first model to apply a smart key system to a manual transmission. To achieve this Nissan have designed the manual transmission variant with a secondary push button on the ignition switch to meet European legislation. The legislation requires two positive actions to engage the steering lock (turning the ignition switch AND push in the secondary release button).

The Nissan Micra is currently the only manufacturer to offer a smart key system in the 'B' segment

Smart key systems may include both **smart entry** (locking and unlocking) and **smart start** (immobiliser operation and engine starting and stopping). In the UK, the Nissan Micra is available with a smart key system as standard fit on its three highest level trim grades, (SE, SX & SVE). **Intelligent Key** is the Nissan name for their smart key system.

In Germany **Intelligent Key** is available as standard fit on the *Tekna* grade and included in a €XXX option pack with rain sensor on the *City* grade. It is not available on *Visia* or *Acenta* grades.

Two notable security features are fitted to the Micra in the UK market as standard fit; *double locking* and *selective unlocking*. These features are independent of whether or not the car has **Intelligent Key**. The selective unlocking feature can be enabled by the user.

Nissan do not provide a factory fitted alarm system for the Micra. The Micra is, however, pre-wired at the factory to accept a Nissan approved dealer fit alarm system. The test vehicle was selected without an alarm system as it may have compromised the functionality of the factory fitted smart key system under evaluation.

This report covers the detailed investigation of the functionality and performance of the smart key system as factory fitted to the Nissan Micra. The test vehicle is shown in Figure 1:

Figure 1. Test vehicle



- Model ~ Micra
- Grade ~ SE
- Specification ~ RHD UK (5 door)
- Engine ~ 1386cc petrol
- VIN ~

Source: SBD Ltd. 2004

1.2 Summary of performance

Overall, the Micra's smart key system offers XXX levels of customer convenience, and high levels of security.

The *smart entry* functionality is not overly complex and is intuitive and easy to use. The selective unlocking feature, which can be enabled by the user, improves personal security despite some small loss of convenience.

The *smart start* system incorporates a combined electro mechanical steering lock and ignition switch, which is conventional in appearance, location, and operation. The only difference is that no mechanical key is required, and that the user has to depress the brake pedal before the steering lock can be released.

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The overall system performance is good and meets all Thatcham's security requirements for smart key systems.

Table 1 below shows SBD's judgement on how the system performed overall. The system was judged against other smart key systems fitted to premium brands. The Micra competes in the 'B' segment category (city car).

Table 1. Summary of performance

Criteria	Smart entry	Smart start (and immobiliser)
Convenience		
Features		
Security		

★★★★ Excellent ★★★ Good ★★ Average ★ Poor

Source: SBD Ltd. 2004

□ **Smart entry**

The smart entry system functionality is well thought out and either prevents undesirable locking scenarios or gives the user an audible warning to highlight the locking status. The audible warnings use a series of tones that are different for each locking status. Initially it was difficult to distinguish between the various warnings and SBD test engineer felt that users may find these warnings confusing until such time as they understood the functionality and used the system efficiently.

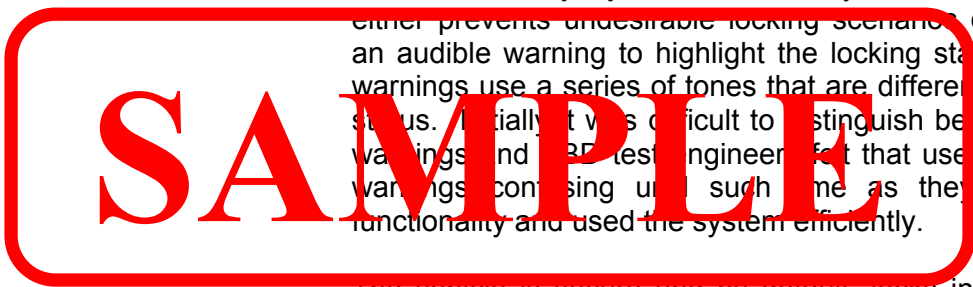
The vehicle is secure and by default, locks in a double locked condition. The system operates in precise, limited operation zones. System functionality is such that the user is reasonably well protected from misplacing the key whilst using the car.

□ **Smart start**

The smart start feature is intuitive as it is based on a conventional arrangement for the location and operation of the ignition switch. The interior range is well defined and there is almost zero bleed outside the vehicle.

The operation of the electro mechanical steering column/ignition switch is difficult and requires familiarity. The switch needs to be rotated and a separated button to be pressed simultaneously to allow the steering lock to engage.

Although this feature does protect against inadvertent engagement of the steering lock whilst driving it still remains difficult for users to engage the steering lock upon leaving the car. This compromises the overall convenience.



3. Summary of application

3.1 UK feature availability

The Micra is the only model in the 'B' segment to provide a smart key system. Uniquely the system is standard fit on the top three grades in the UK.

Smart key systems from other manufacturers are generally offered as stand alone cost options. For example, BMW, Mercedes and VW all have smart key systems as option fit, costing around £XXX.

The Nissan Micra is the first model (from any manufacturer) offer a smart key system on manual transmission variants.

Table 2 below shows the availability of Nissan's Smart key system (Intelligent key) and other related feature options.

Table 2. UK feature availability

Grade	E	S	SE	SX	SVE
Intelligent Key	NOT Available	NOT Available	Standard	Standard	Standard
Doublelocking	✓	✓	✓	✓	✓
Dealer option alarm system (£XXX inc VAT)	✓	✓	✓	✓	✓
Selective unlock (customer configurable)	✓	✓	✓	✓	✓

Source: SBD Ltd. 2004

3.2 UK insurance Group ratings

Table 3. UK group ratings

Engine	Trim grades	Fuel type	Transmission	Group	Electrical security
1.0	E	Petrol	Manual only		
1.2	S, SE	Petrol	Manual & Auto		
1.2	SX	Petrol	Manual & Auto		
1.4	SE	Petrol	Manual & Auto		
1.4	SX, SVE	Petrol	Manual & Auto		
1.5 dCi 65	S, SE	Diesel	Manual only		
1.5 dCi 82	SE, SX, SVE	Diesel	Manual only		

There are 2 diesel options identified by different power outputs (nominally 65 hp & 82 hp)

Source: Association of British Insurers

3.1 External smart entry operation range

There is no *real* difference in range between any of the three smart entry zones either in unlock mode or lock mode. The consistency between all of the results shows that the antennas are remarkably similar and are likely to have the same nominal range.

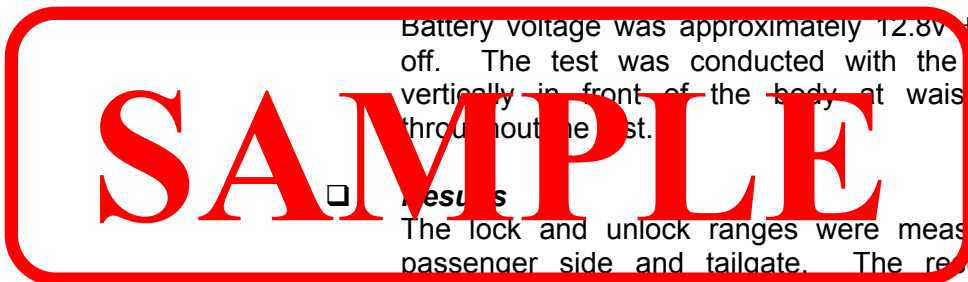
Average perpendicular lock range = XXX
Average perpendicular unlock range = XXX

These are both within the Thatcham requirement of maximum 2m.

The side door ranges are approximately semi-circular and centred on xxxxxxxxxxxx, indicating xxxxx separate antenna locations, one near each xxxxxxxxxxxx. A xxxxxxxxxxxx antenna is located at the xxxxxxxxxxxxxxxxxxxxxxxx.

Test conditions

The range test was undertaken in a brick constructed workshop environment with no other vehicles present.



Battery voltage was approximately 12.8v ± 0.2 with the engine off. The test was conducted with the remote control held vertically in front of the body at waist height consistently throughout the test.

Results

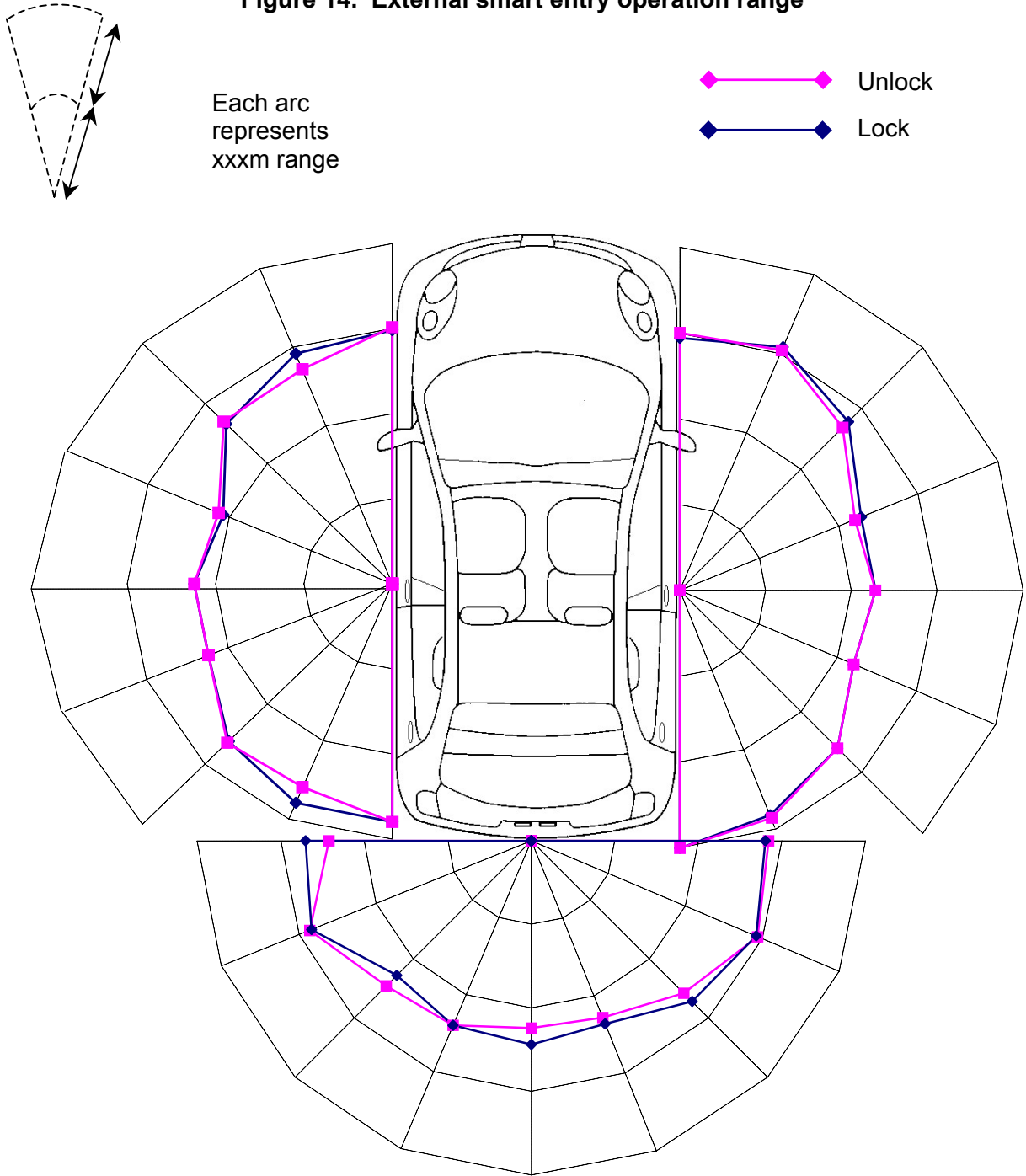
The lock and unlock ranges were measured for driver side, passenger side and tailgate. The results were consistent between all three zones.

Table 5. External smart operation range (m)

Angle (°)	Drivers door		Passenger door		Tailgate	
	Lock	Unlock	Lock	Unlock	Lock	Unlock
0						
22.5						
45						
67.5						
90						
112.5						
135						
157.5						
180						
Average						

Source: SBD Ltd. 2004

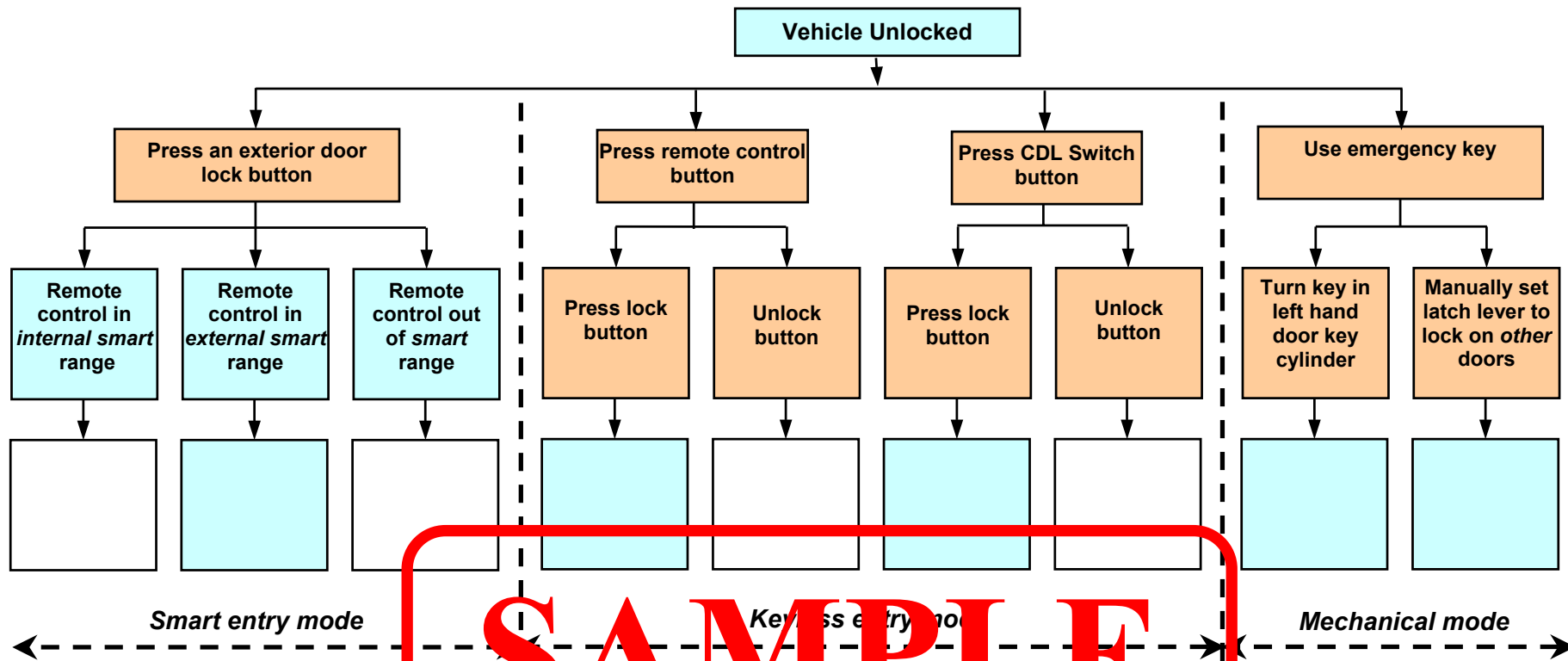
Figure 14. External smart entry operation range



Source: SBD Ltd. 2004

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Figure 17. Flowchart showing *lock* operation sequence



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Source: SBD Ltd. 2004

Table 9. Keyless entry mode *locking*

Door status			Action	Feedback	Result			Comments
Drivers door	Other doors	Tailgate	Press remote Lock button	Direction indicators	Drivers	Others	Trunk	
Closed	Closed	Closed	Press once	1 flash				
Open	Closed	Closed	Press once	Warning beeps				
Closed	Open	Closed	Press once	Warning beeps				
Closed	Closed	Open	Press once	Warning beeps				

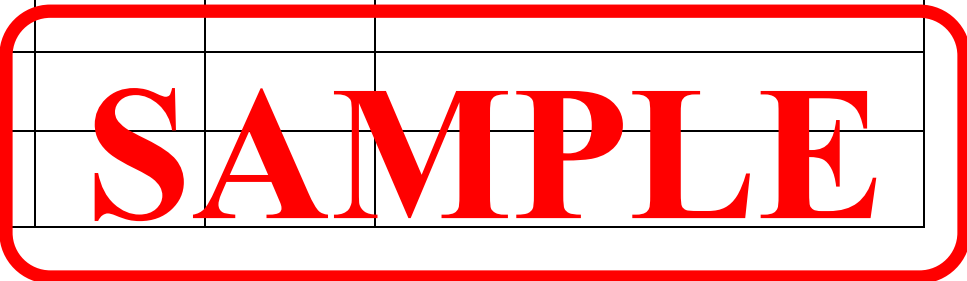


Table 10. Keyless entry mode *unlocking*

Lock Status	Action	Feedback	Result	Drivers	Others	Tailgate	Comments
Double-locked	Press unlock button once	DI Flash Twice					
Centrally locked	Press unlock button once	DI Flash Twice					

① If selective unlocking is enabled, then only the *drivers door* is unlocked. The remaining doors are changed from *doublelocked* to *centrally locked*, so that they can then be unlocked from inside the vehicle.

Source: SBD Ltd. 2004

2.3 Emergency mode

If the remote control battery becomes discharged or through some other electrical (or mechanical) failure the smart key system is inoperative, then an emergency key is available from within the remote control housing. The mechanical key can be folded out from the remote control to act as a conventional method of releasing the steering lock and starting the engine.

Figure 27. Remote control Emergency Start



Removable cap



Fold-out blade



Remove ignition
switch cap



Emergency mechanical
key in use

Source: SBD Ltd. 2004

A conventional transponder is contained within the remote control to allow the system to verify that a legitimate key is being used.

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Figure 31. Exterior bleed – Side door measurement positions

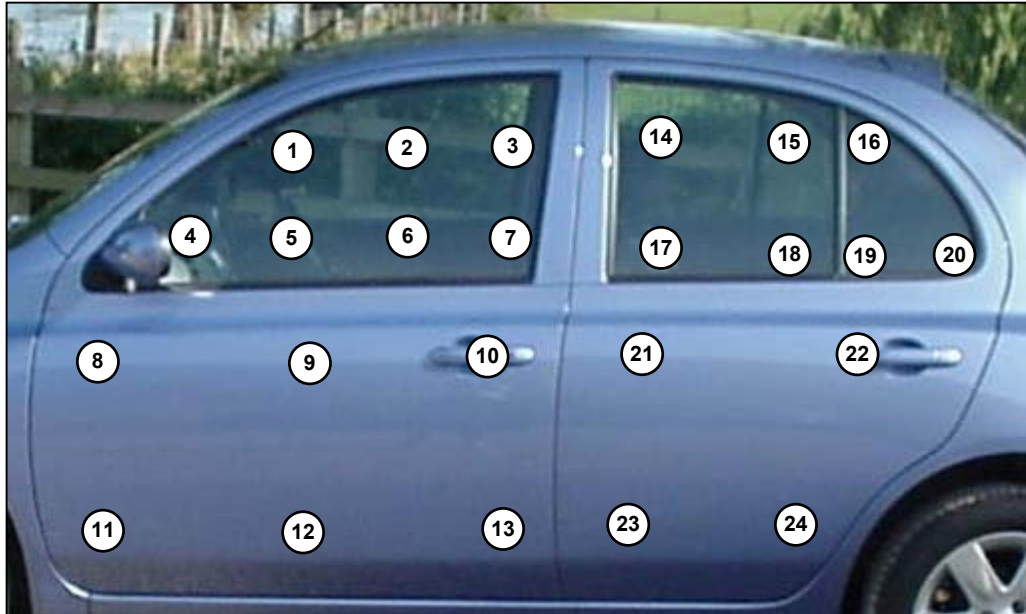


Table 12. Exterior bleed (mm) – Side doors

Front door position	Remote control orientation		Rear door position	Remote control orientation	
	Vertical	Horizontal		Vertical	Horizontal
1			14		
2			15		
3			16		
4			17		
5			18		
6			19		
7			20		
8			21		
9			22		
10			23		
11			24		
12					
13					

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Source: SBD Ltd. 2004