



# Genesis II Select™



**User's Manual &  
Installation Guide**  
Canada Variant • Rev 21/June/2012





# Genesis II Select™

## User's Manual & Installation Guide

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*This manual is the most current version  
and supersedes all other manuals.*



SONCELL NORTH AMERICA  
A PUBLIC SAFETY COMPANY

## **7. Performance Tips**

Understanding potential radar interference and what to do when it occurs can greatly improve your results.

### **7.1 How Radar Works**

Determining a motor vehicle's speed begins with the radar antenna transmitting and directing a beam of microwave energy (radio waves) at an approaching (or receding) target motor vehicle. When energy from this beam strikes a moving motor vehicle, a small amount of the beam is reflected back to the antenna.

The reflected signal frequency shifts by an amount proportional to the speed of the target motor vehicle. This is known as the Doppler Effect. The radar device then determines the target motor vehicle speed from the difference in frequency between the reflected and transmitted signal.

### **7.2 Interference Sources and Remedies**

When properly installed and operated, Doppler radar technology is accurate and reliable. However, variations in the environment can cause situations and circumstances, which can cause spurious

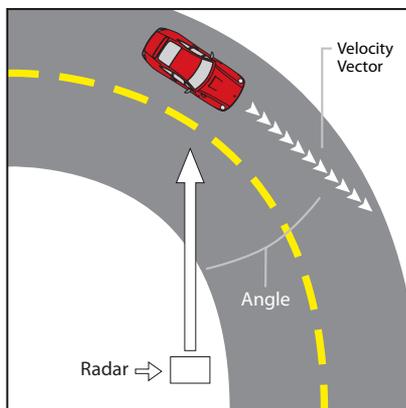
responses which are readily identified by a qualified operator. Signs that a speed is spurious can include the following characteristics:

- A valid target motor vehicle speed in the operational range will always override the source of interference and will be confirmed by the audio component.
- The Doppler tone will lack the pitch and clarity component.
- Speeds are irregular.
- Speeds appear to track with the engine speeds.

### 7.2.1 Angular Interference (Cosine Effect)

When operating in the Stationary Mode, the cosine effect causes the radar unit to display a speed, which is always lower than the actual target motor vehicle speed. This condition exists when the target motor vehicle's path is not parallel to the antenna, including conditions such as the motor vehicle traveling on a curve or a hill.

As the angle between the beam of the antenna and the target motor vehicle increases, the displayed speed decreases. Ideally, an angle of zero (0) degrees is preferable, because the displayed speed is the actual target motor vehicle speed. However, in all uses of police radar, the radar device is always at a slight angle to the target motor vehicle to avoid collisions.



**Figure 7.2.1**

An angle between the antenna and the target vehicle causes the cosine effect.

The following table shows the effect that an increasing angle has on a displayed speed.

Actual Speed	Horizontal Angle Degrees										
	0°	1°	3°	5°	10°	15°	20°	30°	45°	60°	90°
	Displayed speed:										
50 km/h	50	49	49	49	49	48	46	43	35	25	0
65 km/h	65	64	64	64	64	62	61	56	45	32	0
80 km/h	80	79	79	79	79	77	74	69	56	40	0
90 km/h	90	89	89	89	88	86	84	77	63	45	0
100 km/h	100	99	99	99	98	96	93	86	70	50	0
110 km/h	110	109	109	109	108	106	103	95	77	55	0

**Table 7.2.1**

Actual and displayed speeds at different antenna-to-target angles.

Small angles (less than 10°) have little effect on accuracy. As the angle increases, the displayed speed decreases. At 90°, the displayed target speed is 0 km/h.

### **7.2.2 Fan Interference**

Fan interference is the most common form of interference that you are likely to experience. It is caused when the radar measures the speed of the motor vehicle blower fan. Changing the fan speed causes a proportional change in the display speed.

### **7.2.3 Batching**

With the DSP algorithms the Genesis II Select™ uses, batching will not occur.

### **7.2.4 Electromagnetic Interference (EMI)**

Operating electric motors can produce EMI. With the DSP algorithms the Genesis II Select™ has eliminated this.

### **7.2.5 Multi-Path Beam Cancellation**

The Genesis II Select™ is immune to multi-beam cancellation.

### 7.2.6 Patrol Harmonics

In all police radar, when a patrol motor vehicle passes a large, stationary object such as a road sign, building, or overpass, the return signal can briefly overload the processing circuitry. The Genesis II Select™ detects this condition and will not display speeds which are generated by this overloading.



- Targets traveling at speeds which are close to the patrol speed can also mimic this condition and will be rejected. The target window will show an “\_H\_” indicating that it is a patrol harmonic. To process this type of target, simply increase or decrease your patrol speed by at least 3 km/h.

### 7.2.7 Radio Frequency Interference (RFI)

The Genesis II Select™ contains an RFI detection circuit that detects excess radio frequency energy. When stray radio frequency energy reaches an excessive level, the system displays the RFI message and stops processing and displaying speeds. The system resumes normal operation when the RFI condition no longer exists. At that time, any locked speeds will display again.

### 7.2.8 Shadowing

In Moving mode, the radar processes two speeds—patrol and target. The stronger of the two, the patrol speed, is created when the radar beam reflects from passing stationary objects, such as the pavement or terrain the motor vehicle is traveling on. However, some situations cause return signals to be larger than the reflection from the ground, such as when the patrol motor vehicle is rapidly overtaking a slow-moving 18-wheeler. Given a choice between reading passing ground clutter or the large return signal generated by the vertical expanse of the truck's trailer, the radar might ignore the ground speed and lock onto the stronger return signal. Rather than receiving a true patrol speed, the radar reads the differential speed between the motor vehicle and the 18-wheeler. The computer then subtracts this artificially low speed from the closing speed and assigns a higher speed to the target.

The shadowing error is easy to recognize, because the radar patrol speed and the speedometer reading will vary significantly. The target speed in this instance also will vary considerably from your visual estimation. The correct City/Highway setting helps to minimize this effect.



- The Genesis II Select™ recognizes and ignores shadowing when equipped with the VIP.

### **7.2.9 Motor vehicle Ignition Interference**

The Genesis II Select™ is designed to operate from the motor vehicle's cigarette lighter receptacle. However, some motor vehicles exhibit excessive alternator noise at the cigarette lighter receptacle. This can be eliminated by wiring direct to the battery.

## **8. Field Tests**

You can do the following tests to verify the operation and accuracy of the Genesis II Select™.

### **8.1 Operator-Requested Self Test**

Pressing the TEST button initiates a comprehensive system self test.

The Genesis II Select™ will not power down during a self test and checks the following:

**DISPLAY TEST:** Allows the operator to verify that the digit segments and status LED lights are working correctly and that none of the pixels in the number segments are burned out.

**CIRCUITRY TEST:** Checks the internal circuitry. If the unit passes all internal checks, the messages ROM PASS, RAM PASS, and DSP PASS, and TEST PASS will be displayed, or if the test fails then FAIL will be displayed in the MODE window and the unit should be removed from service.

**Speed Simulation Test:** Verifies the speed accuracy using synthesized Doppler frequencies corresponding to a series of four simulated speeds: 25, 50, 75, and 100 km/h. Each speed is accompanied by a audio tone that is proportional to the speed displayed (speed increases, pitch increases). Once the test is successfully completed, a TEST PASS will be displayed, followed by a single tone and then followed by a two tone audio tone.

## **8.2 Road Test**

After the radar unit passes the self test, conduct a road test to confirm the correlation between the patrol vehicle speedometer and the patrol speed displayed on the radar.

## **10.5 Accuracy**

The speed calculations of any radar Decatur Electronics produces are 100% accurate. The display precision is as follows:

- ± 1 unit of measure in stationary mode of operation.
- ± 1 unit of measure in moving, opposite direction mode of operation
- ± 1 unit of measure in moving, same direction mode of operation.



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