Decatur electronics

A SONCELL NA COMPANY

Genesis II Select Directional™

User's Manual and Installation Guide

Canada Variant • Rev 25/Aug/2010

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

SONCELL NORTH AMERICA
A PUBLIC SAFETY COMPANY

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Welcome to Decatur Electronics, Inc.

Thank you for choosing the Decatur Electronics Genesis II Select Directional™ — A highly advanced traffic radar unit that will reward your department with years of dependable service. The Genesis II Select Directional design incorporates high performance and long range, with many leading features. We urge you to study this manual before using the Genesis II Select Directional, so you can maximize the benefits of this sophisticated radar device. We believe you will be pleasantly surprised by the features and advantages.

The Genesis II Select Directional is small, dependable, features instant target acquisition, and is designed using a quality management system certified to ISO 9001. If you are as pleased with its performance as we think you will be, ask your Decatur sales representative about other Decatur products including the Genesis™ line of radars, the Onsite™ line of speed trailers, dollies, and pole signs and the Responder™ line of in-car video systems.

Traffic officers told us exactly what they wanted in a radar device - and we built it. Try any one of our products and see if you don't agree that it is the best-in-class!

—The Management and Staff at Decatur Electronics,
The Nation's Oldest Radar Company

Genesis II Select Directional™ Features

The Genesis-II Select Directional™ is a highly advanced traffic radar device offering many advanced capabilities. It includes 32-bit digital signal processing (DSP), a versatile detachable computer/display unit, K-band directional antennas, and an easy-to-use hand-held remote control. It also features Faster Mode for detecting the next strongest target going faster than the strongest in multiple target situations.

The Genesis-II Select Directional is able to determine which direction targets are moving. Directional technology enables the radar to single out vehicles moving in one specific direction, while ignoring vehicles moving in the other direction. This capability makes stationary operation far more effective and makes moving same lane mode very easy to operate.

The Genesis-II Select Directional digital signal processing (DSP) provides instant target acquisition and speed lock as well as more precise tracking and speed measurement.

If space in your vehicle is at a premium, you will appreciate the detachable computer/display unit. For more safety conscious installation options, you can separate the pieces and mount them wherever best meets your specific needs.

The hand-held remote controls all of the functions of the radar unit. The remote features convenient "eyes-off" raised buttons for use without taking your eyes off the road and fits comfortably in the palm of your hand, positioning all controls at your fingertips.

About This Manual

This manual contains valuable information to help you set up, use and maintain your Genesis II Select Directional™, so you can extend its life and keep it at peak performance. Please take a moment to read through it, and keep it handy for future reference.

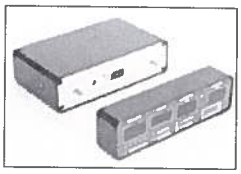
Note the following symbols in this manual:

⚠ Indicates a warning message about safety precautions. Please read it carefully.

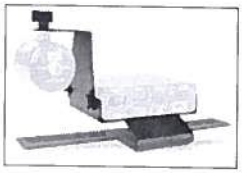
➤ Indicates a helpful tip or precaution to note.

[OPT] Indicates section refers to optional equipment.

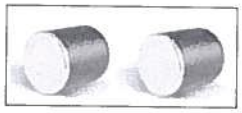
Your Genesis II Select Directional radar unit includes selections from the following components:



Detachable Computer/ Display Unit

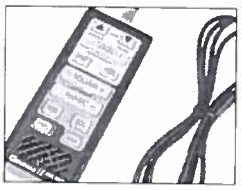


Computer Unit/ Antenna Mounting Bracket

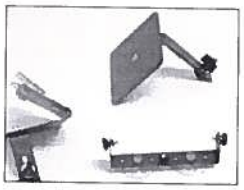


K Band Directional Antennas

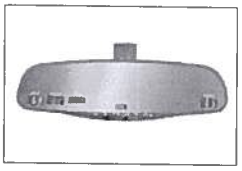
Various Connector Cables



Handheld Remote



Various Mounting Brackets



Optional Radar Mirror Display

1. Installation

Use the following instructions to mount your Directional radar:

1.1 Separating the Computer/Display Unit (optional)

If the space in your motor vehicle is at a premium, you will appreciate Genesis II Select Directional's compact size and versatile components. You can separate and remotely mount the computer unit from the display unit. Common places to mount it are behind the dash, under the driver's seat, or on the console.

To separate the combined unit, firmly grasp the ends and pull them apart.

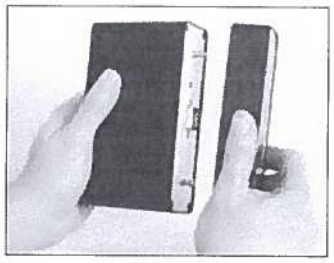


Figure 1.1a
Separating the computer/display unit.

Note the 9-pin connectors on each half of the unit. Screw two standoffs into the holes next to each connector to attach the two pieces with the 9-pin connector cable.

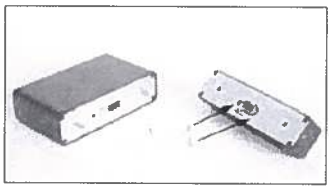


Figure 1.1b
To connect the separated unit, first insert the standoffs to secure the cable connectors.

Then attach and secure the connectors with the thumbscrews on the sides of each cable connector.

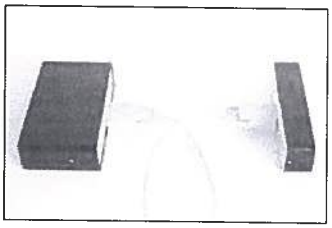


Figure 1.1c
Secure the connecting cable by fastening the thumbscrews into the standoffs.

To return the unit to a one-piece configuration, remove the cables and standoffs, line up the 9-pin connectors, and push the two pieces together.

1.2 Mounting the Computer/Display Unit & Connecting Cabling.

WARNINGS

- Do not place the Genesis II Select Directional components in locations that will obscure the driver's view of the road.
- Double-check each component to ensure it is securely mounted. In an accident, a loose component could strike an occupant of the vehicle.
- Do not place the Genesis II Select Directional computer, antennas, cables, or brackets in your vehicle's air bag deployment zones. Refer to your vehicle's owner's manual or call the vehicle manufacturer if you are unsure where the air bag deployment zones are.

You can mount the computer/display unit behind and to the side of the steering wheel or on the dashboard. The computer unit easily withstands and remains accurate in temperature extremes. Dash-mounting the unit promotes safety; you can read the display without taking your eyes off the road.

To mount the unit, use the Velcro™ fastening material or an approved mounting bracket. Before applying the Velcro™, use a clean cloth to remove any foreign material from the dashboard and bracket face. Position the Velcro™ lightly on the computer/display unit and mounting surface.

After the unit is in the correct position, press it firmly to affix it to the surface. For the approved bracket mount, simply place and tighten the screws on the mounting bracket into the holes in the unit. Then adhere the suction cups to a clean glass surface. For maximum adhesion, moisten the suction cups before affixing them to the surface.

There are five locations where cables connect to the rear panel of the computer unit. Four are quick-disconnect connectors, and a fifth is a nine pin serial port.

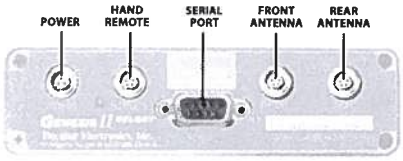


Figure 1.2a
The quick-disconnect connectors plug into the computer unit in the above locations.

1. Align the red dot on the connector with the red dot at the top of the receptacle.
2. Push the connector into the receptacle until you hear a click.

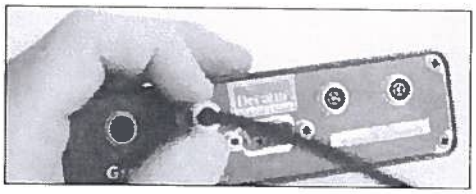


Figure 1.2b
Align the red dot on the connector with the red dot on the computer receptacle.

Power connector

WARNING

- Be sure to plug the connector into the computer unit first before plugging the power plug into the auxiliary power source. If the power source is on, it can damage the unit.

The power cable has a larger 12-volt power plug (cigar plug) on one end. Make sure the plug fits securely in the motor vehicle's auxiliary power (cigarette lighter) receptacle.

Figure 1.2c
The cigarette plug for the auxiliary power receptacle.

Remote connector

The hand-held remote has two connectors, one that plugs into the remote and one that connects to the back of the computer unit. While both connectors are the same, the connector with the strain relief boot typically connects to the hand-held remote.

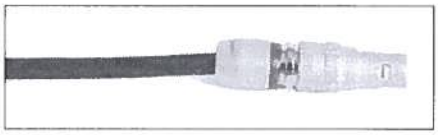


Figure 1.2d
Cable connector that plugs into the computer unit

Antenna connector

The antenna cable uses two different connectors. One connector plugs into the antenna and has a more smooth finish than the connector that plug into the unit. It is important that the right connector be plugged into the right receptacle or damage to the connector or receptacle may result.

Figure 1.2e
Cable connector that plugs into the antenna.

To remove a cable, grasp and pull the connector.

Serial connector

On the back of the computer unit there is a female DB-9 connector marked "serial" that allows you to connect the Genesis II Select Directional to other devices (i.e. VIP, display signs, in-car video, PCs). To use this RS232 serial connector you will need a communications cable. (A communications cable for video and PC is not included. You can order it from Decatur Electronics by calling 800.428.4315).

1.3 Mounting and Connecting the Antenna

The Genesis II Select Directional K-band antennas are incredibly strong, yet compact and lightweight. The antennas are interchangeable. The cables are also interchangeable and work with either antenna.

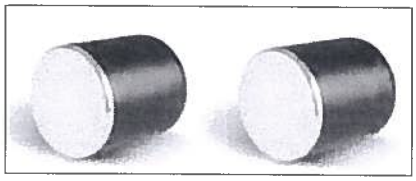


Figure 1.3a
Dual antennas for the Genesis II Select Directional.

To attach the antennas to the brackets, align the threaded mounting hole on the antenna with the slot on the L-brace. Then screw the post into the threaded mounting hole.

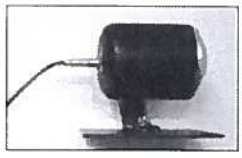


Figure 1.3b
A rear mount antenna

Figure 1.3c
A front mount antenna

When affixing the suction cup mounted front antenna, for maximum adhesion, moisten the suction cups on the bracket before affixing them to a surface of the glass. Mount the forward-facing antenna assembly or Wink Mount Adapter on the windshield. Mount the rear-facing antenna as close to the C-Pillar and as high as possible for optimum performance.

After you affix the bracket to a surface, adjust the position of the antenna. ANY SIGNIFICANT DEVIATION FROM A PARALLEL ORIENTATION CAN AFFECT THE READING OF A VALID TARGET.

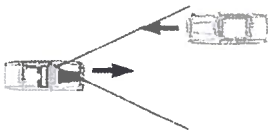


Figure 1.3d
Correct Orientation
The antenna is parallel to the target vehicle's direction.

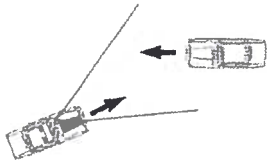


Figure 1.3e
Incorrect Orientation
The antenna and target vehicle's direction are not parallel.

Point the antenna so it is parallel with the patrol motor vehicle, (the direction the patrol vehicle is facing) and parallel with the ground.

- Use only the mounting hardware approved by your agency. Damage to the antenna housing can occur if you use incorrect fasteners.
- Do not modify the brackets. Most brackets incorporate an isolator that prevents the metal housing of the antenna from coming into contact with the frame of the car. Removal of the isolator can cause interference to be easily picked up diminishing performance.
- When removing brackets that have suction cups, use the tabs on the suction cups to break the vacuum seal.

After you have mounted the antenna, plug the cable into the antenna and the antenna receptacle on the computer/display unit. If you are using only one antenna, you must connect it to the FRONT antenna receptacle. Either the FRONT or REAR button on the remote can activate a single antenna system.

2. Computer/Display Unit

2.1 Front Panel

The Genesis II Select Directional display faceplate contains three windows for displaying the patrol, target and locked target speeds. In addition, the faceplate also has indicators used to show the range setting, faster or slower setting and whether the front or rear antenna has been selected.

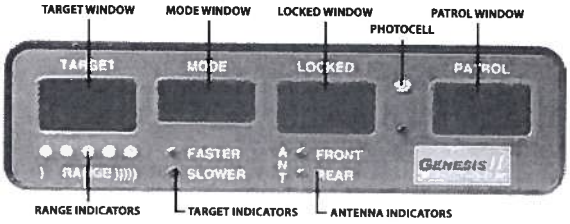


Figure 2.1
The Genesis II Select Directional front display.

The faceplate also contains a photocell that automatically dims the display at night for less glare and makes the display brighter in daylight conditions, so you can easily read the display windows.

2.2 Display Windows

TARGET: The TARGET window displays target speeds and is blank when no target is present.

MODE: Displays the mode of operation (Stationary, Moving Mode Opposite Direction, or Moving Mode Same Direction) except during power up, self-test or when an error occurs. When an error occurs, one of the following appears in the MODE window:

- LowV low voltage
- RFI radio frequency interference
- SYS system failure
- RMT? disconnected hand-held remote

LOCKED: When you press the LOCK button, the LOCKED window holds and displays the target speed that was in the TARGET window.

PATROL: Displays the patrol speed. The window is blank when the radar unit is in Stationary Mode.

2.3 Lights

RANGE: Indicates the sensitivity setting (or the target-acquisition distance). The range can be independently set for each main operating mode.

Figure 2.3a
Short Range

Figure 2.3b
Medium Range

Figure 2.3c
Maximum Range

FASTER: Illuminates when the fast function is active.

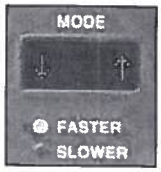


Figure2.3d
The Faster light

ANT FRONT and REAR: Indicates which antenna is transmitting. In standby mode, neither light is on and neither antenna is transmitting.

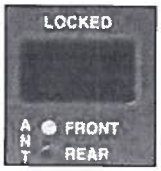


Figure 2.3f
Antenna lights

3. Hand-Held Remote Controls

Figure 3a
The S778-41CC-0 hand-held remote control unit.

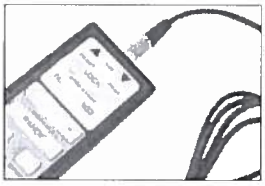


Figure 3b
The S778-41CC-0 hand-held remote control unit with detachable cable.

> • If the hand-held remote is removed during operation, RMT? appears in the Mode window and will stay on until the remote is plugged back in.

3.1 Control Buttons

POWER (PWR): Powers the Genesis II Select Directional on and off.

OPTION (OPTN): The City/Highway option helps reduce shadowing by setting a different minimum patrol speed for city and highway speed conditions. This option works only while the unit is set in a Moving Mode and the motor vehicle is not equipped with a VIP.

STOPWATCH MODE [OPT]: To place the Genesis II Select Directional into the Stopwatch operational mode, press and hold the OPTN button for two seconds. The letters StpW will appear in the MODE window. Press the OPTN button again to exit this mode. See section 5.9 for a full description of the Stopwatch Mode.

PATROL SPEED LOCK, RECALL and BLANKING: This feature comes standard with the Genesis II Select Directional and will enable the patrol officer to lock a target speed which will then become displayed in the locked window, while remembering internally what the patrol speed was at the time the speed was locked. The Genesis II Select Directional will, as long as the antenna remains activated, continue to track both the speed of the target in the target window and the patrol motor vehicle speed in the patrol window.

1. To blank the patrol speed, press the OPTN button. Then press the OPTN button again to recall it.
2. To permanently remove the locked patrol speed, reactivate the antenna by turning it on.

TEST (TEST): Pressing the TEST button starts an extensive self test of the radar unit's circuitry. If the self test fails, the SYS message will appear in the MODE window.

Pressing and holding the test button activates the menu feature. This feature allows the operator to adjust some of the options of the radar which are officer preferences. See Appendix B for more information.

SQUELCH (SQL): Selects the type of Doppler audio you hear. In squelch mode, the sound is only the Doppler tone for the currently displayed target. In the unsquelched mode, the unit sends out all Doppler tones received by the antenna—patrol motor vehicles, targets, interference, and noise. You typically use unsquelched audio when you listen for interference.

RANGE (– RANGE +): Regulates the maximum target-acquisition distance. You press the negative (–) or positive (+) side of the RANGE button to decrease and increase the target acquisition distance. When in the Stopwatch Mode, the RANGE button cycles through distance units.

VOLUME (– VOLUME +): The volume control regulates the Doppler audio and system status tone (beep) volume. Press the negative (–) or positive (+) side of the VOLUME button to decrease and increase the volume level.

FAST (FAST): Controls the Faster Mode feature.

MODE (MODE): Switches between the three operating modes: Stationary Mode, Moving Mode Opposite Direction, and Moving Mode Same Direction.

LOCK (LOCK): Transfers the target speed in the TARGET window to the LOCKED window. After locking the speed, the system continues to process and display target speeds in the TARGET window, so you can continue to track the history of the target speed.

ANTENNA (ANT) FRONT and REAR: Activates and deactivates the front and rear antenna. An antenna must be activated to track a target speed.

4. Communication System Controls

You can configure the Genesis II Select Directional through the serial communications (COM) port on the rear panel to communicate with PCs, speed signs, in-car video systems, such as the Decatur Electronics Responder 1000™ and the Decatur Electronics Vehicle Interface Portal (VIP). The communications cable does not come with your order and can be purchased separately from Decatur Electronics. See Appendix A for the more details on the serial communications port configuration.

5. Operating the Genesis II Select Directional

After you test and confirm that the unit is properly installed, it is ready for use.

5.1 Power

The PWR button on the hand-held remote turns the Genesis II Select Directional on and off. After you press the PWR button, the display illuminates and the computer checks the circuitry. If the power-up checks pass, the computer displays TEST PASS in the MODE window. If the power-up checks fail, a system error message (SYS) will display in the MODE window and the unit will not respond to any control except the PWR button to power down. Turn the unit off then back on. If the error message persists, remove the unit from service and contact Decatur Electronics.

> • When the Genesis II Select Directional is powered down, it stores the current settings. These settings are restored the next time you power up the unit.

5.2 Front and Rear Antenna

At power up, the Genesis II Select Directional antennas are in standby mode. (Standby mode is when the antenna is not transmitting.) If no antenna is connected to the unit, the FRONT and REAR lights cycle on and off and Ant? displays in the MODE window.

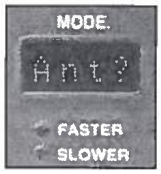


Figure 5.2a
If no antenna is connected, Ant? displays

The radar unit *will not* begin transmitting until you press an antenna button. The antenna (ANT) buttons, up arrow (FRONT) and down arrow (REAR), on the hand-held remote activate and deactivate the antennas. The FRONT or REAR light will illuminate when the antenna is transmitting.

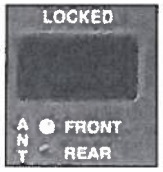


Figure 5.2b
When the FRONT light illuminates, the FRONT antenna is transmitting.

To *discontinue* transmitting (to place the radar back into standby mode), press the same (ANT) button.

The Genesis II Select Directional has three main operating modes: Stationary, Moving Mode Opposite Direction, and Moving Mode Same Direction.

5.3 Stationary Mode

You can use Stationary Mode to monitor traffic that is moving toward or away from the parked patrol motor vehicle. You can also select a specific direction of traffic (toward or away) to monitor.

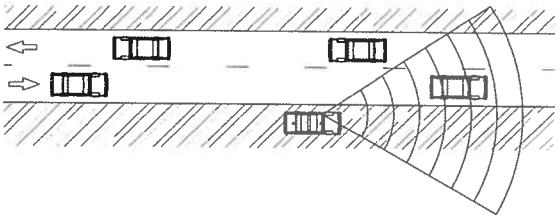


Figure 5.3a
Tracking a vehicle moving AWAY from a stationary patrol vehicle and the radar in Stationary Mode. using the front antenna.

There are three selections for stationary mode:

Stationary Both
Tracks vehicles moving towards or away from the patrol vehicle.

Stationary Towards
Only tracks vehicles moving away from the patrol vehicle.

Stationary Away
Only tracks vehicles moving away from the patrol vehicle.

To select a Stationary Mode of operation, press and hold the MODE button for two seconds. The "Stationary Both" mode will be represented by two arrows on the left (on pointing up, one pointing down) and a solid line on the right representing a parked patrol motor vehicle. When targets are measured, the letter "T" or "A" will be displayed along side of the solid line to indicate the target is moving TOWARDS or AWAY from the patrol motor vehicle.

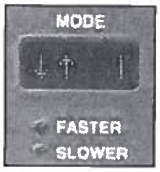


Figure 5.3b
The MODE window when the radar is in Stationary Both Mode.

Detected target speeds will display in the TARGET window. The PATROL window will always remain blank while in this mode.

- In order to select the "Stationary Towards" or "Stationary Away" modes, one of the antennas must be activated.

After the "Stationary Both" mode has been selected, briefly press and release the MODE button a second time to select the "Stationary Towards" mode. Pressing and releasing the MODE button a third time will select the "Stationary Away" mode. Pressing and releasing the MODE button a fourth time will cycle to the moving opposite mode of operation.

When the radar is toggled into the "Stationary Towards" mode, a "T" will briefly be displayed along side of the solid line on the right. When the "T' is cleared, an arrow will be displayed that represents the direction of travel in which the radar will search. (When using the FRONT antenna, targets moving towards the patrol will be represented by an arrow on the left pointing down. An arrow will be pointing up when the REAR antenna is selected.) Once a solid target is acquired, the letter "T" will again appear.

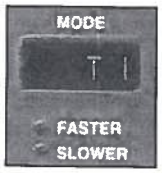


Figure 5.3c
Initially the letter "T" will indicate the Stationary Towards Mode has been selected. The "T" will also appear when a target is acquired.

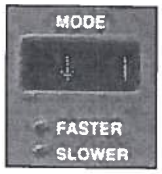


Figure 5.3d
For a FRONT antenna selection, the Stationary Towards Mode will show an arrow pointing down.

When the radar is toggled into the "Stationary Away" mode, an "A" will briefly be displayed along side of the solid line on the right. Once the "A" is cleared, an arrow pointed in the appropriate direction (based on the antenna selection) will be displayed to indicate the direction of the targets moving AWAY from the patrol car. Once a solid target is acquired, the letter "A" will again appear.

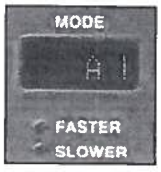


Figure 5.3e
Initially, the letter "A" will indicate the Stationary Away Mode has been selected. The "A" will also appear when a target is acquired.

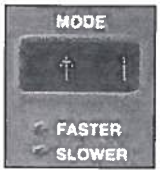


Figure 5.3f
For a FRONT antenna selection, the Stationary Away Mode will show an arrow pointing up.

Detected target speeds will display in the TARGET window. The PATROL window will always remain blank while in all of the stationary modes.

WARNING

- When operating with the Directional Antenna, be sure the antenna facing forward is connected into the "FRONT" antenna port. If using dual antennas, the antenna facing the rear should be connected into the "REAR" antenna port.

5.4 Moving Mode Opposite Direction

Use the Genesis II Select Directional in the Moving Mode Opposite Direction setting to display the speed of a target moving toward or away from the moving patrol motor vehicle. These targets will be moving towards the patrol (using the front antenna) or away from the patrol (using the rear antenna).

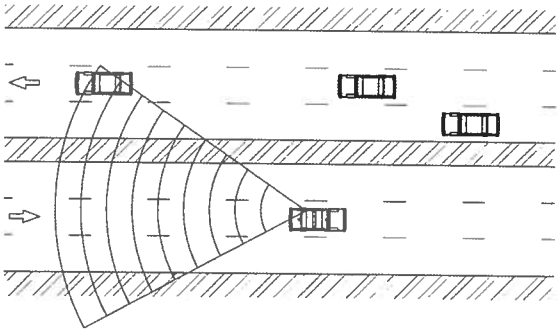


Figure 5.4a
A patrol vehicle that is tracking a target vehicle with the rear antenna while traveling with the radar unit in Moving Mode Opposite Direction.

To select Moving Mode Opposite Direction, press the MODE button until the MODE window displays a down arrow on the left and an up arrow on the right. The down arrow indicates the target's travel direction. The up arrow indicates the patrol motor vehicle's travel direction.

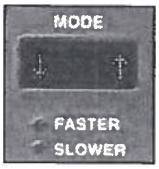


Figure 5.4b
The MODE window with Moving Mode Opposite Direction arrows.

In this mode, the Genesis II Select Directional simultaneously processes and displays the patrol and target motor vehicle speeds. Detected target speeds will appear in the TARGET window. When no targets are present, the TARGET window will show three dashes. Patrol speeds will display in the PATROL window while the patrol motor vehicle is moving.

5.5 Moving Mode Same Direction

To display the speed of targets traveling the same direction as the patrol motor vehicle, use the Moving Mode Same Direction setting.

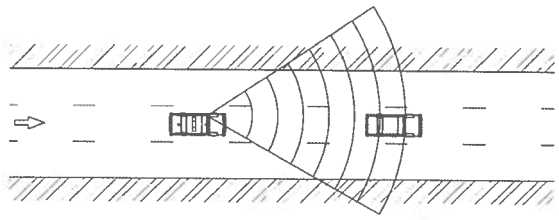


Figure 5.5a
A patrol car tracking a target using Moving Mode Same Direction.

To select this mode, press and release the MODE button until the MODE window shows two upward pointing arrows.

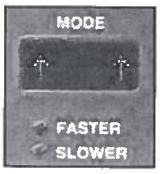


Figure 5.5b
The MODE window when the radar is in Moving Mode Same Direction.

Unlike conventional moving radars, the operator is not required to choose a "Faster or Slower" setting when measuring same lane targets. The Genesis II Select Directional chooses the correct setting automatically.

WARNING

- When operating with the Directional Antenna, be sure the antenna facing forward is connected into the "FRONT" antenna port. If using dual antennas, the antenna facing the rear should be connected into the "REAR" antenna port.

5.6 Faster Mode

The FAST button activates the Faster Mode, modifying the operation of the Stationary and Moving Mode Opposite Direction modes.

The Faster light illuminates when you press the FAST button on the hand-held remote.

When activated, the system simultaneously displays the strongest target signal and the next strongest target signal going faster than the target signal.

In the figure below, the 99 km/h motor vehicle is the strongest target if the FAST button is activated, then the next stronger faster target, namely the passenger motor vehicle at 123 km/h will be displayed.

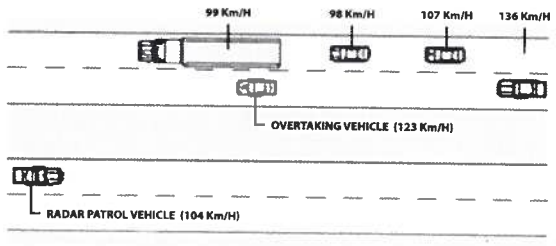


Figure 5.6
Evaluating multiple targets in Faster Mode.

WARNING

- When in Stationary Mode, it is possible that the faster vehicle is not traveling in the same direction as the strongest vehicle.

5.7 Lock a Speed

The LOCK button transfers the target speed in the TARGET window to the LOCKED window. After locking the speed, the radar unit continues to process speeds and display target speeds in the TARGET window, which will be solely the strongest reflected signal.

Clear a locked speed one of the following ways:

- Press the LOCK button when an antenna is transmitting and no target is present.
- Change the operating mode.
- Turn the antenna off then on again.

- The locked speed will remain when you change a dual-antenna transmission status from front to rear or rear to front.
- You may use the lock feature even when the radar is in Faster mode.

5.8 Range Setting

You can adjust the range (sensitivity) of the Genesis II Select Directional in each of the three operating modes independently:

- Moving Opposite Mode
- Moving Same Lane Mode **[OPT]**
- Stationary Modes

The five LED lights above the word RANGE indicate the target-acquisition range.

Press the negative (–) or positive (+) side of the RANGE button to decrease or increase the range setting. The range lights progressively illuminate as you increase the distance. When all lights are on, the unit is in maximum range. The range setting for each operating mode will be remembered when the radar is powered off.

5.9 Stopwatch Operation Mode [OPT]

Calculate target speeds without transmitting a radar signal by using the stopwatch mode. The stopwatch mode relies on the time/distance formula to calculate target speeds by measuring the amount of time a motor vehicle takes to travel a known distance.

SPEED = DISTANCE / TIME

To place the radar into stopwatch mode, first ensure that no antenna is currently selected, then press and hold the OPTN button for two seconds. The MODE window should display "StpW" to indicate you have activated the stopwatch functions.

Figure 5.9
The Mode window will display "StpW" whenever the Genesis II Select is operating in the Stopwatch Mode

The three numeric windows display time, distance, and speed.

TARGET WINDOW	Calculated Speed in km/h
LOCKED WINDOW	Time in Tenths of Seconds
PATROL WINDOW	Distance in Meters

Example:

Distance Set to:	440m (0.4 km)
Time Measured:	150 (15.0 seconds) (.00416 hours)
Calculated Speed:	96 km/h

To make use of the stopwatch mode, you need a road surface that is marked with known distance intervals, or you will need to independently make a measurement between two visible points on the road in which you can time motor vehicles passing between those points (for example a bridge underpass and a road sign) with some precise distance measuring equipment.

Once you have an established measurement area, use the "-" or "+" side of the RANGE button to enter the distance of the measurement area in yards. Quickly press and release the (-) or (+) side of the button to cycle up or down one single distance unit. By holding one side of the RANGE button, the units will cycle up or down by tens, and then later by hundreds.

When the correct distance is set, you can time motor vehicles as they cross between the markers in your measurement area. Use the LOCK button to start and stop the timer. The time will be counted and displayed in the LOCKED window. Each sequential number represents a tenth of a second (there is no decimal point displayed between the right two digits). For example 150 represents 15.0 seconds.

After you have started and stopped the timer, a calculated speed will be displayed in the TARGET window. The speed shown will be in km/h.

The accuracy of the stopwatch mode will be limited by the precision in which the distance measurement was made and the precision in which the timer start and stop was activated. Press the MODE button to exit the Stopwatch mode.

6. Performance Tips

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

6.1 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.

6.2 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.

6.2.1 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.

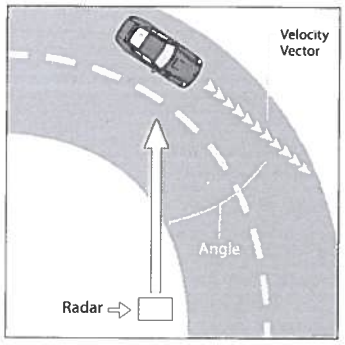


Figure 6.2.1a
An angle between the antenna and the target vehicle causes the cosine effect.

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 6.2.1b
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.

6.2.2 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.

6.2.3 Batching

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

6.2.4 Electromagnetic Interference (EMI)

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

6.2.5 Multi-Beam Cancellation

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

6.2.6 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 Directional 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.

6.2.7 Radio Frequency Interference (RFI)

The Genesis II Select Directional 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.

6.2.8 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 Directional recognizes and ignores shadowing when equiped with the VIP.

6.2.9 Motor vehicle Ignition Interference

The Genesis II Select Directional 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.

7. Field Tests

The following tests are performed to verify the operation and accuracy of the Genesis II Select Directional.

7.1 Operator-Requested Self Test

Pressing the TEST button initiates a comprehensive system self test.

The Genesis II Select Directional 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, 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.

7.2 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.

The road test verifies that the radar unit's patrol speed and the motor vehicle speedometer are within ± 3 km/h of each other.

Drive the patrol vehicle at a constant, legal speed to verify the correlation that exists between the patrol speed of the police vehicle and the patrol speed of the radar unit. Generally they will be within ±3 km/h, any discrepancy in these speeds is not reflective of an inaccuracy of the radar unit but is attributable to a slight tolerance in the speedometer. If you have a dual antenna configuration, repeat this process.

- Section 7.1 and 7.2 must be completed by the operator prior to enforcement and at the conclusion of the officer's tour of duty (if any enforcement action was taken).

8. Care, Cleaning, and Storage

- Avoid spilling food, beverages, and other liquids and substances on the radar device.
- When you are not using or transporting the device, store it in its original packaging.
- To clean the radar device, dust it with a soft clean cloth, which is free of cleaning solutions.
- The Genesis II Select Directional can withstand temperature variations, however, only the antenna is weather resistant.
- Insert and remove the connectors by following the correct connect and disconnect procedures.

WARNING

- In case your unit has a blown fuse, please replace the fuse with another fuse rated at the same capacity. DO NOT replace the fuse with a higher rated fuse since this may cause damage to the equipment and/or the vehicle. Higher rated fuses will cause internal damage to the unit and may result in voiding the warranty. In case the replacement fuse blows please send the unit in for repair.

9. Specifications

9.1 Mechanical

Display Unit

Dimensions	13.33 cm x 3.68 cm x 2.79 cm
Weight	0.17 kg

Computer Unit

Dimensions	13.33 cm x 3.68 cm x 7.62 cm
Weight	0.45 kg

Hand-Held Remote

Dimensions	12.70 cm x 3.04 cm x 5.33 cm
Weight	0.26 kg

K-Band Directional Antenna

Dimensions	10.54 cm x 7.62 cm
Weight	0.37 kg

9.2 Antenna

K-Band Directional

Nominal transmission frequency	24.150 GHz
Nominal horizontal beamwidth	12°
Polarization	Linear (Vertical)
Nominal microwave power output	5mW
Maximum aperture power density	< 1mW/cm2

9.3 Environment

Ambient operating temperatures	-30°C to +70°C
Maximum humidity	90% relative humidity at 37°C

9.4 Power Consumption

Supply voltage range	10.8 to 16.5 VDC with internal, resettable fuse
Low voltage threshold	10.8 VDC with visual indicator

Current draw with 13.6 VDC applied in various modes:

Standby (antenna OFF)	0.35 amperes
Ant. ON, no targets displayed	0.50 amperes
Ant. ON, 55 target displayed	0.53 amperes
Ant. ON, 20 target, 35 patrol	0.55 amperes
Ant. OFF, segment check 888 888 888	0.605 amperes
Ant. ON, segment check 888 888 888	0.65 amperes

9.5 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.

9.6 Speed Range

Stationary Mode

Target	19 km/h - 337 km/h

11. Frequently Asked Questions (FAQ)

Q. My radar device will not power up. What should I do?

A. Make sure the radar device is plugged into the power source and that the power source has power. Also, check to see if the LED light on the power plug is on and that the fuse in the power plug is working. If the unit still does not power up, contact Decatur Electronics.

Q. My radar device has poor range. How can I remedy this?

A. Make sure the range control is adjusted properly and verify that no obstructions are in front of the antenna. If the antenna still has poor range, increase the range (sensitivity) level. If this problem continues, contact Decatur Electronics.

Q. Do the Decatur Electronics traffic safety radar devices interface with in-car video systems?

A. Yes. Decatur's traffic safety radar devices will interface with various in-car video systems with an active communications (COM) port, including the Decatur Electronics Responder 1000™ in-car video system. Please call the Decatur Electronics sales staff to see which video systems will work with your Decatur radar device.

Q. Does Decatur Electronics carry other law enforcement products?

A. Yes, Decatur offers handheld radar units, a full line of OnSite radar speed and message trailers and the Responder line of in car video solutions

Q. Does Decatur Electronics have a sports radar gun?

A. Decatur Electronics has developed a radar gun specifically for use in sports applications such as baseball and softball. Decatur's Prospeed™ model sports radar also works well for boat, personal watercraft and snowmobile racing. Contact Decatur Electronics for more information on this product.

Q. Does Decatur Electronics make speed trailers or speed signs?

A. Yes, Decatur has a variety of speed signs and radar/message trailers—the OnSite™ series. Contact your Decatur sales representative for more information on these products.

Q. What upgrades are available now for my Genesis II Select?

A. Contact Decatur Electronics Sales Department 800.428.4315 for upgrade information.

Q. SYS appears in the MODE window and nothing else works?

A. If your unit has a system error, turn the unit off and on. If it still says SYS, contact Decatur Electronics.