TYPE OF RADAR GUN

OPERATION AND GENERAL FUNCTIONING OF THE RADAR GUN

Stalker Lidar Speed Laser

Once the target is selected, squeeze the trigger to transmit. To “Lock” a target in Tracking Mode, simply release the trigger. To “Lock” a target in Single Shot Mode, simply press the trigger and wait a moment for the “Beep”. The “Lock” LCD display will stay on until the trigger is squeezed again. The “Lock” HUD display will clear in 10 seconds.

Three Operation Mode

- **Tracking Mode**: When the trigger is pressed, the tracking mode will continuously tracks a moving target. The display on the Speed and Range field should be “ ---- “ indicating Tracking Mode. Operation – Pressing and holding the trigger down for constant transmitting (normal factory setting), or by pressing the trigger to indicate the beginning and pressing again to end transmitting (optional factory setting).

- **Single Shot Mode:** When the trigger is pressed, the single shot mode tracks a moving target and then “Locks” the target speed. The display on the Speed and Range field should be “-SS-“ indicating Single Shot Mode. It is important to steady the unit to minimize the shot interval when using this mode. Operation – Point the radar at the vehicle and pull the trigger. The speed and the range (distant) of the vehicle will appears in both the Speed & range Field on both LCD and HUD LED display. Both speed and range display will remains once transmitting has end and there is no need to clear the speed and range of the vehicle from the display before tracking the next vehicle.

- **Time & Distant Mode**: The time and distant mode allows you to enter a min and a max distance, and then determine the average speed of a vehicle by clocking the amount of time it takes for the vehicle to travel between these two points. Once a distance is entered, the time it takes a vehicle to pass through this distance is entered by separate trigger depressions which start and stop the timing clock. Recommend distant of 300-600 feet (90-180 meters). Operation – After setting the max and min points, when the vehicle enter the first point, press the trigger and release. When the vehicle reaches the second point, press the trigger and release. The average of the speed will be displayed in the Speed Field and the total time is displayed in the Range Field. Note: The greater the speed, the longer the measurement distance should reduce the possibility of an error.

Three Setup Mode

- Speed Alert Mode
- Minimum Mode
- Maximum Mode

One Test Mode

- Sight Alignment Mode

Inclement Weather Mode

- This inclement weather mode feature allows the radar to track through interfering weather phenomena. This mode can only be use with Tracking Mode or Single Shot Mode and a distant less than 250 feet (approx. 75 meters)
-

Stalker II SDR - Pending no information yet since **20th January 2010.**

Stalker ATR

Three Operation Mode

- **Stationary Mode**: To measure the speed of moving vehicle. Operation – Simply aim the unit at the target and pull the trigger (and hold). The radar signal will transmitted with XMIT text and target speed display on the LCD. A Doppler tone will also be heard proportional to the target speed from the unit. When the trigger is releases, the last reading obtained will be retained on the display until the trigger is pressed again.

- **Moving Mode**: Two signals must be processed to determine the target speed.

- **Fast Mode**: To Track small and high speed target.

MPH Z35

Two Operation Mode

- **Stationary Mode:** To track in-coming or going target while the patrol vehicle is in the stationary position.

- **Fast Mode:** To process many targets at the same time. (Only available on Z25 and Z35 model).

Trigger Control

- **Two Stage Trigger**: The trigger control has two major functions, transmit/hold and lock/release. The trigger has two distinct notches that are felt as the trigger is pulled. The first notch is transmit, the second is lock. Pulling and holding the first trigger at the first notch turns the transmitter ON and if the targets are present, speeds will be displayed. Releasing the trigger turns the transmitter OFF. The second notch of the trigger will lock the target. The target maybe locked any number of times by releasing back to the first notch and pulling to the second notch again.

- **Single or Two Stage Trigger**: Once the radar unit has been placed into standby with a locked speed, pulling the trigger again will cause the Lock Speed to be erase. A target locked for 15 minutes will automatically be cleared. Note: Transmit is limited to 3 minutes on a single pull of the trigger! This prevents rubber banding the trigger from defeating the safety mechanism.

Laser Altanta Speed Laser

Speed Detection Mode

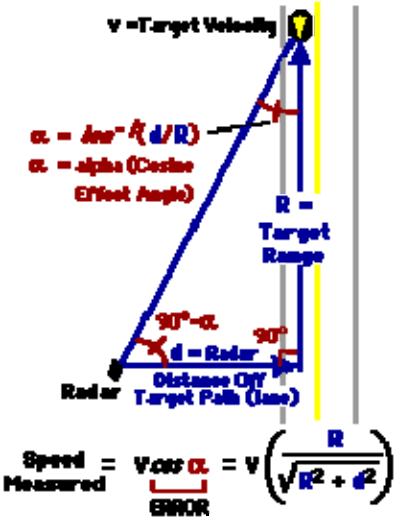
- Squeeze and hold the handle to measure the approaching speed. Trigger (Press “B” the fire button on the top) until speed is displayed. Receding speed “-“ will be precede the speed display, in both HUD and LCD display.
- Release the handle trigger (or fire button) to stop measurement.
- The speed will display twice on the right side of the LCD and HUB Display. The distance to the target will display on the left side of the LCD.

Note: Pressing the trigger/ fire button will take you to the speed display page regardless of any other mode the Speed Laser maybe in.

COMMON ERRORS WITH RADAR

ANGLE ERROR (COSINE ERROR GEMOMETRY)

Cosine Effect Setup - The cosine effect angle (alpha) is the angle between the radar and the target direction of travel. Target range from radar and radar distance off the road (really the distance between radar and the point the target would be closest to radar if target continues in same direction) determine the cosine effect angle. Note that the **road direction and antenna direction (direction antenna pointed) are completely irrelevant**, only the angle (alpha) matters (radar stationary).

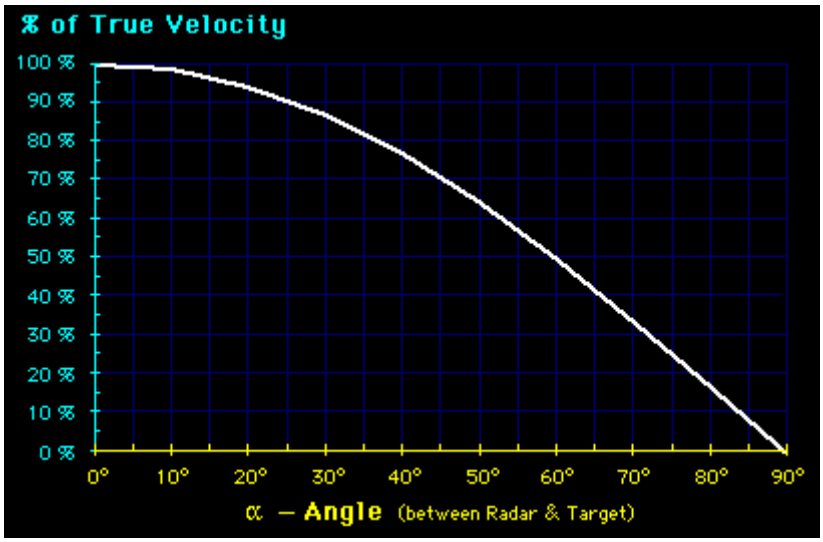


Antenna direction (alignment to patrol car direction) is important in **moving mode** radar. A misaligned antenna measures target speed high if the misalignment is great enough, the target is approaching the moving radar, and the target is traveling slower than the radar.

As long as the angle (alpha) remains relatively small, the error (cosine of alpha) is tolerable. The larger the angle, the larger the error and the lower the displayed (relative) speed. On a straight section of road, **radar distance from the road** and the **range of the target** determine the **angle**. The greater the distance the radar is off the road and/or the closer the target, the larger the angle (and error). When the target is even with the radar (alpha equals 90 degrees) the target speed, with respect (relative) to the radar, is zero.

The Cosine Effect applies to both **microwave** radars and **laser** radars as well as to targets traveling in any direction (on-coming or going traffic at any angle). Most traffic radars do not account for the Cosine Effect; across the road microwave radars (such as photo radars) are an exception. These systems point the beam at a known fixed angle across the road and compensate the measured target speed for the Cosine Effect.

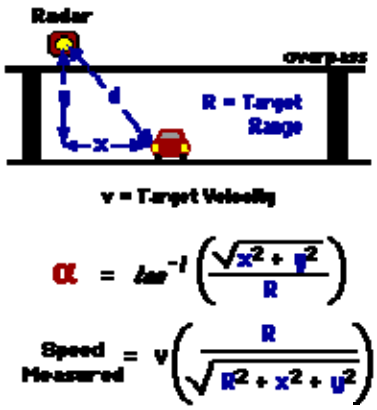
Cosine Error - The below figure is a graphical representation of the Cosine Effect for measured speed, as a **percentage of true speed** versus **angle** (alpha) between radar and target -- the larger the angle the larger the error and the lower the measured target speed. For example at angles of only a few degrees the measured speed is 99 to 100 percent of actual; at an angle of 60 degrees the measured speed is half (50 percent) the actual target speed.



Angle VS Measured Speed (percent of actual speed)

Cosine Effect from an Overpass -

The radar distance from (off) the road is the line-of-sight distance from the radar to the road (target path). If the radar is on an overpass (shooting cars running under the overpass) or hill for example, the radar distance from the road is the distance from the radar position to the road (target path) as in the side figure. In the figure the traffic is traveling directly away or into the page.



In the side figure, **x** represents the horizontal distance and **y** represents the vertical distance from the road to the radar. The line-of-sight distance is **d**. If either the horizontal or vertical component is zero, the equations reduce to that shown in figure - where **d** = **y** (if **x** = 0), or **d** = **x** (if **y** = 0). When applying the equations, all distances must use the same unit dimensions (feet, meters, etc.).

When calculating the angle (alpha) using the inverse tangent function (arctan), the unit dimension of the calculated angle is radians (rad), not degrees. Pi (3.14159...) radians equals 180 degrees; one radian approximately equals 57.3 degrees. **Degrees** = radians x (180/pi).

Angle Error (Cosine Error) –

The most common mistake made with all radar guns is trying to clock targets at angles. All radar guns works on the Doppler principle and need to clock objects moving directly at or away from the gun. Clocking at an angle with stationary radar will result in angle error and the gun will display a speed that is **LOWER** than the actual speed. Below is a chart to determine how much angle error is caused at different angles.

	0 degrees	5 degrees	10 degrees	15 degrees	30 degrees	45 degrees	90 degrees
% Error	0.0%	0.4%	1.5%	3.4%	13.4%	29.3%	100.0%
25 mph	25.0 mph	24.9 mph	24.6 mph	24.1 mph	21.4 mph	17.8 mph	0.0 mph
50 mph	50.0 mph	49.8 mph	49.3 mph	48.1 mph	42.8 mph	35.6 mph	0.0 mph
75 mph	75.0 mph	74.7 mph	73.9 mph	72.2 mph	64.2 mph	53.4 mph	0.0 mph
100 mph	100.0 mph	99.6 mph	98.5 mph	96.3 mph	85.6 mph	71.2 mph	0.0 mph
125 mph	125.0 mph	124.5 mph	123.1 mph	120.3 mph	107.0 mph	89.0 mph	0.0 mph
150 mph	150.0 mph	149.4 mph	147.8 mph	144.4 mph	128.4 mph	106.8 mph	0.0 mph
200 mph	200.0 mph	199.2 mph	197.0 mph	192.5 mph	171.2 mph	142.3 mph	0.0 mph
300 mph	300.0 mph	298.8 mph	295.5 mph	288.8 mph	256.8 mph	213.5 mph	0.0 mph

	0 degrees	5 degrees	10 degrees	15 degrees	30 degrees	45 degrees	90 degrees
% Error	0.0%	0.4%	1.5%	3.4%	13.4%	29.3%	100.0%
41 km/h	41.0 km/h	40.8 km/h	40.4 km/h	39.5 km/h	35.1 km/h	29.2 km/h	0.0 km/h
81 km/h	81.0 km/h	80.7 km/h	79.8 km/h	78.0 km/h	69.3 km/h	57.6 km/h	0.0 km/h
121 km/h	121.0 km/h	120.5 km/h	119.2 km/h	116.5 km/h	103.6 km/h	86.1 km/h	0.0 km/h
161 km/h	161.0 km/h	160.4 km/h	158.6 km/h	155.0 km/h	137.8 km/h	114.6 km/h	0.0 km/h
202 km/h	202.0 km/h	201.2 km/h	199.0 km/h	194.4 km/h	172.9 km/h	143.8 km/h	0.0 km/h
242 km/h	242.0 km/h	241.0 km/h	238.4 km/h	232.9 km/h	207.2 km/h	172.2 km/h	0.0 km/h
322 km/h	322.0 km/h	320.7 km/h	317.2 km/h	309.9 km/h	275.7 km/h	229.2 km/h	0.0 km/h
483 km/h	483.0 km/h	481.1 km/h	475.8 km/h	464.9 km/h	413.5 km/h	343.7 km/h	0.0 km/h