RADAR OPERATOR

Presented by Central Marin Police Authority
RADAR OPERATOR TRAINING

**Introductions**

- **Your name**
- **Agency**
- **Years**
- **Current assignment**

- **Scott Niklewicz**
- **Central Marin Police Authority**
- **13 years**
- **Traffic Supervisor**
- **Radar/LIDAR operator since 2007**
RADAR OPERATOR TRAINING

- Restrooms
- Breaks
- Cell phones
- Forms
RADAR OPERATOR TRAINING

• Course Content
  • 24 hours POST certified
    • Speed Enforcement
    • Radar Technology
    • Equipment
    • Legal Aspect
    • Case Law and Courtroom Testimony
WHY DO WE DO TRAFFIC ENFORCEMENT?

HTTPS://YOUTUBE.BE/h1wFsOScF0
RADAR OPERATOR TRAINING

- History
- Perception and Reaction
- Collisions
- Stopping Distance
## Stopping Distances for Passenger Vehicles

<table>
<thead>
<tr>
<th>Speed (Miles Per Hour)</th>
<th>Perception + Reaction Distance</th>
<th>&quot;Brake Lag&quot; Distance</th>
<th>Effective Braking Distance</th>
<th>Total Stopping Distance</th>
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<td>0</td>
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</table>

**A. Perception + Reaction Distance =** Feet Traveled in 1.5 Seconds. The average driver's perception time is .75 seconds and the average reaction time is also .75 seconds.

**B. "Brake Lag" Distance =** Brake lag in a passenger vehicle is approximately .05 of a second. This figure is generally not taken into consideration in determining stopping distances.

**C. Effective Braking Distance =** Feet Traveled after brakes make contact with drums/rotors with good braking efficiency on good dry level pavement. Coefficient of Friction = .70. Deceleration Rate = 22.5 feet per second per second average.

**D. Total Stopping Distance =** Perception + Reaction + Brake Lag + Effective Braking Distance.
PERCEPTION AND REACTION

- It will take a driver .75 seconds to recognize a hazard, and .75 seconds to react to that hazard
- 1.5 seconds to respond to hazard in roadway
WHY IS SPEEDING DANGEROUS?

- A vehicle traveling at 40 mph in a 25 mph zone will take nearly twice as long to stop as a vehicle traveling at the speed limit.

- 165 feet versus 85 feet.
SPEED LIMITS

- Basic Speed Law
  - 22350 VC
- Maximum Speed Limits
  - 22349 VC
  - 22356 VC
  - 22406 VC
SPEED LIMITS CONT.

• Prima Facie Speed Limits
  • 22352 VC
    • Non-Punitive – Cite 22350 VC
  • Residential, School Zones, Construction Zones
VIDEO: DON'T BE THIS GUY

• HTTPS://YOUTUBE/ZVN7BBKKBO
RADAR HISTORY

• Radar is an acronym
• RADIO
• DETECTION
• AND
• RANGING
WHY IS RADAR NEEDED?

- Collisions
- Traffic Complaints
- Not Responding to Traditional Enforcement
VIDEO: MIKE THE COP

• HTTPS://YOUTUBE/1HQ_000EF0C4
THE DOPPLER PRINCIPLE

- Compression of waves if approaching
- Elongation of waves if receding
VIDEO: HOW RADAR GUNS WORK

https://youtu.be/DAwW7_nYG0c
TYPES OF RADAR

- Pulse radar
- Doppler radar
RADIO WAVES

- 3 Things in Common
  - Wavelength
  - Frequency
  - Travel at the Speed of Light
    - 186,000 MILES per second (approximately)
RADIO WAVE PROPERTIES

One Cycle

Wavelength
Beginning of Peak to End of Valley
RADAR CONCEPTS

• **Frequency**
  - **Hertz (Hz)** = 1 cycle per second (cps)
  - **Kilohertz** = 1000 cps
  - **Megahertz** = 1,000,000 cps
  - **Gigahertz** = 1,000,000,000 cps
RADAR CONCEPTS CONT.

- **Traffic Radar Frequency**
  - **K Band** – 24.150 GHz
    - Genesis handheld radar
  - **Ka Band** = 33.4 to 36.0 GHz
    - Stalker Radar
RADAR CONCEPTS CONT.

- **Beam Properties**
  - Conical
- **Side Lobes**
- **Beam Width**
  - Becomes wider as it travels further away from the radar unit
Radar Concepts Cont.

11° Beam width

0' 50' 100' 200' 1000'

RADAR CONCEPTS CONT.
BEAM WIDTH FORMULA

\[ X = 2D \tan \left( \frac{1}{2} \right) \]
RADAR CONCEPTS CONT'D.

• **Beam Energy**
  - 85%
• **Operational Range**
VIDEO: RADAR DETECTORS

- HTTPS://YOUTU.BE/Y15Eh_aSW5w
RADAR CONCEPTS CONT'D.

- **Doppler Shift**
  - The radar is "looking" for the difference
  - Transmitted frequency vs. reflected frequency
RADAR CONCEPTS CONT.

• **Cycles Per Second for 1 MPH**
  • **K-band**
    • 1 MPH = 72 cps
  • **Ka-band**
    • 1 MPH = 104 cps
RADAR CONCEPTS CONT.

- **Stationary Radar**
  - Doppler shift
- **Moving Radar**
  - Doppler shift and
  - Subtraction of Patrol Car Speed
RADAR CONCEPTS CONT.

• **Moving Radar**
  • Low Doppler (Patrol Doppler)
  • High Doppler (Target Doppler)

• **Basic Computation for Moving Radar**
  • Target Doppler – Patrol Doppler = Computed Target Speed
RADAR EFFECTS

- **Cosine or Angular Effect**
  - **Always present**
  - **Anytime the target vehicle is not directly in front of the radar**
- **Can be present in moving mode or stationary mode**
RADAR EFFECTS CONT.

- **Interference**
  - Batching Effect
  - Shadow Effect
  - Scanning Effect
  - Feedback (Panning) Effect
  - The Nichols Effect
RADAR EFFECTS CONT.

- Interference cont.
  - Beam Reflection
  - Weather
- Recognizing the Effects/Interference
  - Result of mis-operation
  - Lack supportive evidence
TRACKING HISTORY

- Target in beam
- Visual estimation of speed
- Audio Doppler
- Speed reading on radar unit
TRACKING HISTORY

- **Lane Selection**
- **Reflective Capability**
EQUIPMENT

• Components
  • Antenna(s)
  • Counting Unit
  • Display
• Verification and Calibration Tests
  • Demonstration
EQUIPMENT

- Discuss equipment currently in use and its operation
  - Decatur Genesis handheld
PATROL TECHNIQUES AND TACTICS

- STATIONARY OPERATION
- MOVING OPERATION

WATCH YOUR U-TURNS!!!!!!
Central Marin Police Authority Policy

- There is no current policy
SPEED TRAPS

40802 VC

• (A) A "SPEED TRAP" IS EITHER OF THE FOLLOWING:

• (1) A PARTICULAR SECTION OF A HIGHWAY MEASURED AS TO DISTANCE AND WITH BOUNDARIES MARKED, DESIGNATED, OR OTHERWISE DETERMINED IN ORDER THAT THE SPEED OF A VEHICLE MAY BE CALCULATED BY SECURING THE TIME IT TAKES THE VEHICLE TO TRAVEL THE KNOWN DISTANCE.
SPEED TRAPS

• **[2]** A particular section of a highway with a prima facie speed limit that is provided by this code or by local ordinance under paragraph (1) of subdivision (b) of Section 22352, or established under Section 22354, 22357, 22358, or 22358.3, if that prima facie speed limit is not justified by an engineering and traffic survey conducted within five years prior to the date of the alleged violation, and enforcement of the speed limit involves the use of radar or any other electronic device that measures the speed of moving objects, this paragraph does not apply to a local street, road, or school zone.

• **[b] [1]** For purposes of this section, a local street or road is one that is functionally classified as "local" on the "California Road System Maps," that are approved by the Federal Highway Administration and maintained by the Department of Transportation. When a street or road does not appear on the "California Road System Maps," it may be defined as a "local street or road" if it primarily provides access to abutting residential property and meets the following three conditions:

  • **(A)** Roadway width of not more than 40 feet.
  • **(B)** Not more than one-half of a mile of uninterrupted length. Interruptions shall include official traffic control signals as defined in Section 445.
  • **(C)** Not more than one traffic lane in each direction.
SPEED TRAPS

• **(A) When radar is used, the arresting officer has successfully completed a radar operator course of not less than 24 hours on the use of police traffic radar, and the course was approved and certified by the Commission on Peace Officer Standards and Training.**

• **(B) When laser or any other electronic device is used to measure the speed of moving objects, the arresting officer has successfully completed the training required in subparagraph (A) and an additional training course of not less than two hours approved and certified by the Commission on Peace Officer Standards and Training.**
CRS MAPS
CASE LAW

• State vs. Dantonio (New Jersey)
  • Judicial notice of the Doppler Principle

• State vs. Tomanelli
  • Judicial notice of the tuning fork test

• Kentucky vs. Honeycutt
  • Operator qualifications and training
CASE LAW

• **People vs. Miller (CA)**
  - Radar may be used for max speed without a survey

• **People vs. Krueger, Pantos, Payne et al.**
  - Inadequate training

• **People vs. DiFiore (CA)**
  - OK to use radar on a road which has a prima facie limit and no survey as long as that limit is not mentioned. Must cite maximum
CASE LAW

- **People vs. Hanson (Wisconsin)**
  - Moving radar
- **Florida vs. Aguilera**
  - Inadequate training
- **People vs. Halopoff (CA)**
  - Prosecution must present traffic survey if it applies to the roadway/speed limit
CASE LAW

- **People vs. Goulet (CA)**
  - Speed trap exists if the limit is not justified by the survey
RADAR EVIDENCE

- Evidence Kit
  - Documents for court
  - Notes on officer’s copy
THINGS TO REMEMBER WHEN TESTIFYING

- What were you wearing and driving?
- Testing beginning and end of shift
- Radar calibration within 3 years
- Engineering and traffic survey on file with the court
- Completed a 24 hour post certified course
- Serial number of device
- Posted speed limit
- Why you felt it was unsafe
QUESTIONS?