**Purchase Specification**

**for a**

**12" Radar Speed Sign (AC-powered)**

1. **Overview**

**Each 12" radar speed sign shall consist of an LED display and enclosure assembly that houses the LED display board, radar, controller, strobe, and Bluetooth hardware. Optional remote connectivity for two-way communication and control shall be available. Each 12" radar speed sign shall include a static sign mounted directly to the LED display enclosure. The 12" radar speed sign shall be pre-wired to the maximum extent possible. The 12" radar speed sign shall conform to MUTCD legibility standards for color, character, and letter height.**

1. **Mechanical**

**The 12" radar speed sign shall be a clamshell design consisting of three major components: LED display enclosure, rear enclosure, and universal mounting bracket.**

**The LED display enclosure shall house the radar unit, controller, strobe, and LED display board in one preassembled unit. The LED display enclosure shall be constructed from 11-gauge (0.091") aluminum. The LED display enclosure shall mount to the static sign with six tamper-resistant screws and be secured to the rear enclosure via integrated tamper resistant hinges. The LED display enclosure shall be secured to the rear enclosure via a “keyed” barrel lock.**

**The rear enclosure shall be a non-sealed, ventilated NEMA 3R type design. The rear enclosure shall be constructed from 11-gauge (0.091") aluminum. The vents shall be screened to prevent ingress by insects and debris.**

**The 12" radar speed sign shall consist of modular components that are field-replaceable without complete removal of the product assembly from the mounting post or pole. The static sign, display window, rear enclosure, and LED display enclosure shall all be field-replaceable.**

**The display shall be a seven-segment design for maximum digit recognition. A full matrix or 13-segment design is not acceptable.**

**Each individual segment shall consist of 16 discrete surface mounted LEDs each with an approximately 15° viewing angle.**

**Each seven-segment digit shall be 12" (30.5 cm) in height.**

**The display design shall have an approximately 1" black border around the LED sections and shall have very high contrast between LEDs and their immediate background to maximize visibility in direct sunlight, fog and nighttime conditions.**

**Non-illuminated portions of the seven-segment display must not have visible “88” ghosting when a mix of on and off segments is displayed or in direct sunlight.**

**The display window shall be made of 3/16" (4.76 mm) thickness shatter-resistant UV-protected polycarbonate.**

**The LED display enclosure window shall be designed with LED safety masking to reduce driver distractions introduced by the illuminated display. The display view shall be limited to the forward viewing angle approximately 30° from the roadside.**

**The display window shall have a matrix of clear, uncoated, individual windows for each LED and a black surround matrix of less than or equal to 25% reflectance in accordance with the MUTCD, to maximize viewing contrast in all lighting conditions.**

**Display must not use anti-glare sheeting that would reduce the display’s visibility and contrast.**

**The LED display enclosure shall have a single integrated white strobe, consisting of seven discrete surface mounted LEDs, which shall be powered and triggered from the display’s controller at a programmable speed threshold from 5 to 99 mph (8 to 99 km/h).**

**The LED display enclosure shall have four discrete downward facing status LEDs, visible from the front that indicate power status, vehicle detection status, radar status, and system status.**

**The LED display enclosure without static sign shall not exceed 21.8" (55.4 cm) in width and 15.9" (40.4 cm) in height. The depth of the combined LED display enclosure and rear enclosure shall not exceed 6.0" (15.2 cm).**

**The LED display enclosure shall be constructed to absorb impacts from thrown objects or vandalism attempts. Display window shall deflect inwards without damaging internal components. The LEDs shall be protected by internal rubber bumpers contacting the polycarbonate window upon deflection.**

**The LED display control circuitry shall be reverse polarity protected.**

**All user-accessible cabling shall be labelled and fitted with unique connectors to physically restrict improper electrical connections.**

**The 12" radar speed sign shall have an integrated handle and sit flat when stored upright.**

**The static sign shall be constructed from 12-gauge (0.080") aluminum and shall adhere to the MUTCD size requirement of 30" (76.2 cm) wide by 24" (61 cm) high. Optional 24" (61 cm) wide by 22" (55.9 cm) high and 30" (76.2 cm) wide by 36" (91.4 cm) high sizes shall also be available.**

**Static sign letters, “YOUR SPEED”, shall be printed in one line using approximately 4" high letters, or on two lines using approximately 5" high letters. The static sign background shall be fluorescent yellow-green, yellow, orange, or white high intensity retroreflective sheeting or equivalent.**

**Mounting:**

**A universal mounting bracket shall be provided that will accommodate the following mounting configurations: square post, round pole, and flat surface.**

**The universal mounting bracket shall be constructed from 10-gauge (0.102") aluminum. The 12" radar speed sign shall attach to the pole mount via integrated hooks on the rear enclosure. The 12" radar speed sign shall be secured to the mounting bracket via a single retention bolt, which is concealed within the rear enclosure. When the LED display enclosure is mated and locked to the rear enclosure, the retention bolt shall be inaccessible without unlocking the assembly.**

**The LED display assembly and rear enclosure may be removed from the pole without removing the pole mount.**

**Mounting hardware kits for the 12" radar speed sign shall be available for the following configurations:**

* **2.38" - 2.88" OD-round or square side of pole**
* **2.38" - 4.75" OD-round side of pole**
* **5.5" - 8.25" OD-round side of pole**
* **Flat surface**

**Specialized tools shall not be required for standard mounting configurations.**

**The 12" radar speed sign display cabinet shall be rated to a minimum of NEMA 3R.**

**The sign shall be 170 mph (274 km/h) wind load rated when installed as specified by the manufacturer.**

**The 12" radar speed sign shall meet a system operating temperature between -40 to 167 °F (-40 to 75 °C).**

**The 12" radar speed sign shall not exceed 15 lbs. (6.8 kg), not including mount.**

**The rear enclosure shall be vented to provide air circulation and cooling of the electronics.**

1. **Electrical**

**Radar device shall meet specifications for an FCC part 15 Low Power Device - 24.150 GHz (K-band) and shall not require an operating license.**

**The radar shall have a reporting accuracy of +/- 1 mph and shall be set to detect approaching vehicles only.**

**The 12" radar speed sign shall have a detection range for oncoming vehicles of: 5 to 99 mph (8 to 99 km/h).**

**Radar shall operate on voltages from 10.5VDC to 16.8VDC and shall consume less than 1/3 amp at 12VDC, typically <1/10 amp.**

**The 12" radar speed sign shall be capable of displaying the numeric readout value within one second of detection of a vehicle and shall hold the detected speed for approximately one second after the vehicle passes outside the detection area and return to standby mode with a blank display when no vehicles are present.**

**The 12" radar speed sign, with the LEDs illuminated at full intensity, shall consume less than 4 Watts and less than 0.5 Watts when operating in stealth mode (collecting data but no display).**

**The system shall use an ambient brightness sensor for automatic nighttime dimming.**

**AC Power System:**

**The rear enclosure shall house a universal AC power supply capable of operation from 85-254VAC/47-440Hz. Power supply shall be rated for 60W and output 15VDC. AC wiring input shall terminate on DIN-rail-mounted components, which includes a 4A circuit breaker.**

**The universal power supply, the DIN-rail assembly, and a separately mounted ground connection busbar shall be mounted to an aluminum base plate within the rear enclosure.**

**Fluctuations in line voltage within normal limits shall not affect luminous intensity of the display.**

1. **Solar Simulations (If Applicable)**

**Not applicable for AC-powered configuration.**

1. **Configuration and Operation**

The 12" radar speed sign programming software and mobile app shall maintain settings and schedules indefinitely.

Display shall have the following speed threshold programming capabilities:

* Display on/off (stealth mode)
* Minimum displayed speed
* Speed limit
* Flashing digits in excess of pre-set violation threshold
* Flashing strobe in excess of pre-set violation threshold
* High-speed blank-out threshold

Display digits shall flash upon breach of the violation threshold at a user selectable rate from 30 – 150 FPM, factory programmed to 109 FPM.

The radar sign shall have integrated data collection and scheduling capabilities. Data collection function shall have the capacity to record over 300,000 individual data points which include date, time, and speed.

Scheduling shall be able to be programmed and uploaded to the 12" radar speed sign from a compatible mobile device.

Vehicle data from the 12" radar speed sign shall be able to be downloaded from a compatible mobile device and distributed via SMS or email.

Vehicle data shall be formatted as a .csv file that can be imported into other traffic analysis tools.

Optional traffic analysis software shall be available. The software shall have the ability to analyze traffic data that has been downloaded from the sign. The software shall have the ability to display the date, speed and time of the vehicle, the number of daily vehicles, average daily volume, posted speed, average speed, vehicles within user-specified percentiles (typically 50th and 85th percentiles), and percent compliance. The software shall also contain filters for creating customized reports.

The 12" radar speed sign mobile app shall allow programming, scheduling, data downloads, and diagnostics to be accessible via Bluetooth wireless link to a Windows-compatible computer or mobile device, and shall have the following display diagnostics:

* Test the real-time connection to the sign
* Run a test sequence that initiates a display digit roll-up test to verify the sign is operating properly
* System voltage check, to confirm the power supply voltage
* Validate real-time vehicle count to determine if data is being collected and radar is operational
* Ability to verify and update to new firmware versions
* Check various status conditions
* Program and upload schedules

The 12" radar speed sign shall be capable of displaying numbers from 1 to 99 with display in mph or km/h as selected.

The mobile app shall be available free of charge on the Apple App Store or Google Play Store for compatible devices. The mobile app can be used in conjunction with the Windows-based software and shall mimic the functionality to the maximum extent possible. Each radar sign shall be password protected by default and must be changed on first connection.

The 12" radar speed sign shall have the capability to integrate with third-party hardware and web-based applications for remote settings control, scheduling, monitoring of system voltage, detected speeds, communication events, and errors.

1. **Remote Monitoring (Optional)**

**The 12" radar speed sign shall have the optional capability to remotely connect to a cloud-based platform allowing for two-way communication and control. The monitoring unit shall be mounted in the rear enclosure and include a GPS and cellular modem with optional ethernet connection and RS-232 port.**

**Monitoring Unit:**

**The monitoring unit shall be a single piece of equipment housed within the rear enclosure and shall not require any peripheral attachments except for the GSM and GPS antenna lead wires for the externally mounted antenna.**

**The externally mounted integrated GSM/GPS antenna shall be a suitable weather-resistant design and shall mount directly to the top surface of the display cabinet without the requirement for additional hardware.**

**The monitoring unit shall be capable of being programmed locally via a laptop interface and ethernet.**

**The monitoring unit shall be capable of receiving over-the-air software and security updates via cellular communication. Physical trips to the monitoring unit shall not be required for updates.**

**The monitoring unit shall be connected-vehicle ready and capable of communicating safety messages to motorists via cellular infrastructure and a mobile application. The monitoring unit shall support the SAE J2735 standard for connected vehicle messages. The monitoring unit shall support both cellular and optional DSRC technology. The mobile application is freely available to all users, including pedestrians, cyclists, and motorists.**

**Connectivity and Support Plan:**

**The 12" radar speed sign shall include cloud-hosted software with user web-based access.**

**The user interface shall be web-based and viewable using any modern web browser such as Chrome, Edge, Firefox, or Safari. This compatibility extends to mobile devices that are able to access fully featured web browsers.**

**Cellular communication shall use the latest 4G LTE wireless broadband networks.**

**1/2/3/4/5-year connectivity and support plans shall be available.**

**The cloud software shall be mobile friendly and operate without requiring a static IP address. Operators shall be able to access the data and control the 12" radar speed sign via a mobile device.**

**Over-the-air software and security updates shall be available, and hardware shall be upgradeable if the service provider changes network requirements.**

**The user interface shall include a scrollable, zoomable map display, with the 12" radar speed sign shown as a representative dynamic icon on the map. The map display must have the option of satellite view or standard street view. The map shall include the ability to see the 12" radar speed sign icons using Google Street View.**

**The icons shall be able to identify if there is an alert status or if the 12" radar speed sign is offline.**

**The map display shall allow the operator to turn on layers which can display all 12" radar speed sign designations. Operators shall also be able to Google traffic overlay information so they can see traffic together with the 12" radar speed signs.**

**An integrated GPS shall provide 12" radar speed signs geolocation.**

**If cell service is interrupted or unavailable, events shall be stored in internal memory, and automatically forwarded when cell service is restored. Battery back-up shall also be available for continual operation.**

**The monitoring unit shall autonomously ping the cellular network every 15 minutes to ensure online connectivity.**

**HTTP and HTTPS protocols and XML data structures for communications shall be utilized.**

**The cloud software shall meet NEMA TS 8 requirements for Cyber and Physical Security for Intelligent Transportation Systems.**

**The user interface shall display the alert/fault status, last communication with the device, real-time, minimum, and maximum values for battery voltage, and on/off status. These parameters can be viewed in graphical form.**

**When a fault occurs, real-time alerts shall be published via SMS and/or email. The alert will be immediately sent to the response personnel.**

**Key performance indicators shall be recorded by the software and reported on a weekly or daily basis. The report shall include details on the health condition of the batteries. The following types of reports shall be available: Alerts, User-Activity, Operation, and Fault Repair Response Time.**

**Alerts shall be displayed by color codes to indicate priority and critical nature of the alert.**

**Raw data, error logs, and communication logs shall be available for diagnostics. The logs shall be print-ready or downloadable to spreadsheet.**

**Speed thresholds, schedules, or program delays shall be set-up and downloaded remotely from the cloud-based storage via the web-based user interface. The schedule shall be published to one or more 12" radar speed signs simultaneously.**

**Real time graphs of vehicle speeds and volumes shall be viewable including the median speed, 85th, and 95th percentiles, and volume of vehicles per hour - based on 15-minute interval, average values.**

**The user interface shall have the following programmable options: sign mode (on/off), speed offset, speed limit, minimum display speed, violation alert flashing speed, and maximum display speed. Stealth mode for data collection shall also be programmable.**

1. **Optional Configuration**

The 12" radar speed sign may be configured with any of the following options:

* Cellular connectivity (see Section 6.0)
1. **Qualifications**

The 12" radar speed sign shall be FCC certified to comply with all 47 CFR FCC Part 15 Subpart B Emission requirements.

The 12" radar speed sign shall be manufactured in the USA and shall be Buy America compliant.

Manufacturer shall provide a 3-Year Limited Warranty.

The Manufacturer shall be ISO 9001 certified.

The unit shall be manufactured by Carmanah Technologies.

Manufacturer: Carmanah Technologies Inc.

Model: SPEEDCHECK-12 radar speed sign

Toll-Free: 1-877-722-8877

www.carmanah.com