RoadHound

Cell phone deterrent

User manual version 1.4

RoadHound ships completely assembled and shrinkwrapped on its own pallet. The unit dimensions are 5' x 5' x 7' and weighs approximately 600 pounds.

Overview

Thank you for purchasing the RoadHound cell phone deterrent. It is our goal to utilize wireless technology in an effort to help curb illegal and dangerous use of distracting mobile devices by drivers behind the wheel.

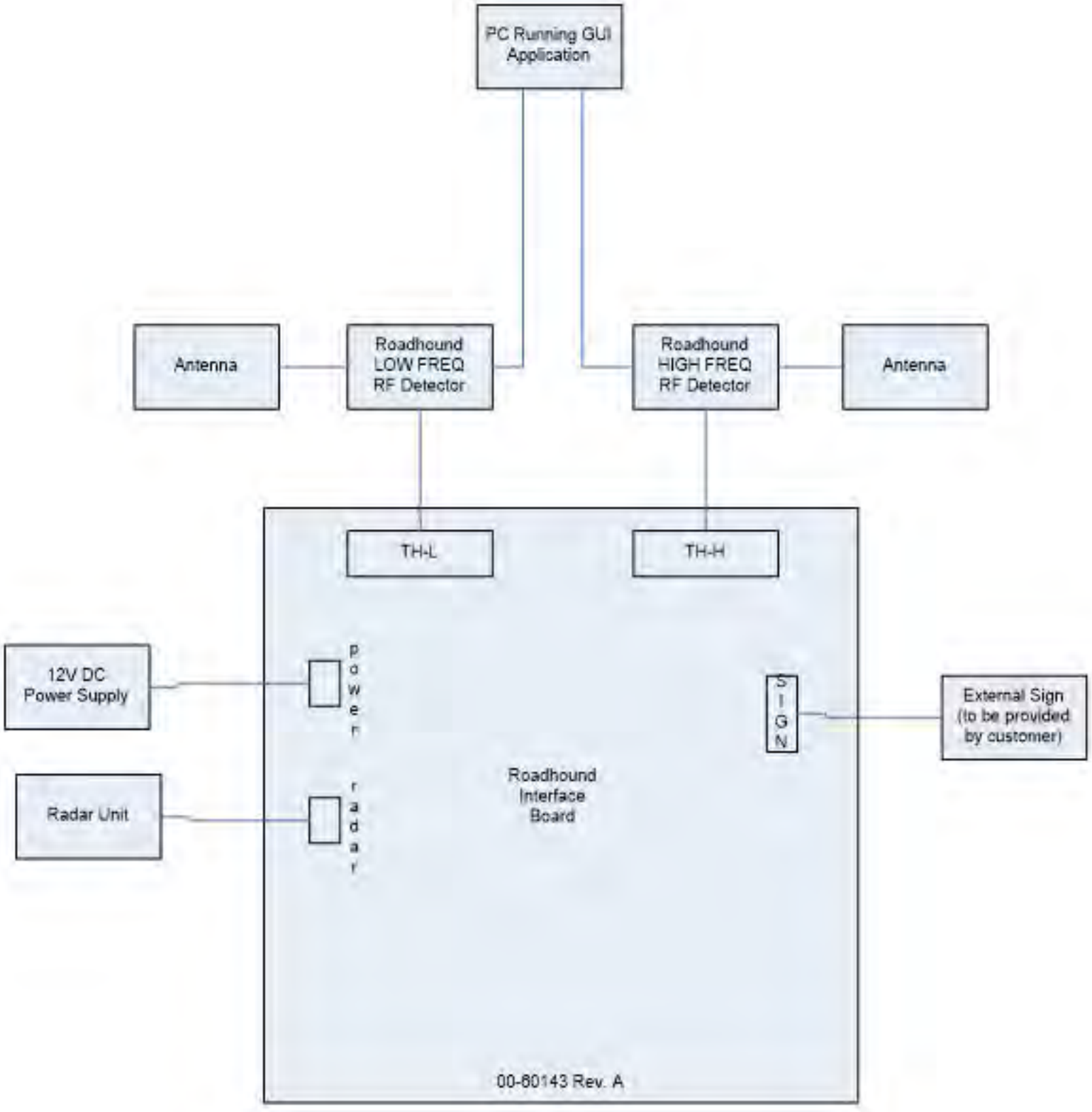
Distracted driving accidents and fatalities continue to rise due to the ubiquity of cell phones used everywhere. RoadHound roadside alert acts as both a detector of active voice, text and data use as well as a warning and reminder to all vehicles in the form of a distracted driving alert. And just like automated electronic radar speed warning signs, RoadHound offers immediate feedback for distracted drivers to put down their wireless devices and pay more attention to safe driving practices without the need for law enforcement presence.

RoadHound™ is an electronic roadside alert and trailer combination that automatically detects and deters distracted drivers on the road. This distracted driving alert is a self-contained DOT certified Wanco mobile trailer including cell phone detection receiver, dual linear

antenna array (high and low band), vehicle detection radar and solar charged battery power. RoadHound was developed for use in rural areas (i.e. single lane roads 45 MPH or less), private campuses or any other areas where cell phone use (talking/texting/surfing the internet) is prohibited. The system includes mechanical and software adjustments to counter terrain, signal coverage, nearby RF interference, weather conditions and overall location of mobile trailer location. Please remember that since this system is a cell phone deterrent and should not be considered a law enforcement tool nor a legal traffic device. There will be occasional false detections due to the nature of radio frequency and the way cellular signals propagate. RoadHound works best as stand-alone deterrent for drivers but can also function as a broad alert for nearby law enforcement agents as well.

The Roadhound cell phone deterrent is a fully self-contained DOT certified trailer which includes both low and high band cell phone detectors, linear antenna array (Direction Finding Antennas), electronic alert sign, vehicle radar detection and solar battery power with integrated charging. The distracted driving alert only detects cell phone use in approaching vehicles and is not triggered by vehicles in the other lane nor by nearby pedestrians on their phones. The RoadHound is proudly designed and manufactured in the USA.

RoadHound Block Diagram Release 1.1.1



* Both antennas are identical, cover both LOW FREQ and HIGH FREQ.

WANCO RADAR UNIT FOR ROADHOUND

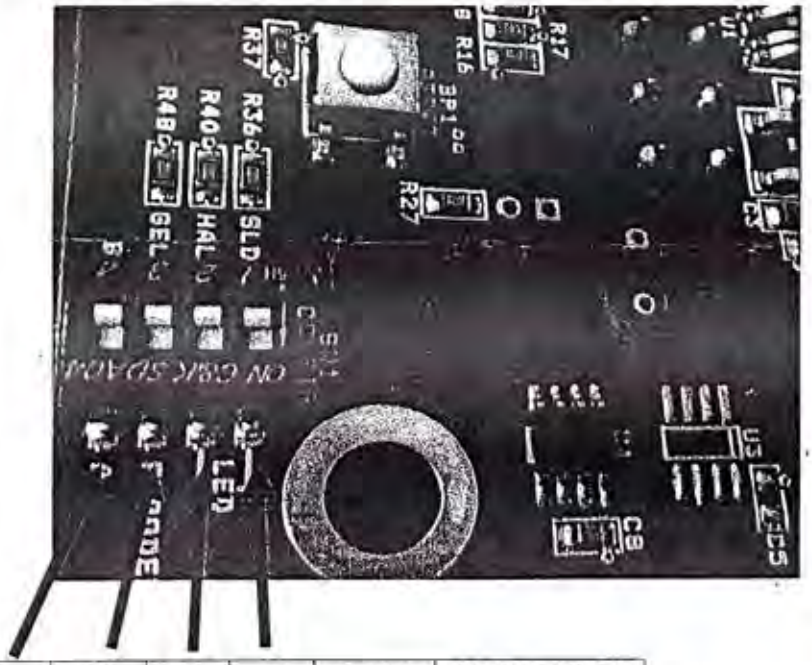
HOOKUP AND USAGE

The Wanco radar unit provided to roadhound has two LEDs on the rear panel. The red LED is a 'heartbeat' signals and blinks once every three seconds. The green LED turns on in concert with the switched 12V that energizes the texting detector unit

The front/blank panel faces traffic, pointing straight down the road. Suggested mounting height is approximately 6' from the ground.

The unit is configured at the factory for a detection speed minimum of 10MPH and an 'ON' duration of 5 seconds to power the texting detector.

Should changing the settings be desired, remove the front panel and configure the DIP switch on the bottom left side of the PCB. The leftmost two bits set detection speed, and the rightmost two bits set 'ON' duration to power the text detector. UP is '1', DOWN is '0'. The image below shows '1111'.



S1	S0	D1	D0	SPEED	ON DURATION
0	0	0	0	5MPH	3 SEC
0	1	0	1	10MPH	5 SEC
1	0	1	0	20MPH	7 SEC
1	1	1	1	30MPH	9 SEC

Please note, settings can be mixed and matched. For example, '0011' is 5MPH/9 SEC ON time.

ELECRICAL HOOKUP:

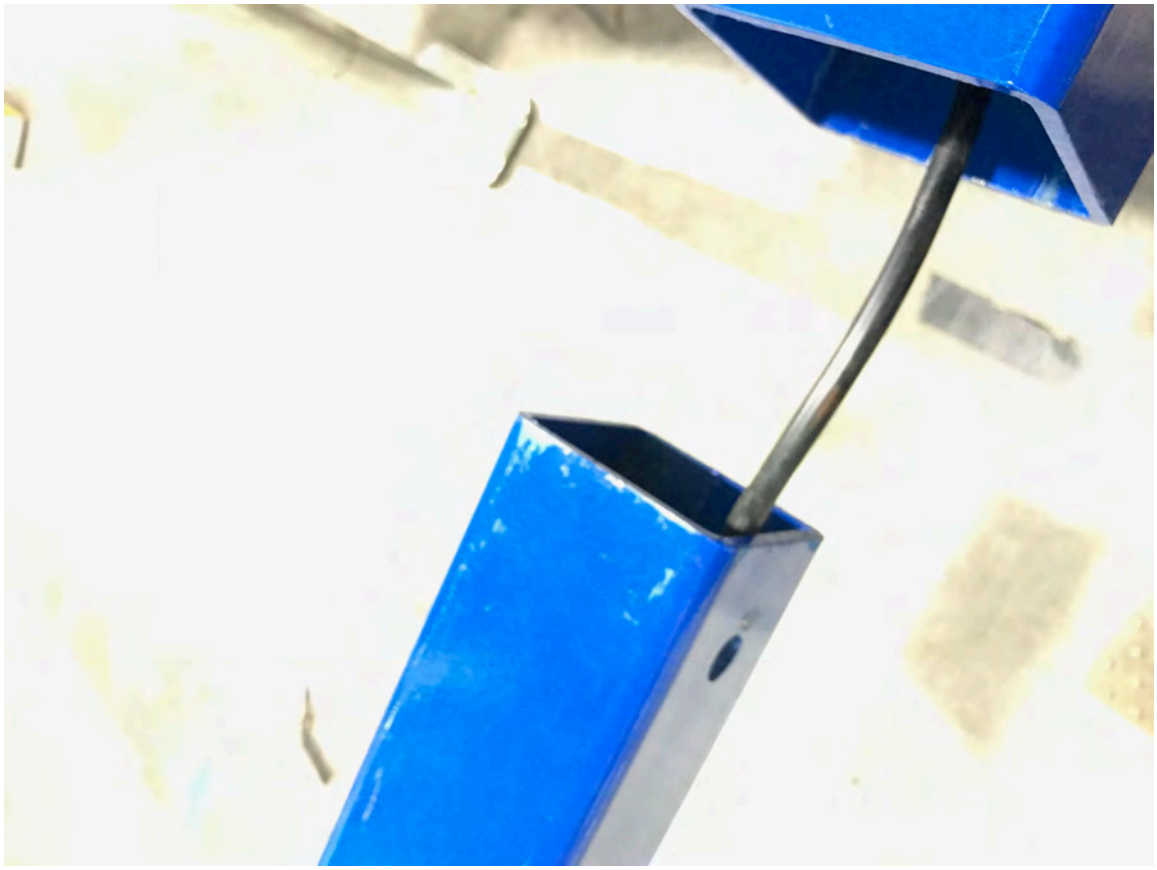
RED: +12/BATTERY

BLK: GROUND

WHITE: TEXT UNIT +12 OUT

GRN: GROUND (TEXT UNIT)

Transport and Setup



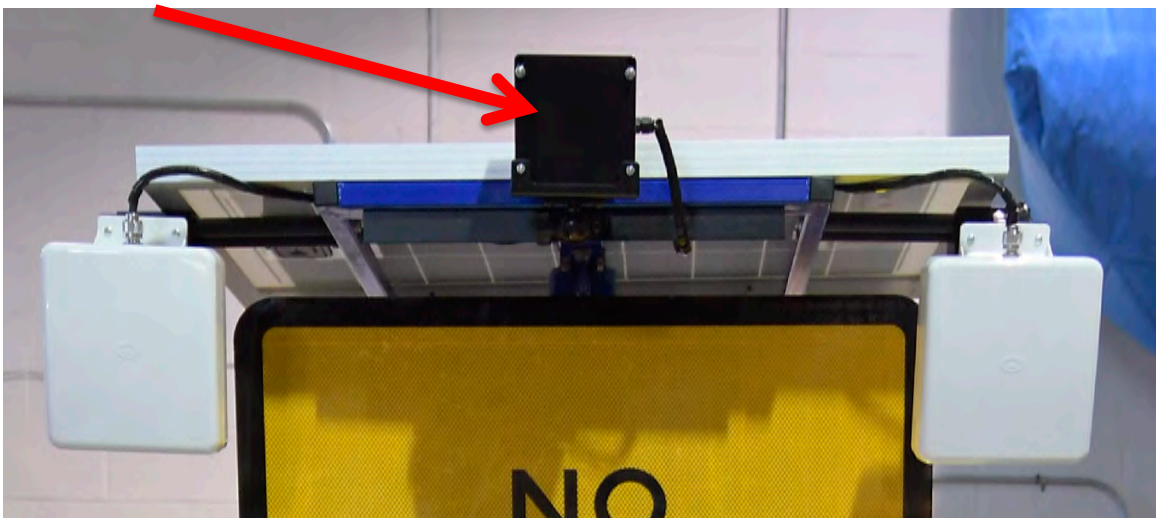
After initially unpacking the RoadHound, be sure to properly install the front hitch bar.

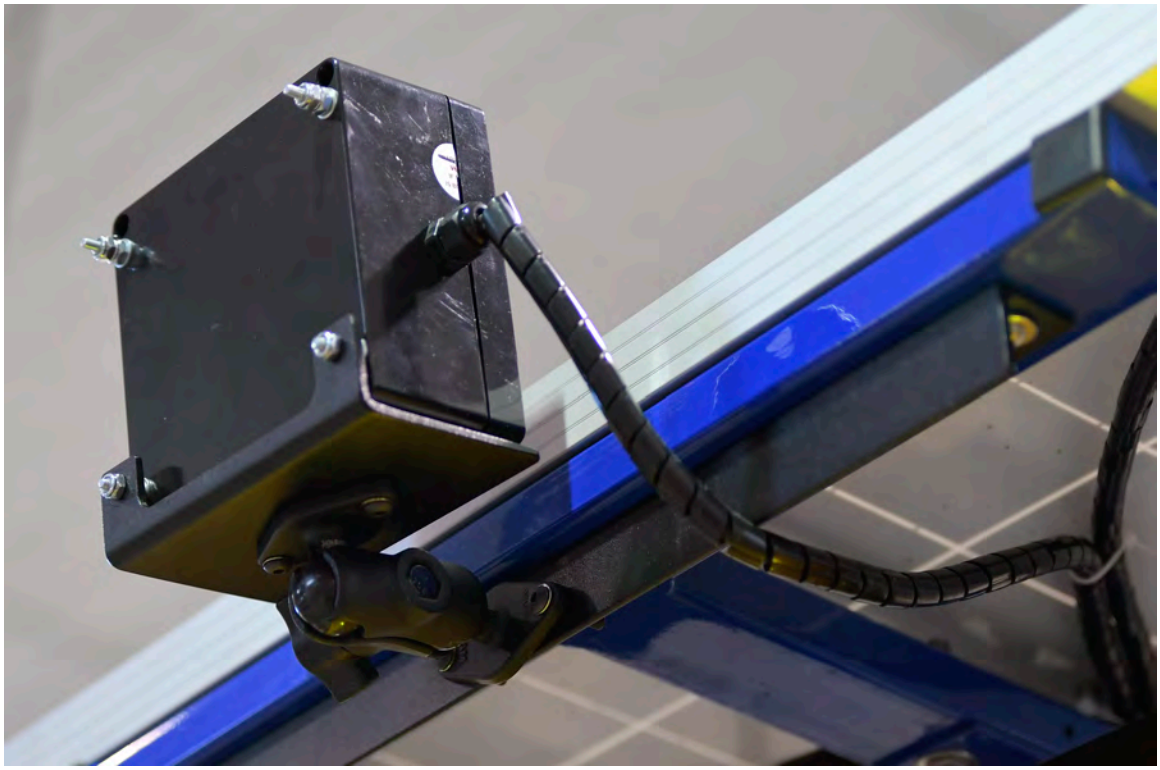
IMPORTANT: when connecting the hitch bar and bolting it to the frame, do not forget to connect the POWER connector. After securing this connection you can slide the wire harness back into the hitch tube.

Firmly secure the bolt and affix it using the split washer and nut.

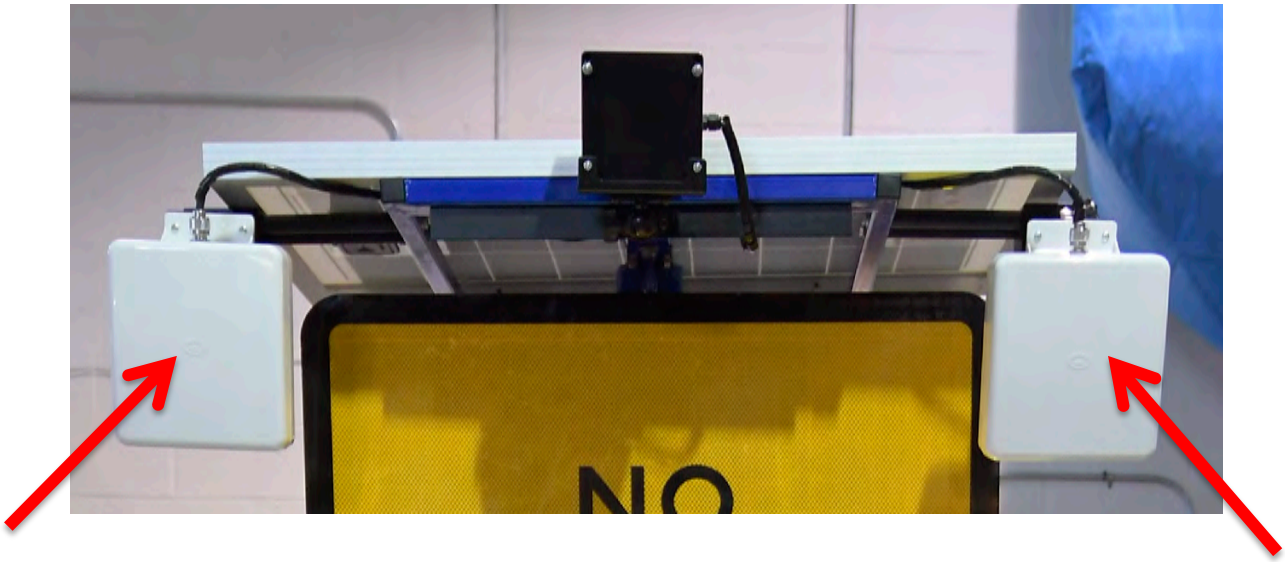
Make sure that all adjustable jack stands are deployed on a solid, level surface to prevent the mobile trailer from rolling or shifting on pavement or earth.

There are (4) main jacks on each corner and (1) jack integrated into the hitch bar. When moving the trailer from one location to another, make sure ALL (5) jack stands are fully retracted after affixing securely to the transport vehicle. Each jack stand is entered into the UP position by releasing the PIN release and rotating it up 90 degrees from the ground surface and locking it into place.





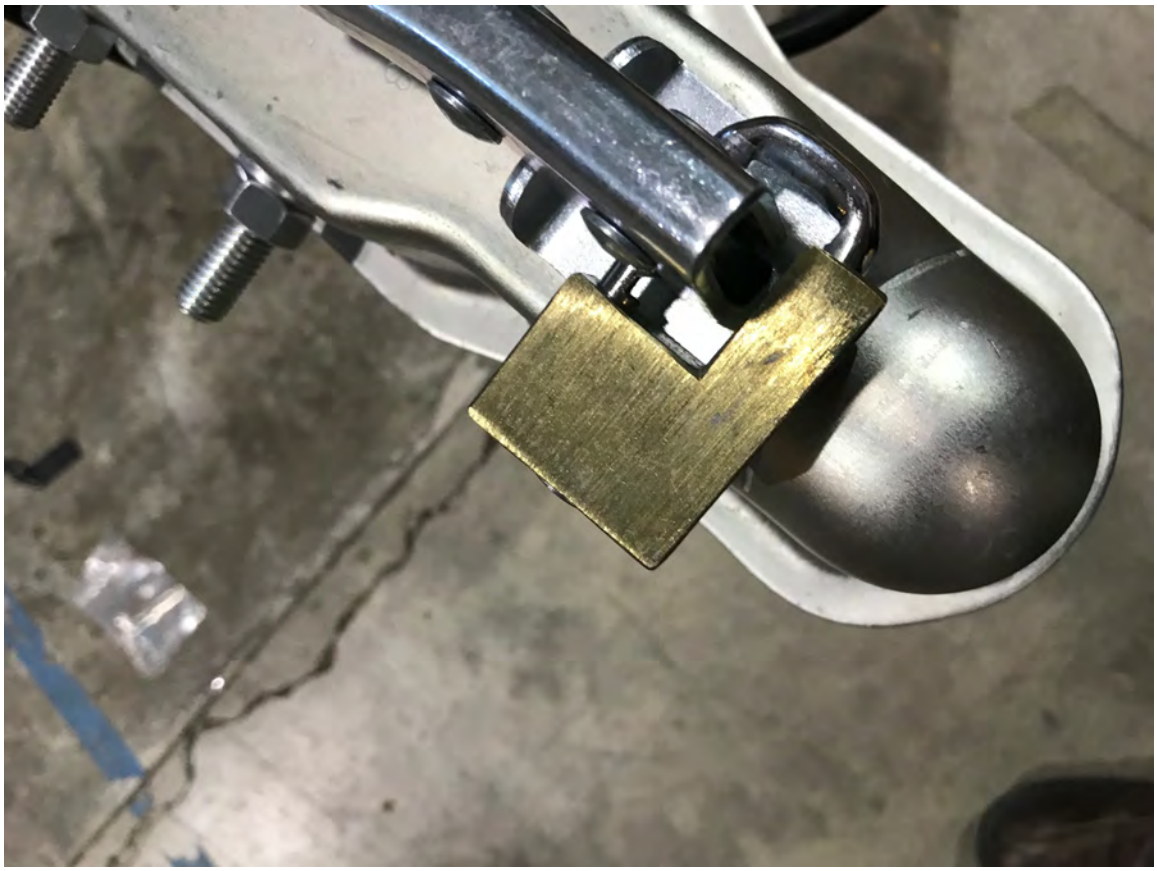
The vehicle detection radar should blink RED (LED located in the rear) when it is operational. This radar picks up vehicles in the detection zone only when they are travelling over 10 MPH. It can be had-adjusted with the gooseneck fixture to point in an optimal position facing approaching traffic. Do NOT block or obstruct the radar or it will not function properly within the system.


NO


TEXTING

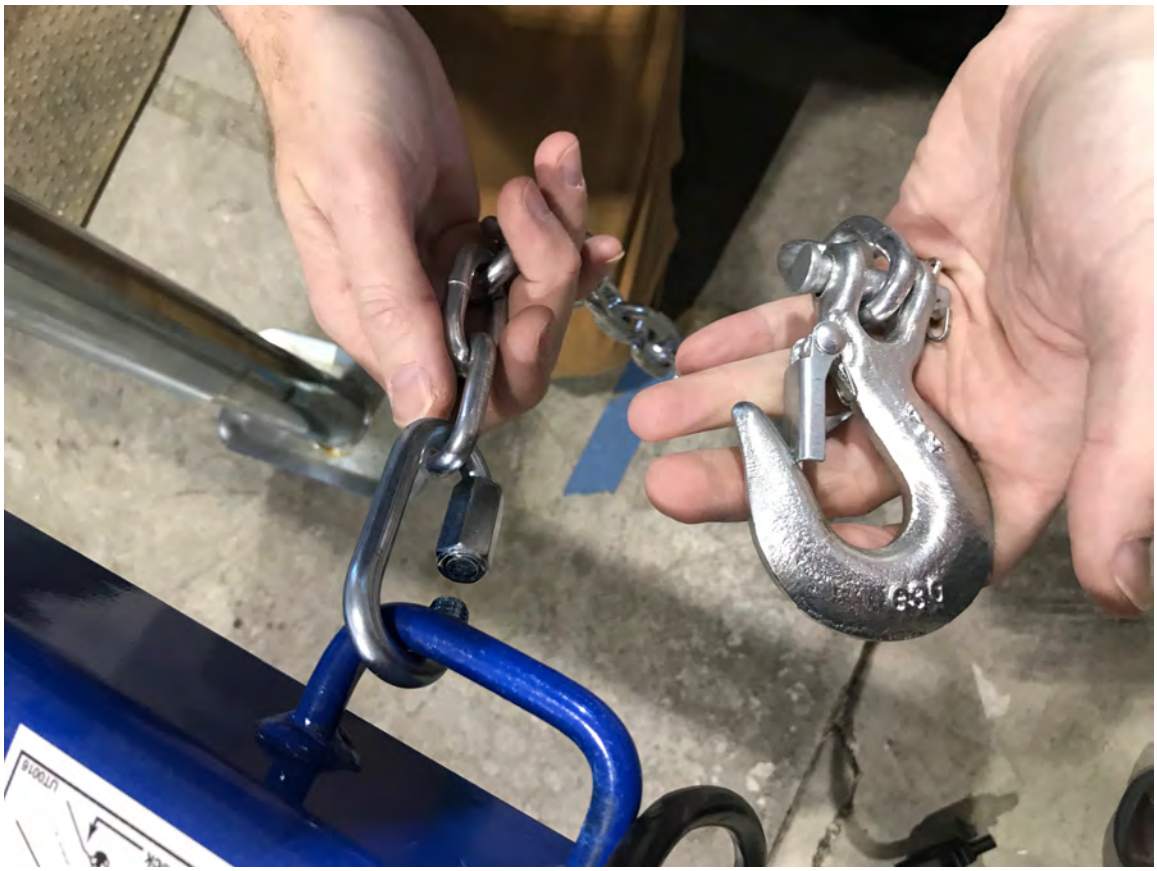
There are (2) DF (Direction Finding) antennas an approximate 60 degree beam width (one HIGH band and one LOW band) that can be hand-adjusted with the gooseneck fixture to point in an optimal position facing approaching traffic.

There is a converter/sensor on the bottom of the 65 watt solar panel. This is non-serviceable and integrated into the bottom of the solar panel.

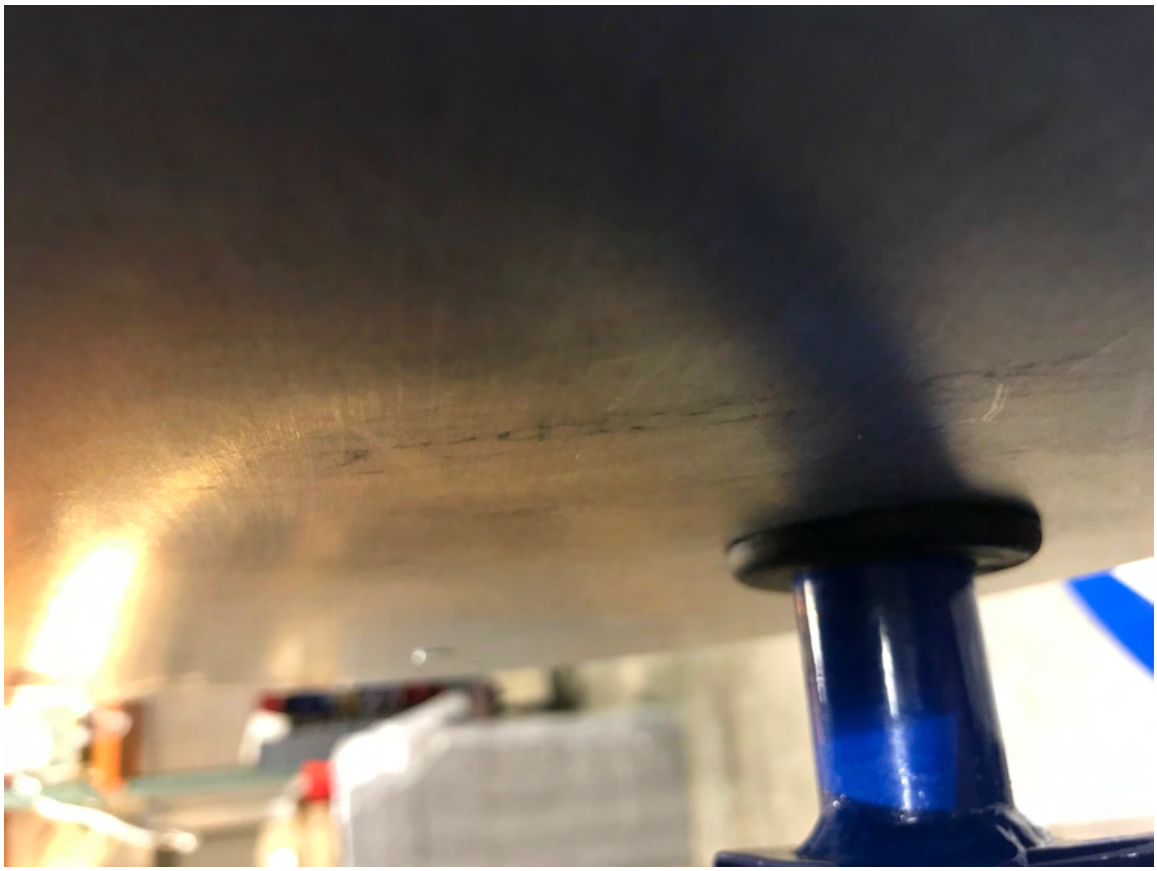


Safety is very important when transporting the RoadHound cell phone deterrent.

Make sure you properly fasten the BALL to the HITCH and that it is firmly locked into position. We recommend obtaining a lock to secure this while in transit.

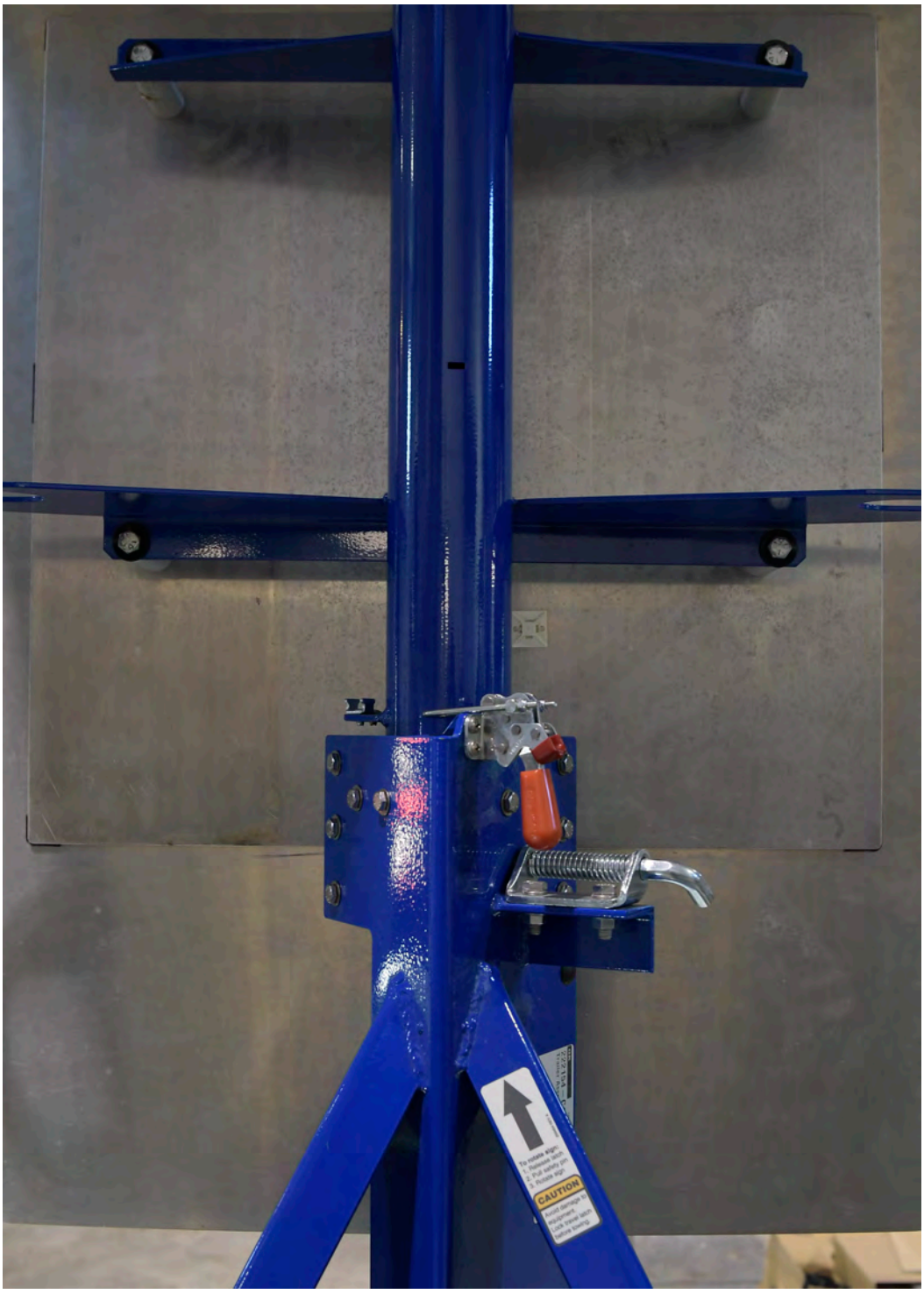


It is imperative that you affix the (2) supplied safety chains when transporting the RoadHound mobile trailer. They need to be secured at both ends of the vehicle before attempting to tow.

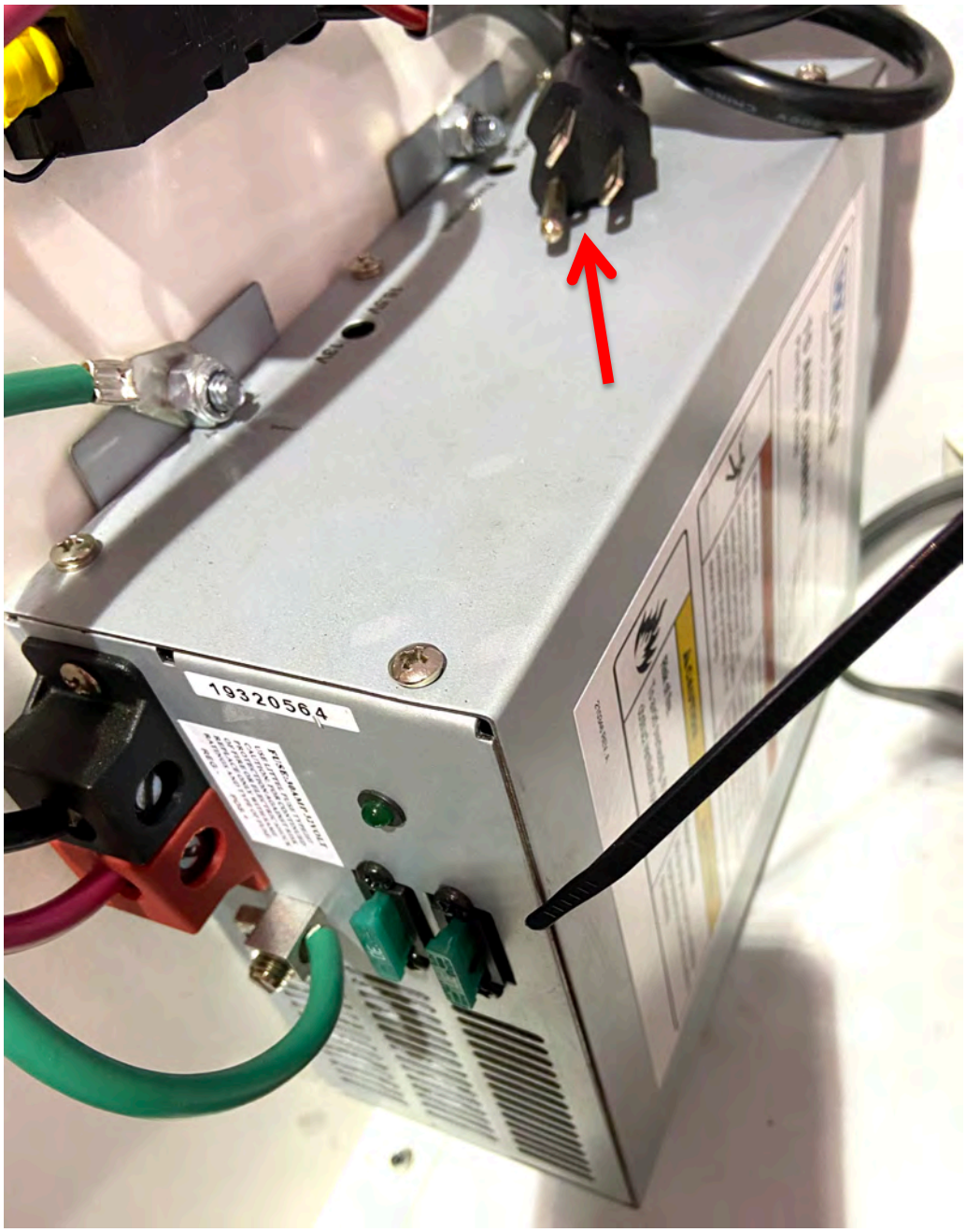


All of the wires on the mobile trailer are protected from the elements and transition into the sign through a pipe with a grommet seal.

Use the locking PIN and the RED handle to rotate the sign for transportation.



Once the PIN and red handle are unlocked, the sign can be rotated 90 degrees. It must then be re-locked into place so it does not move due to wind or vibration.

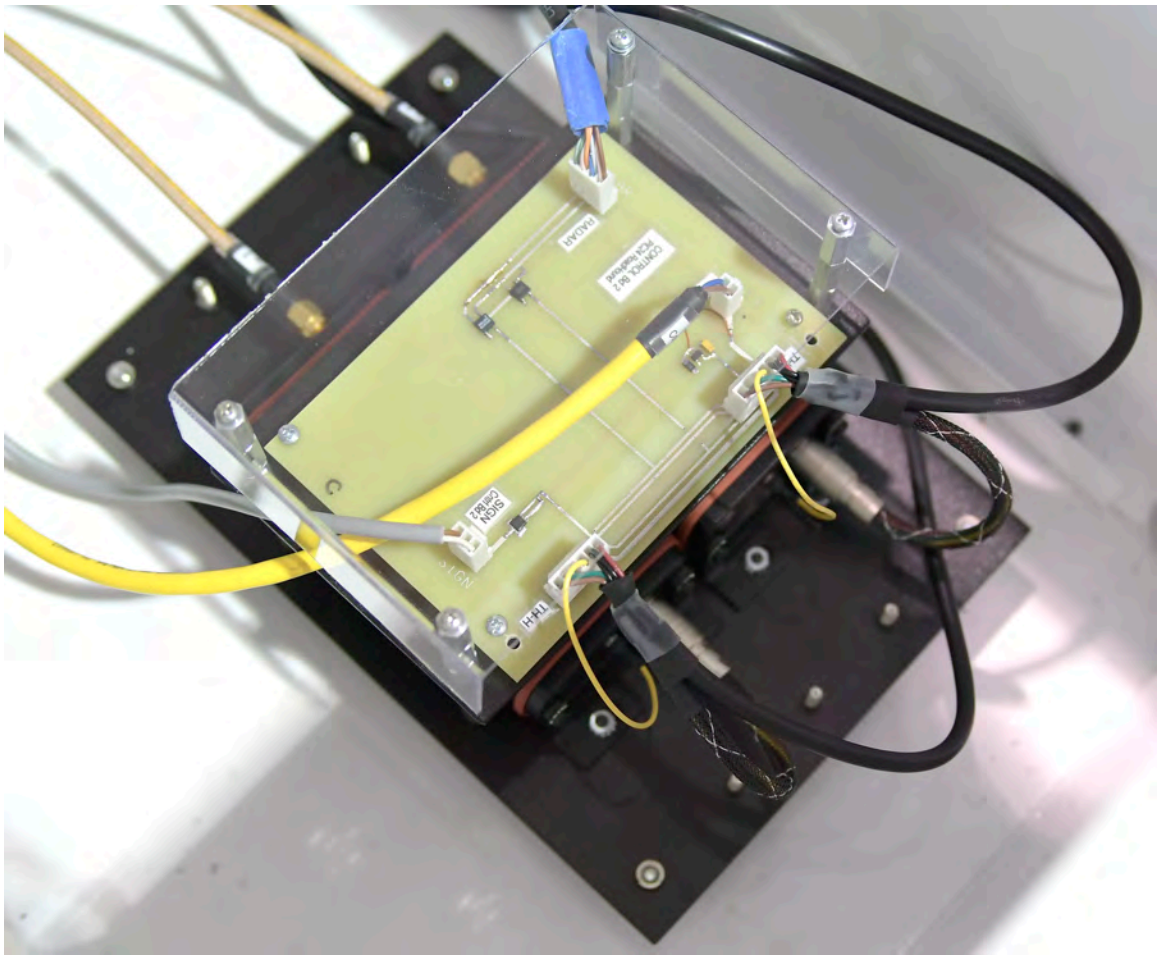


Carefully insert the (2) supplied fuses (labeled in the clear bag). The fuse holders are integrated into the power supply controller at the back of the large white battery box next to the battery terminals.

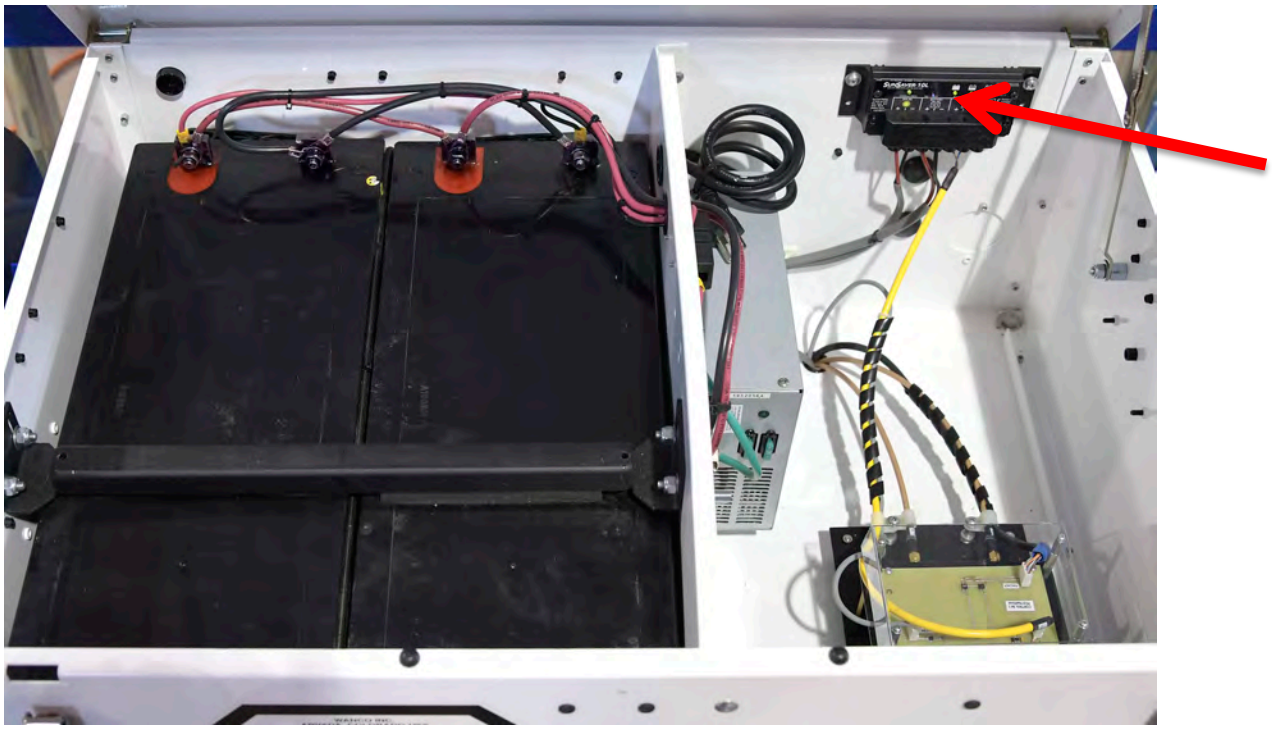
To adjust the settings of RoadHound, you will need to connect the RoadHound to a PC laptop using the two USB connections. One port is labeled (H) for High Band and one is labeled (L) for Low Band. You will need to install and launch the RoadHound PC configuration utility that is supplied with the system to make adjustments. The system's default parameters are stored internally in the cell detection engine memory.

The system default is:
Manual Threshold: 100
Auto Threshold: ON;
Margin for all bins: 100;
RF Atten: 0
Rising Trigger Delay: 1
Falling Trigger Delay: 3

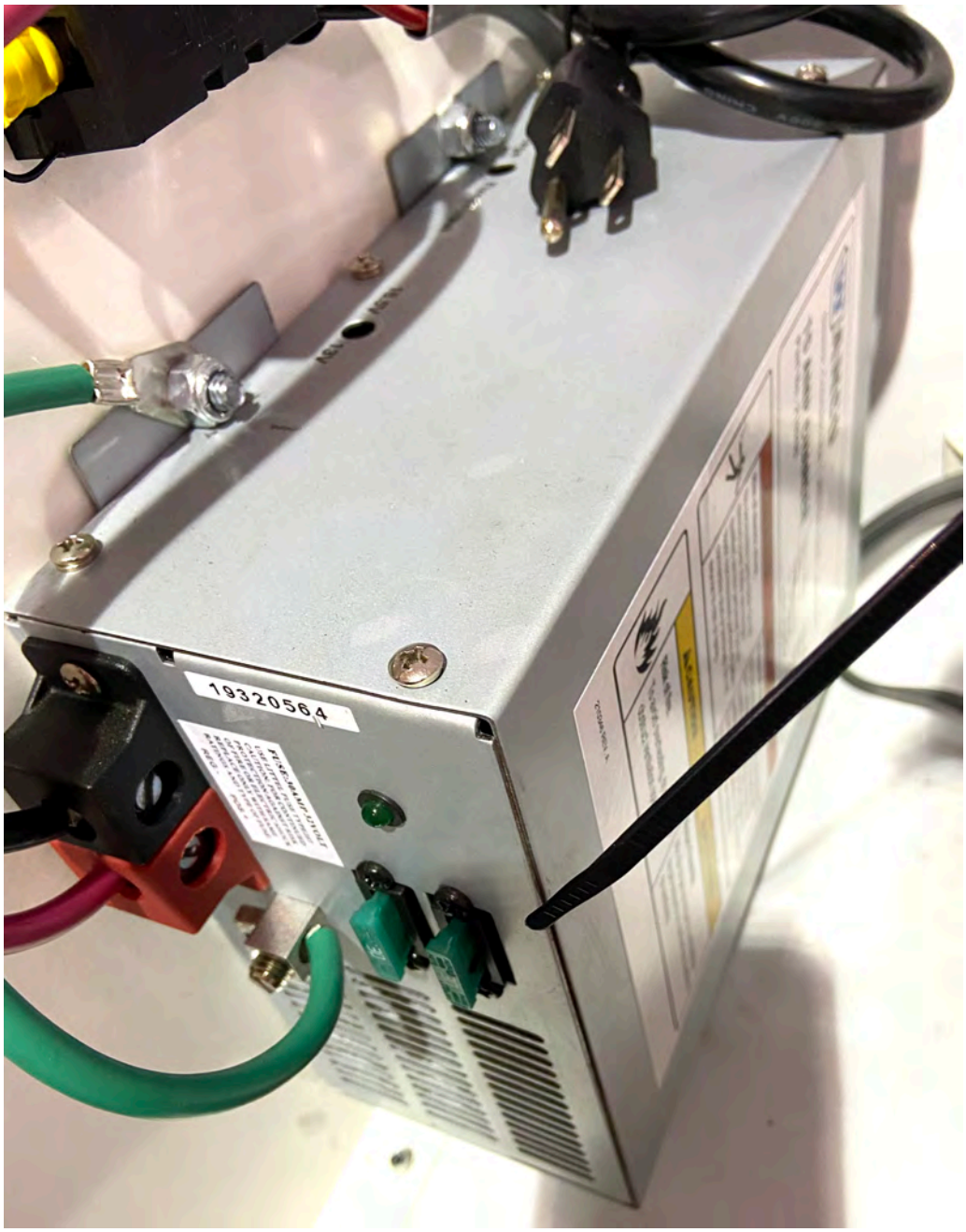
Any setting change will be saved to system's NVRAM upon closing the comport or closing the app, and will be recalled automatically next time when the GUI is connected to the system.



Both RoadHound cellular detection engines are mounted on a plate inside the white box housing. It is important that all connections are secure and not removed. Each engine is labeled accordingly (one HIGH band RoadHound and one LOW band RoadHound). Each RF input matches the respective HIGH and LOW RF antennae mounted on top of the system using goose necks for aiming the antennas.



RoadHound includes integrated intelligent solar technology that continually and smartly charges the included dual-sealed batteries. If the system sits for extended periods of time without ample charge, the batteries may naturally deplete. So it is recommended that RoadHound is stored and used under ample sunlight to keep the system fully charged.



In the event you are unable to power the system from the sun for a prolonged period of time, there is a built-in 15 AMP charger allowing you to plug into nearby 110VAC power to recharge the batteries. There is a built-in indicator that will turn GREEN when the system is fully charged.

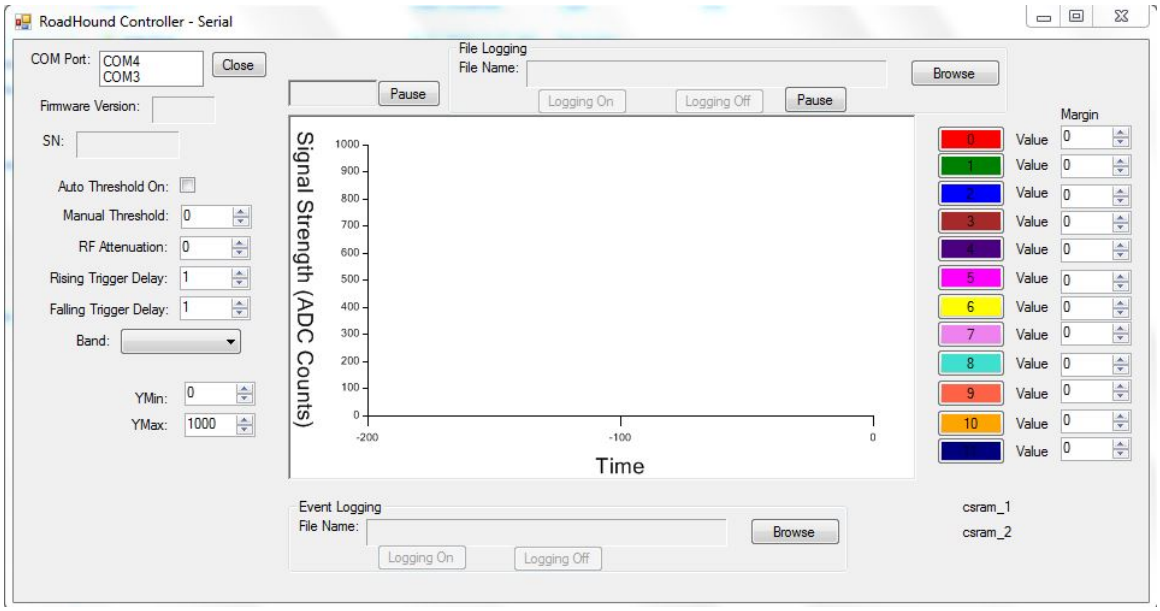
Note: If trailer is going to be stored for an extended period of time, be sure to remove two fuses to avoid battery discharge.

RoadHound Configuration Utility PC Software

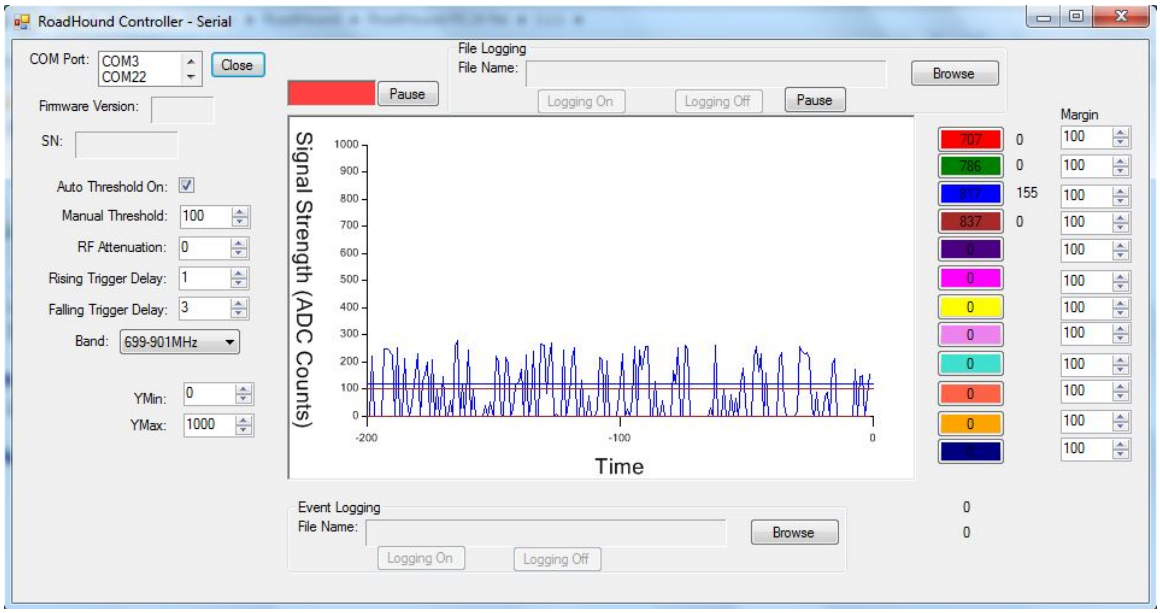
RoadHound software requires Windows 7 Microsoft OS or later to operate. RoadHound is shipped from the BVS factory in Metuchen, NJ with default settings, but the user can adjust the settings based upon their specific needs and requirements.

1. Prerequisite: USB Serial Port driver properly installed.

2. How to use the GUI to control Roadhound



Launch the RoadHoundControllerSerial.exe file to see the GUI interface displayed. Make sure the COM PORT is ON and device is listed. Click the correct COM PORT and the GUI will connect to the device, start talking to it and the graph should update and display the detected signal level. An example plot is shown on the following page.



There are two RF detectors in the system, one for US low band, and one for US high band. The USB cable connector for the US low band detector is labeled as “L”, and the high band detector is labeled as “H”. If the low band detector is plugged into the PC, the GUI will show 699-901Mhz in the “Band” field. If the high band detector is plugged into the PC, the GUI will shows 1710-1910Mhz in the “Band” field. The low band is further divided into four frequency bins centered at 707Mhz, 786Mhz, 817Mhz and 837Mhz. The high band is further divided into 6 bins centered at 1720Mhz, 1740Mhz, 1745Mhz, 1860Mhz, 1880Mhz and 1900Mhz. The energy level of all frequency bins for a given band is plotted in a strip chart with corresponding color, as shown above. The horizontal line of the corresponding color is the threshold for a given frequency bin.

Auto Threshold and Margin

These two are used together. When auto threshold is on, every frequency bin will have its own continuously updated threshold which is the average measured power for that bin plus a fixed margin for that bin. Therefore, margin is individually changeable for each bin. For example, if a nearby stationary transmitter is continuously triggering the system, then it might be a good idea to disable that frequency bin by turning on auto threshold, and set margin for that frequency bin to 1000.

Manual Threshold
When auto threshold is disabled, the manual threshold is used, which is one value used across all the bins.

Rising Trigger Delay and Falling Trigger Delay
These trigger delays are used in hysteresis to declare detection and clear detection. Whenever the signal is above the threshold for "Rising Trigger Delay" number of samples, it will declare detection. And when the signal is below the threshold for "Falling Trigger Delay" number of samples, it will clear the declared trigger.

Once connected to the RF detector, the buttons to the right of the plot show center frequency of each bin. Clicking on a button disables the plotting of that bin; however the bin is still used as part of the detection.

Depending on RF spectrum content of the deployment site, this GUI can be used to optimize settings tailored for that particular environment.

1.5 Where to obtain service

Before calling for service, please have the unit's model number and VIN ready. This information is displayed on the vehicle identification tag (see Figure 1-1).

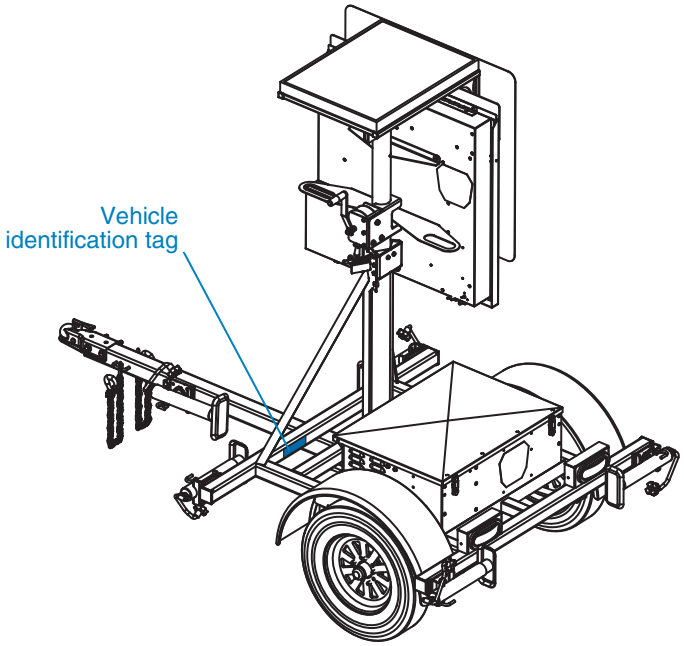
Contact our service department using the following information:

Wanco Inc.
5870 Tennyson Street
Arvada, Colorado 80003 USA

303-427-5700
fax 303-427-5725

www.wanco.com
info@wanco.com

Figure 1-1. Vehicle identification tag



2 Safety

2.1 Safety statements in this manual

This manual contains the following types of callouts, which must be followed to reduce the possibility of personal injury, damage to the equipment, or improper service. Each alert has a specific meaning, as described below:

⚠ The safety alert symbol alerts you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.

⚠ WARNING

Indicates an imminently hazardous situation which, if not avoided, COULD result in death or serious injury.

⚠ CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

CAUTION

Used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, could result in property damage.

IMPORTANT!

Indicates information that is of particular importance when transporting, operating, or servicing the equipment.

2.2 General safety

⚠ WARNING

Improper use of equipment could cause serious injury or death.

Prior to using or servicing this product, carefully read, understand, and observe all instructions in this manual.

⚠ CAUTION

Crush hazard.

When operating or working on the radar-speed trailer, keep hands and body parts clear of pinch points.

2.3 Operating Safety

2.3.1 Prior to use

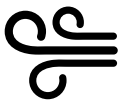
- To reduce the risk of personal injury, ensure the surrounding area is in good order and free of debris.
- To reduce the risk of shifting, rolling, or overturning, locate the speed trailer on a firm, level surface.
- Always stabilize and level the trailer before raising the regulatory speed limit sign.
- Ensure the speed trailer is in good operating condition. Never use any equipment that is damaged or in need of repair.

2.3.2 During operation

⚠ WARNING

Improper sign display could cause a traffic accident resulting in severe injury or death.

Visually inspect display to ensure proper operation.



⚠ CAUTION

High winds can topple trailer, resulting in damage and injury.

Do not deploy trailer in winds over 55 miles per hour (90 kilometers per hour).

- Always visually inspect the electronic display to ensure it is operating as expected.
- Always replace display modules that are not functioning properly.

- The trailer is susceptible to wind blowing on the face of the display and regulatory sign. The trailer may tip and fall in a wind gust of 75 mph (120 km/h), or in sustained winds of 60 mph (97 km/h) or greater.
- Never move the trailer while it is in use.
- Do not allow water to accumulate around the base of the trailer.

2.4 Service safety

⚠ CAUTION

Adverse weather conditions can result in equipment damage and injury.

Whenever possible, perform maintenance indoors.

- When working with batteries, never allow positive wiring to short to ground.
- Always take precautions to ensure the safety of service personnel. Whenever possible, perform maintenance indoors, out of weather and away from traffic.
- Never perform even routine service unless all electrical components are shut down. Ensure all speed trailer power circuits are shut off.
- If disconnecting speed trailer battery cables, always disconnect the positive (+) cable first.*
- If the ground under or around the trailer is damp or wet, move the trailer to a dry location and allow it to dry before servicing.
- Do not service the speed trailer if your clothing or skin is wet.
- Always be aware of traffic when performing roadside maintenance.
- Keep the speed trailer and all its components clean.

2.5 Labels

Labels provide instructions and information. They also warn of hazards. For convenience and safety, keep all labels in legible condition, replacing labels when damaged or missing. Replacement labels are available from the factory.

Label locations are indicated in Figure 2-1. Samples of labels and their descriptions are provided in Table 2-1.

**Removing the positive cable first is a requirement specifically for negative-ground systems.*

Figure 2-1. Label locations

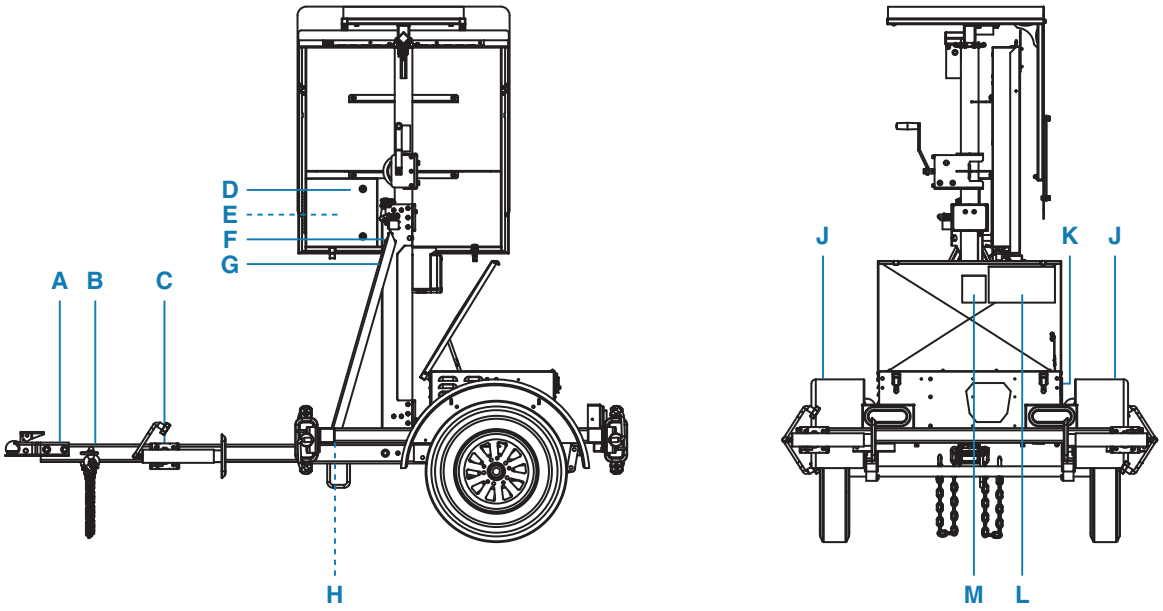
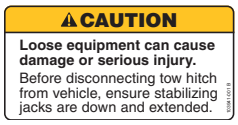
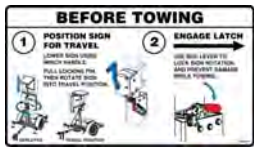
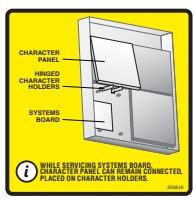
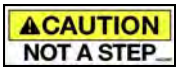
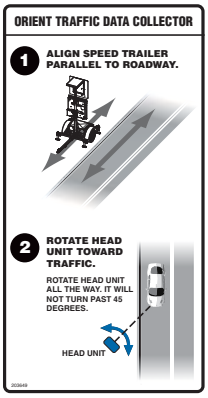
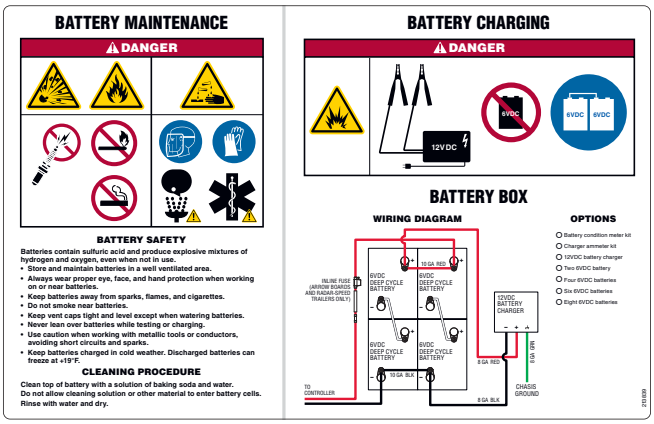


Table 2-1. Label samples and descriptions

Ref.*	Label (not to scale)	Description
A		Warning: towing connection
B		Caution: travel/rotation brake
C		Caution: extend stabilizing jack
D		Travel position instructions
E		Service instructions
F		Release locking pin

*Reference Figure 2-1 for label location.

Table 2-1. Label samples and descriptions *continued*

Ref.*	Label (not to scale)	Description
G		Sign rotation instructions Caution: travel/rotation brake
H		Vehicle identification tag
J		Caution: not a step
K		Orient data collector (if equipment is installed)
L		Danger: battery maintenance Warning: battery voltage

*Reference Figure 2-1 for label location.

Table 2-1. Label samples and descriptions ***continued***

Ref.*	Label (not to scale)	Description
M		Service record

*Reference Figure 2-1 for label location.

3 Assembly

3.1 Drawbar

Before using your Wanco Radar-Speed Trailer for the first time, it might be necessary to install the drawbar. The drawbar may be removed before shipment from the factory.

To install the drawbar, follow these steps:

1. The drawbar includes wiring for the trailer lights. Before installing the drawbar, ensure the wiring cable and harness are hanging out of the drawbar, as indicated in Figure 3-1.
2. Refer to Figure 3-2 and install the drawbar and wiring:
   a. Locate the receiving sleeve, centered under the trailer frame.
   b. Carefully insert the wiring and harness into the sleeve, followed by the drawbar.
   c. Align the holes in the sleeve and drawbar.
   d. Attach the drawbar to the trailer with two sets of bolts, washers, and nuts. Tighten the nuts fully.
   e. Connect the wiring harness to the receptacle under the trailer frame. Before towing, ensure the trailer brake lights, taillights, and directional/turn indicators are functioning properly.

Figure 3-1. Wiring and harness

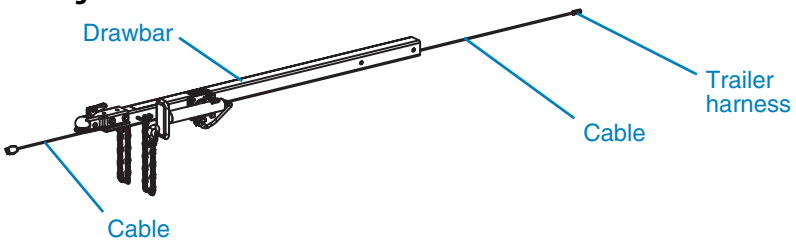
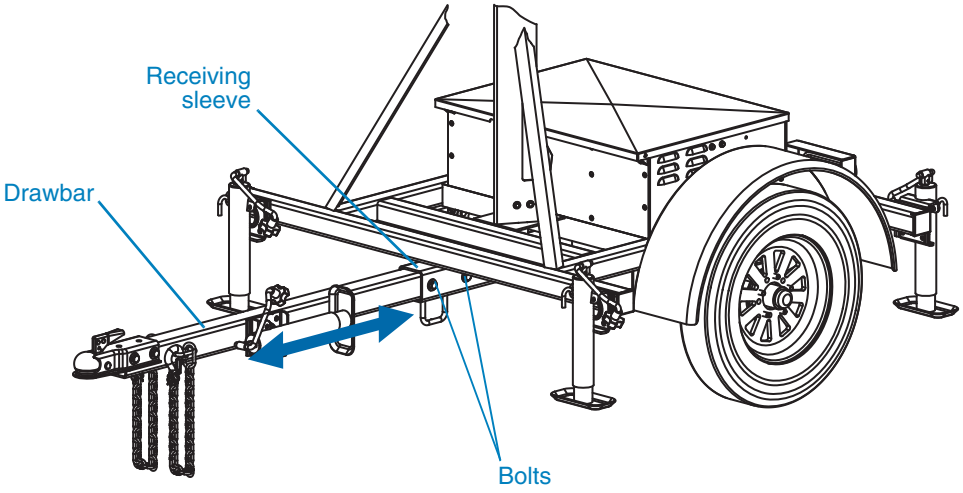


Figure 3-2. Drawbar installation



3.2 Optional tow hitch

For U.S. models, a reversible combo hitch for a 2-inch-ball and pintle hook is optional. To reverse the optional combo-hitch:

1. Remove the two large bolts that hold the tow hitch to the drawbar.
2. Lift the hitch off the drawbar and rotate the hitch end-to-end.
3. Return the hitch to the drawbar, making sure to align the bolt holes.
4. Reinstall the bolts and tighten the nuts fully.

3.3 Speed limit numbers

The regulatory sign has detachable speed limit numbers. Before using the sign, install the proper digits on the regulatory sign to indicate the desired speed limit.

- Individual speed-limit numbers are stored in the battery box.
- Each digit attaches to the sign with two wingnuts.
- Additional and replacement sets of numbers are available from the factory (see Section 1.5, “Where to obtain service,” page 5).

4 Operation

4.1 Overview

A typical deployment of the Wanco Radar-Speed Trailer includes the following steps:

1. Towing the trailer to its destination (Section 4.3)
2. Deploying the trailer, which includes:
   a. Locating the trailer (Section 4.4.1, page 18)
   b. Positioning (Section 4.4.2, page 19)
   c. Leveling (Section 4.4.3, page 20)
   d. Setup and configuration (Section 4.4.4, page 21)

4.2 Before using

Before using the Wanco Radar-Speed Trailer:

- Read and follow all safety instructions (see Section 2, page 7).
- Ensure batteries are fully charged.

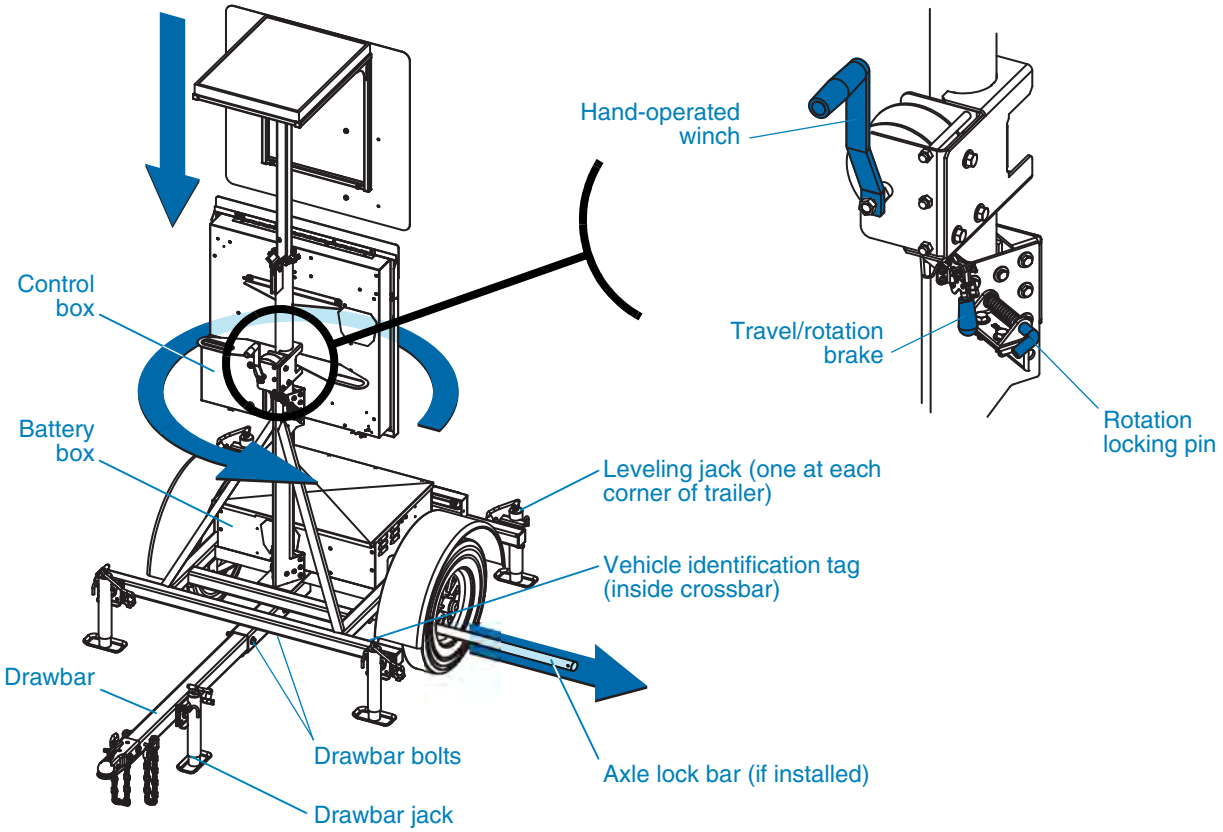
4.3 Towing

4.3.1 Before towing

Before towing, refer to Figure 4-1 and prepare the speed trailer as follows:

1. Open the control box and set the operating mode to the OFF position.
2. Close and lock the control box.
3. Close and latch the battery box.
4. Lower the regulatory speed sign using the hand-operated winch.
5. Pull the rotation locking pin to release the sign cabinet, then rotate the cabinet and regulatory sign into the travel position, parallel to the trailer.
6. Engage the travel/rotation brake by pressing the brake lever downward. Ensure the handle is all the way down and the brake is tight.

Figure 4-1. Before towing



7. Check tires, wheels, and lights:
   a. Check tires for wear. Replace worn tires.
   b. Ensure tires are inflated to the proper pressure.
   c. Verify all wheel lugs are in place and tightened. Do not tow the trailer if a wheel lug is missing.
   d. Remove axle lock bar, if installed.
8. Check the drawbar, tow hitch, and safety chains:
   a. Ensure the tow hitch and coupling on the tow vehicle are rated for weight equal to or greater than the trailer's gross vehicle weight rating (GVWR). The GVWR is listed on the speed trailer vehicle identification tag.
   b. Ensure the tow hitch on the tow vehicle and the drawbar hitch on the speed trailer are compatible.
   c. Inspect the tow hitch and coupling for wear and damage. Replace or repair if necessary.
   d. Ensure the trailer's detachable drawbar is attached securely to the trailer frame with two sets of bolts and nuts. The bolts should engage the drawbar and the nuts should be tight. (For drawbar installation instructions, see Section 3.1, page 13.)

e. Verify the trailer's four corner leveling jacks are in the up position and secured with their locking pins. To raise the leveling jacks, use the hand-crank to raise the jack foot off the ground, then pull the jack locking pin and rotate the jack upward. Release the pin and continue rotating the jack upward until the pin re-engages with an audible "click."

f. Lift the drawbar and set the tow hitch on the tow vehicle using the drawbar-mounted jack to raise, and then lower, the drawbar. Ensure the tow hitch is properly engaged and locked onto the tow vehicle's hitch.

g. Raise, rotate, and lock the drawbar-mounted jack in the up position.

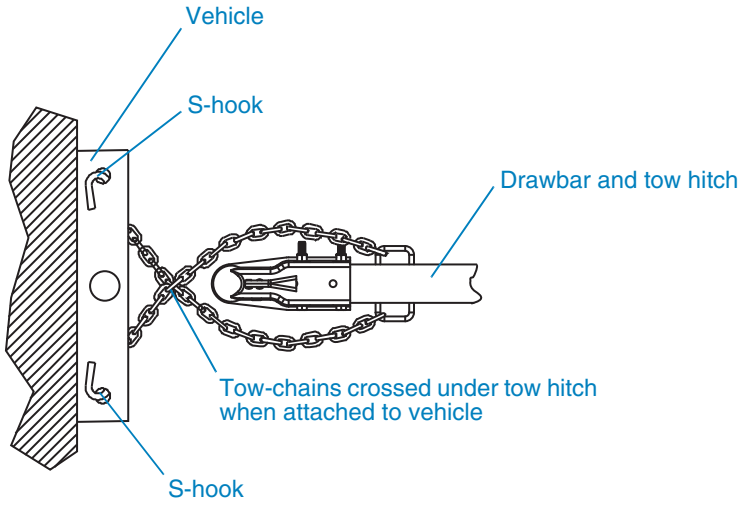
h. Verify approved safety chains are attached properly to both the trailer and tow vehicle, as illustrated in Figure 4-2. The chains should cross underneath the tow hitch.

9. Ensure the trailer brake lights, taillights, and directional/turn indicators are hooked up and functioning properly.

10. Remove blocks or chocks from wheels, if present.

11. Follow the towing requirements in Section 4.3.2.

Figure 4-2. Tow-chain hook-up



4.3.2 During towing

- Do not tow the trailer with any people, parts, supplies, or additional equipment attached to the trailer or loaded onto it.
- Do not tow additional trailers or other equipment in tandem with the speed trailer.
- The recommended maximum speed for highway towing is 65 mph (105 km/h). For off-road towing, the recommended maximum speed is 15 mph (25 km/h) or less, depending on terrain.
- Adhere to applicable transportation department regulations when towing the trailer.

4.3.3 After towing

After towing, unhook the tow chains from the tow vehicle, then use the drawbar-mounted jack to raise the drawbar and release the drawbar hitch from the tow vehicle. Pull the vehicle away from the speed trailer when ready.

4.4 Deployment

4.4.1 Locating the trailer

⚠ DANGER

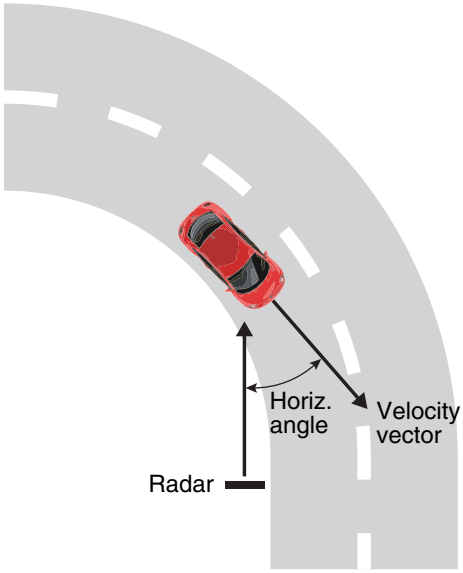
Electric shock hazard.

Contact with overhead electrical power lines will cause serious injury or death.

Do not position speed trailer under power lines.

- When deployed, the speed trailer is nearly 10.5 feet (3.25 meters) tall. When choosing a location, ensure the area above the trailer is clear of overhead wires and other obstructions.
- To reduce the risk of shifting, rolling, or overturning, locate the speed trailer on a firm, level surface.
- For the speed display's radar to function properly, do not locate the trailer at a sharp curve in the road. See Figure 4-3.
- An optimal location provides the radar with a line-of-sight from 500 to 1000 feet (155 to 310 meters), which allows ample time for the speed to appear on the display and for motorists to read and react to it. See Section 4.4.2.
- Fog, rain, snow, and blowing dust can reduce the detection distance from motorists to the speed display. Allow for possible weather conditions when selecting a location.
- For the speed trailer's solar charging system to function properly, locate the trailer where it will be exposed to full sunlight during daylight hours.
  - ☐ The solar panel is significantly affected by shadows. Avoid locating the trailer where the sun will be obstructed, such as under a tree or in the shadow of a building.
  - ❑ Ensure the solar panel is clean (see Section 6.3.1, page 53).

Figure 4-3. Angular interference



The cosine effect causes the speed display to indicate a speed that is lower than the vehicle's actual speed. This occurs when the target vehicle's path is at an angle to the radar, including conditions such as the vehicle traveling on a curve or hill. As the angle between the radar beam and the target vehicle increases, the displayed speed decreases (see table, below).

Ideally, an angle of zero degrees is preferable (i.e., the vehicle is traveling directly at the radar beam), because the displayed speed is the actual target vehicle speed. In all applications, however, the radar device is always at a slight angle to the target vehicle.

Effect on displayed speed of horizontal angle between radar and path of vehicle

	Horizontal angle							
	5°	**10°**	**15°**	**20°**	**30°**	**45°**	**60°**	**90°**
Actual speed*	**Displayed speed***							
30	30	30	29	28	26	21	15	0
40	40	39	39	38	35	28	20	0
50	50	49	48	47	43	35	25	0
60	60	59	58	56	52	42	30	0
70	70	69	68	66	61	49	35	0
80	80	79	77	75	69	57	40	0
90	90	89	87	85	78	64	45	0
100	100	98	97	94	87	71	50	0
110	110	108	106	103	95	78	55	0
120	120	118	116	113	104	85	60	0

**Speed in any unit of measure.*

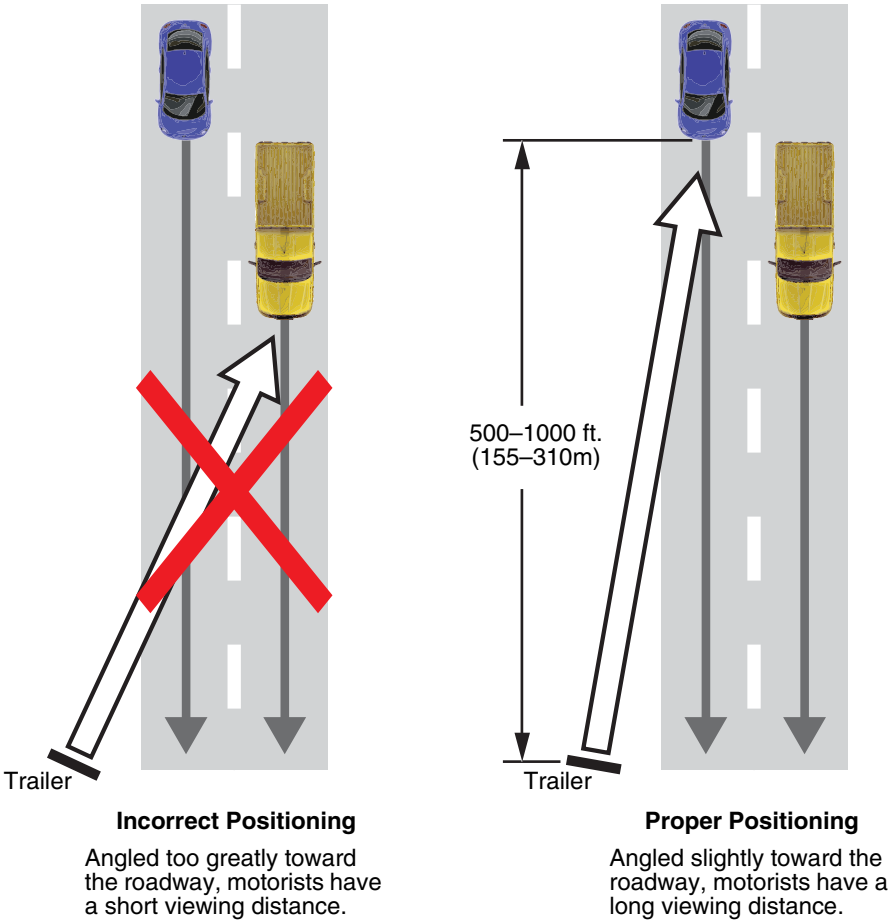
4.4.2 Positioning the trailer

The angle of the speed display to the roadway is important for viewing by motorists. Proper positioning ensures motorists have the best chance of seeing and reacting to the display.

Optimal positioning provides the radar with a line-of-sight from 500 to 1000 feet (155 to 310 meters), which allows ample time for the speed to appear on the display and for motorists to read and react to it.

- Position the trailer so the rear of the trailer faces oncoming traffic.
- Angle the trailer slightly toward the roadway, as indicated in Figure 4-4.
  - ❑ Too great an angle creates a short viewing distance, and does not allow motorists enough time to see the speed display.
  - ❑ A slight angle provides a long viewing distance, and gives motorists plenty of time to see the speed display.
- For information about the limitations of positioning the trailer along a curve or hill in the road, see Section 4.4.1.

Figure 4-4. Positioning the trailer



Incorrect Positioning

Angled too greatly toward the roadway, motorists have a short viewing distance.

Proper Positioning

Angled slightly toward the roadway, motorists have a long viewing distance.

4.4.3 Leveling the trailer

Prior to raising the regulatory sign, the trailer must be level. To level the trailer:

1. For each of the four leveling jacks at the corners of the trailer, pull the jack locking pin and rotate the jack downward until the locking pin engages. Do not lower the jacks yet. When the jack is properly set, the locking pin snaps into position with an audible "click."
2. Determine which corner of the trailer is highest, and extend the jack foot on that corner downward until it rests firmly on the ground. Then, level the trailer with the remaining three corner jacks.
3. Rotate and lower the drawbar jack until its foot rests firmly on the ground.
4. If the trailer has an axle lock bar, insert the lock bar through the wheels and lock both ends with padlocks.

4.4.4 Setting up the trailer

After positioning and leveling the trailer (Sections 4.4.2 and 4.4.3), set up the trailer by following these steps:

1. Install the proper digits on the speed limit sign to indicate the desired speed limit (see Section 3.3, page 14).
2. Referring to Figure 4-5, rotate the speed display and raise the regulatory sign:
   a. Release the travel/rotation brake by pressing the brake lever upward.
   b. Pull the rotation locking pin to release and rotate the display cabinet and regulatory sign. Rotate the cabinet 90 degrees to face traffic. (Release the locking pin after starting to rotate the cabinet.)
   c. Use the hand-operated winch to raise the regulatory sign to its full height, approximately 10.5 feet (3.25 meters).
3. Set the speed limit and turn on the speed display:
   a. Access the control box, located on the back of the speed-display cabinet.
   b. The control box cover is latched with two key-operated locking mechanisms. Each keyhole is protected by a plastic cover. Pull the tab on each cover to reveal the keyhole, then insert and rotate the key to release each lock.
   c. Open the control box cover to access the control panel.
   d. Set the desired speed limit using the speed limit selector (see Figure 4-6). For more information about using the sign and selector switches, see Section 4.5, page 24.
4. Test the radar for proper operation:
   a. At the control panel, set the operating mode to RADAR SETUP (see Figure 4-6).
   b. As traffic approaches the sign, watch the LED display on the control panel, then the speed display. Speed should register for approaching traffic up to 1000 feet (315 meters) away.
   - If the speed display functions as expected, proceed to Step 5.
   - If the speed display functions but vehicle speeds appear to be wrong, it might be necessary to adjust the angle of the trailer in relation to the road. See Section 4.4.2, page 19.
   - If there is no traffic, use the tuning fork as described in Section 5.4, page 36.
   - If the radar appears to be malfunctioning, see Section 5.4, page 36.
5. At the control panel, turn on the speed display by setting the operating mode to RUN.

IMPORTANT

In Radar Setup mode, the power drain is significant. To avoid a power failure, do not leave the trailer in the Radar Setup mode for extended periods.

6. Close and lock the control box cover.

Run mode

The Run mode is the normal operating mode.

In the Run mode, the speed trailer and all installed auxiliary devices are on, and should function as expected. The speed display is fully functional, and behaves as illustrated in Figure 4-10, page 26, based on the position of the speed limit selector on the control panel.

DIP switches determine the unit of measure for the displayed speed (mph or km/h) and the displayed excessive-speed message. These settings can be changed by accessing the systems board (see Section 6.2.4, page 43). For more information about excessive-speed messages, see "Sign behavior" on page 3 and "Preview mode" on page 29.

On the control panel, the 3-digit LED status display shows the user-selected speed limit. The SYSTEM ON LED is lit, and the other status LEDs are lit if applicable.

Run & Beacons mode

The Run & Beacons mode has all the system functionality and behavior of the Run mode, but also activates optional caution beacons if they are installed. The beacons flash when activated by the approach of an oncoming vehicle.

On the control panel, the 3-digit LED status display shows the user-selected speed limit with three dots (such as, ".5.0."). The SYSTEM ON LED is lit, and the other status LEDs are lit if applicable.

Data Collector Only mode

The Wanco Traffic Data Collector is an optional, auxiliary device that can be integrally installed on the radar-speed trailer. Your trailer may or may not include this device. For more information, see Section 4.7.3, page 31.

In the Data Collector Only mode, the speed display is off and remains blank, the radar and all auxiliary devices except the data collector are off.

On the control panel, the 3-digit LED status display shows "CLA" or, if communication with the data collector fails, "Err". The SYSTEM ON LED is lit, and the other status LEDs are lit if applicable.

Data Collector & Beacons mode

The Data Collector & Beacons mode has all the system functionality and behavior of the Data Collector Only mode, but also activates optional caution beacons if they are installed. The beacons flash when activated by the approach of an oncoming vehicle.

On the control panel, the 3-digit LED status display shows "C.L.A." (with three dots) or, if communication with the data collector fails, "E.r.r." The SYSTEM ON LED is lit, and the other status LEDs are lit if applicable.

Schedule mode

The Schedule mode uses an optional, auxiliary device that can be integrally installed on the radar-speed trailer. Your trailer may or may not include this device. For more information, see Section 4.7.5, page 32.

In the Schedule mode, the run mode and speed limit are controlled by the optional scheduling software; the speed limit selector has no effect. The speed display, radar, and all auxiliary devices including the data collector are controlled by the software.

On the control panel, the 3-digit LED status display shows "Sch". The SYSTEM ON LED is lit, and the other status LEDs are lit if applicable.

Demo mode

The Demo mode demonstrates the most common functions of the speed trailer, and can be used for verifying these functions are working properly.

In the Demo mode, the radar and auxiliary devices are off, except the optional flashers, strobe, and data collector. The speed display is on and cycles through preprogrammed sample speeds (showing 1-, 2-, and then 3-digit speeds), followed by excessive-speed messages. When the excessive speed messages appear, the red-and-blue flashers and strobe light flash, if installed. This cycle repeats continuously while in Demo mode.

On the control panel, the 3-digit LED status display shows "[d]". The SYSTEM ON LED is lit, and the other status LEDs are lit if applicable.

Preview mode

The Preview mode is used for viewing available excessive-speed messages and other test patterns, one at a time, regardless of the message that has been configured with DIP switches on the systems board (Section 6.2.4, page 43).

In the Preview mode, the radar is on, but all auxiliary devices except the data collector are off. The speed display is on and shows one excessive-speed message, which can be changed by rotating the speed limit selector. When the speed limit selector is in the "0" position, the display is blank.

On the control panel, the 3-digit LED status display shows "[P]". The SYSTEM ON LED is lit, and the other status LEDs are lit if applicable.

Radar Setup mode

The Radar Setup mode is used for verifying proper operation of the speed-trailer radar.

In the Radar Setup mode, the radar is on, but all auxiliary devices except the data collector are off. The speed display shows the speed of passing vehicles. Excessive-speed messages do not appear, regardless of the user-selected speed-limit setting.

On the control panel, the 3-digit LED status display shows the actual speed detected by the radar. The SYSTEM ON LED is lit, and the other status LEDs are lit if applicable.

IMPORTANT

In Radar Setup mode, the power drain is significant. To avoid a power failure, do not leave the trailer in the Radar Setup mode for extended periods.

Power Test mode

The Power Test mode is used for performing diagnostics on the power system.

In the Power Test mode, the radar is off, but all auxiliary devices are on. The speed-display has all LEDs on, lit at a fixed brightness independent of input from the photocells. If any LEDs are not lit, replace the appropriate display module (see Section 6.2.6, page 50).

On the control panel, the 3-digit LED status display shows the battery (system) voltage. If the voltage is lower than expected, see Section 5.5, page 37, for troubleshooting. The SYSTEM ON LED is lit, and the other status LEDs are lit if applicable.

Status mode

The Status mode is used for performing diagnostics on the electrical system and sensors. For information about status conditions, see Section 5.2, page 33.

In the Status mode, the radar is on, but all auxiliary devices except the data collector are off. The speed display cycles through five sets of system status variables. Additional system parameters can be shown by rotating the speed limit selector.

On the control panel, the 3-digit LED status display shows a user-selected system status variable. The selection is made using the speed limit selector. The SYSTEM ON LED is lit, and the other status LEDs are lit if applicable.

Service mode

The Service mode is used for servicing the speed display modules. For more about servicing, see Section 6, page 39.

In the Service mode, the radar and all auxiliary devices except the data collector are off. The speed display shows the first eight letters of the alphabet—ABCD on the top row, and EFGH on the bottom row.

On the control panel, the 3-digit LED status display shows "[S]". The SYSTEM ON LED is lit, and the other status LEDs are lit if applicable.

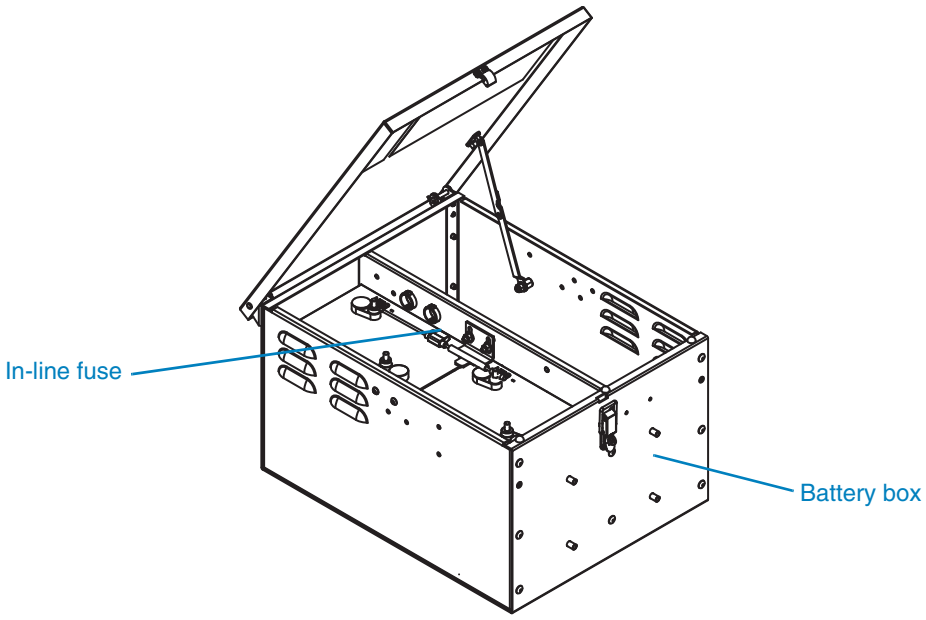
4.5.3 Speed display configuration options

The speed display shows vehicle speed in either miles per hour (mph) or kilometers per hour (km/h). Additionally, when a vehicle is traveling at an excessive speed, the display shows a preprogrammed message.

The units of measure and the excessive-speed messages are configured with DIP switches on the systems board, and can be changed if necessary.

- For more information about excessive-speed messages, see Section 1.4.2, page 3.
- For more information about the systems board and setting DIP switches, see Section 6.2.4, page 43.

Figure 6-8. In-line fuse



6.4 Wiring

The speed trailer has no exposed or user-serviceable wiring.

- Many wiring connections are made at the systems board, as illustrated in Figure 6-9. For additional information about the systems board, see Section 6.2.4, page 43.
- For a comprehensive wiring diagram, see Figure 6-10.

6.5 Replacement parts

For replacement parts, see the diagrams and parts lists starting on page 64, or contact the Wanco Service Department (see Section 1.5, “Where to obtain service,” page 5).

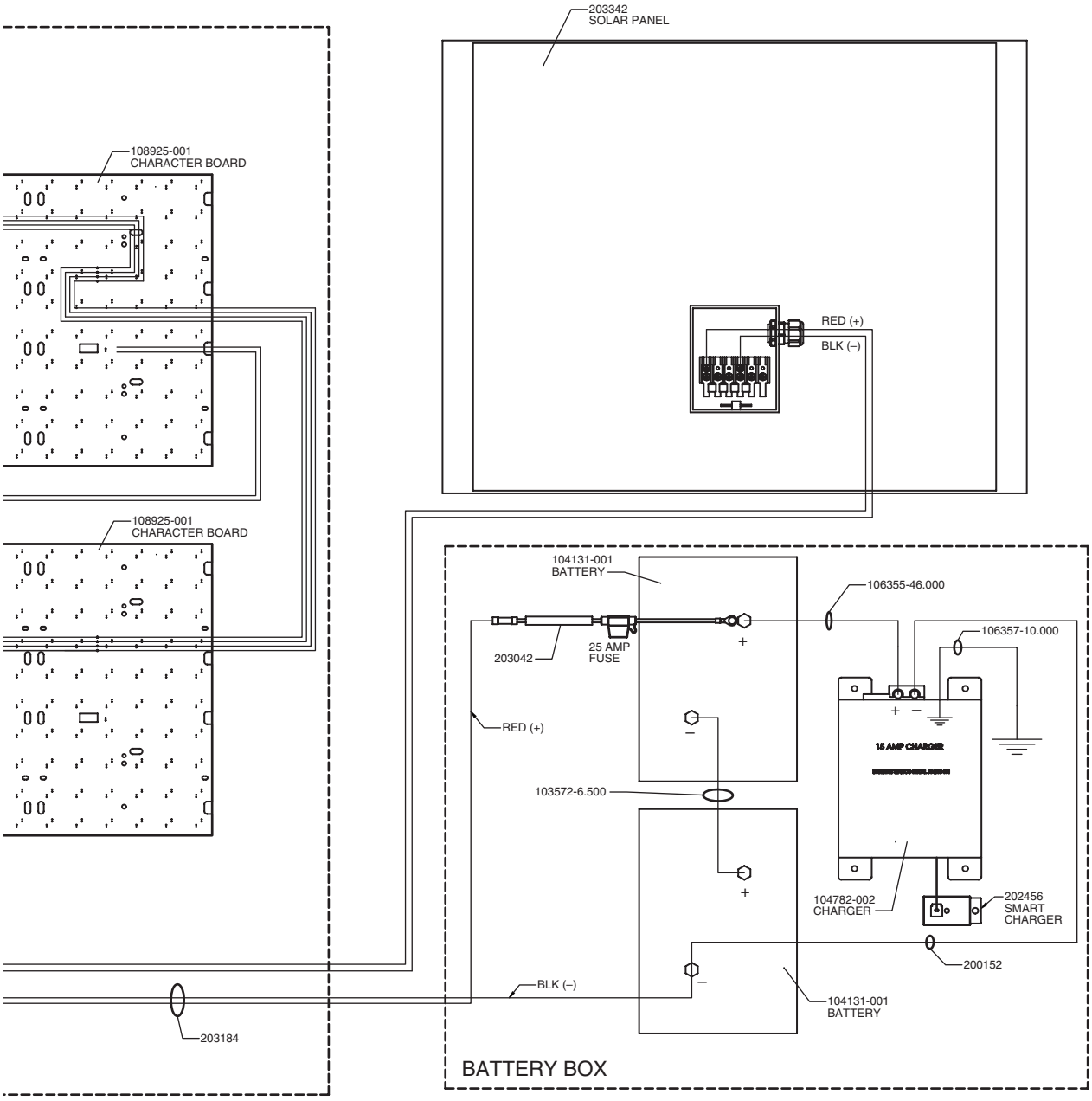

203342
SOLAR PANEL
108925-001
CHARACTER BOARD
RED (+)
BLK (–)
108925-001
CHARACTER BOARD
104131-001
BATTERY
106355-46.000
106357-10.000
203042
25 AMP
FUSE
+
RED (+)
–
103572-6.500
+
+ –
15 AMP CHARGER
104782-002
CHARGER
202456
SMART
CHARGER
200152
BLK (–)
–
104131-001
BATTERY
203184
BATTERY BOX

Figure 6-11. Trailer assembly, exploded view

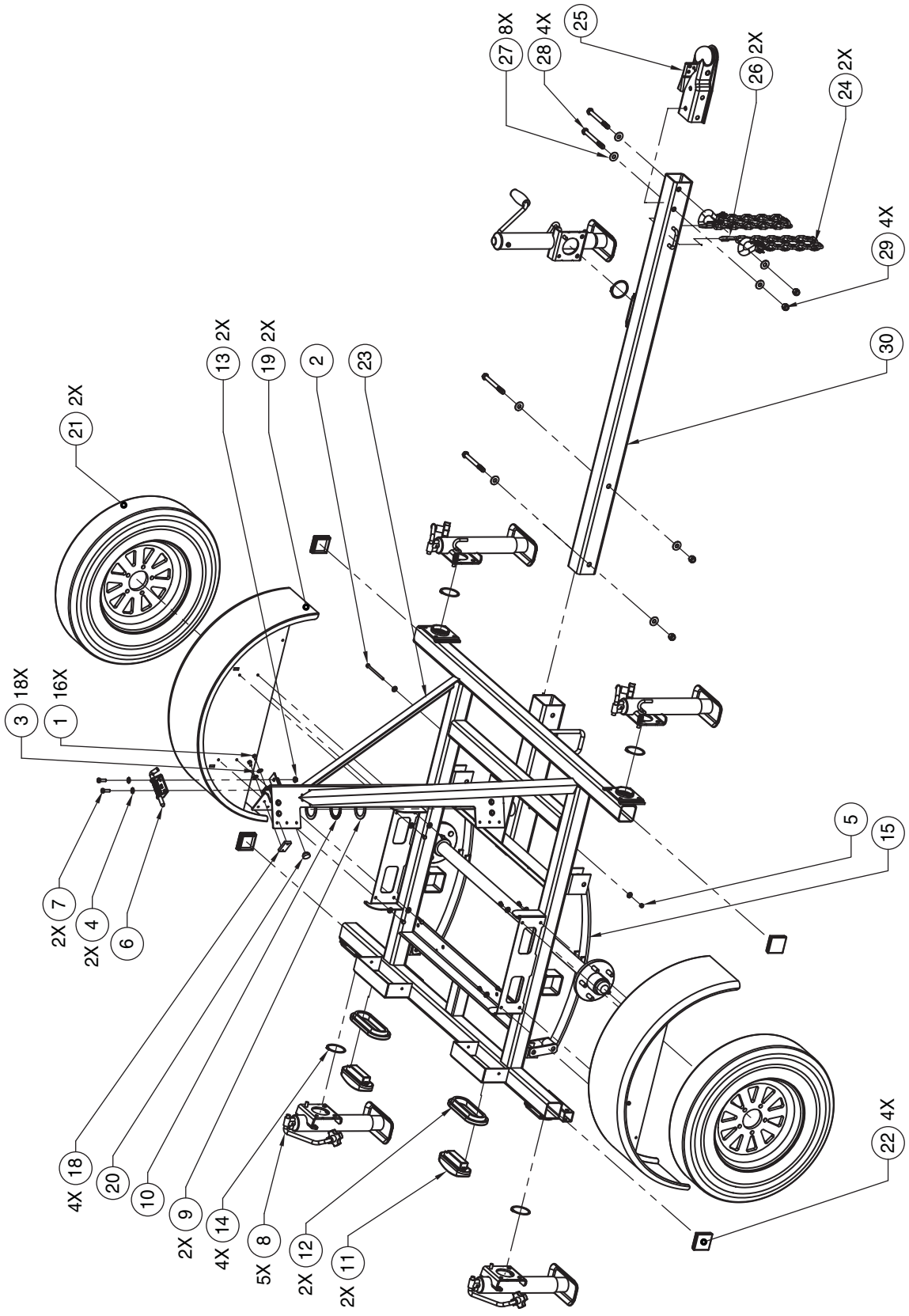


Figure 6-12. Trailer assembly parts list

Item No.	Part No.	Description	Qty.
1	100207-001	Hex screw, 1/4-20 × 1/2"	16
2	100207-018	Hex screw, 1/4-20 × 4 1/4"	1
3	100236-001	Flat washer, 1/4"	18
4	100237-001	Flat washer, 5/16"	2
5	100238-001	Hex nut, nylon insert lock 1/4-20	1
6	100394-001	Spring latch	1
7	100627-003	Hex screw, 5/16-18 × 1"	2
8	100943-001	Top-wind swivel jack, 2000-lb. cap.	5
9	101197-001	Thrust washer, 2"	2
10	101198-001	Thrust bearing, 2"	1
11	102409-002	Combination stop/turn/taillight	2
12	102409-003	Taillight grommet	2
13	102551-001	Hex flange nut, 5/16-18	2
14	102919-003	Swivel jack snap ring, 2 1/2"	4
15	104261-001	Axle assembly, 2000-lb. cap., 60" track	1
18	105812-001F	Nylon guide block	4
19	108420-200P1	Fender, round bolt-on	2
20	200019	Rubber bumper	1
21	202161	Trailer tire with wheel, ST175/80D-13	2
22	202568	Plug for 2 1/2" sq. steel tube	4
23	203001-P1	Tower base	1
24	104859-001	Tow chain with hook	2
25	101677-002	Tow hitch, 2" ball	1
26	201432	Quick-link for tow chain	2
27	100233-001	Flat washer, 1/2"	8
28	100216-017	Hex screw, 1/2-13 × 5"	4
29	100217-001	Hex nut, nylon insert lock 1/2-13	4
30	203013-P1	Drawbar	1

Figure 6-13. Mast assembly, exploded view

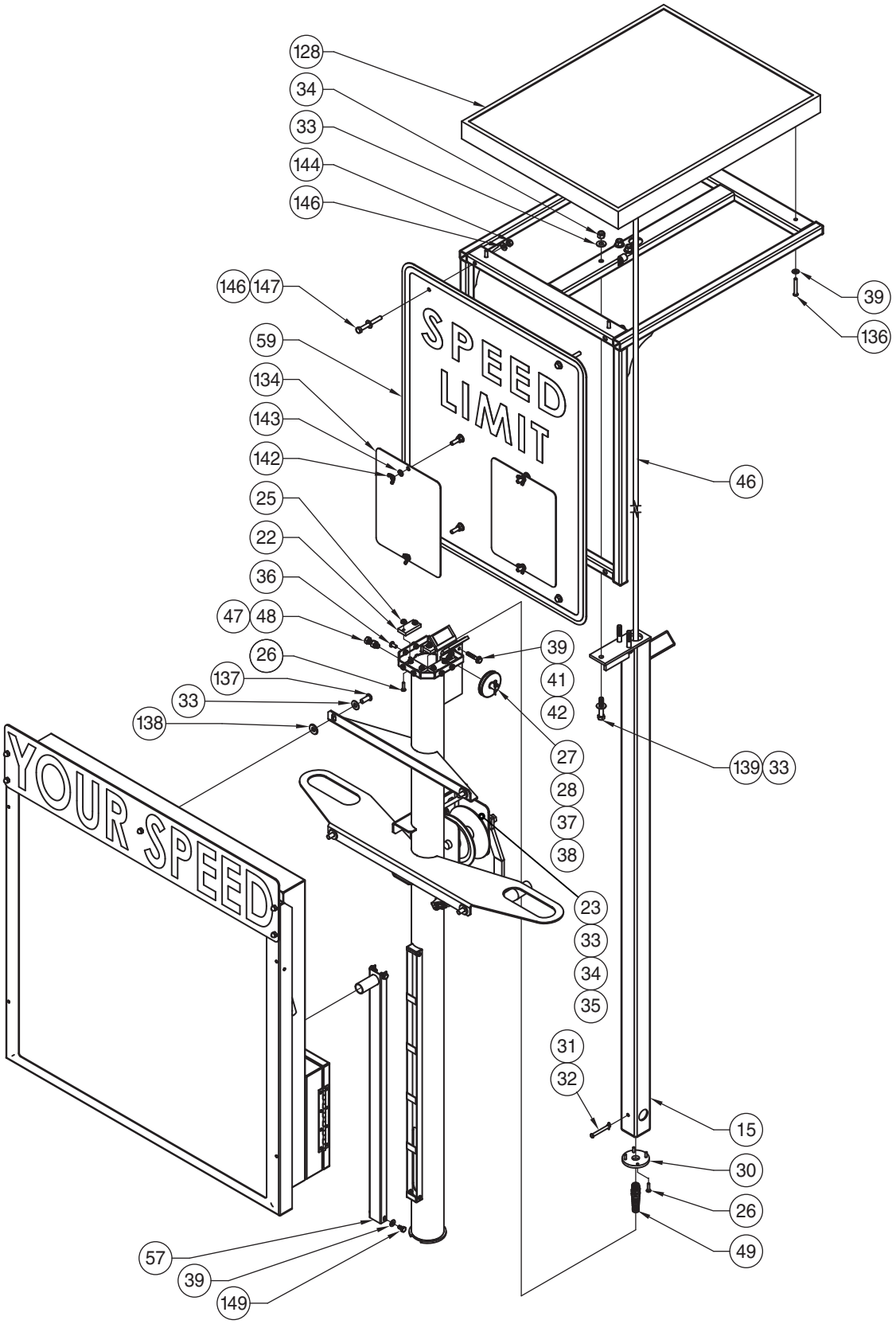


Figure 6-14. Mast assembly parts list

Item No.	Part No.	Description	Qty.
15	203065-F	Inner tower	1
22	105812-001F	Nylon guide block	3
23	203062	Hand-operated winch, 200-lb. cap.	1
25	203694	Keps nut, #10-32	8
26	203685	Pan-head screw, 10-32 UNF × 3/4"	14
27	105830-001	Clevis pin, 1 1/2"	1
28	105418-001	Cotter pin, 5/32" × 1"	1
30	203077	Wear block, inner tower	1
31	107238-001	Clevis pin, 2 1/4"	1
32	104461-001	Cotter pin, 3/32" × 1/2"	1
33	100234-001	Flat washer, 3/8"	16
34	104179-001	Hex nut, nylon insert lock 3/8-16	6
35	203692	Hex screw, 3/8-16 × 1"	3
36	203684	Pan-head screw, 1/4-20 UNC × 1/2"	8
37	104856-001	Flat washer, 1/2"	2
38	100757-001	Single-groove pulley, 2 1/2"	1
39	105198-001	Flat washer, 1/4"	28
41	203693	Hex nut, nylon insert lock 1/4-20	35
42	203696	Hex screw, 1/4-20 × 1 1/2"	1
46	203185	Power wire assembly	1
47	108633-001	Hex nut, 3/8-16	1
48	104177-004	Hex screw, 3/8-16 × 1 1/4"	1
49	103317-001	Cord grip, 3/8" NPT	1
57	203085-F	Conduit front panel	1
59	203619	Speed limit sign, 24" × 30"	1
128	202578	Solar panel, 40-watt	1
134	104289-002F	Speed number set, 24" × 30"	2
136	203023	Button-head screw, 1/4-20 × 1 3/4"	4
137	103666-003	Button-head screw, 3/8-16 × 1"	4
138	103168-001	Neoprene sealing washer	4
139	203702	Hex screw, 3/8-16 × 2"	3
142	203705	Wing-nut, 5/16-18	4
143	108375-001	Split lock-washer, 5/16"	4
144	203701	Hex nut, nylon insert lock 5/16-18	8
146	100237-001	Flat washer, 5/16"	16
147	203700	Hex screw, 5/16-18 × 2 3/4"	2
149	106253-001	Hex screw, 1/4-20 × 1/2"	4

Figure 6-15. Speed-display cabinet, exploded view

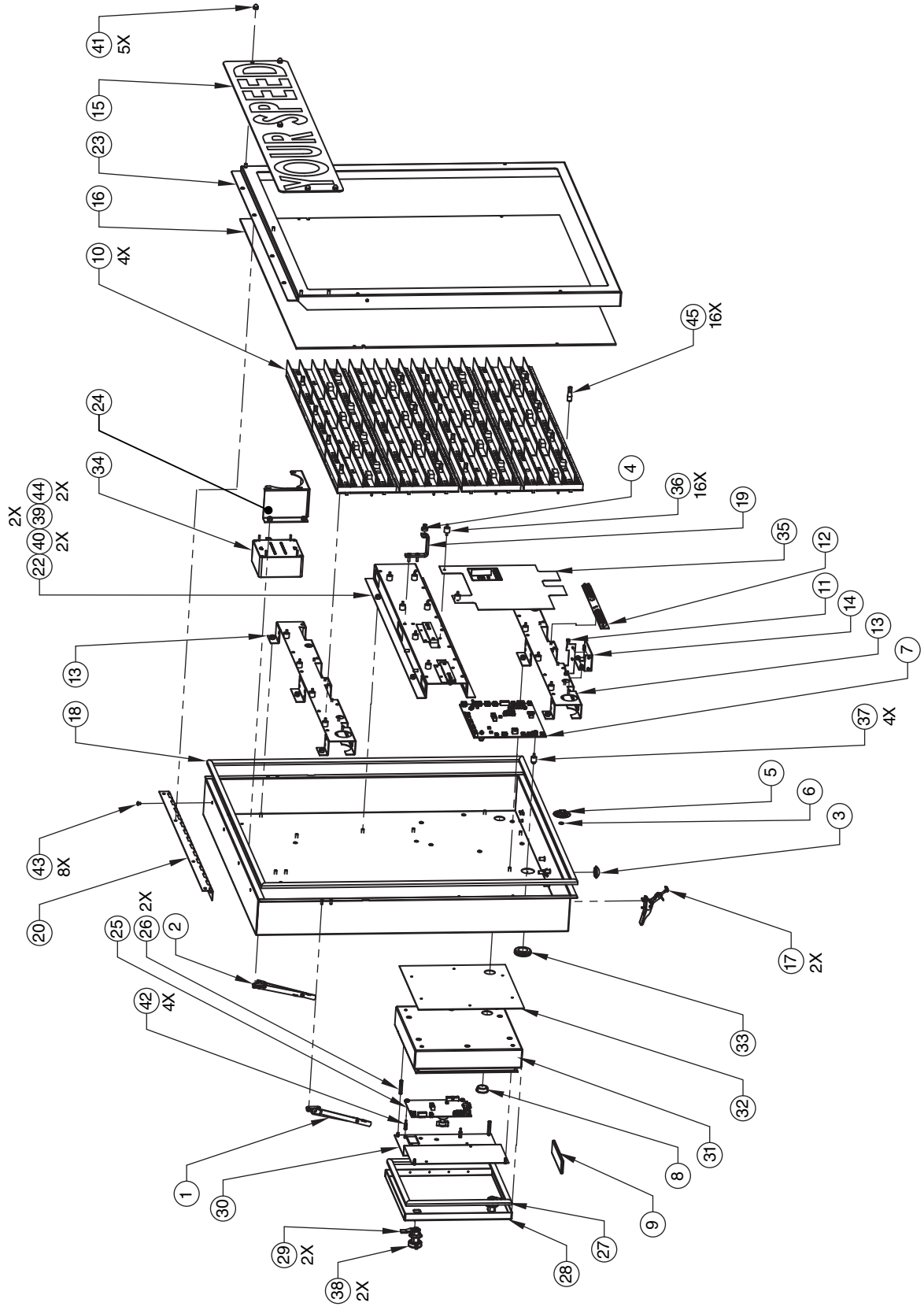


Figure 6-16. Speed-display cabinet parts list

Item No.	Part No.	Description	Qty.
1	102033-001	Lid support, right side	1
2	102033-002	Lid support, left side	1
3	104417-001	Liquid-tight plug, 7/8" diameter	1
4	104828-001	Rubber bumper	1
5	106111-001	Photocell holder	1
6	106302-001	O-ring	1
7	106846-001	PCB, systems board	1
8	108427-001	Snap bushing	1
9	108743-001	Wanco tuning fork, 55 mph	1
10	204071	LED display module, 9"	4
11	202454	Photocell	1
12	202621	Red-blue flasher assembly	1
13	203027-P2	Interior bracket, top/bottom	2
14	203028-P2	Photocell bracket	1
15	203030	“YOUR SPEED” sign	1
16	203031	Display cabinet window	1
17	203032	Speed display door latch	2
18	203033	Display cabinet gasket	1
19	203034-P2	Window bumper bracket	1
20	203035-P3	Display cabinet door hinge	1
22	203039-P2	Interior center, top/bottom	1
23	203041-P2	Door frame	1
24	203043-P2	Radar bracket	1
25	202311	PCB, selector board	1
26	203096	Standoff, 8-32 × 1 1/2"	2
27	203047	Door gasket	1
28	203049-P3	Control box door	1
29	104221-001	Cam latch	2
—	104222-001	Key for cam latch (not shown)	2
30	203059	Control panel	1
31	203052-P3	Control box	1
32	203053	Control box rear gasket	1
33	203091	Control box grommet	1
34	203168	Wanco radar head	1
35	203341	Polyester cover for systems board	1
36	102314-001	Vibration mount for LED display module	16
37	203061	Vibration mount for systems board	4
38	104223-001	Cam latch seal	2
39	204194-P2	Swing arm extension	2
40	204195-P2	Swing arm	2
41	103810-001	Acorn nut, 1/4-20	5
42	104234-001	Standoff, 8-32 × 5/8"	4
43	104448-028	Button-head screw, #10-32 × 1/4"	8
44	100207-019	Hex screw, 1/4-20 × 5"	2
45	107557-001	Nut, #8-32	16

Figure 6-17. Battery-box assembly, exploded view

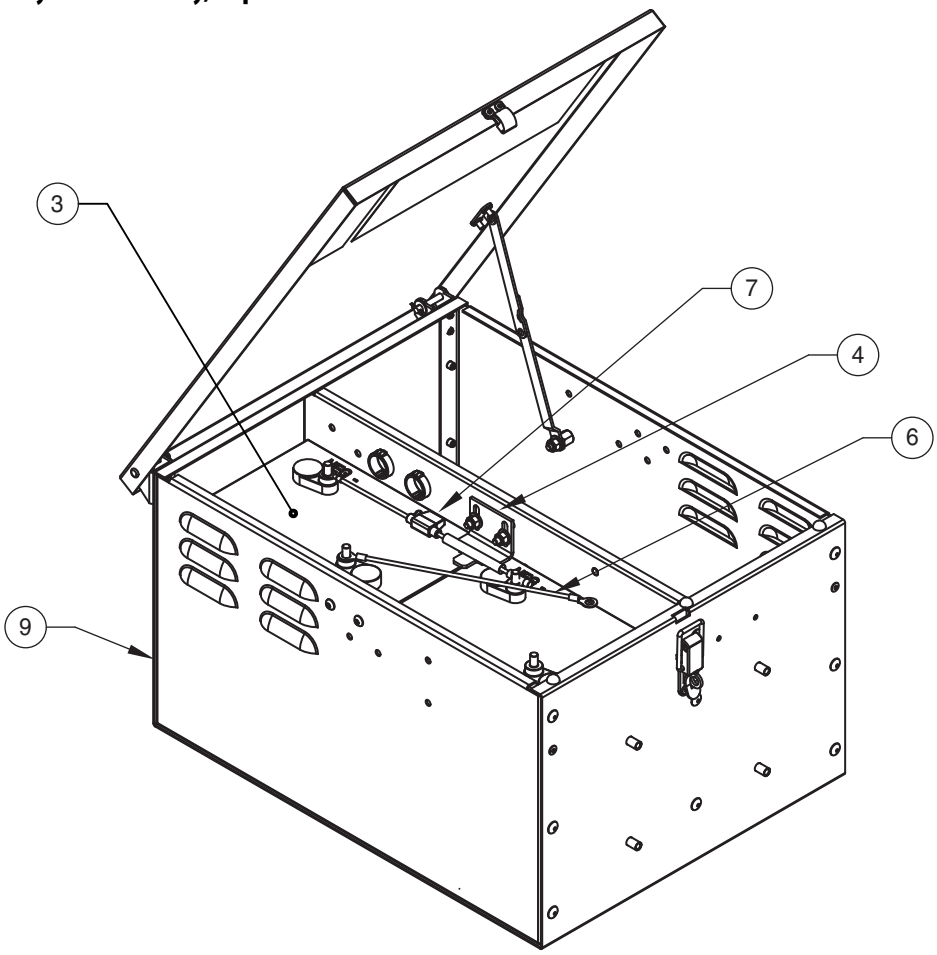


Figure 6-18. Battery-box assembly parts list

Item No.	Part No.	Description	Qty.
3	104131-001	Battery, 6V deep-cycle 225Ah	2
4	104577-001P2	Battery hold-down bracket	2
6	202205	Wire assembly with ring connector	1
7	203042	Wire assembly with fuse holder	1
9	205437-C	Battery box	1
10	202209	Wire assembly, bundled (not shown)	1
11	210268	Battery charger, 15A 60Hz 105/135VAC 12VDC	1

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