Use and Operation Guide

FLASHING SIGN SYSTEMS

Wrong Way Warning System

Applies to the following assemblies:

M75-DE0TS-CTLA
M75-DE0TS-CLTE

This guide is designed to asssist in the installation of

- System Design
- Theory of Operation
- Installation
- System Configuration
- Validation Testing
- Maintenance

In addition to this guide, installation manuals and supplements have been delivered with the product. These are also available at Trafficalm.com/wwa.

TraffiCalm greatly appreciates your investment in our solutions, if at any time you require additional assistance feel free to give us a call at 855-738-2722

PN 029-05227-0000 rev B

Components:

The TraffiCalm™ Wrong Way Warning Systems consist of these basic elements:

- *Controller* (M75-DE0TS-0013)
- *Collaborators* (M75-SA300-CLBX)
- Power Supplies
- LED Sign Enhancement Rings or RRFBs

Additional accessories include

- Expanded-use power supplies (low temp, larger solar, etc)
- Internally-illuminated signs with LED enhancement rings
- other detection methods (loops, for example)
- Third party detection systems

System Layout

A single Wrong Way ***Controller*** works in conjuction with at least one ***Collaborator*** to create a network that cover a road section (typically a ramp) in wireless collaboration, resulting in timely warning to any violating drivers

Some form of detection must be connected to either the Controller or a Collaborator. Multiple forms of detection can be combined across the platform.

The Controller and each Collaborator can be set up as flashing or detecting, and layed out in any orientation on the road section.

Especially consider the position of the Controller to ensure it is easily accessed in the event maintenance is required.

What it all looks like

Radar
(if equipped)

Collaborator

Controller

Enhanced Wrong Way Sign

Reason we need wrong way mitigation

In anticipation of your project we supplied design guides (example shown below) that itemized the hardware used per specific road section (typically a ramp) and per post. This guide is critical to the success of the installation and should be available for reference during the planning and installation phases. After the installation, this guide can be referenced during maintenance and, if needed, repair.

example of design guide/pictorial

The design guide portrays the functionality of our system and how the specific components will need to be placed in order to perform well for the given road section.

The design guide was created remotely, with information at hand. Locally exclusive information may dictate change orders to the design of the system, these should be noted and updated on the design guide.

Note that the visualized detection aiming is approximate, further in this guide we will cover detection theory.

LED Sign Enhancements:

The supplied sign enhancements are made to install to any Wrong Way or Do Not Enter sign manufactured to MUTCD requirements. They can be highlighted in either red or white LEDs and are designed to provide ample warning to any wrong way driver in almost any condition, day or night.

The LED enhancements can be connected to any Controller or Collaborator in the system.

LED flashing will only occur upon succesful detection of a wrong way vehicle

LED intensity is hard to photograph, but these things stand out when needed!

Before installing the system...

The three main goals of any wrong way mitigation system:

1. Detect Wrong Way Drivers (WWDs) in any condition
2. Prompt WWDs to self correct and safely turn around

Trafficalm has developed a proven system that can accomplish all three with minimal hardware and stellar performance

Performance must be measured by two factors:

1. Ability to warn any wrong way driver
2. Ability to send undeniable evidence of a WWD's activity to a system or person that can act upon the reported activity

Wrong Way Alert has been developed to make installation not only easy, but nearly foolproof. However, it is still important to understand a few core concepts...

Radars and Other Detection

We use many "small" radar detectors to create up to 4 zones of detection. While each zone can consist of a single radar, it is highly recommended that two make up the zone.

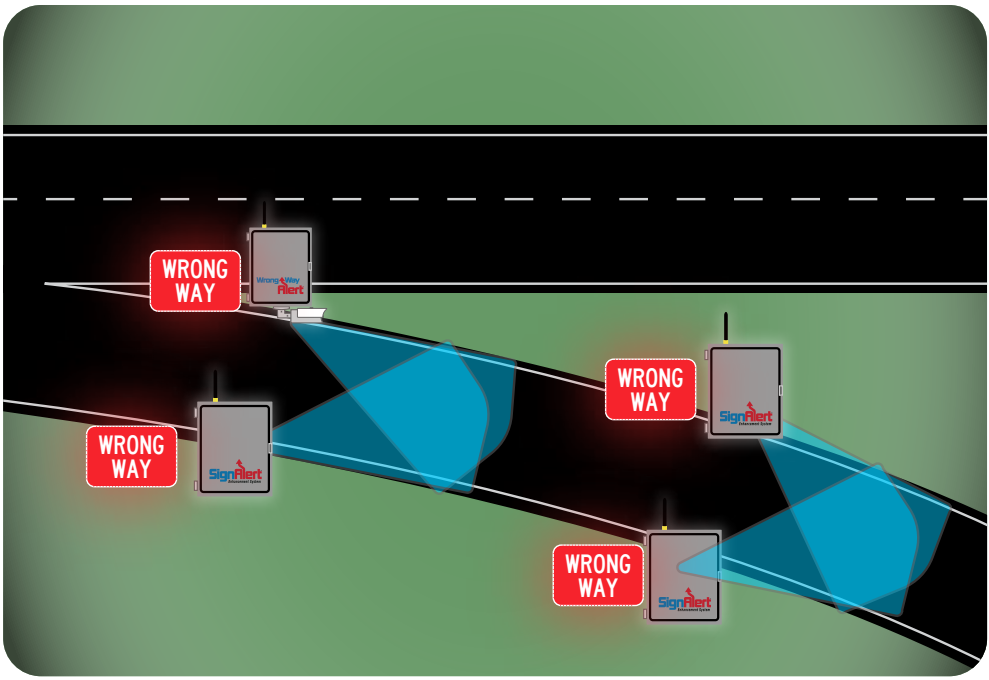
The more radars and zones that are incorporated the more accurate a system can be considered. It is entirely viable to create a system with just one radar, but the chance for false detections increase dramatically. Adding a second radar will halve the occurance of false calls, a third will halve it again. Typically, a complete system that can deliver at least a 99.5% accuracy rate consists of 4 radars in two zones.

Third party detection methods can also be employed. Examples of these systems are loop detectors, thermal cameras, and advanced radars. System reliability is contingent on the design, use, and user's understanding of these devices.

Collaboration

The Controller wirelessly receives all the detection data from the detectors. This information is validated by a collaboration algorithm that determines whether a notification should be sent or not.

How does it work? The system's algorithm considers the vehicle's presence and distance travelled (determined by series of detections). A real vehicle will have a predictable signature of detection which can be relied upon for sending notification.



example of typical 2 zone, 4 radar setup

Introduction

It is beneficial to understand how the individual components are deployed in the field, especially where maintenance will be required.

In this section we will detail each component and notes on its installation.

Typical installation procedure...

1. Affix LED enhancment ring to sign face (if needed)
2. Install Controller or Collaborator
3. Install supporting power supply (solar panel, battery box, AC inverter, etc.)
4. Install Radar high on post, alternatively install third party detection system according to manufacturer's instructions
5. Install sign and LED ehnacement ring to post
6. Make all connections between devices
7. Power on Collaborators
8. Power On Controller
9. Configure System

NOTE: It is prudent to take note of each Collaborator's ID number and location before installing on the post!

Mounting Methods

Various methods can be used to mount our components. An installation kit is supplied which contains bolts for mounting to square posts and banding brackets for mounting to round posts or unusual infrastructure. No banding or banding tool is supplied. Where banding is used, it is recommended that 3/4" banding be double wrapped to ensure maximum stability in windy and icy conditions.

Some of our solar panel brackets require large u-bolts (not supplied) not readily available. It is highly recommended this be planned for and purchased accordingly. They are the best possible way to mount our solar panels to ensure years of trouble free service.

ALWAYS ensure the antennas have clear line of site to the Controller!(!!!)

LED Enhancement Rings

The supplied LED enhancment rings (wrong way or do not enter) are designed as a cohesive ring that affixes to the face of the respective sign. A single wire exits the top left or right of the ring; no hardware or cabling are visible on the back of the sign.

To attach the ring, peel and stick the addhesive backing to the sign. It is highly recommended that the sign be cleaned with the supplied alcohol wipes before adhering the ring.

Controller

Critical-The controller has two antennas that must be installed before power is applied!

If utilized, the radar must be attached before power is applied

The controller should be located on the post or infrastructure so that all supporting components can be connected with the supplied lengths of cable and conduit.

It is also important to consider camera aiming. See the next segment for more info

The controller features two mounting tabs, top and bottom, that are spaced on 1” centers for mounting directly to square posts. Alternatively, banding brackets can be used in the same location

Power Supplies, cont'd

The Controller can operate on any 12V source supplying about 6 amps of power. We spec (and supply) the following options:

- Outdoor rated AC inverter
- Battery charger kit that can operate off timed street lamps
- Large solar kits to provide completely off-grid power

Many systems use a combination of power- AC at the Controller and solar power at the Collaborators

Unlike the Controller, the Collaborators are configured for their specific power type and feature built-in components to support the supplied power.

AC Collaborators receive AC power terminated directly inside the unit.

Solar powered units feature a 13Ah extreme temperature battery built into the unit. A 20W, 30W, or 60W panel can be supplied to charge the battery. All charging circuitry is integrated into the unit. A single wire runs from the solar panel into the box.

Where solar power is utilized, ensure that the solar panels are south-facing and angled at 45º (off of level). A calculation typical to solar installation can be utilized to measure an exact angle specific to your latitude.

example of solar setup, from the ground

Radars

Much of the system's success or failure relies on the radar's aiming and configuration. Some of this will be a matter of trial and error on every site, but some guiding principals will help...

The radar can detect a wrong way vehicle driving toward it or away from itself. The configuration will designate the desired function.

The radar should be mounted as high as possible on the post or infrastructure. Height maximizes the unit's ability to be aimed correctly and to exclude periphery activity not constituting wrong way driving.

Nothing (Controller, solar panel, signage, etc.) should obstruct the immediate face of the radar.

As much as possible the radar's view should be minimally obstructed by nearby signage, buildings, or foliage. Such objects can cause dead spots, reflections, or small motions that will obfuscate functionality.

The radar mounting bracket accomodates a great angular adjustment of the radar. As shown at right, it can be rotated both up and down, as well as left and right to achieve an accute (45º, typically) aiming at the roadway.

You want the radar to spotlight a small section of roadway about 60' (183m) in front of the post. Higher aiming (broadcast) will produce false detections that are difficult to exclude with configuration settings.

Signage

With the LED enhancement applied the sign will mount as any other road sign. It is important that the cable exit the ring at the top left or right corner.

Hardware to mount the signs is not supplied, but readily available at any hardware store or sign supply shop.

Making Connections

Within the Controller and Collaborator are labeled headers for each connection. No other connections within the box will need to be made, as these are all connected and tested at the time of shipment. If applicable, the battery terminal block may need to be connected.

Controller

Solar Collaborator

AC Collaborator

Our components utilize quick capture connections. To terminate a wire, strip the wire back 10mm, dpress the orange tab on the terminal, insert the wire, and release the tab. The whole green connector block may be removed to ease connections.

All the Collaborators in a group can be powered on at any time. However, due to a 2 hour security time out, it is advised that the Controller be powered on in the final stage of installation.

Overview

Configuration is compatible with any wi-fi enabled device. This includes smartphones, tablets, and PCs.

2-5 minutes after being powered on, the Controller will activate a wi-fi network (identified as a unique id containing WWA") available for connection. Connect to this network as any other, through your device's wi-fi settings. You will need to use the following password:

Tr@ffiCalm (case sensitive)

The device will warn you that no internet connection is available; this is expected and should be excused. Open the web browser of choice (Explorer, Chrome, Safari, and Edge have been tested functional) and navigate to:

Setup.trafficalm.com

You will be prompted for the following password:

Tr@ffiCalm

The setup wizard will take you step by step through the system configuration and setup.

A configuration guide is supplied seperately to ensure the entire process can be planned ahead of the installation.

Validation Testing

After setup has been finalized it is important to test the system. The first phase of testing should be to observe any sources of radar "noise" and to adjust the settings and aim to exclude this noise.

The system can be "reversed" to test on live "right-way" traffic. Alternatively, and preferably, the road section should be shut down and live wrong-way testing be performed. We have developed the following test script for reference...

Wrong Way Alert Test Script

released: 20190815

Where ramp closure is not possible

Procedure- Where RSUT closure is not permissible; it is feasible to test the system off of active, right way traffic. The control of speed and traffic volume is inherently impossible in this scenario. System test will rely on sufficient observation of traffic activating the system from specific lanes of entry. It is advised that tests occur during hours that traffic is expected to be low; specifically, gaps between passing vehicles results in improved accuracy and is most indicative of an average wrong way event. With the assistance of TraffiCalm systems team, these tests can be performed remotely. To perform this test, the system will be set up in "reverse" of its final configuration. For example, a system consisting of 2 radars in the Pre-Alert Zone and 2 radars in the Alert Zone, all detecting approaching traffic (wrong way traffic) will be configured with 2 radars in the Confirmation Zone and 2 radars in the Alert Zone, all set to detect receding traffic. It is critical that the detection aiming remains identical throughout the test to ensure proper operation in Wrong Way mode. Once the test is complete, the system can be configured to wrong way mode by reversing the changes set.

Run description	Pass?	Time to Notify	Notes
Lane 1			
Lane 2			
Lane 3			
Lane 1+2			
Lane 2+3			
Lane 1+3			

Notes

This test can be expanded to as many lanes of entry as necessary, we have limited it to three (3)only for reference. Where alternative methods of detection are utilized (loops, push buttons, etc) the test will still be effective, though additional hardware settings may be required on the detection hardware. We have seen this test expanded upon, with different vehicle sizes noted, expanded speeds added, and additional environmental influences (trains in motion, for example) considered, consider this a starting point for your own tests.

Wrong Way Alert Test Script

released: 20190815

Given the variability of ramps and roadways that Wrong Way Alert can cover, it is important to properly test and verify system functionality. In our experience, a concise test plan results in effective performance measures that can be relied upon for real world monitoring of dangerous wrong way events. This script is the result of working with dozens of transportation engineers on real projects and we feel it is comprehensive, but local knowledge and regulations should be considered when implementing your own test plan. Note that this procedure is intended to be used after the system has been configured. All tests should result in a full notification and warning devices being illuminated.

Where ramp closure is feasible (recommended)

Procedure- Per governing guidelines, the road section under test (RSUT) shall be closed to permit sufficient and safe passage of a single vehicle traveling the wrong direction at up to 45mph through all potential lanes of entry; this may include medians and shoulders. The result should be twofold- complete coverage resulting in notifications being sent from any possible wrong way driving scenario, and no false detections after the RSUT is opened to live traffic. If a fail occurs, it is (typically) reasonably acceptable to adjust radar aiming and configuration, and then restart the test.

Run description	Pass?	Time to Notify	Notes
10mph, lane 1			
25mph, lane1			
35mph, lane1			
45mph, lane1			
10mph, lane 2			
25mph, lane2			
35mph, lane2			
45mph, lane2			
10mph, lane 3			
25mph, lane3			
35mph, lane3			
45mph, lane3			
25mph, Cross Lanes			

Applies to: All TraffiCalm supplied Wrong Way Alert System devices

TraffiCalm Systems provides the following warranty for its traffic calming solutions whether sold directly by TraffiCalm or by an authorized TraffiCalm distribution partner.

- TraffiCalm Systems warrants the product, excluding batteries, will be free of defect in materials and workmanship for a period of five (5) years beginning on the day the end user receives the product. Warranty is only valid if the product is ineffective for its intended purpose due to defects in materials or workmanship.
- Warranty is only valid if the product is installed, operated and maintained in accordance with the manufacturer's instructions and recommendations (available upon request).
- TraffiCalm's sole responsibility, and the purchaser's and users' exclusive remedy, shall be that TraffiCalm will either repair or furnish replacements for defective parts.
- Replacement parts will carry the unexpired warranty of the parts they replace. Any repairs conducted on out-of-warranty items will carry a 90 day warranty.
- Claims made under this warranty will be honored only if TraffiCalm is notified of a failure within the warranty period, reasonable information requested by TraffiCalm is provided, and TraffiCalm is permitted to verify the cause of the failure.
- TraffiCalm assumes no liability for any incidental or consequential damages, in any way related to the product regardless of the legal theory on which the claim is based.
- TraffiCalm Flashing Sign Systems are designed, tested, and warranted to operate as a matched component system. The warranty is voided if all system components for controllers, collaborators, and LED rings are not TraffiCalm equipment and third party devices are substituted without prior written approval from TraffiCalm.

This warranty does not cover damage resulting from:

- Accidents, vandalism, impact with a foreign object, or acts of God.
- Product modifications made by someone not authorized by TraffiCalm
- Failure of Customer to follow TraffiCalm's published operating instructions,
- Failure to follow TraffiCalm's published site selection and installation instructions,
- Removal or relocation of the unit,
- Electrical work external to the unit, virus/hacker activity, and external computer errors.

THIS WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES AND CONDITIONS, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY.