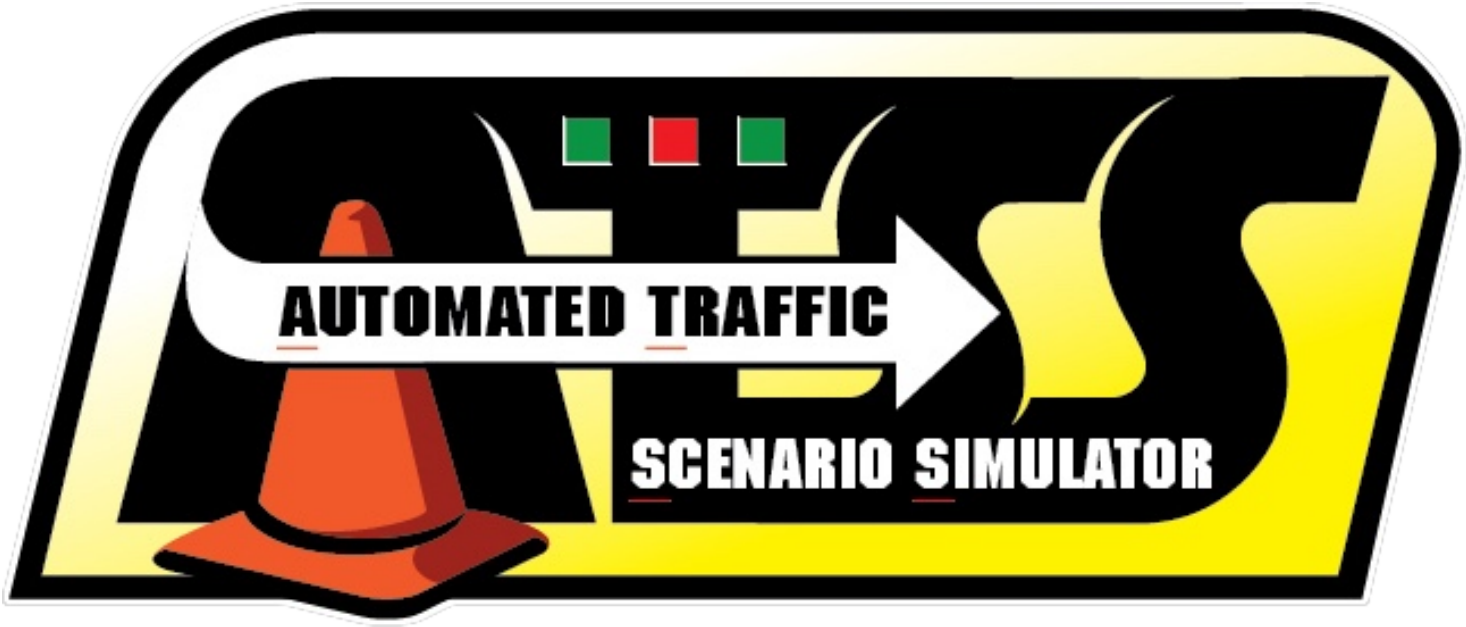


USER'S MANUAL &
COURSE CURRICULUM

HARDWARE SERIES 5.0 AND LATER
SOFTWARE VERSION 3.50 AND LATER
Rev 2509180711

Automated Traffic Scenario Simulator

Table of Contents

Introduction

Blacktop Bootcamp is proud to introduce the Automated Traffic Scenario Simulator (ATSS). Sold only to public safety and government agencies through our exclusive distributor, Skidcar System, Inc. This versatile training tool can enhance your driver training program by reducing costs, improving training quality, reducing manpower needs, and providing unbiased, repeatable training scenarios for your department.

The ATSS simulates real-world situations for driver training scenarios. Using a series of red and green lights the ATSS simulates oncoming cars, or roadway hazards, to provide added realism to driver training. The ATSS's advanced automation frees an instructor from the tedious duty of actuating signaling equipment or standing in a dangerous location waving flags. It also eliminates the use of unrealistic audible commands, instead creating visual cues to direct students to take corrective action.

Adaptive Reaction Time™ allows for consistent reaction times regardless of the student's vehicle speed. Unlike fixed activation point systems, the ATSS uses the student's speed to determine when to change the lights to achieve the configured reaction time. This prevents the student from gaining more reaction time by slowing down or losing reaction time by going faster than your instructed exercise's target speed.

Traditionally this kind of system has required a dedicated facility with expensive, permanently mounted lights and an instructor to operate them manually. The ATSS is completely portable and can be set up in dedicated facilities as well as temporary training venues. The ATSS can greatly expand your department's training flexibility and offer smaller departments training opportunities without the need for dedicated facilities. Any school, church, mall, or office parking lot can now become a training facility. The ATSS also supports permanent installation facilities as well.

Designed by a law enforcement officer with over 27-years of High Performance, Racing, and EVOC instructing experience, the ATSS is easy to set up, test and operate. Simple configuration ensures consistent, repeatable, bias-free, and randomized scenarios.

Product Variances

Physical characteristics may differ from the photographs in this manual depending on the options ordered with your particular system.

Important Operating Notes

- Blacktop Bootcamp has gone through great lengths to provide a rugged, easy to use, system that should provide years of reliable service when properly maintained and cared for.
- While the components of the ATSS system can withstand normal use and typical rainfall and moisture; being struck by a vehicle, drops, falls, or submersion in water can damage the ATSS components and is not covered under warranty.
- **To prevent exposure to the elements and damage from items being dropped on the control panel - Keep the lid of the ATSS closed when not monitoring exercises or configuring the ATSS.**
    - The exterior of the ATSS controller is moisture-resistant and the interior control panel face should be treated like any other electronic device. Therefore the control panel of the ATSS controller should be kept out of prolonged and direct exposure to rain!
    - In high-temperatures, prolonged exposure to extreme sunlight may cause the ATSS controller to heat up beyond normal operating temperatures.
- Cold weather with temperatures near or below freezing may reduce the capacity of the sealed lead acid batteries. Reduced runtime between charges under these conditions are possible even with a full battery charge. *Consult the section of this manual on Cold Weather Operation.*
- In extreme cold the LCD display on the control panel may be slow to respond. This is normal and does not affect the speed with which the system operates.
- Do not carry the ATSS by the antenna-guard; this is designed only to protect the antenna mounting point.
- Light stands MUST BE WEIGHTED AND SECURED to prevent falls from wind gusts or cable pulls. Fall damage to lights is not covered under warranty.
- Ensure adequate space when positioning sensors, lights and the ATSS Controller to prevent vehicle strikes to the equipment.
- Placing the ATSS controller in an elevated position off the ground can improve its effective communications range with the sensors.
- **DO NOT ALLOW THE BATTERIES TO RUN BELOW 11.5 VOLTS, THIS CAN PERMANENTLY DAMAGE THE BATTERIES!** USE THE INCLUDED BATTERY TESTER TO CHECK VOLTAGE AT THE END OF EACH DAY TO ENSURE THE SENSOR BATTERIES AND ATSS BATTERIES ARE WITHIN SPECIFICATION.

Cold Weather Operation

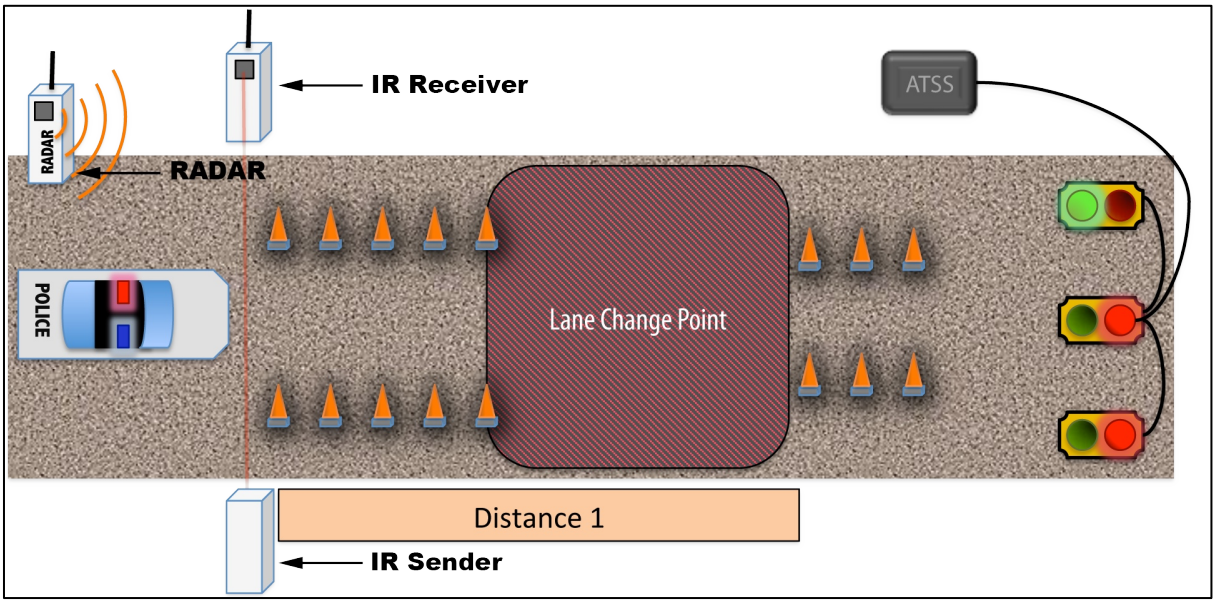
Like any battery operated device cold weather will reduce the amount of runtime for all components of the ATSS system. Particular care should be exercised with the ATSS Controller when operating at temperatures below freezing.

- Minimum operating temperature of the ATSS is -5° F/-20° C with wind chill factor.
- When bringing the ATSS Controller from outside to inside the unit should be powered off and the lid CLOSED to prevent frost and moisture condensation. Keep the lid closed until the ATSS Controller has warmed up to ambient indoor temperature.
- Do not charge the ATSS components until they have warmed to above freezing.
- Storing and charging the ATSS at room temperature and then bringing it into the cold will ensure run times nearly equivalent to warm weather operation.
- If the ATSS is brought from room temperature into a cold environment it is best to power on the ATSS before its temperature reaches outdoor temperatures. The power draw of the unit will provide some self-heating capabilities that will help ensure longer run times as long as the lid remains closed as much as possible.

Quick Start Guide

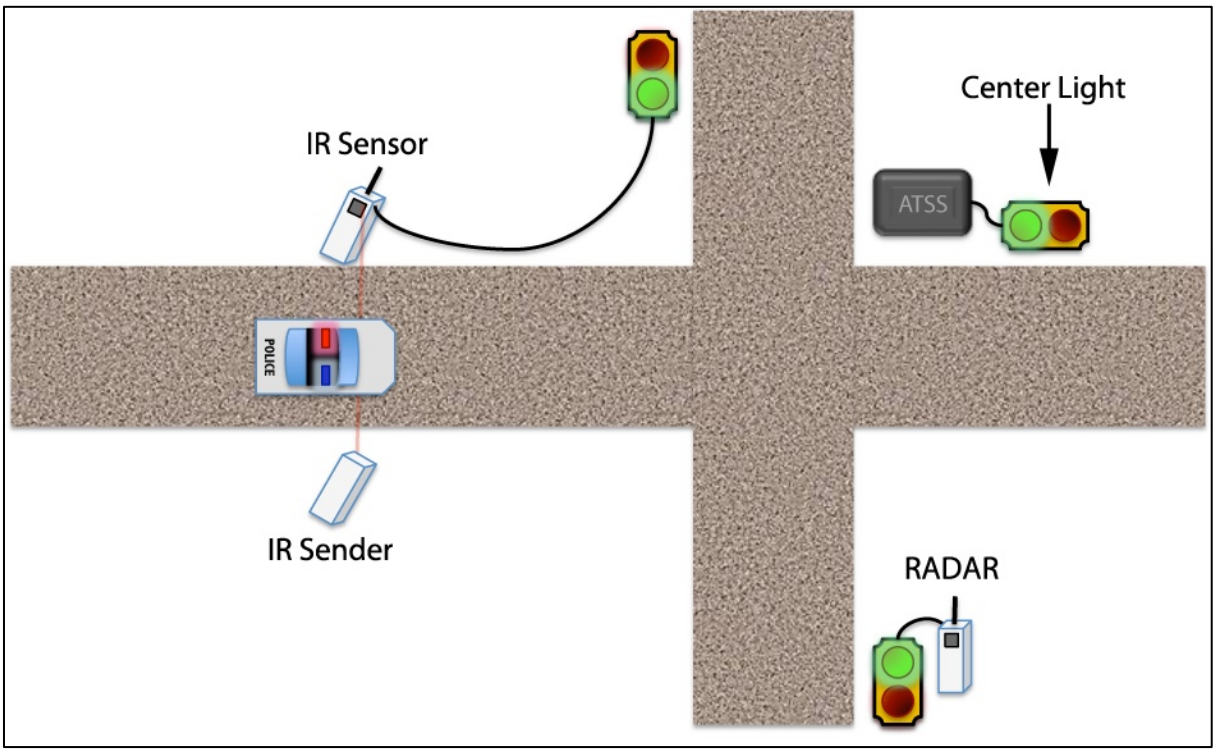
Follow these simple steps to set up the ATSS for operation.

Lane Change / Lane Decision / Braking Mode



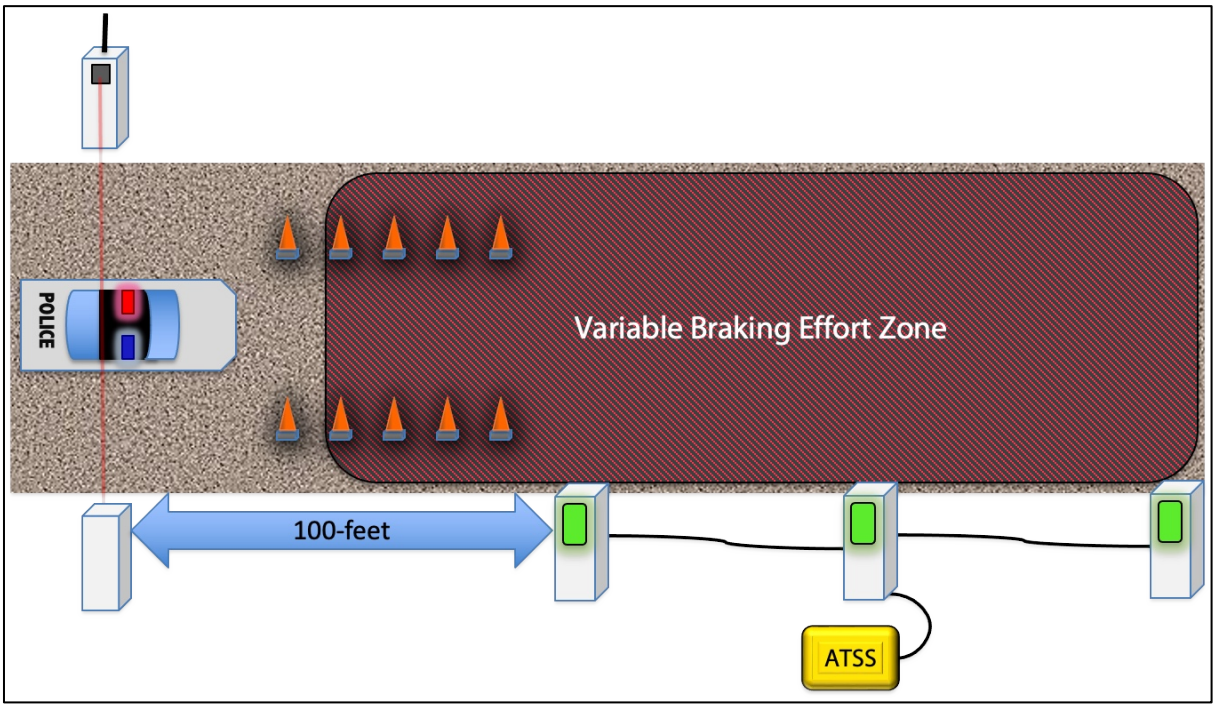
1) Before turning on the ATSS Controller, install the antenna, then turn on the Infrared (IR) Sensor within 20-feet of the ATSS Controller.
2) Install the antenna on the ATSS, turn it on, and wait for it to pair with the sensor.
3) Place the ATSS controller and lights in a safe location on your course.
4) Turn on the RADAR sensor.
5) Set up the lights either on the ground or on the optional scaffold or tripods.
6) Connect the left and right lights to the center light.
7) Connect the center light to the ATSS Controller.
8) Place the IR Sender and Receiver at the appropriate locations (50, 75, 88, 100, 125, 150, 175, 200-feet from target lane entrance – **100-feet is the default**).
9) If you place the sensors at anything other than 100-feet, configure this distance on the ATSS controller.
10) Place the RADAR in a safe location where it can get accurate readings on the vehicles.
    a. The preferred location is such that the vehicle passes the RADAR and the RADAR obtains readings as the car recedes.
    b. Ensure the RADAR obtains readings BEFORE the car breaks the IR sensor beam.
11) Set the ATSS into Braking Mode, Lane Change Mode, or Lane Decision Mode.

Intersection Clearing Mode



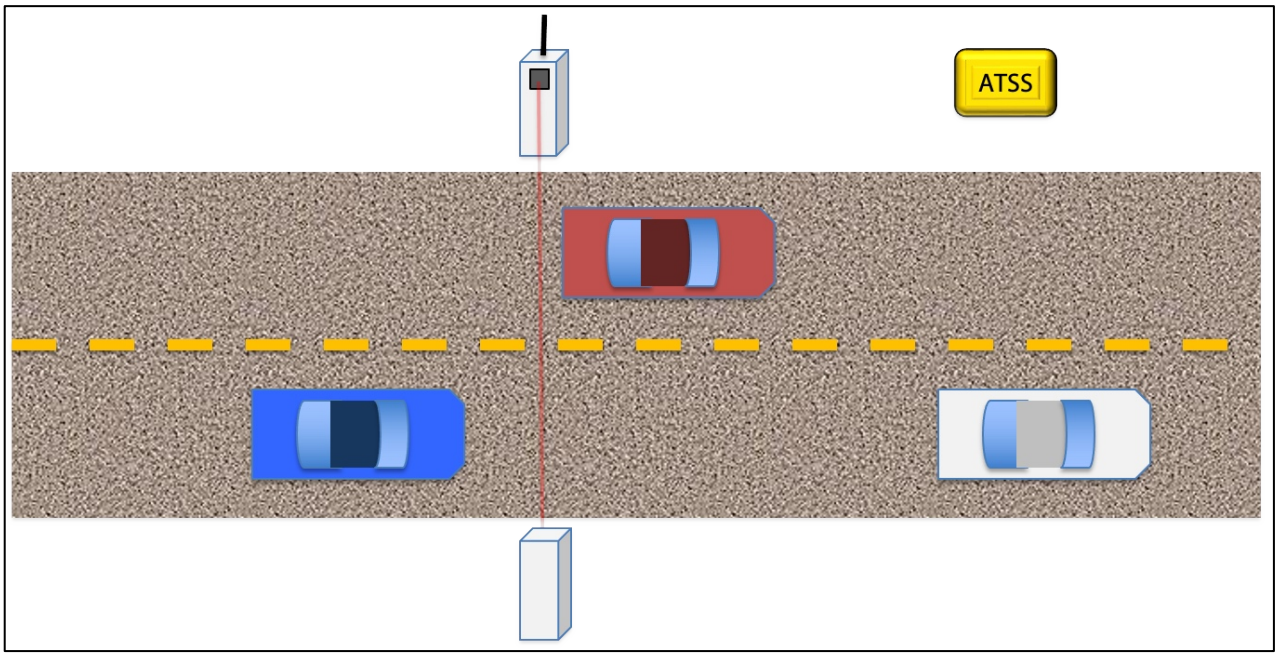
1) Turn on the Infrared (IR) Sensor within 20-feet/10-Meters of the ATSS Controller.
2) Turn on the ATSS and wait for it to pair with the sensors.
3) Place the ATSS controller in the course.
4) Turn on the RADAR sensor within 20-feet/10-Meters of the ATSS Controller.
5) Set the ATSS to “Intersection Clearing Mode” (ICM).
6) Select which ICM program to run: “First Car Through” (Emergency Response Training) or “Second Car Through” (Pursuit Training).
7) The ATSS will pair with the second sensor.
8) Plug the center light into the ATSS.
9) Connect a light to the RADAR and place it on the course as shown above.
10) Connect a light to the IR Sensor and place it on the course as shown above.
11) Place the IR Sender across from the IR Sensor.

Brake Decision Mode



1) Turn on the Infrared (IR) Sensor within 20-feet/10-Meters of the ATSS Controller.
2) Turn on the ATSS and wait for it to pair with the sensor.
3) Place the ATSS controller in the course.
4) Set the ATSS Mode to: “Brake DecisionMode”.
5) Plug the center light into the ATSS.
6) Connect the RIGHT light to the CENTER light and place it at the BEGINNING of the course as shown above.
7) Connect the LEFT light to the CENTER light and place it at the END of the course as shown above.
8) Set the IR Receiver 100-feet from the first light.
9) Place the IR Sender across from the IR Sensor.

Traffic Counter Mode



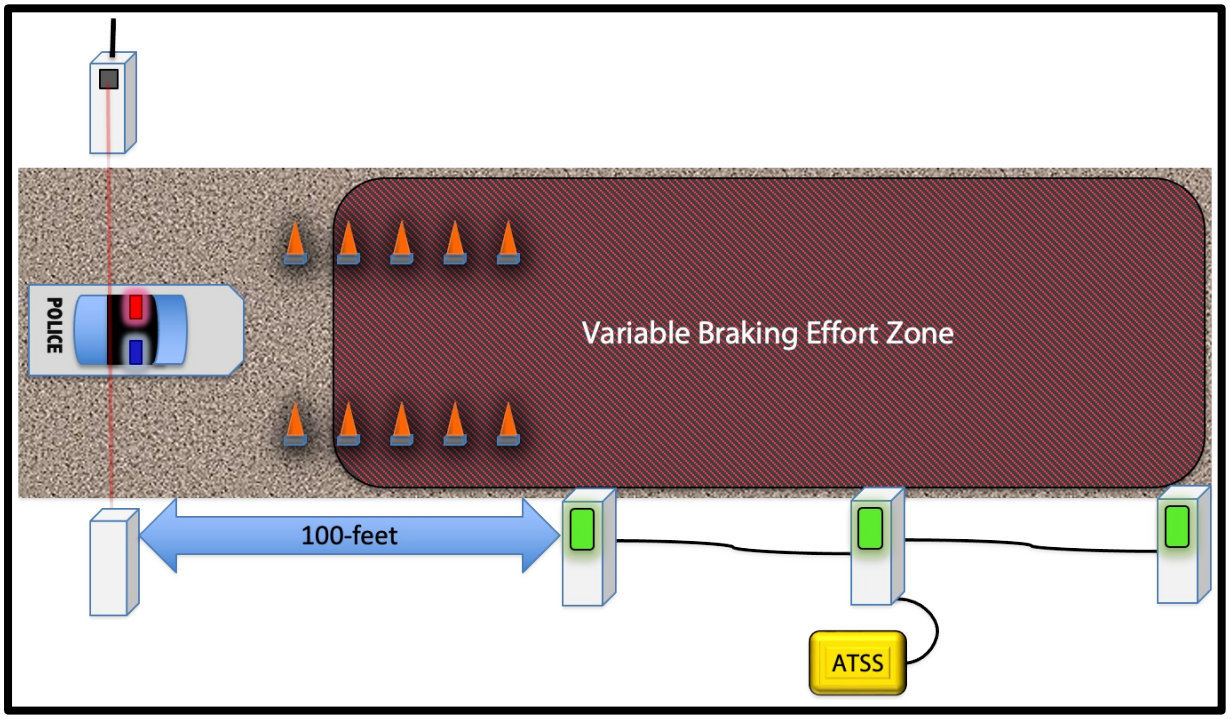
1) Turn on the Infrared (IR) Sensor within 20-feet/10-Meters of the ATSS Controller.
2) Turn on the ATSS and wait for it to pair with the sensor.
3) **WITH DUE REGARD FOR OFFICER AND PUBLIC SAFETY!** Place IR Receiver and ATSS on one side of the roadway within 250-feet of each other. It is recommended the receiver and the ATSS be placed on the same side of the roadway. Place the IR Sender on the opposite side of the road.
    a. Make sure the receiver and ATSS controller are far enough off the roadway that they will not be struck by vehicles.
    b. Make sure the receiver and sender have an unobstructed view of the opposite side of the roadway. Tall grass, weeds, branches, bushes, etc., will prevent proper actuation of the system.
    c. If the counter function is to be used for an extended period of time try to position the receiver so that the sun does not shine directly into the receiver during sunset or sunrise.
    d. If used in high-wind areas it may be necessary to secure the receiver with the optional ATSS Stabilizer kit (P/N BBIS11-00245), sand bags, or some other method to secure the sensor.
    e. The sender and receiver may be up to 100-feet apart.
    f. The receiver's red light will turn off when the units are properly aligned.
4) Go to the "Traffic Functions" menu on the ATSS and set the mode to: "Traffic Counter".
5) Select whether you want to zero the counter, or pick up from the last count.
6) Ensure that the counter is properly counting vehicles, then close the lid of the ATSS.
7) Secure the ATSS
    a. The ATSS Controller may be secured to a fixed object like a tree or pole, using a chain or cable and padlock through the handle.
    b. The lid of the ATSS Controller can be padlocked using either or both of the reinforced holes.
8) When you are finished with your count, turn off the IR Receiver and the system will stop counting.
9) Press the [<-] Left Button to save the count and exit out. The number is stored on the ATSS even if the power is turned off and will remain until it is zeroed out.

Curriculum

This curriculum has been developed to help you get the most out of your driver training program and the ATSS. It is not intended to supercede or replace any mandated or existing agency training programs. This curriculum is intended to be a useful template only.

This course is designed with a natural progression to transition average street drivers into more advanced Emergency Vehicle Operations.

Brake Decision Mode



Overview

Brake Decision Mode (BDM) is intended to help transition drivers who are used to light to moderate braking for normal street driving into a more aggressive, performance-oriented, emergency reaction style of braking. It can also be used to help drivers who have difficulty properly modulating the brake pedal.

When the Braking Decision Mode is selected from the main menu, the ATSS display will show the randomly selected delay time and light. The lights are numbered 0 through 2, where 0 is the first light, and 2 is the last light.

Objective

After accelerating to a speed of 35 to 40 MPH, the student should use the appropriate amount of braking force to stop before the front bumper of the vehicle breaks the plane of the red light. The appropriate braking force should be applied such that the vehicle is able to stop no more than 10-feet before the red light. Stopping too far away from the light indicates too much brake pressure was used. Breaking the plane of the red light indicates that not enough brake pressure was used.

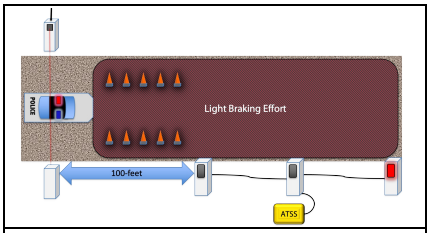
The student should not be letting off of the brakes or reducing pressure in order to "ease" up to the light. Brake pressure should start with a firm squeeze and be constant and steady until the vehicle stops.

Method

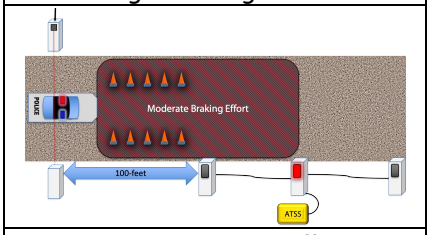
This course is set up on a straight driving path, area, or roadway with the lights placed along the shoulder of the roadway facing the driver. When the student passes the Infrared Receiver the three lights will turn green briefly to allow the student to identify the position of the lights. After a randomly chosen delay time, the green lights will turn off leaving one randomly selected red light .

Standard

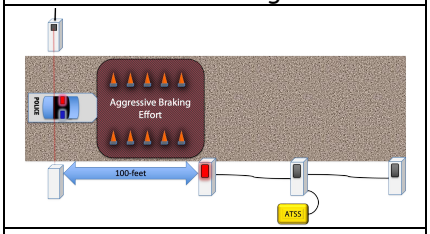
The student should utilize the appropriate amount of braking necessary to prevent the front bumper of the vehicle from breaking the plane of the red light, but not so much as to stop than 10-feet from the light. ABS should only be engaged when scenario dictates and non-ABS cars should only be threshold when ABS would otherwise intervene.



Light Braking Effort



Moderate Braking Effort



Aggressive Braking Effort

Last Light

When the last red light is lit braking should be smooth and controlled as if stopping for a red-light on the street. Wheel or ABS activation should not occur.

Middle Light

When the middle light is lit braking will need to be more aggressive. Depending on when the light activates it is possible that the student may have to use ABS or threshold braking.

First Light

When the first red light is lit the student will need to be extremely aggressive with the brake pedal. ABS will almost certainly activate and threshold braking in non-ABS equipped need to be used.

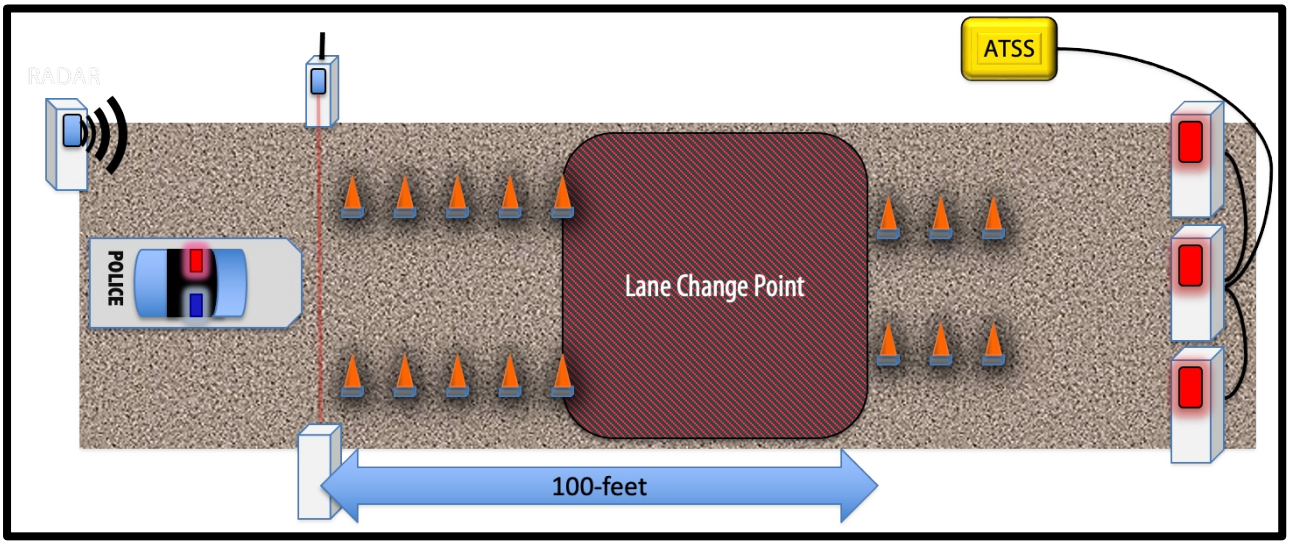
Scoring Matrix

This scoring matrix is a suggestion of criteria to look for as well as a suggested number of point deductions out of a 100-point scale. Each run is scored separately, then the runs are averaged for a final score.

Suggested Criteria	Points	Deducted
Slides/Runs off course.	-100	
Front of vehicle breaks plane of the red light	-100	
Fails to stop at all	-100	
Stops more than 10-feet prior to the light	-10	
Engages ABS when not necessary	-10	
(Non-ABS car) Does not use threshold braking	-10	
Eases off brakes to “inch up” to the red light	-10	
Enters the course below the minimum exercise speed (e.g. 5 MPH too slow = -10 points)	-2 per MPH	
Total Deductions		
Single Run Score		

Average the scores from all attempts at this training evolution to get a final score.

Braking Mode



Overview

Braking Mode (BM) is intended to teach students how to stop quickly in panic/crash avoidance situations. The instructor will set a reaction time (default is 1.5 seconds) and then the ATSS will ensure that each student gets that reaction time regardless of what speed the student is traveling.

When Braking Mode is selected from the main menu, the ATSS will turn three lights to green as soon as the RADAR detects a vehicle speed over 10-MPH. When the student is 1.5 seconds away from the stop area the lights will all turn red. The student must stop before the front of the vehicle breaks the plane of the braking zone.

Objective

The student should accelerate to and maintain the suggested speed of 35 MPH. When presented with three red lights, the student should stop quickly and aggressively before the front bumper of the vehicle breaks the plane of the braking zone.

Once all graded runs are complete, it is suggested that the exercise be attempted with increasing speeds: 40, 45, 50 MPH. This will show the student that with the same reaction time faster speeds will require more stopping distance to prevent a crash.

Method

This course is set up on a straight driving path, area, or roadway with the lights placed down the road, directly across form the starting lane, but away from the braking area, or on the optional overhead scaffold which places them directly over the escape lanes. When the student passes the RADAR the ATSS will display three green lights. At the appropriate time to allow for a 1.5-secod reaction time, the system will turn all three lights red. When the student has come to a complete stop the center light will turn green briefly to allow the student to proceed.

Standard

The student should utilize maximum braking force necessary to prevent the front bumper of the vehicle from breaking the plane of the brake zone. Braking force should be hard enough for ABS to engage during this crash avoidance stop. Non-ABS cars should threshold brake when ABS would otherwise intervene.

Scoring Matrix

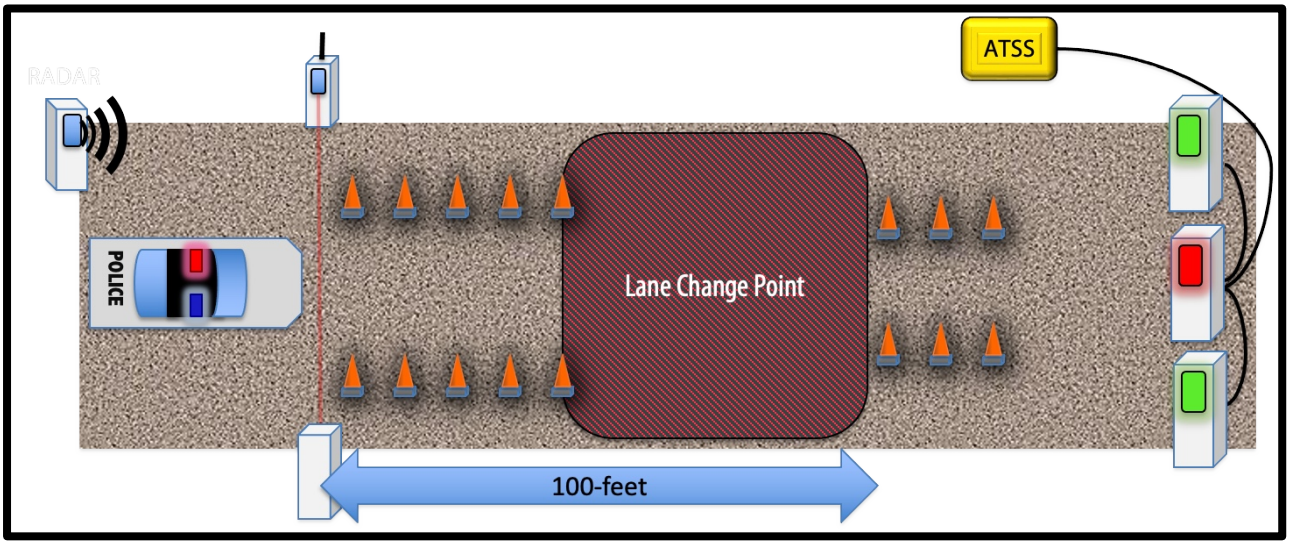
This scoring matrix is a suggestion of criteria to look for as well as a suggested number of point deductions out of a 100-point scale. Each run is scored separately, then each run is averaged together for a final score in this exercise.

Suggested Criteria	Points	Deducted
Slides/Runs off course.	-100	
Front bumper breaks plane of the brake zone (minor crash)	-10	
Base of windshield breaks plane of the brake zone (moderate crash)	-25	
C-pillar breaks plane of the brake zone (serious crash)	-50	
Rear bumper stops before the plane of the brake zone (major crash)	-75	
Car completely passes the plane of the brake zone. (potentially fatal crash)	-100	
(Non-ABS car) Does not use threshold braking	-10	
Total Deductions		
Single Run Score		

Average the scores from all attempts at this training evolution to get a final score.

Once all graded runs are complete, it is suggested that the exercise be attempted with increasing speeds: 40, 45, 50 MPH. This will show the student that with the same reaction time faster speeds will require more stopping distance to prevent a crash.

Lane Change Mode



Overview

Lane Change Mode (LCM) is intended to teach students how to maneuver quickly to avoid a crash when an object or vehicle blocks the path ahead. The instructor will set a reaction time (default is 1.5 seconds) and a light pattern set. Available patterns with their estimated success rates if a student cheats by anticipating the lights:

- R/L (Right / Left) – 50% cheat success
- R/L/Stop (Right / Left / Stop) – 33% cheat success
- R/L/R&L (Right / Left / Right & Left) – 50% cheat success
- R/L/R&L/Stop (Right / Left / Right & Left/Stop) – 33% cheat success
- R/Mid/L (Right / Middle / Left) – 33% cheat success
- R/Mid/L/R&L (Right / Middle / Left / Right & Left) – 25% cheat success
- R/Mid/L/Stop (Right / Middle / Left / Stop) – 25% cheat success
- R/Mid/L/R&L/Stop (Right / Middle / Left / Right & Left / Stop) – 20% cheat success

Once the pattern mode is selected then the ATSS's Adaptive Reaction Time will ensure that each student gets the programmed reaction time and a randomly selected light pattern.

When Lane Change Mode is selected from the main menu, the ATSS will turn three lights to green as soon as the RADAR detects a vehicle speed over 10-MPH (this option can be turned off in the Settings menu option). When the student is 1.5 seconds away from the escape lanes at any speed, the system will display a random light pattern.

Objective

The student should accelerate to and maintain the suggested speed of 35 MPH. When presented with a light pattern the student must navigate to an available green lane without hitting any cones. If all lights are red the student must stop before the front of the vehicle breaks the plane of the braking zone/lanes. If the student swerves toward a red lane they must treat the situation as an emergency braking stop. If they break the plane of the red lane, then scoring for a red-lane selection is the same as for braking mode.

Method

This course is set up on a straight driving path, area, or roadway, at least three lanes wide. The lights are placed directly in front of the starting lane, but down the road away from the lane change/braking area, or on the optional overhead scaffold which places them directly over the escape lanes. When the student passes the RADAR the ATSS will display three green lights (this is the default setting, this feature can be turned off in the Settings menu option). At the appropriate time to allow for a 1.5-secod reaction time, the system will turn the lights to a random pattern. If the student swerves toward a "red" lane then they must stop before breaking the plane of that lane. If they break the plane they have essentially had a crash, and scoring is the same as the Braking Mode Matrix.

Ideally the student should select the lane that requires the least amount of inputs to the vehicle. *For example: If an amber right lane and green left lane are displayed, the left lane requires only steering input. The right lane choice in this example requires the student to slow down AND use steering input.*

Standard

The student should be able to swerve to avoid entering a red lane without hitting any cones or losing control of the car before or after the lane change. In an instance where a student accidentally swerves into a red lane they will utilize maximum braking force necessary to prevent the front bumper of the vehicle from breaking the plane of the escape lane/brake zone. Braking force should be hard enough for ABS to engage during this crash avoidance stop. Non-ABS cars should threshold brake when ABS would otherwise intervene. Failure to stop is graded the same as for braking mode.

Scoring Matrix

This scoring matrix is a suggestion of criteria to look for as well as a suggested number of point deductions out of a 100-point scale. Each run is scored separately, then each run is averaged together for a final score in this exercise.

Suggested Criteria	Points	Deducted
Slides/Runs off course.	-100	
All Red or Red Lane - Front bumper breaks plane of the brake zone (minor crash)	-10	
All Red or Red Lane - Base of windshield breaks plane of the brake zone (moderate crash)	-25	
All Red or Red Lane - C-pillar breaks plane of the brake zone (serious crash)	-50	
All Red or Red Lane - Rear bumper stops before the plane of the brake zone (major crash)	-75	
All Red or Red Lane - Car completely passes the plane of the brake zone. (potentially fatal crash)	-100	
Hit/Displace Cone (per cone)	-5	
Selects a red lane but stops in time	-5	
Loses control before or after lane change	-100	
(Non-ABS car) Does not use threshold braking	-10	
Total Deductions		
Single Run Score		

Average the scores from all attempts at this training evolution to get a final score.

Lane Decision Mode

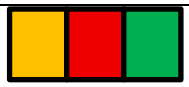
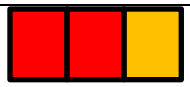
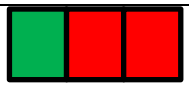
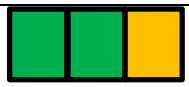
Overview

Lane Decision Mode (LDM) is intended to add an additional decision-making component to lane changes. Once the physical mechanics of making lane changes is complete, students must then determine the best route through the lane-change course. Instead of just red or green lights, an "amber" light (both red and green LEDs illuminated) adds an additional task that can be performed.

A green lane can be passed through at speed without braking. A red lane cannot be entered and students must either swerve around it if possible, or stop. An "amber" lane is passable; however, the student must drive through the lane slowly. This means there can be more than one right answer; however, some patterns will have a more correct choice.

As with Lane Change Mode, the instructor will set a reaction time (default is 1.5 seconds) but the light pattern is determined solely by the ATSS Controller. The object is to take the safest path that requires the least amount of input to the vehicle. The color of the lights determines what the driver must do:

Examples:

 Left: Slow Down Center: Stop Right: Clear	 Left: Stop Center: Stop Right: Slow Down	 Left: Clear Center: Stop Right: Stop	 Left: Clear Center: Clear Right: Slow Down
The safest path in this example is the right lane because only steering is needed; however, using the left lane is correct as long as the student slows.	In this example, the safest path is the right lane - but the driver must proceed *slowly*.	The safest path is the left lane because the driver can continue through at speed.	The safest path is the center lane because neither braking nor steering are needed.

These examples are just a few of the possible patterns LDM offers and each pattern is randomly selected on the fly.

Adaptive Reaction Time will ensure that each student gets the programmed reaction time and a randomly selected light pattern.

When Lane Decision Mode is selected from the main menu, the ATSS will turn three lights to green as soon as the RADAR detects a vehicle speed over 10-MPH. When the student is 1.5 seconds (or the instructor-set reaction time) away from the escape lanes, the system will display a random light pattern.

Objective

The student must determine the best lane choice then properly execute a lane change or stop as necessary. There may be more than one correct solution; however, the student must proceed at an appropriate speed. If the student mistakenly swerves into a red lane they must treat the situation as an emergency braking stop. Scoring

for a red-lane selection is the same as for braking mode. Driving at speed through an "amber" lane without slowing down is the equivalent of running through a red lane.

Method

This course is set up on a straight driving path, area, or roadway with the lights placed directly in front of the starting lane, but down the road, away from the lane change/braking area, or on the optional overhead scaffold which places them directly over the escape lanes. When the student passes the RADAR the ATSS will display three green lights. At the appropriate time to allow for a 1.5-secod reaction time, the system will display a randomly selected pattern. The student must select the correct lane and either stop or travel through at the appropriate speed.

Standard

The student should be able to swerve into a green or amber lane - and avoid entering a red lane - without hitting any cones or losing control of the car before or after the lane change. In an instance where a student accidentally swerves into a red lane they will utilize maximum braking force necessary to prevent the front bumper of the vehicle from breaking the plane of the escape lane/brake zone. Braking force should be hard enough for ABS to engage during this crash avoidance stop. Non-ABS cars should threshold brake when ABS would otherwise intervene. Failure to stop is graded the same as for braking mode.

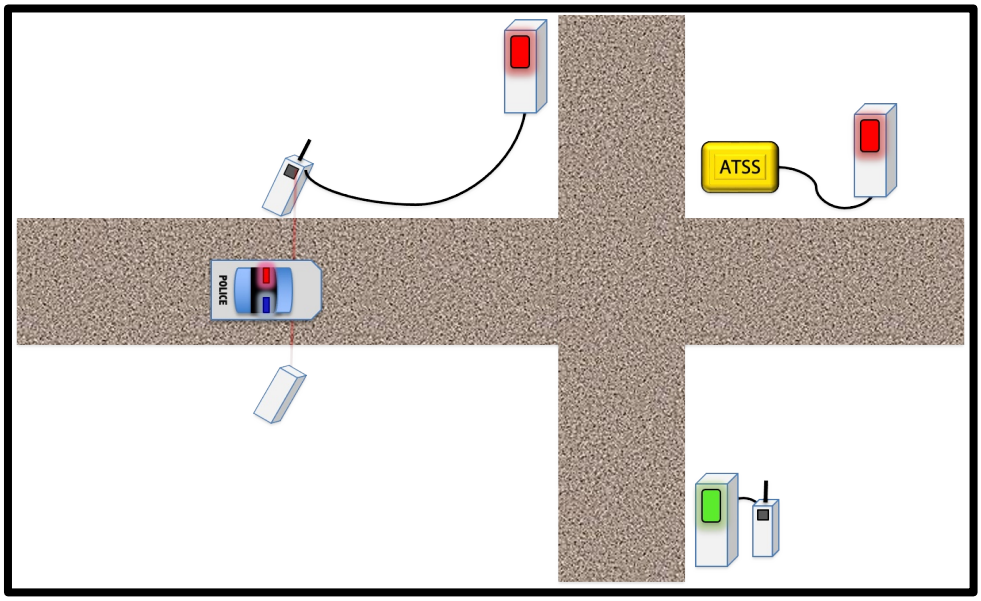
Scoring Matrix

This scoring matrix is a suggestion of criteria to look for as well as a suggested number of point deductions out of a 100-point scale. Each run is scored separately, then each run is averaged together for a final score in this exercise.

Suggested Criteria	Points	Deducted
Slides/Runs off course.	-100	
All Red or Red Lane - Front bumper breaks plane of the brake zone (minor crash)	-10	
All Red or Red Lane - Base of windshield breaks plane of the brake zone (moderate crash)	-25	
All Red or Red Lane - C-pillar breaks plane of the brake zone (serious crash)	-50	
All Red or Red Lane - Rear bumper stops before the plane of the brake zone (major crash)	-75	
All Red or Red Lane - Car completely passes the plane of the brake zone. (potentially fatal crash)	-100	
Hit/Displace Cone (per cone)	-5	
Selects a red lane but stops in time	-5	
Loses control before or after lane change	-100	
Fails to slow down before and through amber lane	-25	
(Non-ABS car) Does not use threshold braking	-10	
Total Deductions		
Single Run Score		

Average the scores from all attempts at this training evolution to get a final score.

Intersection Clearing Mode



Overview

Intersection Clearing Mode (ICM) is intended to help instructors teach students how to properly clear an intersection during Emergency Response and Vehicle Pursuits. The ATSS accomplishes this by using red lights to represent cross traffic that is failing to yield without the need to have instructors driving interference vehicles. ICM has two modes:

- First Car Through – Used for Emergency Response training
- Second Car Through – Used for Pursuit training

First Car Through – Emergency Response

In this mode the ATSS will randomly select which light (or lights) to turn red when the student approaches the intersection. Each light that turns red will do so for a random period of time from a minimum of 3-seconds to an instructor-set maximum of up to 15-seconds.

Second Car Through – Pursuit

In this mode when the first car or "rabbit" car goes through the ATSS will display all green lights. When the pursuing vehicle approaches the intersection the ATSS will randomly select which light or lights to turn red. Each light that turns red will do so for a random period of time from a minimum of 3-seconds to an instructor-set maximum of up to 15-seconds. *Note: The pursuing vehicle must be no more than 6-seconds behind the rabbit vehicle. If after 6-seconds a second vehicle has not approached the intersection, the ATSS will reset and the lights will turn off.*

Objective

Students will properly clear an intersection during Emergency Response and Pursuits. The student must begin scanning the intersection as they approach by turning their head and looking down each leg of the roadway. Instructors should ensure that students are looking through the side windows and around blind spots cause by the A-pillar, spot lights, or open computer terminals. If ANY light is red the student cannot proceed into the intersection.

Method

This course is set up on in a 4-way intersection. We will assume the intersection has a North/South and East/West orientation. The course should be set up so the student travels the same way through the intersection, for example the student travels North from the Southern leg of the intersection. A traffic control device like a stop sign should be used to help simulate an intersection on the street.

In this instance a light is placed on the shoulder near the travel lane on the West, East, and North legs (see diagram at the beginning of this section). Each light should face toward the student stopped at the intersection. The Infrared Receiver and sender should be set up about 50 feet away from the intersection.

When *any* red light is on the student must come to a complete stop and continuously scan the intersection until all lights are green. Once the intersection is "clear" the student can proceed.

Standard

The student should be able to approach the intersection at a speed that will enable him to be able to stop should any leg of the intersection have "cross-traffic" that has not yielded (*i.e. a red light is displayed*).

recognize utilize maximum braking force necessary to prevent the front bumper of the vehicle from breaking the plane of the brake zone. Braking force should be hard enough for ABS to engage during this crash avoidance stop. Non-ABS cars should threshold brake when ABS would otherwise intervene.

Scoring Matrix

This scoring matrix is a suggestion of criteria to look for as well as a suggested number of point deductions out of a 100-point scale. Each run is scored separately, then each run is averaged together for a final score in this exercise.

Suggested Criteria	Points	Deducted
Runs through - or fully enters - the intersection when any light is red.	-100	
Front bumper breaks plane of the intersection when any light is red. (minor crash)	-10	
Base of windshield breaks plane of the intersection when any light is red. (moderate crash)	-25	
C-pillar breaks plane of the intersection when any light is red. (serious crash)	-50	
Rear bumper does not enter intersection when any light is red. (major crash)	-75	
Student fails to turn head and clear intersection.	-10	
Total Deductions		
Single Run Score		

Average the scores from all attempts at this training evolution to get a final score.

Once all graded runs are complete, it is suggested that the exercise be attempted with increasing speeds: 40, 45, 50 MPH. This will show the student that with the same reaction time faster speeds will require more stopping distance to prevent a crash.

Components

The system is comprised of the ATSS Controller, an infrared sensor (IR) pair, a RADAR unit, and three high-intensity red and green signal lights. Either a scaffold mounting system or a tripod-based mounting system is available depending upon department needs. The system is wireless, weather resistant, portable, and runs on long-life rechargeable sealed lead-acid batteries and includes an easy to use charger. The entire system fits inside a ruggedized case for charging and easy transport.

ATSS Controller

The ATSS control unit has its own internal power and provides power to the lights and handles all signal processing and calculations. The ATSS control unit is menu driven, software upgradeable and integrated into a weather resistant case.

Setup is extremely easy. Simply wait for the wireless sensor to pair with the controller. Once initialization is complete the instructor selects the desired operating mode. Course configuration, operating mode and desired reaction time can be reset as many times as desired.

A liquid crystal display shows system status, menus, and diagnostic information. Four directional buttons and an "ENTER" button are used to scroll through and activate menu items. A "RESET" button will reboot the ATSS control unit.

On the side of the ATSS case is an antenna port, light connection port and the charging/external power port. The charging/power port is used to charge the ATSS control unit's internal batteries.

Infrared Sensor Pair

The infrared (IR) sensor detects the presence of a vehicle and signals the control unit via long-range wireless signal. The IR Sensor has a whip antenna mounted on top, and a light port on the back. The IR sender has no antenna and emits a focused beam of infrared light to the IR receiver. Each unit has a power switch on the top and an SAE-2 battery charging port on the back. The units have an effective infrared range of up to 75-feet/25-Meters between sender and receiver in full sunlight. This provides enough range for use on dedicated track facilities or parking lot type training areas. The receiver has a wireless communication range of at least 350-feet/110-Meters from the ATSS when used with the included external antenna.

Setup instructions are included later in this manual.

Infrared Sensor Pair

RADAR

The RADAR unit has a virtually identical appearance to the IR receiver; however, it does not have an external antenna. The RADAR tells the ATSS controller how fast the student's car is traveling. This is used to calculate the correct timing sequence for the accident avoidance lights. The RADAR must be within 200-feet/60-Meters of the students' path of travel prior to reaching the IR Sensor.

On the back of the RADAR is a charging port and an additional connection port for attaching the light for use in Intersection Clearing Mode.

Setup and placement instructions are included later in this manual.

Optional Scaffold

The optional scaffold unit is used to hold the lights over the travel lanes. The standard scaffold crossbeam is made of three sections of square aluminum tubing. Widths up to 45-feet are available for departments utilizing dedicated track facilities with highway-style road widths. With 9-feet of ground clearance the scaffold can be used with just about any vehicle.

The scaffold crossbeam breaks down into individual sections for transport or storage. The crossbeam is extremely light and when assembled one person can pick it up. The scaffold's heavy-duty bases must be weighted down or bolted to the ground for use in high-wind areas.

Light Stands

The standard light stands are used to hold the three red/green lights. The stands extend to heights up to 5-feet and are collapsible for easy transport and storage.

Lights

The ATSS uses three high-intensity police-grade LED lights that are weather hardened for outdoor use. Each pair of red and green lights can be mounted on a standard audio PA Speaker stand with the optional light mounting kit.

Light Cables

A short cable is used to connect the left and right lights to the center light and a longer cable connects the center light to the ATSS Control Unit. The long light cable helps ensure that the ATSS controller can be placed safely away from the driving area, or to move the lights farther apart as needed for your particular course setup. The light cables utilize a standard "Straight-Through" Ethernet patch cable that is readily available at any computer or hardware store should you need an emergency replacement. DO NOT USE A CROSSOVER CABLE as this will prevent the lights from functioning properly.

High Wind Stabilizers

Six optional aluminum stabilizers and weight bags are available for stability of sensors and lights in high-wind environments. The bags may be filled with sand, pea gravel, used tire weights, or any other similar material.

Multi-Port Charger

A 4-bank battery management system is included in each system to provide charging and battery maintenance functions to the ATSS components. It is recommended that the ATSS controller be charged at the end of each day of use and the sensors charged at least every other day of use. The battery management system should be connected to the ATSS components for long-term storage.

AT LEAST ONCE A MONTH UNPLUG THE CHARGER FROM THE WALL, WAIT 30-SECONDS, THEN PLUG IT BACK IN.

DO NOT STORE BATTERIES IN A DISCHARGED STATE.

Battery Tester

A battery tester is also included to help check the battery level of the sensors and the ATSS. Simply plug the unit into the charge port and it will show the actual voltage on the display with a red, yellow, or green light depending on the charge level.

ATSS Channel System

The ATSS is designed to operate in close proximity to other ATSS controllers and sensors without interference from each other. Currently three channels are available for use: A, B, C, with a virtually unlimited number available for future expansion. These sensors will only work with other components on the same channel.

When troubleshooting a training environment with multiple channels, ensure that the sensors are correctly matched to the same channel.

Optional Wireless Light

The ATSS is designed to work with up to TWO optional wireless lights, and future software updates will allow the use of more.

Sensor Setup

Two different kinds of sensors are used with the ATSS: the Infrared Sensor and a RADAR Sensor. The ATSS Controller will automatically pair with the sensors when they are turned on. Placing the sensors close to the ATSS will speed the pairing process.

IR Sensor

The ATSS system comes with an Infrared sensor pair that consists of a sender (which does not have an antenna port) and a receiving sensor with a gold antenna port on top. The sender emits an infrared beam that is received by the sensor and transmits this change to the ATSS controller.

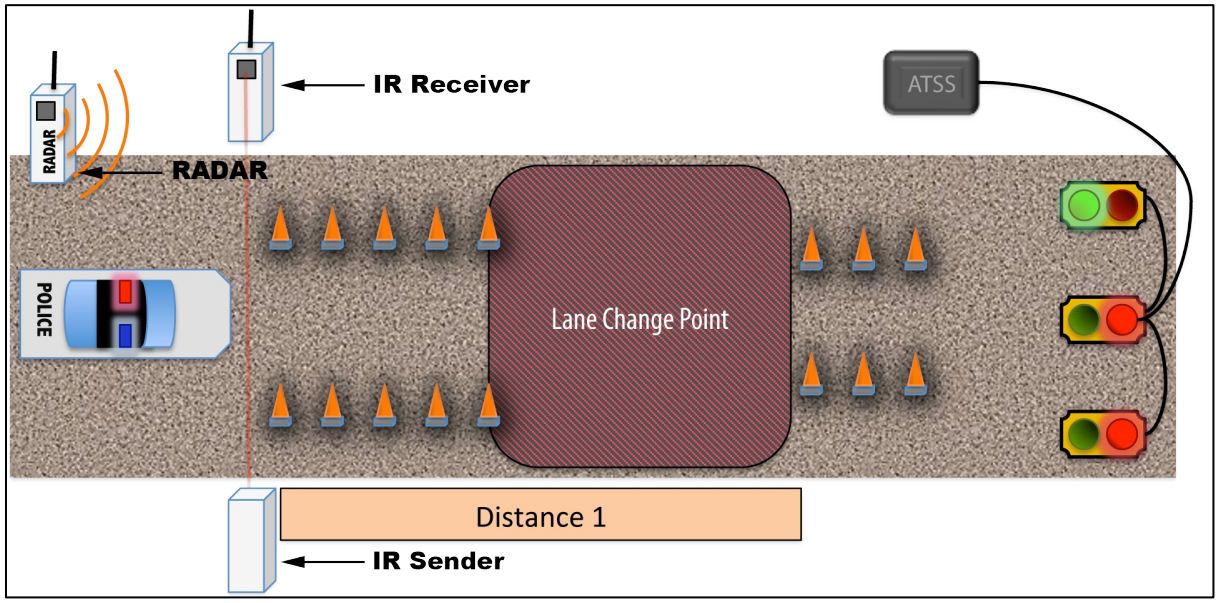
- ***GENTLY*** Screw an antenna on the IR Sensor. **It should only be finger-tight - Do not over tighten.**

- Turn the sensor on. You will see a red and green light inside the sensor window. Pointing the IR Sending unit towards the sensor will cause the red light to turn off.
- When an uninterrupted beam path has been established, a green light will illuminate. Breaking the IR beam will cause the red light on the sensor board to activate.

RADAR Sensor

The RADAR has an effective speed reading range of about 200-300 feet, with longer distances possible depending upon terrain. The transmission distance of RADAR readings to the ATSS is a range of about 300-400 feet or more, again depending upon terrain and positioning. The higher the ATSS controller is located from the ground the greater the distance the RADAR can be from the ATSS controller. After the RADAR powers up you can check proper operation and range by going to the Diagnostic menu.

- Place the RADAR as close to the path of vehicle travel as possible, while still maintaining a safe distance. Ensure that the clear window points toward the vehicle before it enters the approach lane.
- **The RADAR works best when the vehicle passes and the RADAR takes readings as it drives away.**
- You can check proper operation by going into the Diagnostic Menu
- Select "RADAR Test"
- Drive a car through the course at a pre-determined speed to ensure that readings by the RADAR match the vehicle's speed.
- Keep in mind that, as with any RADAR, cosine angle affects speed-readings.
- If there is no RADAR reading try moving the RADAR closer to the ATSS.
- While adjusting the location of the RADAR for proper communications with the ATSS, you can utilize X-Band tuning forks to simulate a car as well. Tuning forks for K-Band and Ka-Band RADARs will work as well; however, they will show incorrect speed-readings.
    - Strike the tuning fork and place it in front of the clear RADAR window.
    - The ATSS Controller will display a speed.



ATSS Setup

How your course is designed will have an effect on sensor and light placement. For maximum range, sensors should be placed within line of sight of the ATSS Control Unit. Adequate space for runoff room, braking room, and loss of control should be designed into your course to ensure the safety of drivers and the ATSS equipment.

The ATSS system can be set up three different ways:

- Lane Change / Braking Mode / Lane Decision Mode
- Brake Decision Mode
- Intersection Clearing Mode (ICM)

The setup procedure involves initializing the sensors with the ATSS Controller, placing the lights and ATSS controller in a safe area where they will not be in danger of being struck, configuring the ATSS controller, and placing the sensors on the course.

If the same course is used over and over, the location of the sensors and lights may be marked to speed the setup process in the future.

ATSS Controller Setup

Place the ATSS controller in the desired location and turn it on. **For maximum range the higher the ATSS is placed off the ground the greater its range from the sensors can be.** While not necessary, placing the ATSS on a table or other non-metallic structure at least two-feet off the ground will increase range. Placing the ATSS on or in close proximity to a metallic structure can reduce the range of the system.

If the ATSS is operated in an area with high Radio Frequency emissions like an airport, military base, cellular towers, or public safety radio repeaters, an optional Range Extension Kit is available, Part Number: BBICA0-00208. Contact Skid Car System to order.

On the side of the ATSS is the light port, charging port, and located behind a protective loop is the antenna port.

GENTLY Screw the antenna into the antenna port. It only needs to be finger-tight, **DO NOT OVERTIGHTEN!**

With the IR Sender, IR Receiver, and RADAR in close proximity to the ATSS Controller:

- Turn on the IR Sensor.
- Turn on the ATSS Controller.
- Press the RESET Button (If starting the system for the first run of the day. There is no need to press the RESET button again unless the system has been powered off).
- Wait for the ATSS to pair with the IR Sensor.
- Turn on the RADAR Sensor.

- Configure the system. (See ATSS Configuration and Operation, System Setup subsection.)
- After configuring the ATSS for Reaction Time and sensor distance, place the sensors in the selected locations.
    - The RADAR should be set so that it takes readings from the rear of vehicles as they pass.
- Use the course setup guidelines in the next section as a guide for sensor placement.

ATSS Configuration and Operation

Basic Operation

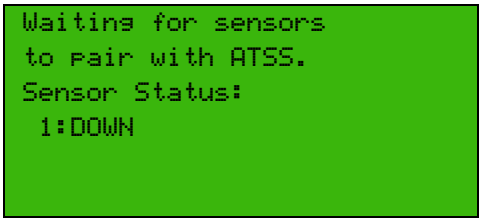
The ATSS utilizes five buttons to navigate through the menu options. Four directional buttons scroll through the menus and a center "ENTER" button is used to select certain options. To the right of the directional is a RESET button should you need to reboot the system.

Press the silver power button located on the front control panel to turn the ATSS on.

Then press the **RESET** button to initialize the system.

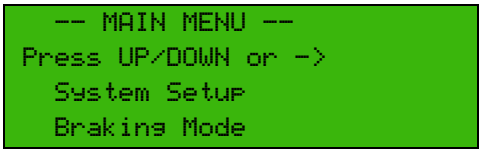
ATSS Initialization

While the ATSS boots you will see the intro screens, software version and then the system will then display the status of the IR sensor. Pairing will happen faster if the IR sensor and ATSS are in close proximity. Until the system has paired, it will show sensor status as "DOWN."



Once the sensor has paired, its status will go from "DOWN" to "UP."

The system will now display the main ATSS menu. Pressing the UP or DOWN buttons will scroll through the menu. Pressing the RIGHT (->) arrow button will select an option.

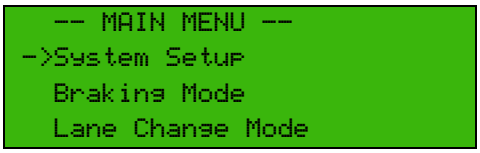


System Setup Menu Option

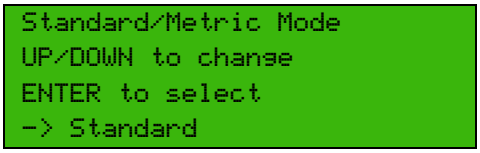
This menu mode allows the user to reinitialize the sensors should one fail or need to be replaced; it also enables the user to set various system parameters. These settings will remain even if the system is rebooted or powered off and on again. The default Reaction Time value is 1.5-seconds and the default distance is 100-feet and green light activation upon detection of speed above 10-MPH.

If you are using this distance for your course, you can skip this step.

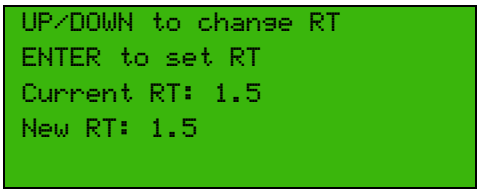
To access the System Setup menu option press the UP or DOWN button until the indicator arrow (->) points to "System Setup." Press the RIGHT arrow button to select this option.



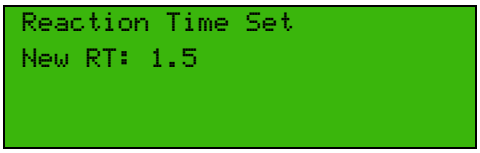
The system will prompt to select either Standard or Metric mode. Press the up or down button to change the option, then press the ENTER button.



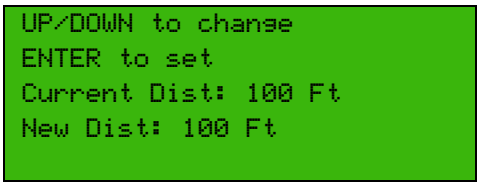
The next option within the System Setup menu is the Reaction Time selection screen. The default is 1.5 seconds. Pressing UP or DOWN will change the reaction time by 0.1-second increments from 0.0 to 3.0 seconds. Once you have the desired reaction time press ENTER.



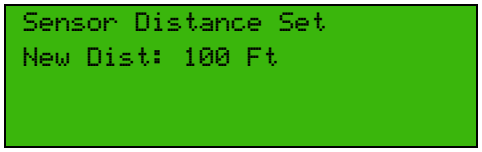
The system will confirm the setting. You can change reaction time while certain exercises are running by pressing the UP or DOWN buttons. This will store that new reaction time in the system.



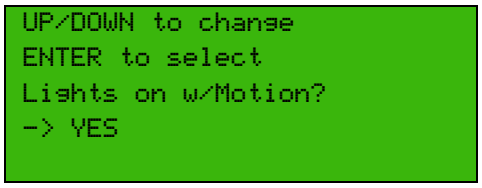
The default sensor distance is 100-feet. If you plan to use exercise speeds higher than 35 MPH, review the chart in Appendix A to determine the appropriate distance. Press UP or DOWN to select the new distance. Press ENTER to set.



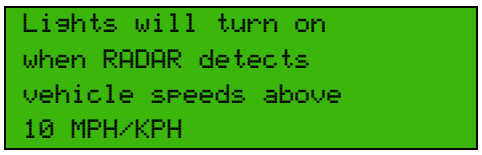
The system will confirm the setting.



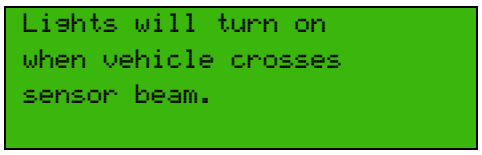
The ATSS will now prompt if you wish to have the lights turn green when the RADAR detects motion. When selected the system will turn all lights green when speeds >10 MPH are detected. If set to NO the lights will change when the vehicle crosses the sensor beam.



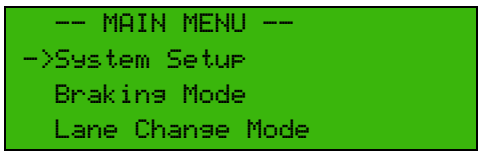
If set to YES, the system will display:



If set to NO, the system will display:



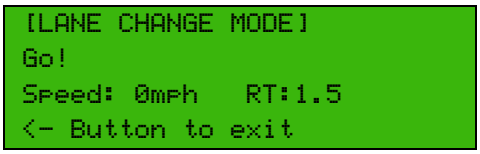
The system will return to the main menu.



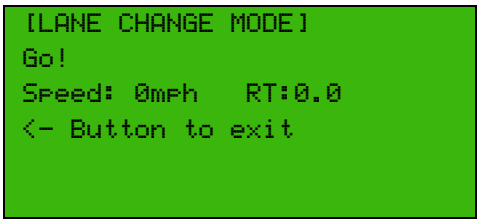
In-Mode Reaction Time Adjustment

While in either Braking or Lane Change Mode, it is possible to change the desired reaction time without having to exit the mode and re-enter.

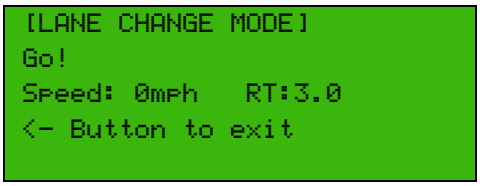
To change reaction time simply press the UP or DOWN arrow to change the current reaction time.



You will see the reaction time shown after RT: change up or down depending on which button you press. Once the maximum reaction time of 3.0-seconds has been reached, the number will return to 0.0-seconds. An RT of 0.0 will change the lights immediately when the IR beam is broken.



The reaction time will be set immediately and the next time the car that runs through the course will be presented with that time. This value is memory resident and will remain the next time you power on the ATSS or until you change the value again.

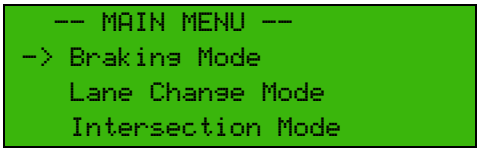


Braking Mode

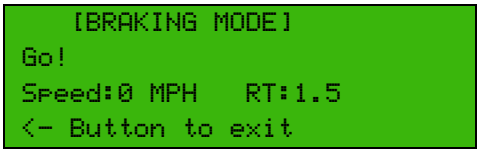
Braking mode is designed to help teach students panic braking. This mode switches the lights from green to red at a pre-programmed reaction time. When the ATSS detects an oncoming vehicle, it will turn the lights green. The ATSS RADAR determines the speed of the vehicle and once the student car breaks the IR beam the ATSS will calculate the appropriate delay and turn the lights red.

The lights will remain red until the RADAR detects vehicle speed has dropped to 0 MPH or for approximately 4-seconds if no RADAR is connected. The center light will turn green briefly indicating that the driver can continue through the course. The lights will then turn off to conserve battery power.

To access the Braking Mode menu option press the UP or DOWN button until the indicator arrow (->) points to "Braking Mode." Press the RIGHT arrow button to select this option.

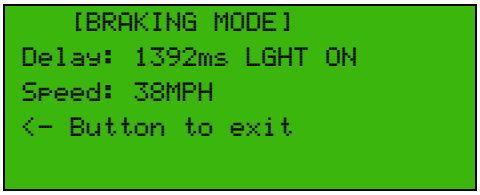


The ATSS will wait for a car to pass through the beam and will display the screen shown to the right. To exit this mode press the LEFT button.

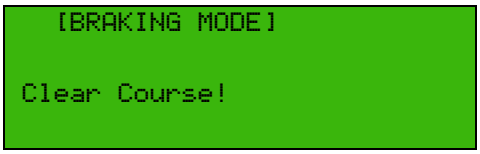


Once the RADAR detects an incoming vehicle it will turn the lights green. When the vehicle trips the IR Sensor the system will display the parameters of the run and turn the lights red at the configured reation time. The delay displayed is the amount of time the system

must wait after the vehicle has crossed the IR sensor beam path before changing the lights to red. The faster the speed the lower this number will be. **This number is for informational purposes only.**

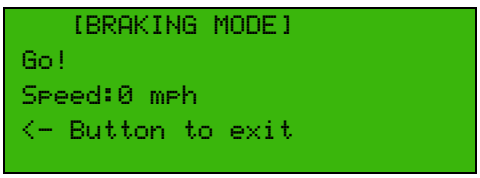


When the RADAR detects that the vehicle speed has dropped to 0 MPH or when 4-seconds has passed, the ATSS will turn the CENTER light GREEN briefly and will display the message "Clear Course!"



After a 3-second reset period the system is ready for the next run.

When you are finished with Braking Mode, press the LEFT button to return to the main menu.



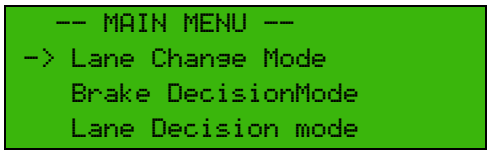
Lane Change Mode

Lane Change Mode (LCM) is designed to help teach students emergency lane change maneuvers using instructor-selected reaction times. The system detects the presence of an approaching car, determines its speed, and then changes the lights according to the Reaction Time set during the setup process. The light pattern displayed is selected at random with one of the patterns shown in the chart to the right depending on the selected option.

LEFT	CENTER	RIGHT
Green	Red	Red
Red	Red	Green
Green	Red	Green
Red	Red	Red
Red	Green	Red

Selecting Lane Change Mode

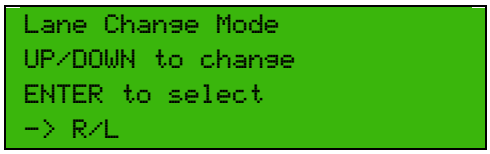
To access the Lane Change Mode menu option press the UP or DOWN button until the indicator arrow (->) points to the desired mode. Press the RIGHT arrow button to select this option.



While selecting the Lane Change Mode from the main menu, one of eight different options may be chosen:

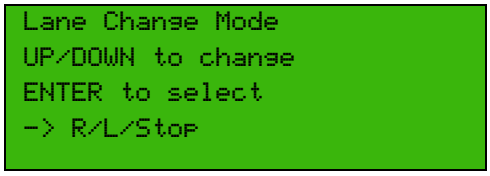
Option 1 – R/L

Randomly selected Right or Left green patterns.



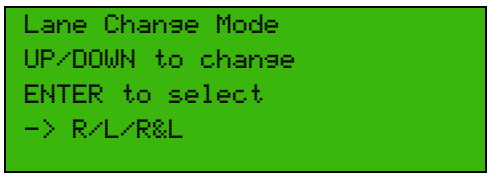
Option 2 – R/L/Stop

This option enables three light patterns. The patterns are: Left green, Right green, or Stop.



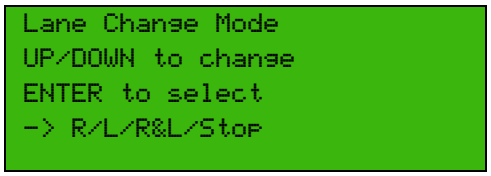
Option 3 – R/L/R&L

Left and Right green, Right and Left Green. When both Left and Right Green lights are displayed the student may choose either lane.



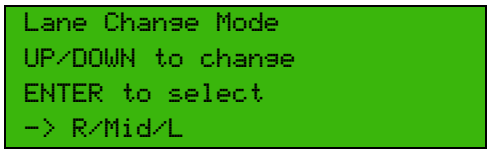
Option 4 – R/L/R&L/Stop

This option enables three light patterns. The patterns are: Left Green, Right Green, or Stop.



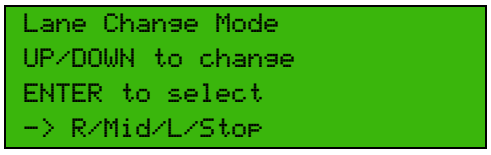
Option 5 – R/Mid/L

Pattern enables Right, Middle, or Left Green lights.



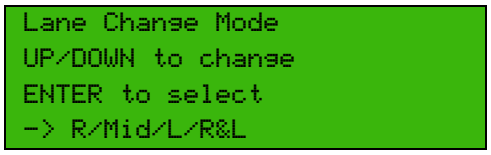
Option 6 – R/Mid/L/Stop

Pattern enables Right, Middle, Left and Stop



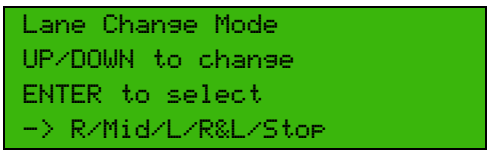
Option 7 – R/Mid/L/R&L

Pattern enables Right, Middle, Left, or Right and Left Green lights



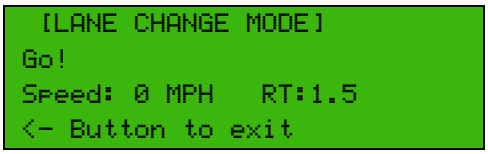
Option 8 – R/Mid/L/R&L/Stop

Pattern enables Right, Middle, Left, or Right and Left Green lights and Stop.



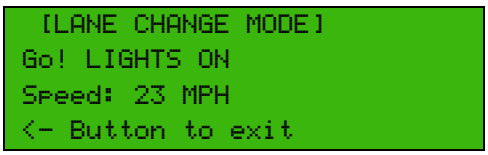
Lane Change Mode Operation

Once selected the ATSS will wait for a reading from the RADAR or for a car to pass through the IR Sensor beam and will display this screen.

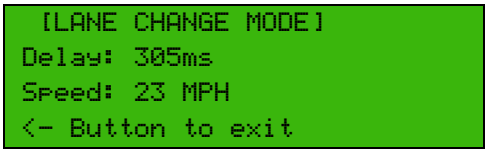


Press the LEFT button to exit the mode.

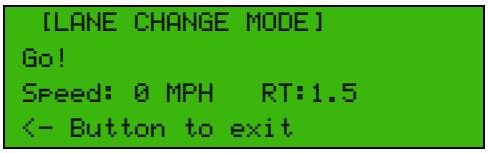
By default, when the RADAR detects a speed over 10 MPH it will turn all lights green. This feature can be turned off in the system setup menu.



When the vehicle crosses the IR sensor the ATSS will calculate the appropriate delay to activate the lights for the selected reaction time.



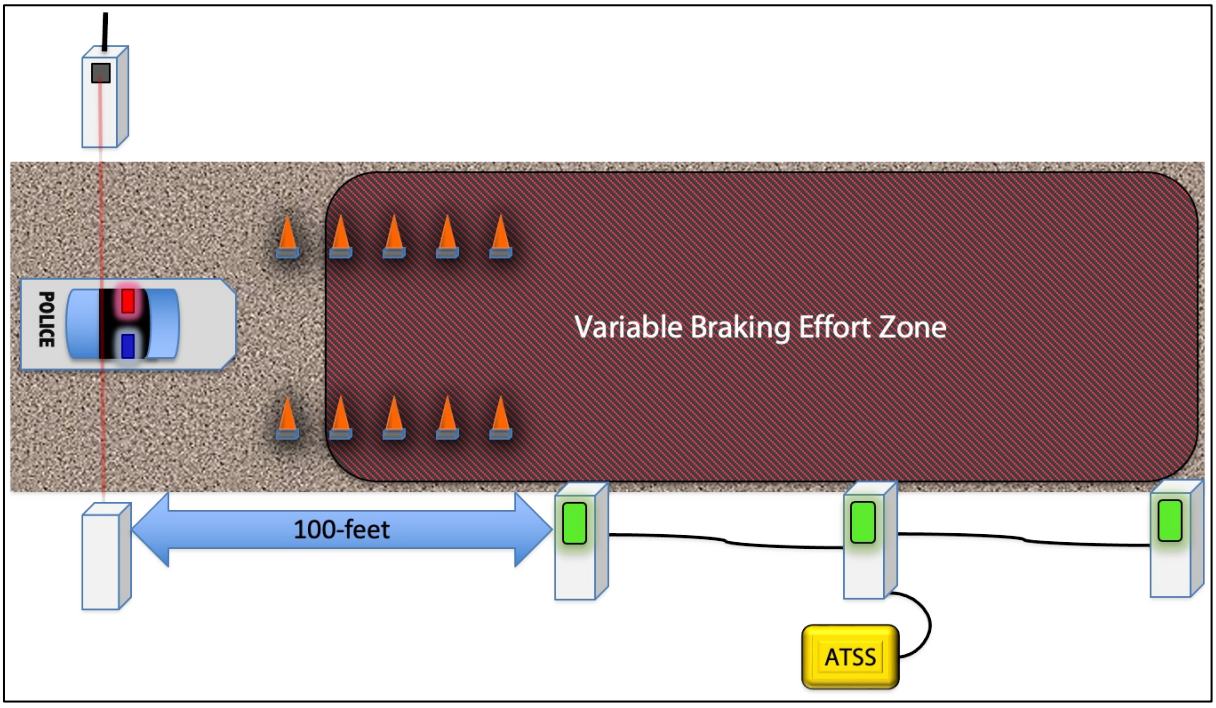
The system will reset itself and prepare for the next run. If at any time you need to quit from the mode, press the LEFT button and the ATSS will return to the main menu.



Brake Decision Mode

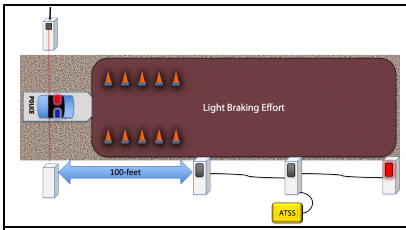
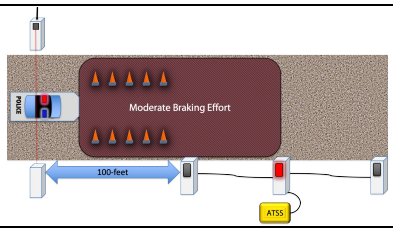
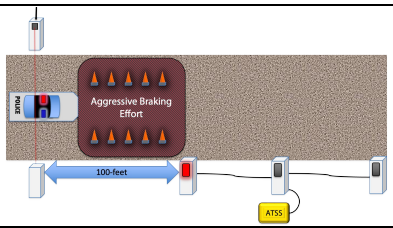
Brake Decision Mode (BDM) helps transition drivers from "street braking" - where the student is conditioned to drive for comfort – to a more aggressive accident avoidance-focused braking style. It can also help to train drivers who use the brakes unnecessarily hard to use the appropriate amount of braking force for the situation at hand.

With Brake Decision Mode a series of three lights are staged along the course approximately thirty feet apart from each other. The goal is to stop the vehicle without breaking the plane of the red light. The course should look like the illustration below:



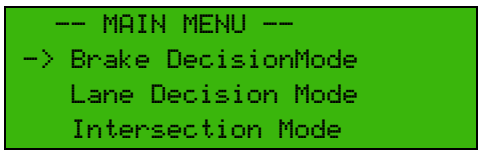
The student accelerates to approximately 40 MPH and when the driver passes the IR Receiver, all three lights will flash green momentarily. The ATSS will turn all lights off except for a single, randomly chosen red light. The objective is for the student to use the appropriate amount of braking force to stop the vehicle without breaking through the plane of the red light.

The following examples show the intended braking forces:

		
Light Braking Effort	Moderate Braking Effort	Aggressive Braking Effort

Selecting Brake Decision Mode

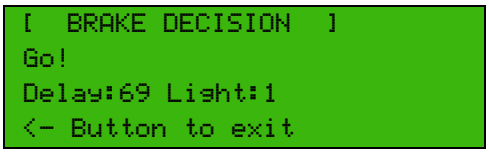
To access Brake Decision Mode menu option press the UP or DOWN button until the indicator arrow (->) points to "Lane Decision Mode." Press the RIGHT arrow button to select this option.



Brake Decision Mode does NOT utilize a reaction time, therefore there is no option to set a reaction time.

Brake Change Mode Operation

Once selected the ATSS will display a randomized delay time (shown in milliseconds) and which light will activate. It will then wait for the student to pass through the IR Sensor.



The delay helps to create variations on the amount of reaction time for each light which will change the amount of braking force to successfully complete each the training evolution.

For example, a short delay gives the driver more processing time and braking distance resulting in a less aggressive stop. A long delay induces more of a panic stop. A long delay on the first light requires an emergency brake stop. A short delay on the last light results in a traditional street stop.

Press the LEFT button to exit the mode.

Lane Decision Mode

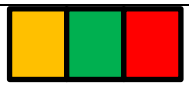
Lane Decision Mode (LDM) adds an extra layer of processing demand onto the student. Instead of simply swerving left or right around an obstacle the student must determine the safest path from a series of options and do so at an appropriate speed. It combines mental processing and physical skill. This mode also makes it virtually impossible for a student to anticipate what is going to happen, forcing a true reaction to the exercise.

Lane Decision Mode incorporates Green, Amber (*Red and Green on at the same time*), and Red lights to indicate if the student can go at speed, can go at a slow speed, or must stop. Like Lane Change Mode and Braking Mode, Lane Decision Mode incorporates Adaptive Reaction Time to ensure students are training to a measurable standard.

When the ATSS detects an oncoming vehicle the lights will turn green. The ATSS RADAR determines the speed of the vehicle and calculates when to change the lights in order to achieve the pre-determined reaction time. It will then display one of twenty-seven different possible pattern combinations.

The object is to take the safest path that requires the least amount of input to the vehicle. The color of the lights determines what the driver must do:

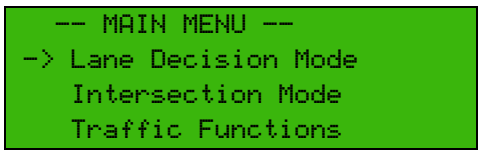
Examples:

 Left: Slow Down Center: Clear Right: Stop	 Left: Stop Center: Stop Right: Slow Down	 Left: Clear Center: Stop Right: Stop	 Left: Clear Center: Clear Right: Slow Down
The safest path in this example is the center lane because neither steering nor braking are needed; however, using the left lane is correct as long as the student slows.	In this example, the safest path is the right lane - but the driver must proceed *slowly*.	The safest path is the left lane because the driver can continue through at speed.	The safest path is the center lane because neither braking nor steering are needed.

These examples are just a few of the possible patterns LDM offers and each pattern is randomly selected on the fly.

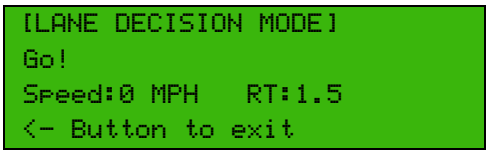
Selecting Lane Decision Mode

To access Lane Decision Mode menu option press the UP or DOWN button until the indicator arrow (->) points to "Lane Decision Mode." Press the RIGHT arrow button to select this option.



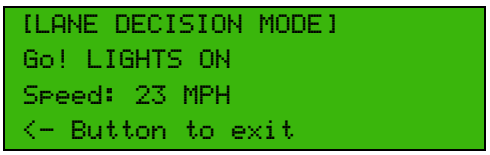
Lane Change Mode Operation

Once selected the ATSS will wait for a reading from the RADAR or for a car to pass through the IR Sensor beam and will display this screen.

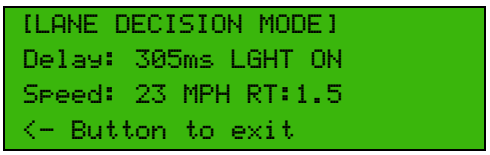


Press the LEFT button to exit the mode.

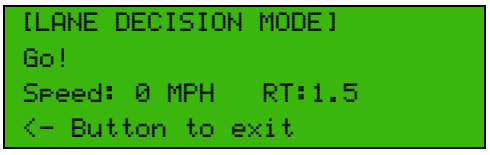
By default, when the RADAR detects a speed over 10 MPH it will turn all lights green. This feature can be turned off in the system setup menu.



When the vehicle crosses the IR sensor the ATSS will calculate the appropriate delay to activate the lights for the selected reaction time.



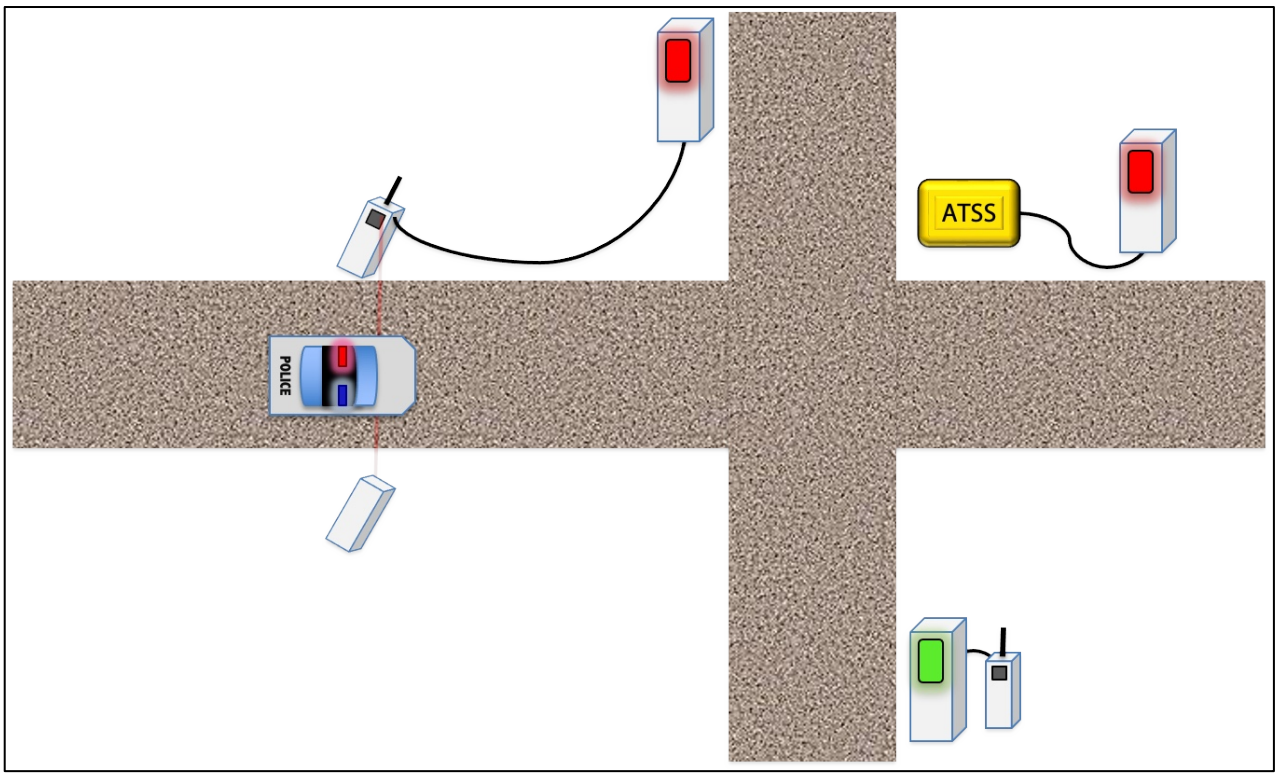
The system will reset itself and prepare for the next run. If at any time you need to quit from the mode, press the LEFT button and the ATSS will return to the main menu.



LANE DECISION MODE MAY NOT DISPLAY PROPERLY WITH SOME HIGH-POWERED LIGHT OPTION SYSTEMS.

Intersection Clearing Mode

Intersection Clearing Mode is designed to help instructors teach students how to properly proceed through an intersection while operating with due regard for public safety. The system operates slightly differently from the other two modes because each light is connected to one or more sensors rather than being directly connected to the center light.



The IR Sensor serves two purposes and is used for vehicle detection and for light activation. Depending on your configuration the ATSS controls either the center and right lights or just the center light. For systems equipped with a RADAR, the RADAR is used to activate the remaining light.

When the vehicle breaks through the IR beam the ATSS control unit turns all lights to green, then randomly selects which lights -- if any -- will be changed to red. Any light that turns red will stay red for a random time between 3-seconds and a user defined maximum time up to 15-seconds. As each red light's time expires it will turn back to green. Once all lights have returned to green, they will remain on for a few seconds and the student can proceed through the intersection. The lights will then turn off to conserve battery power.

During Intersection Clearing Mode, the ATSS LCD will show the light pattern that has been selected and the time that each light will stay red. In the instance shown in this photograph, the Left light will turn red for 4-seconds, the Center light will be red for 2-seconds and the Right light will stay red for 10-seconds.

Intersection Clearing Mode is designed to accommodate two different kinds of scenarios: Emergency Response and Pursuit Training. During Emergency Response Mode it is presumed that only one car will be passing through the intersection at a time. In Pursuit Mode it is presumed the student will be on the course following an instructor.

Option 1

First Car Through – This mode will activate the lights immediately when the sensor beam is broken. This is referred to as "Emergency Response Mode." It is used to train students to exercise good judgment when approaching intersections while running lights and sirens.

Option 2

Second Car Through – This mode will activate the lights when the sensor beam is broken twice. This is referred to as "Pursuit Mode." It allows a leading car to go through the beam which turns the lights green. The system then waits for a second vehicle before changing the lights. If a second car does not pass through within eight-seconds then the lights will turn off and the system will reset.

Selecting Intersection Clearing Mode

To access the Intersection Clearing Mode menu option press UP or DOWN until "Intersection Mode" is displayed.

```
  -- MAIN MENU --
->Intersection Mode
  Traffic Functions
  Diagnostic mode
```

Press the RIGHT (->) button to select this option.

Set how many lights will be controlled by wireless sensors. If your system does **not** have a RADAR (or you wish the ATSS controller to drive the center and one end light) you will select "One Remote."

```
Number of Remotes:
->One Remote
  Two Remotes
ENTER to select
```

95If you selected "Two Remotes" then the ATSS controller will attempt to pair with the RADAR so that it may be used to remotely trigger the light that is connected to it.

```
Waiting for sensors
To pair with ATSS.
Sensor Status:
          2:UP
```

Next, press the UP or DOWN buttons to select the desired Activation Mode you wish to run and then press ENTER.

```
Activation Mode:
->First Car Through
  Second Car Through
ENTER to select
```

(Display showing "Second Car Through" selected.)

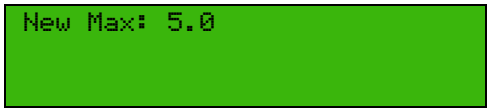
```
Activation Mode:
  First Car Through
->Second Car Through
ENTER to select
```

Once a mode has been selected the ATSS will prompt the instructor for a maximum light time. This is the longest time a Red light will be

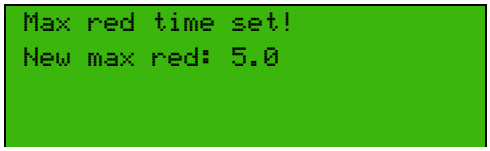
```
UP/DN change max time
ENT set max red time
Current Max: 10.0
```

displayed. Using the UP and DOWN buttons select a maximum red time in 0.5 second increments. Minimum Red light time is 5.0

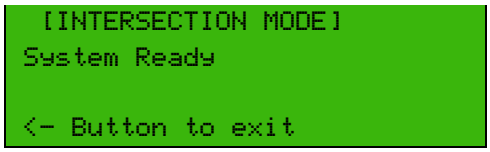
seconds and maximum time is 15.0 seconds.



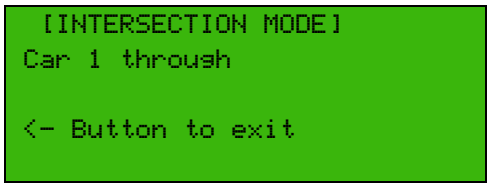
The system will confirm the setting.



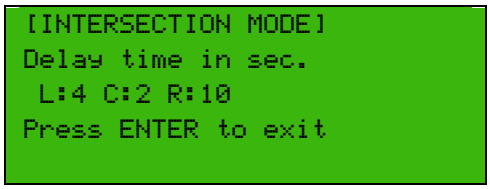
Once selected the ATSS will wait for a car to pass through the beam and will display this screen.



Once the first beam is broken the system will indicate the event, display which car has passed, turn the lights green, and then select a random pattern. When the pattern is displayed depends on whether the ATSS is set for first or second car operation.



The ATSS will change the lights to a random pattern, and will display the pattern and delays for each light on its LCD.



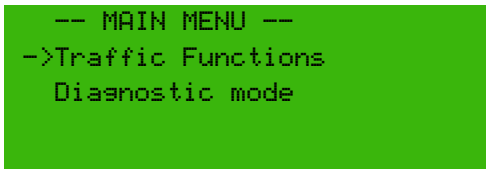
The system will reset itself and prepare for the next run. If at any time you need to quit from the mode, press the LEFT button and the ATSS will return to the main menu.

Traffic Counter

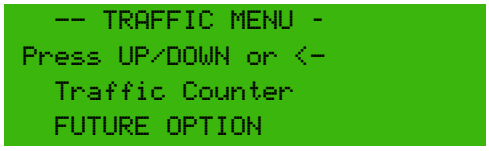
The ATSS can be used to count cars or people entering a facility in a single file line. If you need to know how many vehicles travel down a given road, passed through a DUI check point, or entered a parking area the ATSS can automatically keep count. If you have event attendees entering through a single-file entrance then you can also use it to count the number of people entering an event space, court house, or facility.

To access the Traffic Counter the UP or DOWN button until the indicator arrow (->) points to "Traffic Functions"

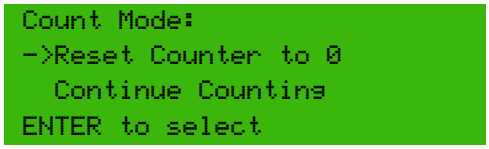
Press the RIGHT button to select this option.



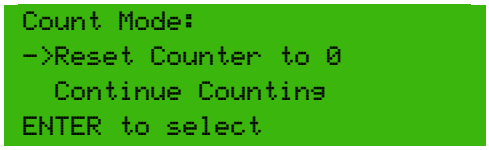
Press the DOWN button, then RIGHT button to select "Traffic Counter"



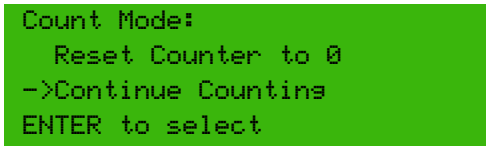
Press UP or DOWN to select the desired option.



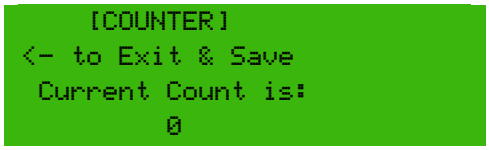
Select "Reset Counter to 0" to erase the previous count and start over.



Select "Continue Counting" to review the last traffic count and continue from that point.



Every vehicle or person that passes through the IR Sensor will now increment the counter. The ATSS can count up to 999,999 vehicles/people.

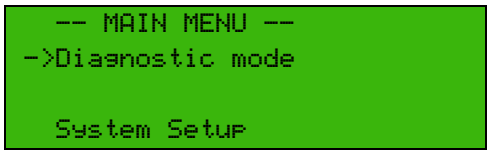


When you are finished press the LEFT button to save the current count and exit. To review your count later make sure the IR Receiver is OFF and select "Continue Counting" in the "Traffic Functions" menu. If the IR Receiver is on the system will continue counting and over write the saved count.

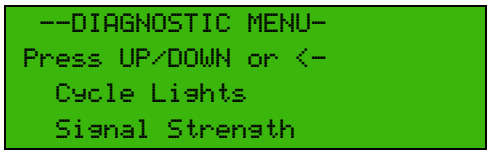
Diagnostic Mode

The ATSS can be operated in a diagnostic mode that is used only for troubleshooting or system familiarization. In this mode the use of the wireless sensors can be turned off so there is no need to

To access the Diagnostic Mode menu option press the UP or DOWN button until the indicator arrow (->) points to "Diagnostic Mode." Press the RIGHT (->) button to select this option.



The Diagnostic Mode will be selected.

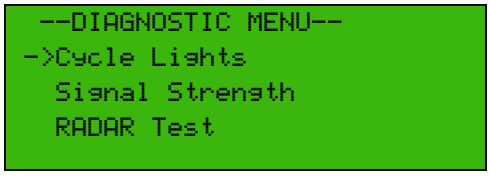


Cycle Lights

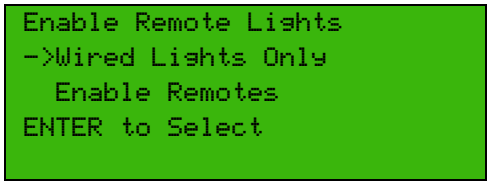
This option will cause the lights to activate in all possible combinations and can be used to verify proper operation of both wired and wireless lights.

Once you have navigated to the Diagnostic Menu, press the UP or DOWN button to select "Cycle Lights".

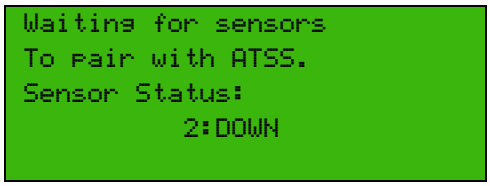
Press the RIGHT (->) button to select this option.



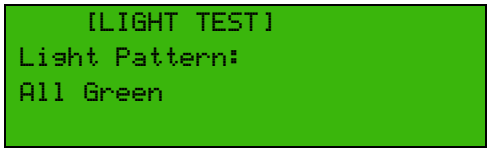
If only one sensor is currently paired, then you will be prompted to check whether you want to enable the remote lights or cycle the wired lights only. Press the UP or DOWN button to select the desired option, then press ENTER.



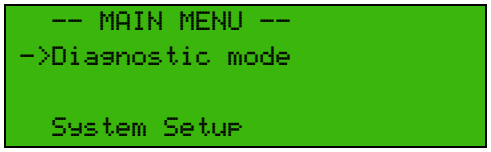
If you selected "Enable Remotes" then the system will search for a second sensor. The system will display "DOWN" until the sensor is found. If you need to cancel, press the LEFT(<-) Button and the system will exit from the pairing mode.



The system will display the text of the various light patterns. The ATSS panel's red and green LEDs will also show the pattern.



When all patterns are displayed the system will return to the Main Menu.



Signal Strength

This option will show the signal strength of any paired sensors on the system. The system will only pair with sensors that it needs therefore, if you have not yet used Intersection Clearing Mode then the only sensor the ATSS has paired with is the IR Sensor. You can have the system check the signal strength for the currently paired sensor, or you can tell it to check ALL sensors that it can find.

For each sensor you will see a unique ID on the display that will match the ID printed on each sensor tower. Additionally the ATSS will display the signal strength in decibel format as well as a percentage of signal strength.

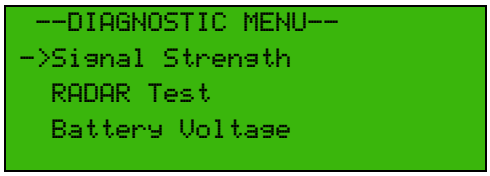
You can use this function to check that the position of your sensors on your course provides adequate signal strength for communication. For best results ensure signal strength is at least 50%. The minimum signal strength necessary for reliable operation is 35%.

Various factors will determine signal strength including:

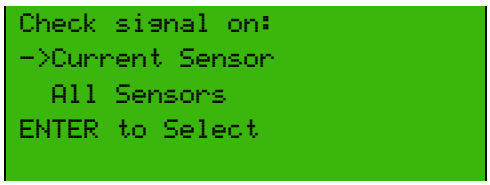
- Wind
- Ambient radio interference from wireless LANs or radios
- Proximity of ATSS controller or sensors to metal structures
- Height of ATSS controller from the ground

Once you have navigated to the Diagnostic Menu, press the UP or DOWN button to select "Signal Strength".

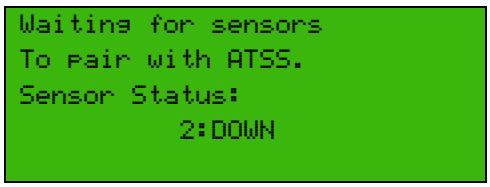
Press the RIGHT (−>) button to select this option.



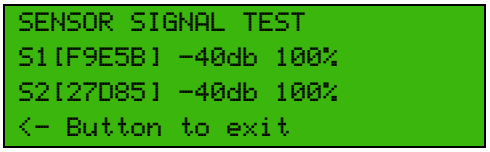
If only one sensor is currently paired, then you will be prompted to check whether you want to check signal strength on the current sensor or All Sensors. Press the UP or DOWN button to select the desired option, then press ENTER.



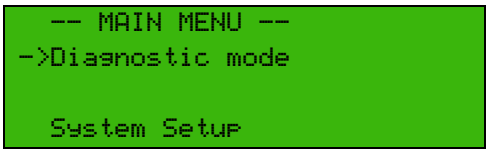
If you selected "All Sensors" then the system will search for the second sensor. The system will display "DOWN" until the sensor is found. If you need to cancel, press the LEFT(<−) Button and the system will exit from the pairing mode.



The ATSS will display the current signal strength for all discovered sensor modules.



When you are finished, press the LEFT (<-) Button and the system will return to the Main Menu

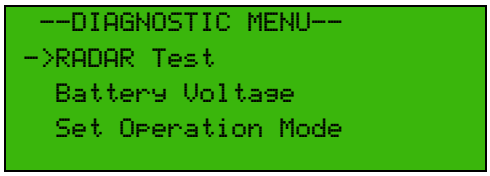


RADAR Test

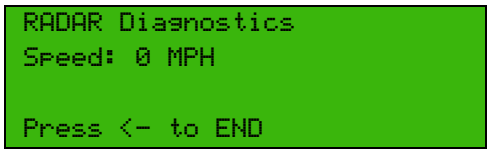
The RADAR Test will continuously display any speed detected by the RADAR. This mode allows you to test that the RADAR is functioning properly for your course configuration. It also provides verification of wireless communication between the RADAR and ATSS Controller. If you have X-Band tuning forks you can strike these and place them in front of the window of the sensor in order to display a speed. K and Ka tuning forks will work also; however, the RADAR will read these forks as significantly higher speeds.

Once you have navigated to the Diagnostic Menu, press the UP or DOWN button to select "RADAR Test".

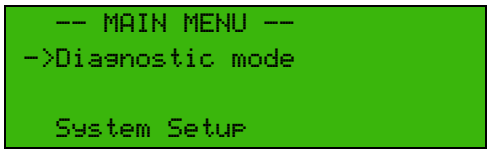
Press the RIGHT (->) button to select this option.



The ATSS will stay in this mode until you exit.



When you are finished, press the LEFT (<-) Button and the system will return to the Main Menu



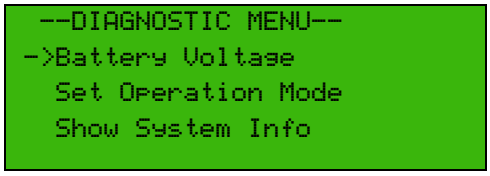
Battery Voltage

The ATSS power level indicator light will show different colors depending upon the battery voltage level. While battery capacity is 50% or greater the light will be green. Once battery capacity drops below 50% the light will turn orange. When capacity reaches 25% the light will turn red. You should connect the system to a battery charger immediately at this point to prevent damage to the batteries. When all capacity has been depleted the system will shut off and the power-saver will prevent operation of the ATSS until the battery has been recharged.

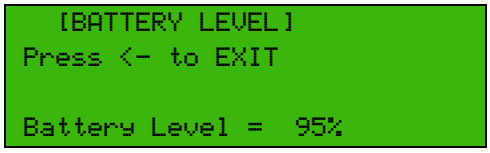
If you wish to know specifically how much capacity is remaining then you can use this mode to display battery voltage level as a percentage.

Once you have navigated to the Diagnostic Menu, press the UP or DOWN button to select "Battery Voltage".

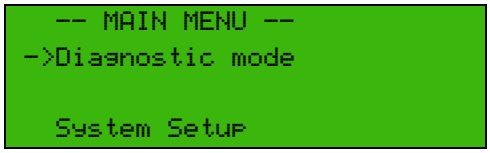
Press the RIGHT (->) button to select this option.



The ATSS will display the estimated battery capacity and will stay in this mode until press the LEFT button to exit.



When you are finished, press the LEFT (<-) Button and the system will return to the Main Menu



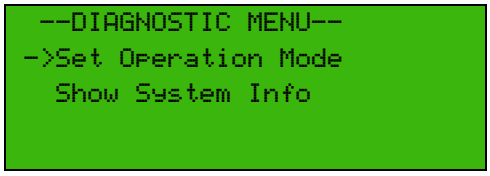
Set Operation Mode

Two modes of operation are available: Diagnostic Mode and Normal Mode. Diagnostic Mode should ONLY be used if tech support asks that you turn it on. Running the ATSS in Diagnostic Mode may cause performance to slow down. If you previously set the ATSS to Diagnostic Mode and would like to resume Normal Operation mode or vice-versa then you can set the system's mode with this menu option.

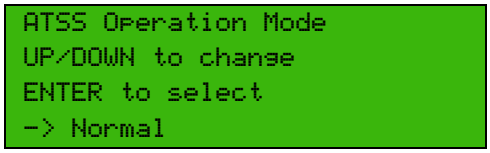
To set the system into Normal Mode:

Once you have navigated to the Diagnostic Menu, press the UP or DOWN button to select "Set Operation Mode".

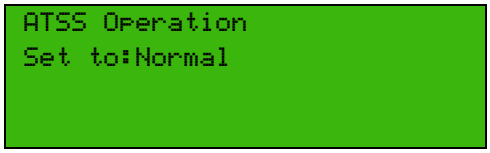
Press the RIGHT (->) button to select this option.



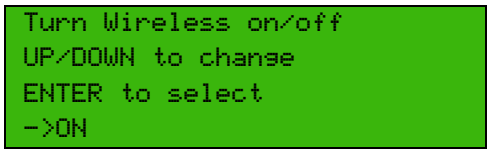
Press the UP or DOWN button to change the option. Then press the ENTER button to select NORMAL.



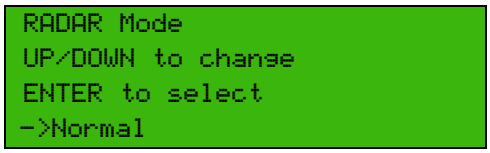
The system will confirm the selection.



The system will ask whether you want to turn the wireless sensors on or off. This can be used for trouble shooting with tech support. Usually this option would remain "ON."



The options are: Normal, Tuning Fork, Disable RADAR.
Normal – Normal speed readings
Tuning Fork – Testing with K or Ka-band tuning forks (the RADAR is an X-Band RADAR so K or Ka forks will cause very high speed readings, this adjusts those readings down)
Disable RADAR – ATSS will disregard RADAR readings



The system will then display the status of the IR sensor, pairing will happen faster if the IR sensor and ATSS are in close proximity. Until the system has paired, it will show sensor status as "DOWN."

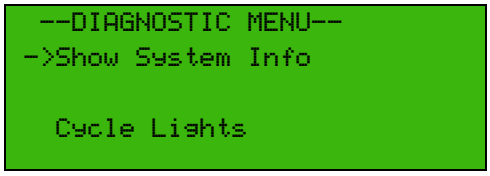
Once the sensor has paired, its status will go from “DOWN” to “UP.”

Show System Info

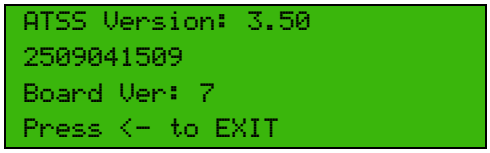
To check the hardware and software version of your ATSS select the "Show System Info" option. This will generally only be needed for tech support.

Once you have navigated to the Diagnostic Menu, press the UP or DOWN button to select "Show System Info".

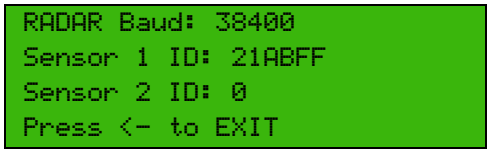
Press the RIGHT (->) button to select this option.



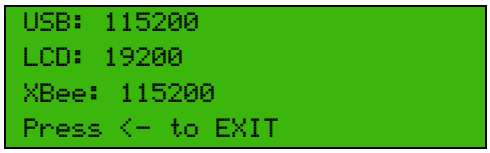
The ATSS will display the current software version and the ATSS motherboard version.



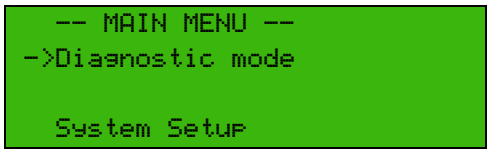
The ATSS will display the RADAR Baud rate, and the ID numbers for any sensors that are powered on.



The ATSS will display the USB, LCD and Radio Baud Rates.



When you are finished, press the LEFT (<-) Button and the system will return to the Main Menu



Diagnostic Operation Mode

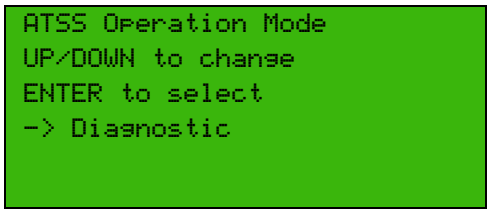
The ATSS can be operated in a diagnostic mode that is used only for troubleshooting or system familiarization. In this mode the use of the wireless sensors can be turned off so there is no need to set up the IR Sender and Sensor or the RADAR unit. You can also set this mode manually in the Diagnostic Menu option from the Main Menu.

Please note that it is generally not advisable to operate the ATSS in this mode as it does have a performance impact on the system.

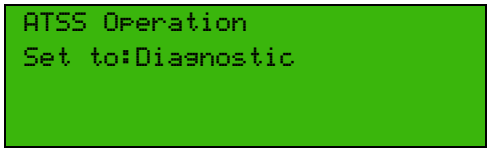
Operation Mode

On startup the system provides a prompt between Normal Operation and Diagnostic Operation Mode. Press UP or DOWN until "Diagnostic Mode" is displayed.

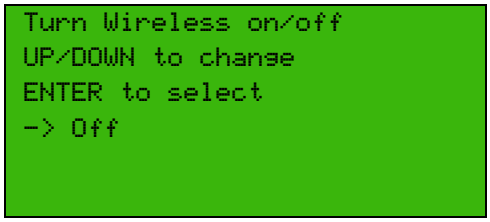
Press the RIGHT (->) button to select this option.



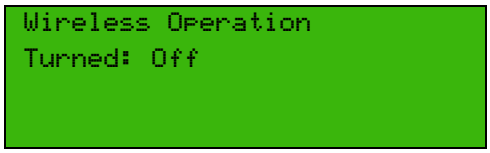
The system will confirm the selection.



The ATSS will prompt to turn the wireless On or Off. If you are simply familiarizing yourself with the ATSS controller you can leave the wireless off. This will enable you to go through all the menu settings without having to set up Turning the wireless ON will enable full system operation.

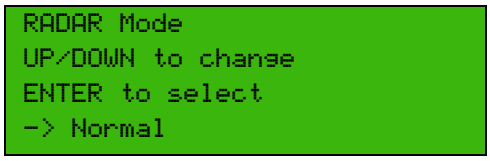


The ATSS will confirm the selection.



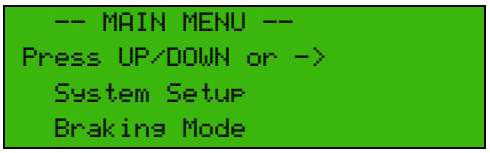
The ATSS will prompt to set the RADAR's operating mode:

Normal – speed readings are displayed
Tuning Fork – when using a non-X Band tuning fork speed is ½
Disable – No RADAR readings are displayed or used



The system confirms selection.

The system will now display the main menu



Optional Wireless Light Setup

The ATSS is designed to work with up to TWO optional wireless lights, and future software updates will allow the use of three or four. With the current software version 3.50, the wireless light(s) must be paired with the ATSS BEFORE any other sensors. To ensure this use the following startup procedures:

ATSS STARTUP PROCEDURES

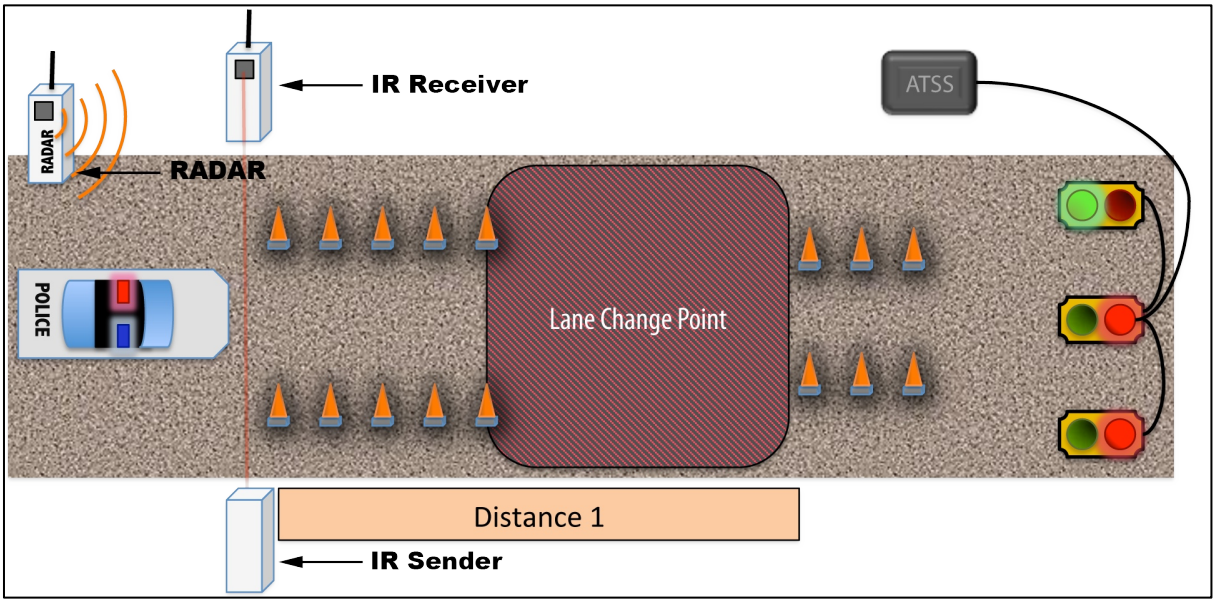
1. Power on the FIRST wireless light and place it in close proximity to the ATSS.
2. Power on the ATSS and press the RESET button to boot the system.
3. When the ATSS has paired with the sensor it will display the main menu.
4. Power on the IR Receiver (or SECOND wireless light) in close proximity to the ATSS.
5. Go to "Diagnostics" menu option:
    a. Select "Cycle Lights."
    b. Select "Enable Wireless Lights."
    c. The system will now pair with the IR Receiver or light and display "UP"
    d. Allow the light patterns to cycle a couple of times.
    e. Press the Left arrow button to return to the main menu.
6. The wireless light is now enabled and the IR Receiver or second light is now paired with the system.
7. You may now use the ATSS normally.

NOTES:

A delay of approximately 0.1 second is required to actuate the wireless light. This is normal and must be factored into the reaction time you are teaching to. For example, if you are teaching to a 1.5 second reaction time, the wireless light would require you to set the ATSS to 1.4 seconds to compensate.

Sensor Placement

At this point you will want to set the ATSS options so you will know where to place the sensors. (See the ATSS Setup section) Where you set the IR Sensor will depend upon the maximum speed and maximum reaction time that will be used. The chart located in the Appendix will aid you in selecting the right distance. Using a tape measure, LASER or wheel-based measuring device, measure the appropriate distance. (See Course Design section)



Put the IR sending unit across from the IR sensor. IR sending units may be up to 75' from the IR sensor. As the distance between the sensor and sending unit increases so too will the need to be accurate with the aim of the sending unit. When the red light in the IR sensor turns off, you will know that the sensor is properly aligned.

To test alignment, breaking the beam with your hand will cause the red light in the IR sensor to illuminate. The red light should turn off when you remove the obstruction from the beam's path. If you are setting the sensors far apart it may be easiest to put the sensors close together and then walk the sending unit farther and farther away from the sensor keeping the red light off as the sender is moved.

If you are using the same location, reaction time, and speed settings then you can mark the course after ensuring the sensors are placed in the appropriate position. This will make setup easier for future use.

Range Extension Kit Setup

For installations with radio interference, extreme distances between sensors, or terrain-induced interference, a signal-boosting kit is available, Part Number: BBICA0-00208. This will drastically increase range of the ATSS.

To install the booster

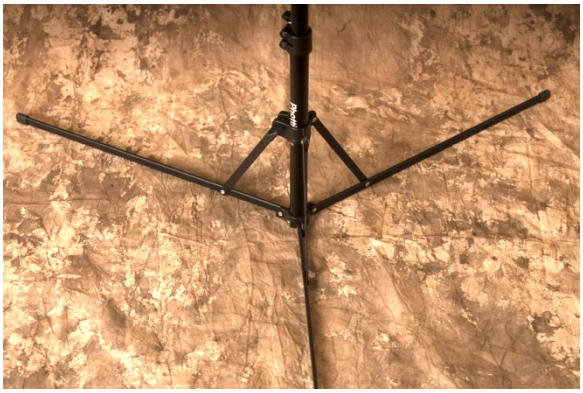
- Connect the antenna cable to the ATSS.
- Partially extend the tripod.
- Connect the whip antenna to the mounting bracket.

- Connect the bracket to the tripod.

- Extend the tripod to its full height.

(Continued on next page)

- Be sure to weight the tripod to prevent it from tipping over.



Tighten the thumbscrews on the stand's segments to maintain their position. **Do not over-tighten, as this will break the thumbscrews!**

Light Setup

The ATSS lights can be mounted either on the ground or on optional tripods. Choose which method you will use and follow the mounting and placement instructions.

Ground

For maximum stability an optional stabilizer kit (Part Number BBIS11-00245) is available for areas that experience high-wind conditions. This will ensure that the lights and sensors remain stable.

- Slide the stabilizer onto the base of the light.
- Place a weight bag or some other weight onto the stabilizer.

Slide the stabilizer onto the base of the sensor or light.

Place a weight bag on the stabilizer.

Optional Tripod

Optional Tripods enable lights to be raised off the ground for greater visibility.

First Time Setup

If this is the first time using the tripods you will need to prepare the lights before you can mount them. The lights are secured to the tripod mount bracket with a small strip of Velcro. The Velcro simply keeps the light from sliding off the mount as the weight of the light is held by the arms of the mount.

Your mounting brackets will be delivered with the Velcro already attached. The mating Velcro that attaches to the light will be fastened to the existing strip.

- Install the tripod mount bracket onto a tripod using the steps listed in the "Routine Setup" section.
- Leave the two pieces of Velcro fastened together.
- Remove the protective plastic cover from the adhesive strip.
- Ensure the light is aligned with the correct orientation. **The charging port and light port should NOT face the tripod.** (See the photo to the right.)
- Slide the light onto the bracket and press firmly to adhere the Velcro to the side of the light.
- Make sure that all the lights are mounted with the Velcro on the same side. This will ensure that any bracket can be used with any light.

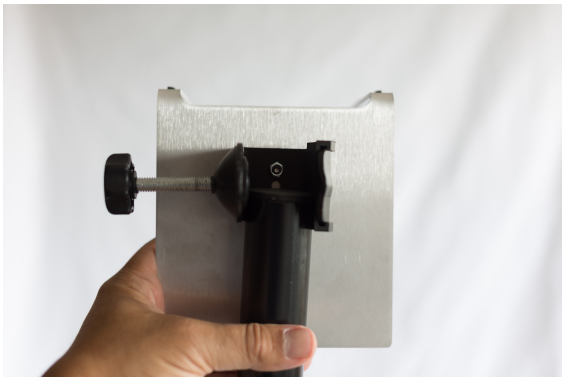
Routine Setup

- Expand the legs and tighten the thumbscrew.
- Place a weight bag onto the tripod to keep it stable.
- Extend the tripod pole to the desired height and slide the retaining pin in.
- Tighten the thumbscrew to prevent the post from turning.
  Do not over-tighten, as this will break the thumbscrews!

Insert the retaining pin.

Tighten the thumbscrew.

- Install the tripod mount bracket onto the post and tighten the thumbscrew.
  Do not over-tighten, as this may bend the mount assembly.
- (If this is the first time setup, see instructions in the “First Time Setup” section.)
- Slide the light onto the tripod mount bracket so that the bracket holds the weight of the light from the top plate. The Velcro will hold the light to the bracket face.



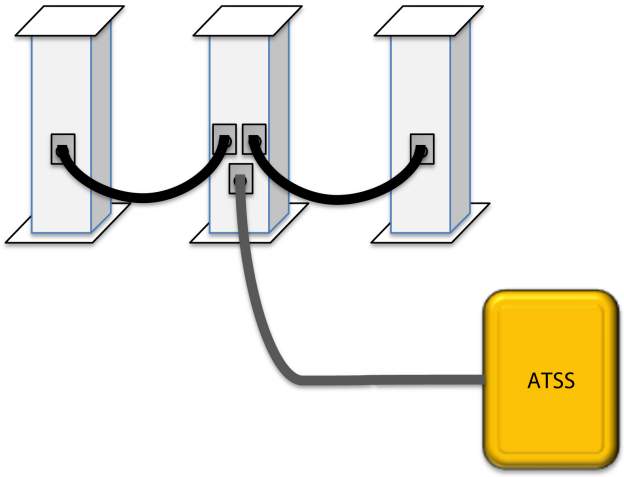
Install the light bracket onto the post.

Slide the light onto the bracket.

Electrical connections

After the lights have been placed on the ground or on the optional tripods, connect the cables.

- Connect the **single bottom** port on the center light to the light port on the side of the ATSS controller.
- Plug the left and right lights into the paired ports on the back of the center light. The lights are now ready for use.



- To remove the connectors depress the release tab on the jack and pull the cable from the jack using the body of the connector. **TO PREVENT DAMAGE TO THE CABLE, NEVER PULL THE CONNECTOR OUT BY PULLING ON THE CABLE, PULL FROM THE CONNECTOR BODY ONLY!**

Optional Light Scaffold Setup

The ATSS can also be ordered with a 36, 39 or 45-foot scaffold system. This scaffold allows the lights to be hung above the accident avoidance lanes. The scaffold is composed of two bases, two uprights, and three cross-beam sections. **The scaffold system must be weighted down after assembly.**

It is recommended that at least 200 pounds (90kg) per side be placed on each base after assembly. This will ensure that high winds will not blow the unit over. If the unit is to be located in a permanent location it is recommended that the bases be anchored to the driving surface through the use of bolts anchored into the asphalt or concrete. **The scaffold is not designed to withstand winds over 30 MPH (48 KPH), it is recommended that the crossbeam be placed on the ground and securely stored for extreme wind conditions.**

Important Electrical Storm Precautions

As with all elevated metallic structures in open spaces, the ATSS frame poses a potential lightning strike hazard. It is the responsibility of the user to take all necessary precautions to ensure the safety of people operating around the structure. Permanent installations may require grounding, consult a licensed electrician for best practices for grounding the scaffold.

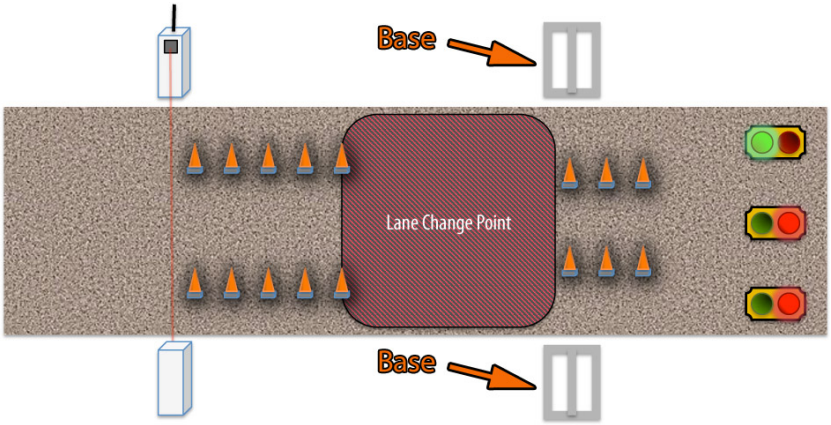
In the event of an electrical storm the following precautions should be taken immediately:

- **If a potential strike is eminent GET AWAY FROM THE SCAFFOLD AND SEEK SHELTER IMMEDIATELY.**
- If time and conditions permit, disconnect the ATSS Controller from the lights and secure it in a safe location.
- Remove ALL the cables from the lights to prevent them from passing current through the circuit.
- If a potential strike is eminent GET AWAY FROM THE SCAFFOLD AND SEEK SHELTER IMMEDIATELY.
- Time permitting, remove the lights from the cross member.
- Remove the cross member from the uprights and place it on the ground (there is no need to disassemble it).
- Remove the two uprights and place them on the ground.
- Seek shelter immediately until the storm passes.

The ATSS components are not hardened against lightning strikes and should never be left connected to the scaffold when not in use.

Scaffold Assembly

Place the bases on either side of the lane change area.

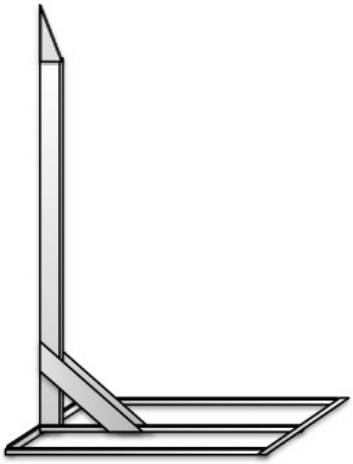


Lay the crossbeam sections down on the ground. Make sure the center section is in the middle and the end sections have the mounting brackets closest to the bases.

Bolt each end section to the center section, ensuring that all bolts are TIGHT. There should be no gaps or play between the sections.

DO NOT MOUNT THE LIGHTS UNTIL THE SCAFFOLD IS COMPLETELY ASSEMBLED AND INSTALLED ON THE UPRIGHTS!

Remove the retaining pin from the base.



Insert an upright into the base, ensuring the flat side of the upright faces inwards toward the lane change area.

The long part of the base should be facing away from the lanes.

Replace the retaining pin and weight the base down.

Repeat for the other side, **but do not weight the base down yet.** You may need to reposition it for final installation.

Put one end of the scaffold on top of the upright with the weighted base.

Place the other end on the remaining scaffold and adjust the position of the base if necessary.

Weight the remaining base down.

Assembled frame

Install the lights onto the crossmember by tightening the thumb screws.

Connect the cables to the left and right lights and then route them to the center light.

Route the center light's cable to the ATSS controller. *(Continued)*

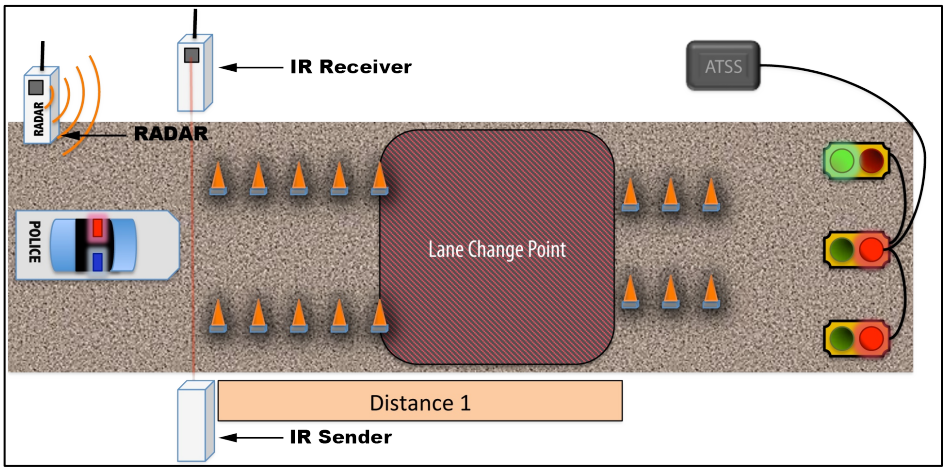
IMPORTANT!

PRIOR TO USE, ENSURE THAT <u>EACH BASE</u> OF THE SCAFFOLD IS WEIGHTED WITH AT LEAST 200 POUNDS (90kg) TO PREVENT TIPPING FROM WIND OR COLLISION. PERMANENT INSTALLATIONS MAY USE APPROPRIATE IN-GROUND ANCHORS.

Course Design

The following diagrams illustrate how the various courses need to be set up to work properly with the ATSS. See Appendix A to determine the appropriate sensor to escape lane distance.

Lane Change / Braking Mode / Lane Decision Mode



(*Diagram is not drawn to scale*)

Configure the ATSS using the SETUP menu option you will enter the distance where the sensors will be placed. This distance is determined by the maximum reaction time and maximum speed your students will be traveling. After you set the distance in the SETUP menu, the system will confirm the distance that the sensor pair must be placed from the escape lanes. (Distance 1 in the figure above).

Valid distances are:

Standard - 50, 75, 88 (for California POST standard), 100, 125, 150, 175, and 200 feet.
Metric - 20, 25, 30, 35, 40, 50, 55 and 60 Meters.

The greater the distance the longer the reaction time can be, or the higher the speed can be. Long reaction times combined with high vehicle speeds will require the maximum distance of 200-feet/60-Meters. Most organizations utilize a speed of 35-50 MPH / 55-80 KPH and a reaction time between 0.5 and 1.5 seconds. This speed and reaction time is best suited for a sensor distance of 100-feet from the escape lanes. (See the chart in the appendix for information on setup distances.)

If the same settings are used every time, mark the course so that sensors may be placed in the same location each time. If varying speeds and reaction times will be used throughout the day it is best to set the system for the maximum speed and longest reaction time that will be used. The system will automatically adjust for the slower speeds without the need to reposition equipment.

Ensure that the lights, RADAR, and ATSS controller are far enough away from the course exit to avoid being struck.

IMPORTANT:

Set the sensors only as far from the escape lanes as necessary to support your maximum speed and reaction time. When a vehicle is traveling at low speeds on a course set for high-speed runs, the long distance between the IR sensors and escape lanes may generate inaccurate reaction times if the vehicle speeds up or slows down dramatically over the longer distance.

Intersection Clearing Mode

Intersection Clearing Mode (ICM) is a unique configuration designed to train the driver to continuously scan through an intersection before passing through. The driver must actually "SEE" if the path is clear rather than just turning his or her head and proceeding through. When the IR sensor beam is broken the ATSS randomly selects which lights will change from green to red. Each light that stays red will do so for a random period of time in order to simulate the varying stopping times of actual traffic. Lights that change red will stay red for a minimum of three seconds and the instructor sets the maximum time during setup. This maximum time can be from 5-seconds to 15-seconds. You may have to experiment with different maximum times to determine which works best for your training program's overall time constraints.

Selection of the lights is random, and it is possible to have three green lights, indicating "all clear" for each direction, for this exercise.

Emergency Response Mode

On the ATSS control panel this mode is listed as "First Car Through," in the Intersection Clearing Mode menu option. This references the system operation where the first car through the beam activates the lights. This mode is best utilized when training for emergency response, where vehicles are traveling with emergency equipment activated in response to a priority incident. In "Emergency Response Mode" the system will change the lights to a random pattern immediately after the Infrared beam has been broken. After the lights change to a random pattern they will turn off and reset for the next vehicle; this mode works best for a single car on course but multiple cars can be on course simultaneously provided they are spaced far enough apart.

Pursuit Mode

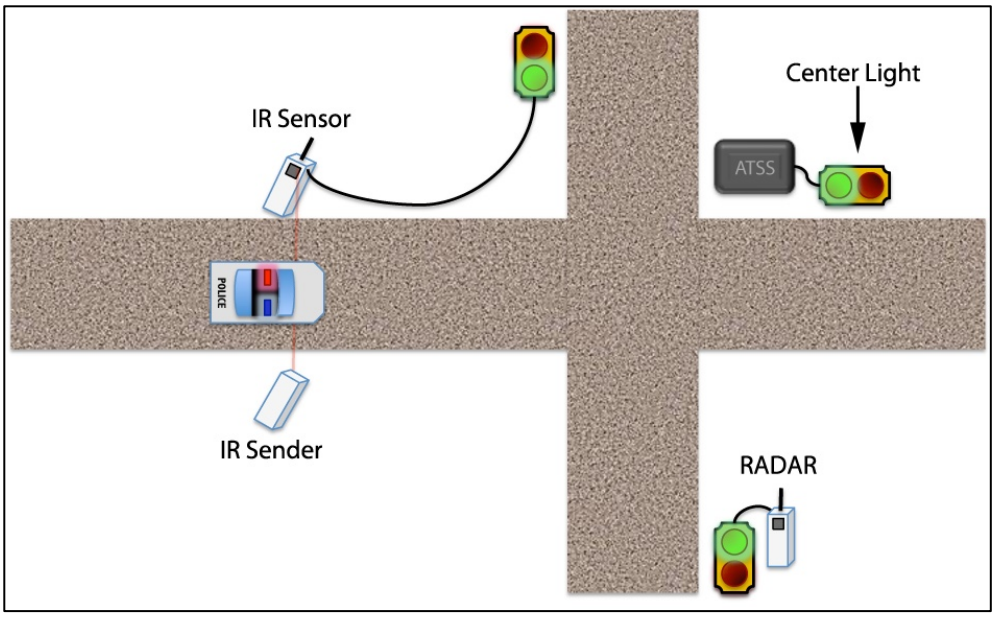
Pursuit Mode forces the student to learn patience during pursuits. The student must continue to drive with due regard for safety of the public despite being in a pursuit. In Pursuit Mode the student is faced with the situation where he or she must wait for traffic to clear as the rabbit car makes his escape.

Pursuit Mode is activated on the ATSS control panel by selecting the "Second Car Through" option in the Intersection Clearing Mode menu option. In "Pursuit Mode" a pursuing officer chases a "rabbit car". The first car through the IR beam will cause all the lights to turn green. The pursuing vehicle will then break the beam and cause the lights to change to a random pattern.

If no vehicle passes through the beam after six-seconds the system will reset itself and wait for the next activation. Instructors should be mindful of this when driving the rabbit car in order to ensure the student is no closer than one-quarter second behind and no more than six-seconds behind. Too close and the system will read the rabbit and student car as a single activation, too far and the system will reset.

This timeframe is necessary to prevent light activations caused by pedestrians, wildlife, or random vehicles from activating the system and leaving it in a continuous "on" state that would drain the batteries as the system waited for a second activation.

The physical setup for Intersection Clearing Mode (ICM) is slightly different. In ICM the ATSS does not compute vehicle speed, but instead simply actuates immediately after the IR sensor beam is broken. In this exercise the RADAR sensor is used only to provide a connection for the red/green signal light, as shown in the diagram, it is not used for speed measurement.



Intersection Clearing Mode Course Setup Diagram

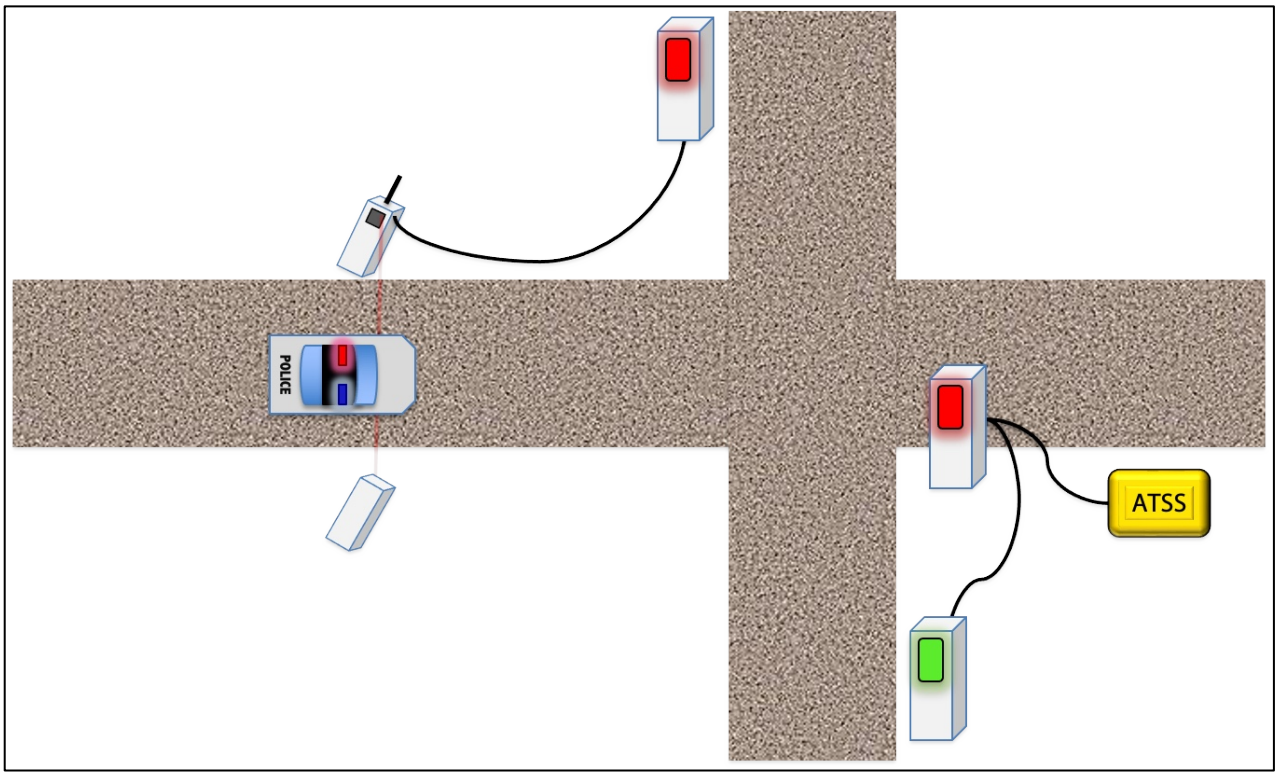
With ICM, the CENTER light is plugged into the light port on the ATSS controller. The remaining two lights are each plugged into the light port located on the IR receiver and the RADAR sensor.

Place the ATSS controller and RADAR sensor on each leg of the intersection as shown in the diagram.

At the entrance to your course place the IR sensor and IR sending unit. Connect a light to the IR sensor and use the long light cable to place your light on the other leg of the course as shown in the diagram above.

Alternate Intersection Clearing Mode Setup

It is also possible for users who do not have a RADAR, or who wish to simplify course setup, to connect two lights to the ATSS and one remote light to the IR Receiver as shown in the diagram below.



Alternate Intersection Clearing Mode Course Setup Diagram

In this example the LEFT light is connected to the IR Receiver. The CENTER light is connected directly to the ATSS Controller, then the RIGHT light is connected to the CENTER light on the RIGHT port.

Note: If the remote light and the light plugged into the center light activate together, switch ports on the CENTER light.

Teardown, Storage and Maintenance

Provided they are not left on overnight, and the temperature is above freezing, up to two 8-hour days of run time can be expected from a full charge on the sensors.

The ATSS controller should be able to operate for at least one 8-hour day on a full charge, and ideally should be charged each night. **Allowing the batteries to deep discharge by running them to failure or storing them in a discharged state can cause premature and permanent battery failure.** Before long-term storage ensure that the batteries are fully charged and periodically charge them once every six-months using the included charger. The charger will also serve to maintain the batteries so ideally they should remain plugged into the charger for long-term storage.

Teardown

Disassembly of the ATSS and all components is the opposite of setup. To remove the lights from the ATSS controller or the sensors push the tab at the top of the port's housing and pull the cable out by grasping the metal body of the plug and pulling out firmly. **NEVER PULL THE CABLE OUT USING THE CORD!**

- Ensure all the power switches have been turned off.
- Turn the ATSS controller off.
- Connect all sensors and the ATSS to the charging station.
- Charge the system before storage. Charging time will depend on many factors but can range from one to five hours. See the section on "Charging" for further instructions.
- For long-term storage follow the storage instructions.

Charging

Multi-port Charger

The ATSS includes a four-port charger that is designed to charge and maintain the batteries of each individual component. When the charger is plugged in and charging the bottom yellow light will illuminate for each charging port that is actively charging.

When the battery on that port is fully charged a green light will illuminate. When the green light is flashes this indicates the charger is in maintenance mode which keeps the battery charged and conditioned.

THE CHARGER SHOULD BE UNPLUGGED FROM THE WALL FOR 30-SECONDS AT LEAST ONCE A MONTH DURING LONG-TERM STORAGE.

Charging ATSS Components

1. Plug the all sensors into the multi-port charger using its SAE-2 connector cables.
2. The charging port of the ATSS is located on the side of the case.

3. Ensure that the power switch for the ATSS is OFF.
    a. The ATSS can be turned on during charging; however, this will increase charging time.
    b. For long-term storage (weeks or months) of all ATSS components, it is recommended to leave them plugged into the charger. The smart charger is designed to maintain the health of the batteries.
4. Plug the charger into the appropriate electrical outlet.

    a. While the batteries are actively charging the charger will display a red light.
    b. When the batteries are fully charged a green light will illuminate and the charger will go into maintenance mode that will keep the batteries topped off during long-term storage.
    c. It is important to plug the charger in AFTER all devices are connected. This will allow the microprocessor in the charger to determine a charging strategy.

Storage

- As with all sensitive electronics, during long-term storage the system should be kept in a climate-controlled environment out of extreme heat, humidity and cold.
- **All batteries should be fully charged before long-term storage.**
- Storing the batteries in a discharged state will ruin the batteries.
- Leave the system plugged into the battery maintainer/charger for storage periods of 6-months or more.
- **The charger should be unplugged from the wall outlet for 30-seconds at least once each month** for proper battery maintenance.

Battery Replacement

The ATSS sensors use 5-amp hour Sealed Lead Acid (SLA) batteries. It is recommended that the Power-Sonic PS-1255F2-FR battery, or equivalent be used.

The ATSS Controller uses a single 12-amp hour SLA battery. We recommend the Power-Sonic PS-12120 F2 battery, or equvalent. Either battery may be purchased through your distributor or at your local hardware or battery store.

Sensor Battery Replacement

Should a battery need replacement:

1) Make sure the power to the sensor is OFF.
2) Unscrew the four screws as shown from the **base** of the sensor or emitter housing.
3) Carefully lift the housing from the base
4) Disconnect the connectors from the spade terminals on the battery.
5) Unfasten the Velcro strap from the base and remove the battery.
6) Replace the battery, and fasten the Velcro strap over the battery.
7) Make double check to make sure the RED wire is connected to the positive (+) terminal on the battery and the BLACK wire is connected to the negative (-) terminal.
   Reversing the wires will permanently damage the sensor and is not covered under warranty!
8) Re-insert the base into the housing and reinstall the screws.

When replacing the cables make certain to connect the correct polarity to the correct terminals on the battery. Failure to do so WILL permanently damage the sensor.

ATSS Controller Battery Replacement

The ATSS battery is replaced by performing the following steps:

1) Ensure the ATSS Controller is off.
2) Unscrew the faceplate retaining screws.
3) Gently lift the faceplate up being careful not to disconnect any circuits connected to the ATSS controller.
4) Make note of the orientation of the foam spacer on the battery, then remove and set it aside.
5) Disconnect the battery terminals by pulling from the body of the connector, DO NOT PULL USING THE WIRE!
6) Pull the battery up from the protective foam.
7) Install the new battery and connect the power cable making sure the RED wire is connected to the positive (+) terminal on the battery and the BLACK wire is connected to the negative (-) terminal.
   Reversing the wires will permanently damage the controller and is not covered under warranty!
8) Replace the protective foam over the battery in the correct orientation.
9) Reassemble the faceplate and screw in "finger" tight. DO NOT OVERTIGHTEN THE SCREWS AS THIS MAY STRIP THE SCREW HOLES.

Troubleshooting

System or Sensors will not power on.

Solution: Check the battery's voltage using the supplied battery tester or a volt meter. If the voltage is low, re-charge the battery. The ATSS Controller will automatically shut off when the battery reaches 9.9-volts. Sensors may function at battery voltages below this level, but should NEVER be operated in this condition.

Battery will not charge.

Solution: If a battery is discharged below 10-volts the supplied battery charger will not charge the battery. Supplied with the charger are a series of leads with alligator clips that can plug into the charging port of the ATSS sensor or controller and connect to a 12-volt power source. Connect the deep-discharged ATSS battery to a known 12-volt source and charge the battery for a few minutes to bring the voltage up. Disconnect the alligator clip charging cable and IMMEDIATELY plug the 4-port charger into the unit. Allow the charger to bring the battery up to full capacity.

If this method does not work then the battery has been deep-discharged too far and needs to be replaced.

Solution: Batteries will only last for one to two years under heavy use/recharge cycles, or even less time if they are deep-discharged. Replace the battery.

When the ATSS Turns on the screen is blank.

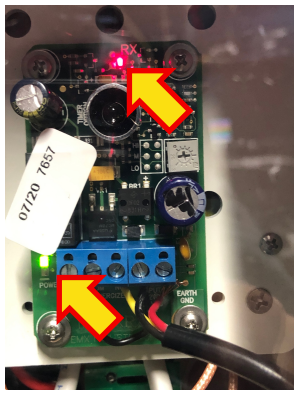
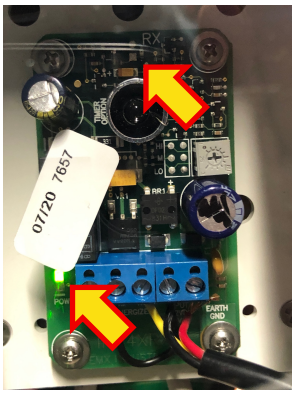
Solution: Press the reset button.

Solution: Check voltage.

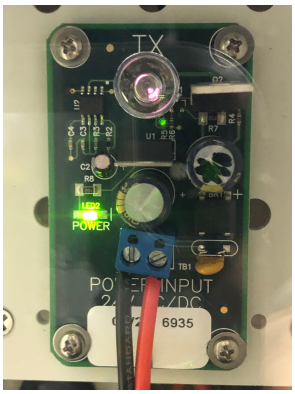
Solution: Call support.

When a car passes through the sensor beam nothing happens.

Solution: Ensure the RED light is not on in the IR Receiver.

	
No IR Signal Detected	Good IR Signal Detected

Solution: Check to make sure that the IR Sender (the unit with no antenna on the sensor) and the IR Receiver (antenna on top) are properly aligned. The IR Receiver should show a GREEN light when it has power and sees the IR Sender. If the IR Receiver shows a GREEN and RED lights then it cannot see the sender. Ensure the IR Sender is powered on. The IR Sender should show a single green light.



IR Sender Powered on.

Place the sensors no closer than 4-feet from each other and aim them at each other. The red light on the receiver should be OFF. If it is not, see other solutions. If it is off then carefully move the IR Sender into position ensuring the green light on the receiver stays off.

Solution: Ensure that the IR Receiver is not facing directly into the sun. Normally facing into the sun isn't a problem except in early morning or late evening hours on bright days. Reposition and test again.

Solution: Check battery voltage.

Solution: In areas with heavy traffic on 900MHz frequencies (*i.e.:* Airports, Cell Phone/Radio/Microwave Towers, High-Voltage Power Transmission lines or substations, etc.) it is possible that radio interference is preventing the IR Sender from communicating properly with the ATSS Controller. Raise the ATSS controller off the ground as high as possible. If this doesn't work an ATSS Range Extension kit (P/N: BBICA0-00208) may be required for your location contact your distributor for more information.

The RADAR is not reading speeds.

Solution: Check the section of this manual dealing with Course Setup to ensure the RADAR is placed properly.

Solution: Check battery voltage to ensure the battery is sufficiently charged.

Solution: Set the ATSS Controller in an elevated position to provide greater range.

Appendix

Speed / Reaction Time Distance Charts

The following charts will show the distances required to support various speeds and reaction times. Longer reaction times or higher speeds may not be possible with shorter sensor placement. In these cases the values in red displayed on the chart will show the time deficit from the desired reaction time. Values in yellow cells may still suffice, as the deficit will only be a few hundredths of a second.

In cases where the vehicle's speed, or the reaction time is set greater than the design parameters, the lights will change instantly when the IR beam is broken.

IMPORTANT:

Set the sensors only as far from the escape lanes as necessary to support your maximum speed and reaction time. When a vehicle is traveling at low speeds on a course set for high-speed runs, the long distance between the IR sensors and escape lanes may generate inaccurate reaction times if the vehicle speeds up or slows down dramatically over the longer distance.

50-foot Sensor Distance Chart

Max Speed and R/T for 50' Course

Speed in MPH	Reaction Time														
	0.0	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
20	1.685	1.185	1.085	0.985	0.885	0.785	0.685	0.585	0.485	0.385	0.285	0.185	0.085	-0.015	-0.115
25	1.344	0.844	0.744	0.644	0.544	0.444	0.344	0.244	0.144	0.044	-0.056	-0.156	-0.256	-0.356	-0.456
30	1.116	0.616	0.516	0.416	0.316	0.216	0.116	0.016	-0.084	-0.184	-0.284	-0.384	-0.484	-0.584	-0.684
35	0.954	0.454	0.354	0.254	0.154	0.054	-0.046	-0.146	-0.246	-0.346	-0.446	-0.546	-0.646	-0.746	-0.846
40	0.832	0.332	0.232	0.132	0.032	-0.068	-0.168	-0.268	-0.368	-0.468	-0.568	-0.668	-0.768	-0.868	-0.968
45	0.738	0.238	0.138	0.038	-0.062	-0.162	-0.262	-0.362	-0.462	-0.562	-0.662	-0.762	-0.862	-0.962	-1.062
50	0.662	0.162	0.062	-0.038	-0.138	-0.238	-0.338	-0.438	-0.538	-0.638	-0.738	-0.838	-0.938	-1.038	-1.138
55	0.600	0.100	0.000	-0.100	-0.200	-0.300	-0.400	-0.500	-0.600	-0.700	-0.800	-0.900	-1.000	-1.100	-1.200

For courses where the IR Sender/Receiver is placed **50-feet** from the escape lanes speeds up to 55 MPH may be accommodated as long as the reaction time is set at **0.6** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

75-foot Sensor Distance Chart

Max Speed and R/T for 75' Course

Speed in MPH	Reaction Time														
	0.0	0.5	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.5	3.0
20	2.557	2.057	1.557	1.457	1.357	1.257	1.157	1.057	0.957	0.857	0.757	0.657	0.557	0.057	-0.443
25	2.045	1.545	1.045	0.945	0.845	0.745	0.645	0.545	0.445	0.345	0.245	0.145	0.045	-0.455	-0.955
30	1.705	1.205	0.705	0.605	0.505	0.405	0.305	0.205	0.105	0.005	-0.095	-0.195	-0.295	-0.795	-1.295
35	1.461	0.961	0.461	0.361	0.261	0.161	0.061	-0.039	-0.139	-0.239	-0.339	-0.439	-0.539	-1.039	-1.539
40	1.278	0.778	0.278	0.178	0.078	-0.022	-0.122	-0.222	-0.322	-0.422	-0.522	-0.622	-0.722	-1.222	-1.722
45	1.136	0.636	0.136	0.036	-0.064	-0.164	-0.264	-0.364	-0.464	-0.564	-0.664	-0.764	-0.864	-1.364	-1.864
50	1.023	0.523	0.023	-0.077	-0.177	-0.277	-0.377	-0.477	-0.577	-0.677	-0.777	-0.877	-0.977	-1.477	-1.977
55	0.930	0.430	-0.070	-0.170	-0.270	-0.370	-0.470	-0.570	-0.670	-0.770	-0.870	-0.970	-1.070	-1.570	-2.070

For courses where the IR Sender/Receiver is placed **75-feet** from the escape lanes speeds up to 55 MPH may be accommodated as long as the reaction time is set at **0.9** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

88-foot Sensor Distance Chart

Max Speed and R/T for 88' Course

Speed in MPH	Reaction Time														
	0.0	0.5	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.5	3.0
20	2.980	2.480	1.980	1.880	1.780	1.680	1.580	1.480	1.380	1.280	1.180	1.080	0.980	0.480	-0.020
25	2.380	1.880	1.380	1.280	1.180	1.080	0.980	0.880	0.780	0.680	0.580	0.480	0.380	-0.120	-0.620
30	1.980	1.480	0.980	0.880	0.780	0.680	0.580	0.480	0.380	0.280	0.180	0.080	-0.020	-0.520	-1.020
35	1.694	1.194	0.694	0.594	0.494	0.394	0.294	0.194	0.094	-0.006	-0.106	-0.206	-0.306	-0.806	-1.306
40	1.480	0.980	0.480	0.380	0.280	0.180	0.080	-0.020	-0.120	-0.220	-0.320	-0.420	-0.520	-1.020	-1.520
45	1.313	0.813	0.313	0.213	0.113	0.013	-0.087	-0.187	-0.287	-0.387	-0.487	-0.587	-0.687	-1.187	-1.687
50	1.180	0.680	0.180	0.080	-0.020	-0.120	-0.220	-0.320	-0.420	-0.520	-0.620	-0.720	-0.820	-1.320	-1.820
55	1.071	0.571	0.071	-0.029	-0.129	-0.229	-0.329	-0.429	-0.529	-0.629	-0.729	-0.829	-0.929	-1.429	-1.929

For courses where the IR Sender/Receiver is placed **88-feet** from the escape lanes speeds up to 55 MPH may be accommodated as long as the reaction time is set at **0.9** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

100-foot Sensor Distance Chart

Max Speed and R/T for 100' Course

Speed in MPH	Reaction Time														
	0.0	0.5	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.5	3.0
20	3.389	2.889	2.389	2.289	2.189	2.089	1.989	1.889	1.789	1.689	1.589	1.489	1.389	0.889	0.389
25	2.707	2.207	1.707	1.607	1.507	1.407	1.307	1.207	1.107	1.007	0.907	0.807	0.707	0.207	-0.293
30	2.253	1.753	1.253	1.153	1.053	0.953	0.853	0.753	0.653	0.553	0.453	0.353	0.253	-0.247	-0.747
35	1.928	1.428	0.928	0.828	0.728	0.628	0.528	0.428	0.328	0.228	0.128	0.028	-0.072	-0.572	-1.072
40	1.685	1.185	0.685	0.585	0.485	0.385	0.285	0.185	0.085	-0.015	-0.115	-0.215	-0.315	-0.815	-1.315
45	1.495	0.995	0.495	0.395	0.295	0.195	0.095	-0.005	-0.105	-0.205	-0.305	-0.405	-0.505	-1.005	-1.505
50	1.344	0.844	0.344	0.244	0.144	0.044	-0.056	-0.156	-0.256	-0.356	-0.456	-0.556	-0.656	-1.156	-1.656
55	1.220	0.720	0.220	0.120	0.020	-0.080	-0.180	-0.280	-0.380	-0.480	-0.580	-0.680	-0.780	-1.280	-1.780

For courses where the IR Sender/Receiver is placed **100-feet** from the escape lanes speeds up to 55 MPH may be accommodated as long as the reaction time is set at **1.2** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

125-foot Sensor Distance Chart

Max Speed and R/T for 125' Course

Speed in MPH	Reaction Time														
	0.0	0.5	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.5	3.0
20	4.241	3.741	3.241	3.141	3.041	2.941	2.841	2.741	2.641	2.541	2.441	2.341	2.241	1.741	1.241
25	3.389	2.889	2.389	2.289	2.189	2.089	1.989	1.889	1.789	1.689	1.589	1.489	1.389	0.889	0.389
30	2.821	2.321	1.821	1.721	1.621	1.521	1.421	1.321	1.221	1.121	1.021	0.921	0.821	0.321	-0.179
35	2.415	1.915	1.415	1.315	1.215	1.115	1.015	0.915	0.815	0.715	0.615	0.515	0.415	-0.085	-0.585
40	2.111	1.611	1.111	1.011	0.911	0.811	0.711	0.611	0.511	0.411	0.311	0.211	0.111	-0.389	-0.889
45	1.874	1.374	0.874	0.774	0.674	0.574	0.474	0.374	0.274	0.174	0.074	-0.026	-0.126	-0.626	-1.126
50	1.685	1.185	0.685	0.585	0.485	0.385	0.285	0.185	0.085	-0.015	-0.115	-0.215	-0.315	-0.815	-1.315
55	1.530	1.030	0.530	0.430	0.330	0.230	0.130	0.030	-0.070	-0.170	-0.270	-0.370	-0.470	-0.970	-1.470

For courses where the IR Sender/Receiver is placed **125-feet** from the escape lanes speeds up to 55 MPH may be accommodated as long as the reaction time is set at **1.5** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

150-foot Sensor Distance Chart

Max Speed and R/T for 150' Course

Speed in MPH	Reaction Time														
	0.0	0.5	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.5	3.0
20	5.094	4.594	4.094	3.994	3.894	3.794	3.694	3.594	3.494	3.394	3.294	3.194	3.094	2.594	2.094
25	4.071	3.571	3.071	2.971	2.871	2.771	2.671	2.571	2.471	2.371	2.271	2.171	2.071	1.571	1.071
30	3.389	2.889	2.389	2.289	2.189	2.089	1.989	1.889	1.789	1.689	1.589	1.489	1.389	0.889	0.389
35	2.902	2.402	1.902	1.802	1.702	1.602	1.502	1.402	1.302	1.202	1.102	1.002	0.902	0.402	-0.098
40	2.537	2.037	1.537	1.437	1.337	1.237	1.137	1.037	0.937	0.837	0.737	0.637	0.537	0.037	-0.463
45	2.253	1.753	1.253	1.153	1.053	0.953	0.853	0.753	0.653	0.553	0.453	0.353	0.253	-0.247	-0.747
50	2.025	1.525	1.025	0.925	0.825	0.725	0.625	0.525	0.425	0.325	0.225	0.125	0.025	-0.475	-0.975
55	1.840	1.340	0.840	0.740	0.640	0.540	0.440	0.340	0.240	0.140	0.040	-0.060	-0.160	-0.660	-1.160

For courses where the IR Sender/Receiver is placed **150-feet** from the escape lanes speeds up to 55 MPH may be accommodated as long as the reaction time is set at **1.9** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

175-foot Sensor Distance Chart

Max Speed and R/T for 175' Course

Speed in MPH	Reaction Time														
	0.0	0.5	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	2.5	3.0
20	5.946	5.446	4.946	4.846	4.746	4.646	4.546	4.446	4.346	4.246	4.146	4.046	3.946	3.446	2.946
25	4.753	4.253	3.753	3.653	3.553	3.453	3.353	3.253	3.153	3.053	2.953	2.853	2.753	2.253	1.753
30	3.957	3.457	2.957	2.857	2.757	2.657	2.557	2.457	2.357	2.257	2.157	2.057	1.957	1.457	0.957
35	3.389	2.889	2.389	2.289	2.189	2.089	1.989	1.889	1.789	1.689	1.589	1.489	1.389	0.889	0.389
40	2.963	2.463	1.963	1.863	1.763	1.663	1.563	1.463	1.363	1.263	1.163	1.063	0.963	0.463	-0.037
45	2.632	2.132	1.632	1.532	1.432	1.332	1.232	1.132	1.032	0.932	0.832	0.732	0.632	0.132	-0.368
50	2.366	1.866	1.366	1.266	1.166	1.066	0.966	0.866	0.766	0.666	0.566	0.466	0.366	-0.134	-0.634
55	2.149	1.649	1.149	1.049	0.949	0.849	0.749	0.649	0.549	0.449	0.349	0.249	0.149	-0.351	-0.851

For courses where the IR Sender/Receiver is placed **175-feet** from the escape lanes speeds up to 55 MPH may be accommodated as long as the reaction time is set at **2.0** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

200-foot Sensor Distance Chart

Max Speed and R/T for 200' Course

Speed in MPH	Reaction Time														
	0.0	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	2.0	2.5	3.0
20	6.798	5.898	5.798	5.698	5.598	5.498	5.398	5.298	5.198	5.098	4.998	4.898	4.798	4.298	3.798
25	5.435	4.535	4.435	4.335	4.235	4.135	4.035	3.935	3.835	3.735	3.635	3.535	3.435	2.935	2.435
30	4.525	3.625	3.525	3.425	3.325	3.225	3.125	3.025	2.925	2.825	2.725	2.625	2.525	2.025	1.525
35	3.876	2.976	2.876	2.776	2.676	2.576	2.476	2.376	2.276	2.176	2.076	1.976	1.876	1.376	0.876
40	3.389	2.489	2.389	2.289	2.189	2.089	1.989	1.889	1.789	1.689	1.589	1.489	1.389	0.889	0.389
45	3.010	2.110	2.010	1.910	1.810	1.710	1.610	1.510	1.410	1.310	1.210	1.110	1.010	0.510	0.010
50	2.707	1.807	1.707	1.607	1.507	1.407	1.307	1.207	1.107	1.007	0.907	0.807	0.707	0.207	-0.293
55	2.459	1.559	1.459	1.359	1.259	1.159	1.059	0.959	0.859	0.759	0.659	0.559	0.459	-0.041	-0.541

For courses where the IR Sender/Receiver is placed **200-feet** from the escape lanes speeds up to 55 MPH may be accommodated as long as the reaction time is set at **2.5** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

20-Meter Sensor Distance Chart

Max Speed and R/T for 20M Course

Speed in KPH	Reaction Time														
	0.0	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	2.0	2.5	3.0
40	1.800	1.300	1.200	1.100	1.000	0.900	0.800	0.700	0.600	0.500	0.400	0.300	-0.200	-0.700	-1.200
45	1.600	1.100	1.000	0.900	0.800	0.700	0.600	0.500	0.400	0.300	0.200	0.100	-0.400	-0.900	-1.400
50	1.440	0.940	0.840	0.740	0.640	0.540	0.440	0.340	0.240	0.140	0.040	-0.060	-0.560	-1.060	-1.560
55	1.309	0.809	0.709	0.609	0.509	0.409	0.309	0.209	0.109	0.009	-0.091	-0.191	-0.691	-1.191	-1.691
60	1.200	0.700	0.600	0.500	0.400	0.300	0.200	0.100	0.000	-0.100	-0.200	-0.300	-0.800	-1.300	-1.800
65	1.108	0.608	0.508	0.408	0.308	0.208	0.108	0.008	-0.092	-0.192	-0.292	-0.392	-0.892	-1.392	-1.892
70	1.029	0.529	0.429	0.329	0.229	0.129	0.029	-0.071	-0.171	-0.271	-0.371	-0.471	-0.971	-1.471	-1.971
75	0.960	0.460	0.360	0.260	0.160	0.060	-0.040	-0.140	-0.240	-0.340	-0.440	-0.540	-1.040	-1.540	-2.040

For courses where the IR Sender/Receiver is placed **20-Meters** from the escape lanes speeds up to 75 KPH may be accommodated as long as the reaction time is set at **0.9** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

25-Meter Sensor Distance Chart

Max Speed and R/T for 25M Course

Speed in KPH	Reaction Time														
	0.0	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	2.0	2.5	3.0
40	2.250	1.750	1.650	1.550	1.450	1.350	1.250	1.150	1.050	0.950	0.850	0.750	0.250	-0.250	-0.750
45	2.000	1.500	1.400	1.300	1.200	1.100	1.000	0.900	0.800	0.700	0.600	0.500	0.000	-0.500	-1.000
50	1.800	1.300	1.200	1.100	1.000	0.900	0.800	0.700	0.600	0.500	0.400	0.300	-0.200	-0.700	-1.200
55	1.636	1.136	1.036	0.936	0.836	0.736	0.636	0.536	0.436	0.336	0.236	0.136	-0.364	-0.864	-1.364
60	1.500	1.000	0.900	0.800	0.700	0.600	0.500	0.400	0.300	0.200	0.100	0.000	-0.500	-1.000	-1.500
65	1.385	0.885	0.785	0.685	0.585	0.485	0.385	0.285	0.185	0.085	-0.015	-0.115	-0.615	-1.115	-1.615
70	1.286	0.786	0.686	0.586	0.486	0.386	0.286	0.186	0.086	-0.014	-0.114	-0.214	-0.714	-1.214	-1.714
75	1.200	0.700	0.600	0.500	0.400	0.300	0.200	0.100	0.000	-0.100	-0.200	-0.300	-0.800	-1.300	-1.800

For courses where the IR Sender/Receiver is placed **25-Meters** from the escape lanes speeds up to 75 KPH may be accommodated as long as the reaction time is set at **1.2** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

30-Meter Sensor Distance Chart

Max Speed and R/T for 30M Course

Speed in KPH	Reaction Time														
	0.0	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	2.0	2.5	3.0
40	2.700	2.200	2.100	2.000	1.900	1.800	1.700	1.600	1.500	1.400	1.300	1.200	0.700	0.200	-0.300
45	2.400	1.900	1.800	1.700	1.600	1.500	1.400	1.300	1.200	1.100	1.000	0.900	0.400	-0.100	-0.600
50	2.160	1.660	1.560	1.460	1.360	1.260	1.160	1.060	0.960	0.860	0.760	0.660	0.160	-0.340	-0.840
55	1.964	1.464	1.364	1.264	1.164	1.064	0.964	0.864	0.764	0.664	0.564	0.464	-0.036	-0.536	-1.036
60	1.800	1.300	1.200	1.100	1.000	0.900	0.800	0.700	0.600	0.500	0.400	0.300	-0.200	-0.700	-1.200
65	1.662	1.162	1.062	0.962	0.862	0.762	0.662	0.562	0.462	0.362	0.262	0.162	-0.338	-0.838	-1.338
70	1.543	1.043	0.943	0.843	0.743	0.643	0.543	0.443	0.343	0.243	0.143	0.043	-0.457	-0.957	-1.457
75	1.440	0.940	0.840	0.740	0.640	0.540	0.440	0.340	0.240	0.140	0.040	-0.060	-0.560	-1.060	-1.560

For courses where the IR Sender/Receiver is placed **30-Meters** from the escape lanes speeds up to 75 KPH may be accommodated as long as the reaction time is set at **1.5** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

35-Meter Sensor Distance Chart

Max Speed and R/T for 35M Course

Speed in KPH	Reaction Time														
	0.0	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	2.0	2.5	3.0
40	3.150	2.650	2.550	2.450	2.350	2.250	2.150	2.050	1.950	1.850	1.750	1.650	1.150	0.650	0.150
45	2.800	2.300	2.200	2.100	2.000	1.900	1.800	1.700	1.600	1.500	1.400	1.300	0.800	0.300	-0.200
50	2.520	2.020	1.920	1.820	1.720	1.620	1.520	1.420	1.320	1.220	1.120	1.020	0.520	0.020	-0.480
55	2.291	1.791	1.691	1.591	1.491	1.391	1.291	1.191	1.091	0.991	0.891	0.791	0.291	-0.209	-0.709
60	2.100	1.600	1.500	1.400	1.300	1.200	1.100	1.000	0.900	0.800	0.700	0.600	0.100	-0.400	-0.900
65	1.938	1.438	1.338	1.238	1.138	1.038	0.938	0.838	0.738	0.638	0.538	0.438	-0.062	-0.562	-1.062
70	1.800	1.300	1.200	1.100	1.000	0.900	0.800	0.700	0.600	0.500	0.400	0.300	-0.200	-0.700	-1.200
75	1.680	1.180	1.080	0.980	0.880	0.780	0.680	0.580	0.480	0.380	0.280	0.180	-0.320	-0.820	-1.320

For courses where the IR Sender/Receiver is placed **35-Meters** from the escape lanes speeds up to 75 KPH may be accommodated as long as the reaction time is set at **1.5** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

40-Meter Sensor Distance Chart

Max Speed and R/T for 40M Course

Speed in KPH	Reaction Time														
	0.0	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	2.0	2.5	3.0
40	3.600	3.100	3.000	2.900	2.800	2.700	2.600	2.500	2.400	2.300	2.200	2.100	1.600	1.100	0.600
45	3.200	2.700	2.600	2.500	2.400	2.300	2.200	2.100	2.000	1.900	1.800	1.700	1.200	0.700	0.200
50	2.880	2.380	2.280	2.180	2.080	1.980	1.880	1.780	1.680	1.580	1.480	1.380	0.880	0.380	-0.120
55	2.618	2.118	2.018	1.918	1.818	1.718	1.618	1.518	1.418	1.318	1.218	1.118	0.618	0.118	-0.382
60	2.400	1.900	1.800	1.700	1.600	1.500	1.400	1.300	1.200	1.100	1.000	0.900	0.400	-0.100	-0.600
65	2.215	1.715	1.615	1.515	1.415	1.315	1.215	1.115	1.015	0.915	0.815	0.715	0.215	-0.285	-0.785
70	2.057	1.557	1.457	1.357	1.257	1.157	1.057	0.957	0.857	0.757	0.657	0.557	0.057	-0.443	-0.943
75	1.920	1.420	1.320	1.220	1.120	1.020	0.920	0.820	0.720	0.620	0.520	0.420	-0.080	-0.580	-1.080

For courses where the IR Sender/Receiver is placed **40-Meters** from the escape lanes speeds up to 75 KPH may be accommodated as long as the reaction time is set at **2.0** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

50-Meter Sensor Distance Chart

Max Speed and R/T for 50M Course

Speed in KPH	Reaction Time														
	0.0	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	2.0	2.5	3.0
40	4.500	4.000	3.900	3.800	3.700	3.600	3.500	3.400	3.300	3.200	3.100	3.000	2.500	2.000	1.500
45	4.000	3.500	3.400	3.300	3.200	3.100	3.000	2.900	2.800	2.700	2.600	2.500	2.000	1.500	1.000
50	3.600	3.100	3.000	2.900	2.800	2.700	2.600	2.500	2.400	2.300	2.200	2.100	1.600	1.100	0.600
55	3.273	2.773	2.673	2.573	2.473	2.373	2.273	2.173	2.073	1.973	1.873	1.773	1.273	0.773	0.273
60	3.000	2.500	2.400	2.300	2.200	2.100	2.000	1.900	1.800	1.700	1.600	1.500	1.000	0.500	0.000
65	2.769	2.269	2.169	2.069	1.969	1.869	1.769	1.669	1.569	1.469	1.369	1.269	0.769	0.269	-0.231
70	2.571	2.071	1.971	1.871	1.771	1.671	1.571	1.471	1.371	1.271	1.171	1.071	0.571	0.071	-0.429
75	2.400	1.900	1.800	1.700	1.600	1.500	1.400	1.300	1.200	1.100	1.000	0.900	0.400	-0.100	-0.600

For courses where the IR Sender/Receiver is placed **125-feet** from the escape lanes speeds up to 55 MPH may be accommodated as long as the reaction time is set at **1.5** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

55-Meter Sensor Distance Chart

Max Speed and R/T for 55M Course

Speed in KPH	Reaction Time														
	0.0	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	2.0	2.5	3.0
40	4.950	4.450	4.350	4.250	4.150	4.050	3.950	3.850	3.750	3.650	3.550	3.450	2.950	2.450	1.950
45	4.400	3.900	3.800	3.700	3.600	3.500	3.400	3.300	3.200	3.100	3.000	2.900	2.400	1.900	1.400
50	3.960	3.460	3.360	3.260	3.160	3.060	2.960	2.860	2.760	2.660	2.560	2.460	1.960	1.460	0.960
55	3.600	3.100	3.000	2.900	2.800	2.700	2.600	2.500	2.400	2.300	2.200	2.100	1.600	1.100	0.600
60	3.300	2.800	2.700	2.600	2.500	2.400	2.300	2.200	2.100	2.000	1.900	1.800	1.300	0.800	0.300
65	3.046	2.546	2.446	2.346	2.246	2.146	2.046	1.946	1.846	1.746	1.646	1.546	1.046	0.546	0.046
70	2.829	2.329	2.229	2.129	2.029	1.929	1.829	1.729	1.629	1.529	1.429	1.329	0.829	0.329	-0.171
75	2.640	2.140	2.040	1.940	1.840	1.740	1.640	1.540	1.440	1.340	1.240	1.140	0.640	0.140	-0.360

For courses where the IR Sender/Receiver is placed **55-Meters** from the escape lanes speeds up to 75 KPH may be accommodated as long as the reaction time is set at **2.5** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

60-Meter Sensor Distance Chart

Max Speed and R/T for 60M Course

Speed in KPH	Reaction Time														
	0.0	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	2.0	2.5	3.0
40	5.400	4.900	4.800	4.700	4.600	4.500	4.400	4.300	4.200	4.100	4.000	3.900	3.400	2.900	2.400
45	4.800	4.300	4.200	4.100	4.000	3.900	3.800	3.700	3.600	3.500	3.400	3.300	2.800	2.300	1.800
50	4.320	3.820	3.720	3.620	3.520	3.420	3.320	3.220	3.120	3.020	2.920	2.820	2.320	1.820	1.320
55	3.927	3.427	3.327	3.227	3.127	3.027	2.927	2.827	2.727	2.627	2.527	2.427	1.927	1.427	0.927
60	3.600	3.100	3.000	2.900	2.800	2.700	2.600	2.500	2.400	2.300	2.200	2.100	1.600	1.100	0.600
65	3.323	2.823	2.723	2.623	2.523	2.423	2.323	2.223	2.123	2.023	1.923	1.823	1.323	0.823	0.323
70	3.086	2.586	2.486	2.386	2.286	2.186	2.086	1.986	1.886	1.786	1.686	1.586	1.086	0.586	0.086
75	2.880	2.380	2.280	2.180	2.080	1.980	1.880	1.780	1.680	1.580	1.480	1.380	0.880	0.380	-0.120

For courses where the IR Sender/Receiver is placed **60-Meters** from the escape lanes speeds up to 75 KPH may be accommodated as long as the reaction time is set at **2.5** seconds or below. As seen in the chart above as reaction time increases, the course speed must decrease.

Limited Warranty

BLACKTOP BOOTCAMP, INC. provides a 30-Day Return Window (see Return of Non-Defective Products below) and the following limited warranty. This limited warranty extends only to the original purchaser.

Please note that any warranty services or questions must be accompanied by the order number from the transaction through which the warranted product was purchased. *The order number serves as your warranty number and must be retained*. BLACKTOP BOOTCAMP, INC. will offer no warranty service without this number.

BLACKTOP BOOTCAMP, INC. warrants this product and its parts against defects in materials or workmanship for *one year labor and one year parts* from the original ship date. During this period, BLACKTOP BOOTCAMP, INC. will repair or replace defective parts with new or reconditioned parts at BLACKTOP BOOTCAMP, INC.'s option, without charge to you.

Shipping fees incurred from returns for under-warranty service in the first 30-days will be paid by BLACKTOP BOOTCAMP, INC.. All shipping fees both to and from BLACKTOP BOOTCAMP, INC. following this 30-day period must be paid by the customer. All returns, both during and following the 30-day period, must be affected via the Procedures for Obtaining Warranty Service described below.

All original parts (parts installed by BLACKTOP BOOTCAMP, INC. at the original system build) replaced by BLACKTOP BOOTCAMP, INC. or its authorized service center, become the property of BLACKTOP BOOTCAMP, INC.. Any after-market additions or modifications will not be warranted. The customer is responsible for the payment, at current rates, for any service or repair outside the scope of this limited warranty.

BLACKTOP BOOTCAMP, INC. makes no other warranty, either express or implied, including but not limited to implied warranties of merchantability, fitness for a particular purpose, or conformity to any representation or description, with respect to this product other than as set forth below. BLACKTOP BOOTCAMP, INC. makes no warranty or representation, either express or implied, with respect to any other manufacturer's product or documentation, its quality, performance, merchantability, fitness for a particular purpose, or conformity to any representation or description.

Except as provided below, BLACKTOP BOOTCAMP, INC. is not liable for any loss, cost, expense, inconvenience or damage that may result from use or inability to use the product. Under no circumstances shall BLACKTOP BOOTCAMP, INC. be liable for any loss, cost, expense, inconvenience or damage exceeding the purchase price of the product.

The warranty and remedies set forth below are exclusive and in lieu of all others, oral or written, expressed or implied. No reseller, agent or employee is authorized to make any modification, extension or addition to this warranty.

Warranty Conditions

The above Limited Warranty is subject to the following conditions:

This warranty extends only to products distributed and/or sold by BLACKTOP BOOTCAMP, INC..

This warranty covers only normal use of the product. BLACKTOP BOOTCAMP, INC. shall not be liable under this warranty if any damage or defect results from (i) misuse, abuse, neglect, improper shipping or installation; (ii) disasters such as fire, flood, lightning or improper electric current; or (iii) service or alteration by anyone other than an authorized BLACKTOP BOOTCAMP, INC. representative; (iv) damages incurred through irresponsible use, including those resulting from vehicle collisions, weather, drops or falls, or other non-recommended practices.

You must retain your bill of sale or other proof of purchase to receive warranty service.

No warranty extension will be granted for any replacement part(s) furnished to the purchaser in fulfillment of this warranty.

All pre-installed software programs are licensed to customers under non-BLACKTOP BOOTCAMP, INC. software vendor's term and conditions provided with the packages.

This warranty does not cover any third party software or third party hardware related problems.

BLACKTOP BOOTCAMP, INC. makes no warranty either expressed or implied regarding third-party (non-BLACKTOP BOOTCAMP, INC.) software or hardware.

Thirty-day Return Window does not include special order merchandise or shipping and handling fees.

Return of Non-Defective Products

A non-defective product may be returned to BLACKTOP BOOTCAMP, INC. within thirty (30) days of the invoice date for a refund of the original purchase price with the following amendments/fees:

BLACKTOP BOOTCAMP, INC. will refund neither the original shipping cost nor the shipping and handling fees incurred from the products return.

No refund will be granted for products which have been opened, used, or tampered with in any way which jeopardized BLACKTOP BOOTCAMP, INC.'s ability to remarket or resell the product. BLACKTOP BOOTCAMP, INC. maintains full discretion in decisions regarding a products fitness for return.

Any non-defective returns are subject to a 15% restocking fee, which percentage is taken from the final purchase price less any shipping or handling charges.

To return a defective product, please contact us directly and follow the Return of Products Instructions below. Manufacturer restrictions do apply.

Procedures for Obtaining Warranty Service

Warranty Service Policy:

If repairs are required, services are rendered by BLACKTOP BOOTCAMP, INC. only. Any shipping costs after 30 days (starting from the original date of purchase) on any item returned for repair is the customers' responsibility. All returned parts must have a letter detailing the problems and a copy of the original proof of purchase. No COD packages will be accepted.

Should you have any problems with your purchase, please follow these procedures to obtain the service:

1. If your purchase must be repaired, please follow the instructions given by BLACKTOP BOOTCAMP, INC. technical support staff to ship your system.

2. Pack the equipment in its original box or a well-protected box, as outlined in the Return Shipping Instructions. BLACKTOP BOOTCAMP, INC. will not be responsible for shipping damage/loss of any product outside the original 30-day BLACKTOP BOOTCAMP, INC.-paid service period. Ship the components with a copy of your bill of sale or other proof of purchase, your name, address, phone number, and detailed description of the problem(s) to:

BLACKTOP BOOTCAMP, INC
19473 Greggsville Road
Purcellville, VA 20132

3. Upon receiving the components, BLACKTOP BOOTCAMP, INC. will repair or replace your system (at BLACKTOP BOOTCAMP, INC.'s discretion) and will ship it back to you after repairs or replacement are completed, usually within 2 weeks (dependent on parts availability) via UPS.

4. BLACKTOP BOOTCAMP, INC. will pay for shipping to and from the customer only within the first thirty days following the original product ship date. Following this 30-day period all shipping fees both for under warranty and post warranty repairs are the sole responsibility of the customer. The customer also assumes full liability for losses or damages resulting from shipping as well as all responsibility to pursue remuneration for such issues with their selected carrier.

After One-Year Warranty – Post Warranty Repair

For post warranty repair, the procedure is the same as outlined above for warranty return and shipping. However, you are responsible for the current price of the complete assembly or repair parts as well as shipping charges both ways.

Technical Support / Customer Service:

info@blacktopbootcamp.com
703-880-4209

WARRANTY EXCLUSIONS

BLACKTOP BOOTCAMP, INC. accepts no liability for problems caused by after-market software or hardware modifications or additions. BLACKTOP BOOTCAMP, INC. is not responsible for giving any technical support concerning the installation or integration of any software or component the customer did not pay BLACKTOP BOOTCAMP, INC. to install. BLACKTOP BOOTCAMP, INC. is not responsible for loss of data or time, even with hardware failure. BLACKTOP BOOTCAMP, INC. is not responsible for any loss of work ("down time") caused by a product requiring service. This warranty is null and void if the defect or malfunction was due to damage resulting from operation not within manufacturer specifications. It will also be null and void if there are indications of misuse and/or abuse. BLACKTOP BOOTCAMP, INC. has the option of voiding the warranty if any one other than a BLACKTOP BOOTCAMP, INC. technician attempts to service the product beyond battery replacement. BLACKTOP BOOTCAMP, INC. will not warrant any problems arising from an act of God (lighting, flooding, tornado, etc.), electrical spikes or surges, or problems arising out of hardware, software, or additional devices added to complement any system/component bought from BLACKTOP BOOTCAMP, INC.. Under no circumstances will BLACKTOP BOOTCAMP, INC. be responsible for any refund or remuneration exceeding the original purchase price of the product less any shipping fees. BLACKTOP BOOTCAMP, INC. will not be held responsible for typographical errors on sales receipts, repair tickets, or on our website. BLACKTOP BOOTCAMP, INC. makes every effort to make sure all information on our website is correct.

Replacement Parts

For replacement parts contact:

Blacktop Bootcamp
(703) 880-4209
info@blacktopbootcamp.com
http://www.blacktopbootcamp.com/atss

System Replacement Parts List

P/N	Description
BBICA0-00188	Fully Assembled ATSS Controller
BBICL0-00192	Fully assembled CENTER Light
BBICL0-00193	Fully assembled END Light
BBICSI-00220	Fully assembled IR Receiver
BBICSR-00222	Fully assembled RADAR Sensor
BBICSS-00223	Fully assembled IR Sender
BBIC11-00207	Ruggedized Carrying Case
ES1-00009	Antenna
LL0-00052	Heavy Duty Light Stand
SX0-00108	Battery Tender 12-Volt 4-Bank Battery Management System
E11-00121	6.0Ah Battery
EA0-00203	12.0Ah Battery
WL0-00241	30-Foot Ruggedized Cable
WL0-00242	100-Foot Ruggedized Cable
BBIS11-00245	High-Wind Stabilizer kit w/3 bags, 3 bases

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