



**IST International Ltd.**

## Single Lane Traffic Control Systems

Safety Warning Traffic Lights (SWTL)  
Remote Distance Traffic Lights (RDTL)



*Leaders in Intelligent Signal Technologies*

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## System Selection and Pricing Guide

### Safety Warning Traffic Light (SWTL)

Single Face Remote Controlled Traffic Light, manual or automatic mode. For flagger assist. Not synchronized with other units. Used as attended standalone.

8" Signal Systems (2 signal w/economy base to 3 signal w/standard base) from **\$2,795—\$4,295 per unit.**

12" Signal Systems (2 signal w/economy base to 3 signal w/economy base) from **\$4,195—\$4,695 per unit.**

### Safety Warning Traffic Light (SWTL-RTC)

Single Face Remote Controlled Traffic Light, manual or automatic mode with programmable times. Precision clock to daily synchronized with other unit for Safe Single Lane control. Used as standalone or unattended in pairs.

8" Signal Systems (2 signal w/economy base to 3 signal w/standard base) from **\$3,195—\$4,695 per unit.**

12" Signal Systems (2 signal w/economy base to 3 signal w/economy base) from **\$4,595—\$5,095 per unit.**

### Wireless Remote Distance Traffic Light (RDTL)

Single Face Remote Controlled Traffic Light, manual or automatic modes with programmable times, continuous unit to unit communications, conflict monitoring and adaptive configuration and cycling. Can be used with vehicle detectors and other advanced options. Longer term Single Lane Control. Used as standalone, or unattended in pairs or quads.

8" Signal Systems (2 signal w/economy base to 3 signal w/standard base) from **\$4,795—\$6,295 per unit.**

12" Signal Systems (2 signal w/economy base to 3 signal w/economy base) from **\$5,895—\$6,695 per unit.**

### Direct wire or Wireless unit to unit communications:

Direct wired systems are less expensive at shorter distances and wireless systems are less expensive at longer distances. SWTL-RTC units use no communication or vehicle detectors.

**Vehicle Detectors:** Wireless low cost short range and long range microwave systems. Direct wired loop (permanent or portable), pneumatic & detectors from **\$250—\$1,250 per unit.**

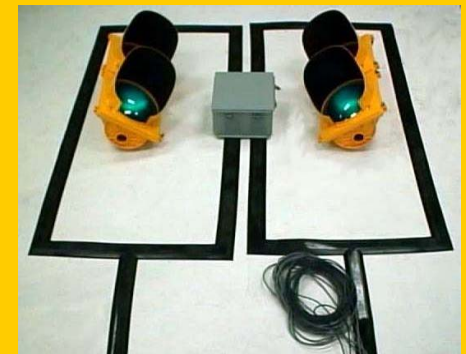
**Solar Power:** 65w panel, charge control regulator, wiring, connectors and support bracket total system **\$750 per unit.**

**Other Configurations and Options available:** like remote paging notification, ramp meter, advanced profiling software, network monitoring, calendar/scheduler, AC power, advanced signage, and more.

**Discounts:** for multiple units, prepayment, GSA, or other agreements. Call for quotation on specific requirements.

## Single Lane Traffic Control Systems

*IST International's SWTL and RDTL product lines provides users with the ability to safely and effectively control traffic through restricted flow areas, such as a construction zones and narrow passages. From simple Flagging assistance to complex adaptive networks, IST has a solution that meets safety and budget requirements. Whether your project lasts a few hours or years, IST has a product that will help you accomplish your goals: Safely, On Time, On Budget, and In Spec.*



**2 Signal wired RDTL-AC system with reusable inductive loops, used for shorter distance projects, such as parking garage renovation.**

# IST's Single Lane Traffic Control Signals Keep Operators and the Public Safe.

## Selecting the Right Amount of Control

IST offers three basic levels of control: SWTL's are standalone traffic lights that can be manually controlled using an RF remote or other switching method.



8" RDTL Head with long range antenna for National Zoo

SWTL-RTC's have the addition of a precise Real Time Clock. The SWTL-RTC can be used as a standalone or can be programmed for specific intervals and physically linked and synchronized with another SWTL-RTC for true single lane, dual direction control.

Remote Distance Traffic Lights (RDTL) provide users with a deeper level of control by communicating with each other. This interaction increases safety and reliability by advanced conflict monitoring. Additionally, RDLT systems can adapt to traffic conditions through the use of a variety of vehicle detection devices. This keeps traffic flowing smoother and allows you to use personnel more effectively. RDTL's may be operated as single face or dual face units, with single sets of units on each end of a zone (two units total), or two



RDTL System with four 12" head units, microwave vehicle detector. Operating a 1,200 feet zone

sets of units on each end (four units total). Or you can use the same two sets of units for two different projects at the same time. RDTL's communicate via 900MHZ **FCC license free** radios, or other radio or wired links may be selected. All of IST's traffic products are designed to **Federal Manual of Uniform Traffic Control Devices (MUTCD)** specifications.

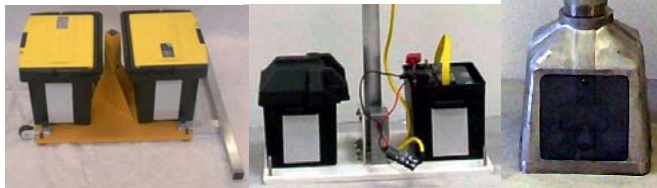


## Configuring the Signal Head

IST offers both 8" and 12" **ITE** signal heads. For portability 8" heads provide lower weight, smaller storage size, better wind resistance and lower cost. More difficult road conditions or restrictions may call for full 12" heads. While most public projects require all three colors (RYG), there are several occasions where just two colors will suffice (RY or RG). LED Lamps offer reliability and low power consumption. For those applications with extreme budget constraints, IST also offers incandescent lamps. Rear facing indicators keep operators in the zone aware of the current condition of the lights.

## Physical Support

While IST specializes in ultra-portable devices, some installations may require more robust or permanent mounting. IST offers a variety of mounting options including the standard "Partner" base and self wiring poles, the "Econo" base and treaded pipe, Standard DOT 4" Frangible Base with 1.5"NPT Adaptor, FCC 2" Airfield Frangible base with 1.5"NPT Adaptor, or other custom mountings. Bases may be installed on a trailer or truck. IST also provides hardware for overhead installations.



## Power Options

IST controllers operate on 12V DC, convenient for portable applications. Since the lights can run anywhere from 24 to 48 hours on



a single charge, you may want to consider some of the power options IST has to offer. The options include Batteries, AC to DC power Supplies, Solar Panel Chargers, AC Chargers and Generators, and DC to AC Power inverters. These options help to extend mission times and aid in equipment maintenance and management.

## Vehicle Detection

RDTL operation can be greatly enhanced by the use of vehicle detection. IST offers many options, each with its own benefit. Advanced microwave sensor require the least amount of external installation. PIR/RF sensors are similar to, but cheaper than the advanced microwave sensor. Pneumatic detectors are cheap and easy to use. Inductive loops provide excellent reliability and better zone control.

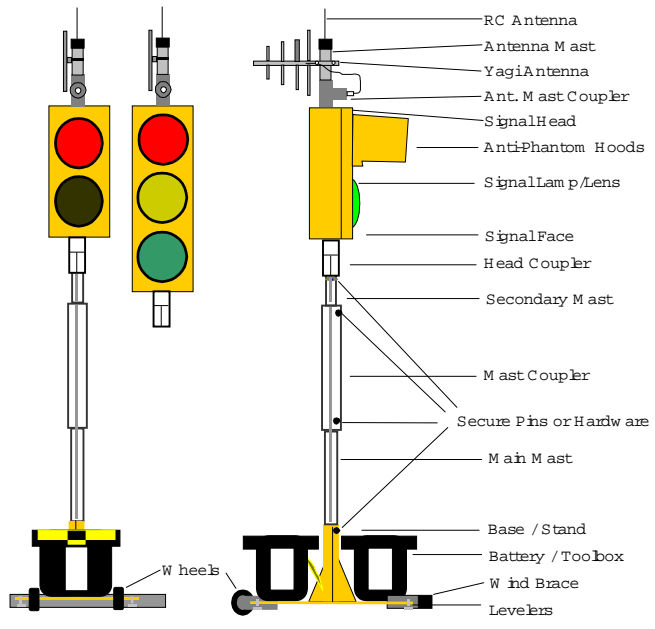
## Accessories

Convenience and productivity can be enhanced with accessories such as rough-road wheels, carrying cases and bags, tool kits, advanced signage, advanced profiling software, network monitoring modules, drone heads. Rear facing indicators keep operators in the zone aware of the current condition of the lights.



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Standard Unit Assembly View

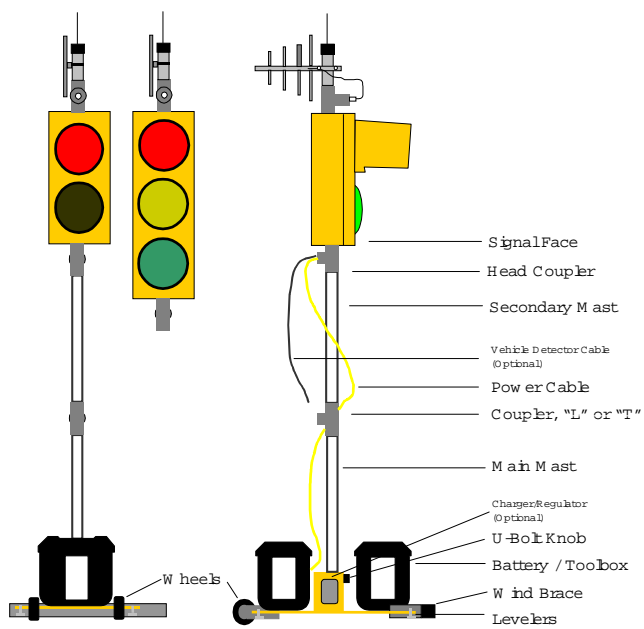
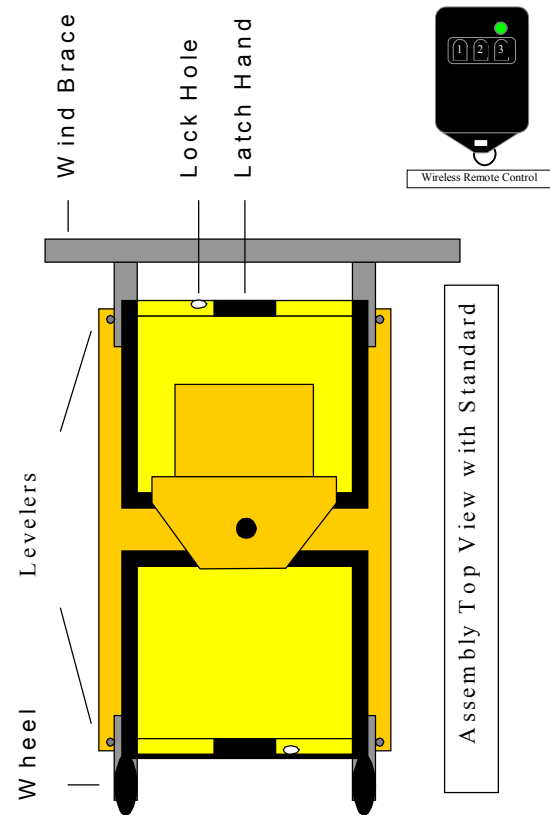


FIGURE 4.3 Economy Base Unit Assembly View



Assembly Top View with Standard

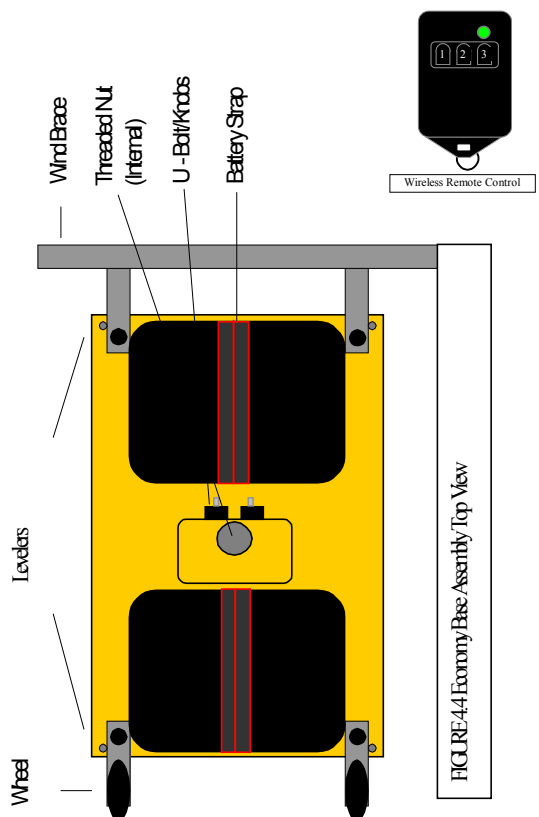


FIGURE 4.4 Economy Base Assembly Top View

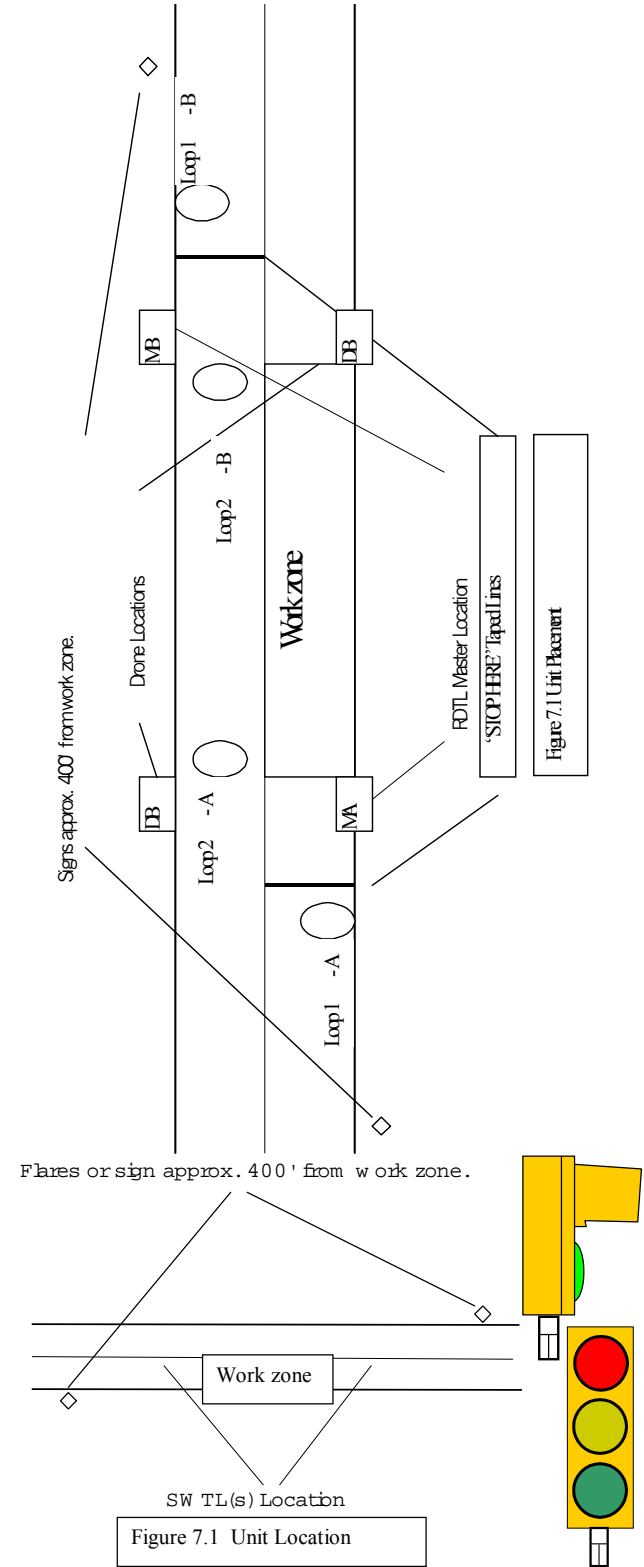


Figure 7.1 Unit Location

## Head Specification (RDTL)

**Operational modes:** Manual/Remote control, Timed Automatic Cycle, Semi-Timed Loop Initiated Automatic Cycle or Adaptive Loop Controlled Automatic cycling. Conflict Monitor Red Flashing, or Blank mode.

**Signal Head Configurations:** Modular signal head allows for different signals or signs for added flexibility. Standard Red Yellow and Green, either 8" or 12" signal face.

**Signal Faces:** Single face per Master/Slave unit, two units required. Each Master unit can drive up to 4 additional simple drone unit faces. Master can control up to 10 other Master/Slave units.

**Master/Slave communication:** ½ Watt 900Mhz spread spectrum FCC license free ISM band. Line of sight 1-5 miles, through buildings ½ mile. Optional 1 Watt FCC license free ISM radio. Optional narrow band 1, 3, 5 Watt radios require special FCC user license or military authority. Can provide other frequency bands for other countries.

**Operating Temperature:** Standard -10 to 120 F. Optional temperature expansion available -40 to 150 F. Or special.

**Weather Resistant:** 100% Solid State electronics and a NEMA style enclosure for Sun, Rain, Snow, and Ocean Mist.

**Color:** "Highway Yellow" Durable polycarbonate & powdered epoxy cured on aluminum with UV stabilized material.

**Visibility:** MUTCD LED signals ITE Red/Grn. All are seen over ¼ mile visibility day or night. Reflector tape also used.

**Lamps:** "Solid State" high reliability low power LED's utilizing high contrast to limit sun phantoming.

**Lamp Life:** IST and ITE LEDs are 5-10 years. Some may last 20 years. Depends on maintenance, care, and OEM.

**CPU:** 16 bit RISC CPU, with internal E2 memory, watchdog, 20MHz 20 ppm clock.

**Serial Ports:** Two Asynchronous Ports, 1 used for Radio Link (RS232), second (RS232/RS485) available for PC interface or other. 1 Synchronous SPI Port available for Level 2 Conflict Monitor. (Level 2 Conflict Monitor has additional ports as well)

**Digital/Switch IO:** 10 pins. 3 used for RF link, 4 used for mode/time select, 3 for loops.

**Analog to Digital:** 10 bit A/D. 2 battery voltage, 4 branch current, 2 temperature, ambient light,

**Level 1 Conflict Monitor:** The CPU scans each lamp output status, signal face branch current, battery voltage, temperature and ambient light several times a second. Additionally CPU is in contact with other units to verify

proper remote operation. If a fault is detected, CPU puts unit into fault mode. CPU continually refreshes watchdogs. If watchdog trips, system is reset. If reset is held low, independent Red Flasher takes over.

**Level 2 Conflict Monitor (Optional):** An additional CPU PCB is connected to the controller. This CPU additionally monitors each lamp output status, signal face branch current, battery voltage and temperature several times a second, and is in constant communication with the primary CPU. If communication is lost, or a fault is detected, the secondary CPU holds the first CPU in reset, thus tripping the independent Red Flasher.

**Triple CPU Protection:** Internal watchdog, secondary 5ppm RTC/watchdog, I/O transient filtering, stored fault diagnostics.

**Software:** Configuration controlled, check sum, and serialized. User can program cycle times, and change modes.

**Program by RC:** A 2 oz wireless three-button hand held remote that can operate 600' away 315 MHz to set the cycles.

Program by Switches: Slide switches can set Mode or default timing.

**Program by PC:** Microsoft Windows Access database and program profile download package. Program Optional.

## Head Specification (SWTL, SWTL-RTC)

**Operational modes:** Manual cycling, Flashing and Automatic

**Signal Head Configurations:** Removable signal head allows for different signals or signs to be added adding flexibility.

**Operating Temperature:** Standard 0 to 110 F. Optional temperature expansion available -40 to 130 F.

**Weather Resistant:** 100% Solid State electronics and a NEMA style enclosure for Sun, Rain, Snow, and Ocean Mist.

**Color:** Durable powdered epoxy cured on aluminum UV stabilized "Highway Yellow" paint and Polycarbonate.

**Set up time:** 2 to 15 minutes to pull from trunk or back seat, set-up and place in Work Zone.

**Wheels:** 2" removable high wear, high traction, urethane hub and wheel with ball bearing.

**Total Weight:** 27 lbs. with 1 wind brace, without battery (s) or ballast. (2 Signal head)

**Head and Pole Weight:** 10.8 lbs.

**Height:** To bottom of signal head: 47", 80", 104", top of housing: 67", 100", 124" using standard poles

**Storage height:** 30". Can be disassembled in to 3 small sub section signal head, masts, and base.

**Storage Dimensions:** Detachable system stores in a space 34"x 26"x20" with 1 battery.

**Optional Storage:** Case, 2 hoods, 12 Vdc charger/maintainer, multimeter, extra remote, and tools.

**Optional Storage Bags:** Signal head storage bag, and inner Pole storage bag.

**Power supply:** One standard 12-volt car battery. A sealed gel cell deep cycle type is recommend.

**Battery Operation:** An "Energy Management System" for up to 48 hours operation per battery.

**Battery Charge Time:** 6-24 hours depending on how much of the battery was discharged.

**Battery Life:** Depends on use, how it was charged, and weather conditions. Typical 150-300 charges.

**Battery weight:** 45-55 pounds each. Unit can hold up to 2 batteries..

**Wind resistance:** Varies with ballast. 75 mph load tested at 73" height with two batteries and wind braces.

**Visibility:** LED signals are seen over ¼ mile visibility day or night. Base reflective markings.

**Reflectivity:** 3M Retro reflective white visible 360 degrees around and 45 degrees from horizon. Poles, Engineering grade, Base Diamond Grade.

**Hoods:** Removable anti-phantom ABS hood(s). Highway Yellow outside, flat black inside.

**Optics:** Standard DOT 8" true ITE Red/Yellow/Green lenses.

**Lamps:** "Solid State" high reliability low power LED's utilizing high contrast to limit sun phantoming.

**Lamp Life:** 5-10 years. Some will last 20 years. Depends on maintenance and care of user.

**Remote Controller:** 2 oz. wireless three-button remote operate 300-600' away (tested to 1000').

**Remote Controller Frequency:** Wireless 315 MHz with over 6500 Unique ID Codes.

**Remote battery Life:** 1 year with weekly use non rechargeable.

**Real Time Clock RTC:** Programmable, precision crystal controlled clock timer, Y2K, reset daily/weekly.

Triple CPU Protection: Watchdog timers, transient filtering, stored fault diagnostics and output warning flags set.

**Software:** Configuration controlled, check sum, and serialized. User can program cycle times, and change modes.

**Certification:** ½ Day class to earn certification is highly recommended for this device; for safe and efficient use.

**Communications Ports:** Internal RS-232 Port.

**Customs:** AC, wired communication, permanent mount, signage, advanced warning, remote paging, etc... Call us!

## 8" Signal Face Head Physical Specifications

**Hoods:** 7" Phantom reducing ABS removable lens hood(s). Color Highway Yellow outside, flat black inside.

**Optics:** Standard 40 mph DOT 8" true ITE Red/Yellow/Green lenses. VTCHS-Section 8.04 & Table 1.

**Head Weight:** 16lbs, including visors

**Head Dimensions:** RYG Signal face 30"h x 10 ¼"w x 6"d. Lower Coupler 8 ½"h x 2" dia. Antenna Mast, 8 ½"h x 2" dia. Hood depth add 6 ½"

## 12" Signal Face Head Physical Specifications

**Hoods:** 10" Phantom reducing ABS removable lens hood (s). Color Highway Yellow outside, flat black inside.

**Optics:** Standard 55+ mph DOT 12" true ITE Red/Yellow/Green lenses. VTCHS-Section 8.04 & Table 1.

**Head Weight:** 30lbs, including visors

**Head Dimensions:** RYG Signal face 42"h x 14"w x 7"d. Lower Coupler 8 ½"h x 2" dia. Antenna Mast, 8 ½"h x 2" dia. Hood depth add 10"

## Power Specification

**Operating Voltage:** 10-14V Normal Operation range. 8.5 – 10V Red Flash mode. 16 Volts peak short duration.

**Extended Voltage Option:** 10-30 Volts Normal Operation range. 8.5 – 10V Red Flash mode. 32 Volt peak.

**Current Draw:** 1.2 – 3 Amps RMS, single face. Depends on lamp and additional accessories used. 1.3Amps typical.

**Power supply:** One size 24 12-volt battery required, two or more may be used in parallel. Sealed gel cell deep cycle type is recommend. AC adapter, DC Solar charge or generators also optional.

**Battery Operation:** 18-48 hours of operation per battery, 1 face. 42 hours per battery typical.

**Battery Charge Time:** 6-24 hours depending on how much of the battery was discharged.

**Battery Life:** Depends on use, how it was charged, and weather conditions. Typical 150-600 charges.

**Battery weight:** 45-55 pounds each. Unit can hold up to 4 batteries, 1 Or 2 recommended per signal face.

**Fuse Rating:** Battery fused at 7.5 Amps. CPU protected by resettable fuse 10A trip, 5A hold.

## Standard Aluminum Base Specification

**Weight:** 50 lbs., including poles, wind braces, without battery(s) or ballast.

**Cabling:** Protected, internally run, self-wiring, polarity protected with quick disconnect for faster battery change.

**Dimensions:** Height to bottom of signal head 49", 81", 106" using various poles. Base foot print 18" x 24".

**Modular:** Can be disassembled in to 3 small sub section signal head/loop detector, mast/poles, and base/batt.

**Storage Dimensions:** Detachable system stores in a space 39"x18"x24" with battery(s).

## Steel Economy Base Specification

**Weight:** 47 lbs., including poles, wind braces, without battery(s) or ballast.

**Cabling:** External 10' cable to head with fused batter terminals.

**Dimensions:** Height to bottom of signal head 106". Base foot print 18" x 24".

**Modular:** Can be disassembled in to 3 small sub section signal head/loop detector, mast/poles, and base/batt.

**Storage Dimensions:** Detachable system stores in a space 39"x18"x24" with battery(s) plus 96" x 2" pole.

## Additional Information

**Wheels:** Removable high wear, high traction, urethane hub/wheel and ball bearing. Optional big wheels for rough road.

**Bag & Boxes:** Optional signal head/accessories storage bag, hard shell flight case, or a secure aluminum base box.

**Wind resistance:** More batteries, sand bags, and ballast used the greater the stability from 35-75 mph/remove visors.

**Reflectivity:** 3M Retro reflective white visible 360 degrees around and 45 degrees from horizon. Base & poles also.

**Set up time:** 5 minutes to remove from vehicle, set-up, place at work zone, and program download or manual control.

**Loop detectors:** Mechanical/wire (in ground, portable reusable, single use), or Microwave (short 25', long range 250').

**Certification:** DOT or ½ Day class to earn certification is highly recommended for this device for safe and efficient use.



## Unit Operations (RDTL)

The RDTL has several modes of operation. Modes may be entered or changed using the RC transmitter. Signal heads are keyed to the transmitters by a factory set security ID; therefore, only matching transmitters may activate or operate the unit. Commands are issued to the signal head by pressing and holding the button for about 1 second. When the signal head receives the message, the RDTL will inform the operator by "blinking" the signals off for about 100 to 200 milliseconds before processing the command.

### Idle Mode

After the self-test, the unit will turn off all signals and wait for the operator to put it into the Standard Flashing mode by pressing button 2.

### Safe Mode (Solid Red)

From this mode, the operator may either choose to enter the Manual/Programming mode or the Automatic Mode. The Red signal will be illuminated during this mode. Safe Mode does not drive remote Drones, which will default to a Blackout condition. Masters in Safe mode can accept a cycle download that will initiate the Automatic mode.

### Standard Flashing/Standby Mode

The Standard Flashing mode is manually entered after the unit is powered up and has gone through the self-test by pressing button 2. This mode is also entered when the operator exits the Manual/Programming mode by pressing button 2. This mode flashes the Red signal in 1-second cycles with signal illuminated for 0.5 seconds. From this mode, the operator may only enter the Safe Mode (Solid Red) by pressing button 2.

### Manual/Programming Mode

This mode may be entered from Safe/Red Mode by pressing button 1. When button 1 is pressed, the RDTL will blink to acknowledge the command, turn off the Red signal, and illuminate the Green signal. While the unit is Green, the user can return to the Standby Mode by pressing button 2, or continue with the manual/programming step by pressing button 1. The second programming step will illuminate the Yellow signal for 4 second, and then turn the Red signal on. The user may finish the programming interval by pressing button 1, which will illuminate the Green signal again, or exit the programming mode by pressing button 2 which will send

the unit back to the Flashing mode. Timing is set by waiting the desired length of time between key presses. Once the timing has been set, the cycle is stored in Non-Volatile memory. This allows the user to recall the last programmed sequence at power up, with out having to reprogram the unit.

### Automatic Mode

This mode uses the either the Real Time Clock or the System Clock to accurately track and replay a programmed sequence. The sequence is programmed in the Manual/Programming mode, and downloaded from one Master unit to the second Master unit via a communications link (typically radio, but possibly wired.) The secondary Master needs to be in the Standby/Red mode to accept the download from the primary Master. When the primary Master is in the Standby Mode, the operator presses button 3. The primary rapidly flash yellow until the secondary indicates a successful download. Both masters will then immediately start into the standard cycle, with the primary in the Green1 time portion, and the secondary in the Red/Red time.

### Abort Mode

Abort is entered from Automatic mode by pressing and holding button #3 for 3 seconds while in Automatic mode. Abort can be issued to either master, and will cause the unit to immediately display a continuous Red. This master will then contact the other master and force it into Abort as well.

### Drone Mode

RDTL units can be configured as wireless Drones or slaves. Drones can be set for A side or B side operation. Set up must be completed before power-up. Upon power-up, the Drone will immediately go into the Drone mode. Drones continually look for status input from the Master, and turn on whichever lamp the master commands it to turn on. If the drone does not receive a valid command from the master, it will turn all lamps off. The drone is still subject to conflict monitor evaluation, and will go into Emergency mode if a severe fault is detected.

### Emergency Mode

Activates on low power, over voltage, dead light, lamp-to-lamp short, lamp stuck on, over -current, and certain other unit faults. In cases of extreme low power, high over voltage, over current and green stuck on or shorted to red, the system will go into a Blackout mode; otherwise other severe faults will display a rapid flashing Red.



## Unit Operations (SWTL, SWTL-RTC)

The SWTL has several modes of operation detailed in this section. Modes may be entered or changed through the use of the RC transmitter. Signal heads are keyed to the transmitters by a factory set security ID; therefore only matching transmitters may activate or operate the unit. Commands are issued to the signal head by pressing and holding the button for about 1 second. When the signal head receives the message, the SWTL will inform the operator by “blinking” the signals off for about 100 to 200 milliseconds before processing the command.

### Idle Mode

After the self-test, the unit will turn off all signals and wait for the operator to put it into the Standard Flashing mode by pressing button 2.

### Standard Flashing Mode

The Standard Flashing mode is automatically entered after the unit is powered up and has gone through the self-test. This mode flashes the either the Red or Yellow signal in 1-second cycles with signal illuminated for 0.5 seconds. If the unit is set for Master, it will flash the Red signal. If the unit is set for Slave, it will flash the yellow signal. From this mode, the operator may only enter the Standby Mode (Solid Red) by pressing button 2.

### Standby Mode (Solid Red)

From this mode, the operator may either choose to enter the Manual/Programming mode or the Automatic Mode. During this mode the Red signal will be illuminated.

### Manual/Programming Mode

This mode may be entered from Standby Mode by pressing button 1. When button 1 is pressed, the SWTL will blink to acknowledge the command, turn off the Red signal, and illuminate the red signal. While the unit is Green, the user can return to the Standby Mode by pressing button 2, or continue with the programming step by pressing button 1. The second programming step will turn the Red signal on. The user may finish the programming interval by pressing button 1, which will send the unit back to Standard Flashing mode, or exit the programming mode by pressing button 2 which will send the unit back to the Standby mode. Timing is set by waiting the desired length of time between key presses. Once the timing has been set, the cycle is stored in Non-Volatile memory. This allows the user to recall the last programmed sequence at power up, with out having to reprogram the unit.

### Automatic Mode

This mode uses the Real Time Clock to accurately track and replay a programmed sequence. The sequence is programmed in the Manual/Programming mode, and downloaded from the Master Unit to the slave unit via a communications link. The slave needs to be in the Flashing mode, and the master needs to be in the Standby mode to synchronize the systems. When the master is in the Standby Mode, the operator presses button 3. The master will dump the program to the slave. The master will then immediately start into the Green time portion, and the Slave will go into the opposite phase (AKA Antiphase). Once the unit has entered into the Automatic mode, it can only be reset by powering down the unit.

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