Carmanah®

OWNER'S MANUAL

i-STOP®
Solar-Powered Transit Stop

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1.0 Introduction

The i-STOP® solar-powered LED transit stop is a completely self-contained unit that offers three distinct features: an on-demand flashing bus signaling device; a security down light, and; an illuminated schedule. Using advanced electronics and the latest LED lighting technology, Carmanah's i-STOP® is revolutionizing passenger safety and security at transit stops around the world.

The i-STOP® transit stop offers numerous benefits for transit agencies which include:

- Enhanced passenger safety and access to information during nighttime hours.
- Reducing or eliminating rider pass-bys.
- Providing a flexible illumination solution with no external power requirements. Transit agencies are now able to add to or modify routes with little disruption to traffic patterns or pavement cutting typically related to hardwiring.
- Offering an entirely modular system. Transit authorities can choose the features to match their current needs, with the ability to upgrade in the future.
- A flexible design that allows for easy replacement of any damaged components, extending the life of the overall system.
- Zero scheduled maintenance for up to five years.
- Easy installation - no external wiring and it mounts on any round, square or octagonal pole from 1 ¾" to 2" in size (requested when ordering). Custom pole sizes available upon request.

Large, illuminated, ADA-compliant buttons are used to activate each of the i-STOP® features, allowing any user to operate it. There is a Braille button identification plate for the visually impaired, and an LED in the center of each button illuminates the buttons at night.

1.1 *Standard LED "On Time" Functionality*

The i-STOP® transit stop offers three different user-activated functions that turn off automatically after a predetermined period of operation:

- i-SIGNAL™ Flashing Beacon – 60 seconds.
- Security Downlight – 5 minutes.
- Illuminated Schedule – 30 seconds.

1.1.1 i-SIGNAL™ Flashing Beacon

The i-SIGNAL™ flashing beacon is a signaling device that enables waiting passengers to notify an oncoming bus that a stop is requested. It can be activated during both the day and night and it flashes at a rate of 60 flashes per minute for 60 seconds (default time). If more time is required, the signal can be activated again.

The signal is located at the top of the i-STOP® head unit directly below the solar panel. The direction of the signal is adjustable independent of the other two features (i.e. the signal can be rotated around the head in increments of 22.5° for a total of 16 different positions). Precise positioning of the i-SIGNAL™ can have an impact on reducing rider pass-bys.

1.1.2 Security Downlighting

The security downlighting feature provides enhanced security for waiting passengers. Ultra bright LEDs located in the head of unit cast a pool of light downwards, illuminating a large area around

the i-STOP® transit stop. The light is activated only at night (when it is needed) and the default "on" time is five minutes. The security downlighting can be rotated around the head in increments of 90° for a total of four different positions. This allows downlighting to be directed where illumination is required, and independent of the other functions.

1.1.3 Illuminated Schedule

The schedule display is illuminated using proprietary edge-lit technology. High-intensity LEDs illuminate light-reflective acrylic that provides backlighting for the schedule material. It is an on-demand system with a default "on" time of 30 seconds. The light-pipe assembly is housed in a tough, extruded aluminum housing and protected by tempered glass. This aesthetically pleasing design, with the display housing wrapping around the pole, offers maximum viewing area with increased vandal-resistance.

1.1.4 Button Illumination/Functionality

Lights will not "stay on" if a button is held down. If a button is pressed and held down, the corresponding LED feature will illuminate for the pre-programmed time, and then turn off. The button must be released and pressed again to activate the LED feature again. Each button has an LED that is illuminated at night but turns off during the day. When any button is pressed, all button LEDs will turn off for 50 milliseconds to provide visual feedback.

2.0 Component Identification

1. Head Assembly
2. Bottom Collar
3. Security Downlighting
4. Flag
5. Pole
6. Schedule Assembly
7. 2-Button Assembly
8. Optional 2-Button Assembly (for no illuminated schedule)
9. EMS
10. Connectors
11. Battery Pack Assembly
12. i-SIGNAL™
13. Front Panel Assembly
14. Tempered Glass
15. Back Housing Assembly
16. Top Plate
17. The Light Pipe with LED assembly
18. Solar Panel Connector
19. Bottom of Solar Panel
20. Top Housing

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Document: MAN_TRAN i-STOP (2 button)_50218_vA.doc
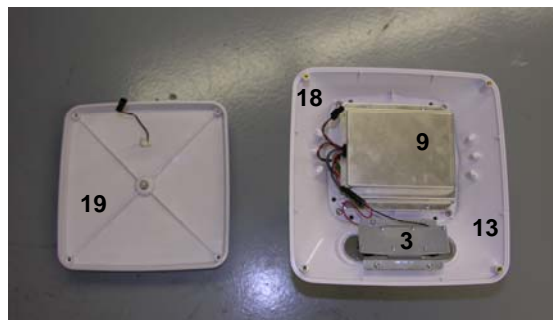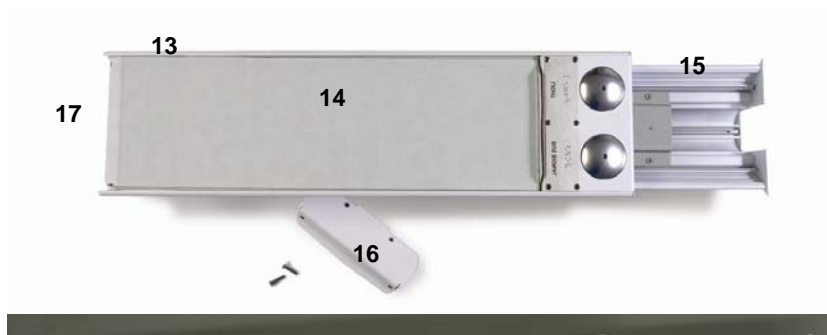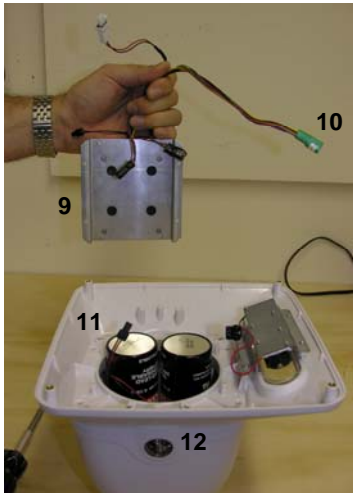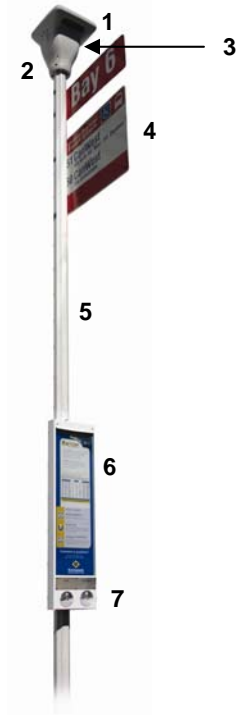
3.0 Installation and Assembly Instructions

Assembly instructions can vary depending on the options selected. Since the i-STOP[®] transit stop is upgradeable with different options that can be installed at any time, this manual outlines installation and assembly of the complete system with provisions for different options. The head and schedule assemblies are delivered completely assembled; they simply require mounting on the pole using the instructions outlined below. All parts required for installation and assembly are provided with the exception of tools, such as a drill and screwdriver with replaceable drivers. The connectors are not interchangeable and the features can only be connected one way (the connectors are designed in such a way that it is not possible to confuse them).

3.1 *Pole*

3.1.1 Pole Preparation

The i-STOP[®] unit can be mounted on any round, square or octagonal pole from 1¾" to 2" in diameter.

Two holes must be drilled into the pole in order to accommodate the head and the schedule assembly. (Note: Nex® Poles ordered for this application come pre-drilled so you can skip the following step). Both of these holes should be drilled on the same side of the pole.

For the schedule assembly or 2-button assembly without schedule illumination, drill a 3/8" diameter hole 1½" from the top of the pole. This hole will anchor the head, as the notch in the metal bracket located on the bottom collar of the head will snap into the hole.

1. The hole placement varies slightly for units depending on whether they have two- or three-button assemblies:

   a. **Standard i-STOP[®] Unit:** Drill a 3/4" diameter hole in the pole 52" from ground level. This hole should be in the middle of the schedule assembly and will allow connection between the head and the schedule assembly.

   b. **i-STOP[®] (two-button assembly):** Drill a 3/4" diameter hole 42", instead of 52", from ground level. This hole should be in the middle of the schedule assembly and will allow connection between the head and the button assembly. In case the schedule is added at a later date, the new hole will need to be drilled at 52" height.
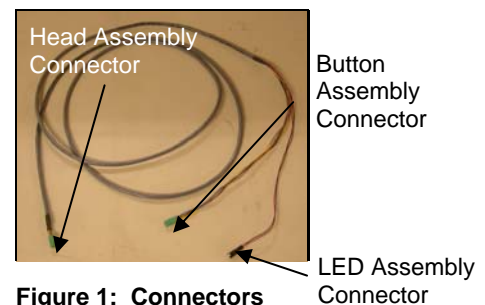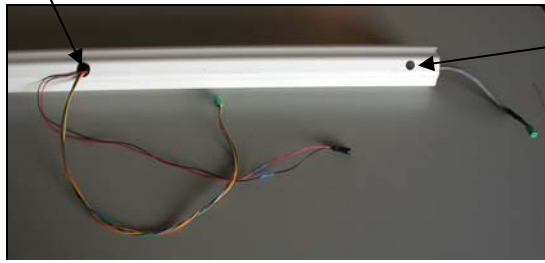

Figure 1: Connectors

Head Assembly Connector

Button Assembly Connector

LED Assembly Connector

3/4" diameter hole

3/8" diameter hole

Note: Before inserting the harness as shown in Figure 2, it is recommended to deburr both the inside and outside edges of the ¾" to reduce the chance of damaging wires.

Note: Hole locations in this diagram are not to scale.

Figure 2: Pole

3.1.2 Using the NEX® Sign Support System

The NEX® Sign Support System for octagonal pole provides an anchor for the i-STOP® solar-powered transit stop. To install the NEX® Sign Support System, follow the steps below:

1. Place the drive cap on the opening of the anchor.
2. Using a power driver or sledgehammer, drive the anchor into the ground.
3. When the anchor is two inches from the ground, remove the drive cap. Alternatively, the anchor can be mounted flush with the ground.
4. Place NEX® Post into the anchor, approximately twelve inches, and insert the NEX® Wedge between the anchor and the NEX® Post. Using a hammer, drive it approximately two inches in between the sleeve and the pole.
5. The NEX® Sign Support System installation is now complete.

Figure 3: Nex® Sign Support System Installation

3.1.3 Flag Addition

If the pole being used is structurally tested and certified for this type of installation, it is possible to add a flag to the pole at this point. The flag will not hinder the operation of the i-STOP® unit in any way. In fact, the security downlighting, in the right orientation, provides flag illumination as an extra feature. Consult with the pole manufacturer to determine whether it is possible to add the flag to your pole. If adding the flag, drill the holes at the same time as preparing the pole for the i-STOP® unit's installation. It will be easier to run the harness prior to bolting the flag. Care must be taken when inserting the bolts for the flag, to not damage the wire harness that runs inside the pole.

3.2 *Schedule Button Assembly*
3.2.1 Mounting Schedule Assembly on the Pole

1. The schedule assembly is shipped assembled. It consists of two different components:

    a. The front panel assembly (Figure 4) contains the light pipe and tempered glass. The light pipe, schedule and tempered glass slide in separate channels (see Figure 5 for light pipe assembly).

LED assembly attached to acrylic

Figure 4: Front Panel Assembly
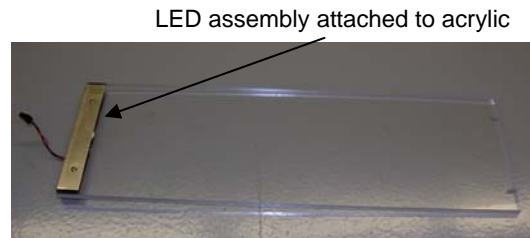
Figure 5: The Light Pipe with LED assembly

    b. The back housing, which wraps around the pole (see Figure 6).

2. Separate the front from the back housing in order to install the assembly on the pole. The pole should have a 3/4" hole already drilled and the harness threaded though the pole, with the connectors exposed (see Figure 2).

3. Remove the two security fasteners from the top (see Figure 7) and remove the top plate.

4. Slide the front panel assembly away from the back housing as shown in Figure 8.

Top Plate

Location of security fasteners (remove to slide front panel assembly)

Figure 7: Top of the Schedule Assembly

Figure 6: Back Housing Assembly

Taped LED connector harness

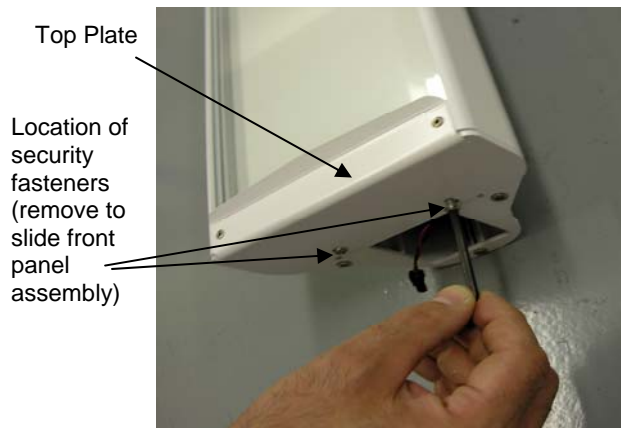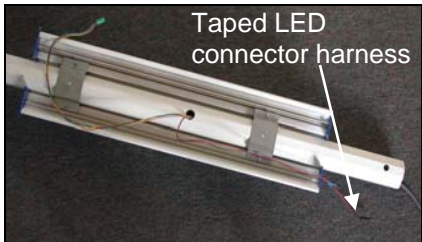**Figure 9: Location of the Brackets (front and back view)**

Figure 8: Direction of Sliding the Front Panel Assembly from Back Housing Assembly

5. Place the back housing around the pole. The predrilled hole in the pole should be located approximately in the middle of the housing.

6. Anchor the back housing to the pole using two metal brackets and two security fasteners for each bracket. See Figure 9 for different views of the brackets and their fastening.

7. In order to secure the brackets to the pole, drill a 5/32" diameter hole in the pole through the hole in each bracket (Figure 10) and secure with the supplied sheet metal fastener.

8. The harness has two connectors: one for the button assembly (Figure 11) and the other for the LED assembly attached to the acrylic. The connectors are very different and they cannot be interchanged. Tape the LED connector harness to the top of housing as shown in Figure 9 to easily connect it to the acrylic light pipe when sliding down the front panel back onto the back housing assembly (refer to Figure 8).

Location of the hole to be drilled
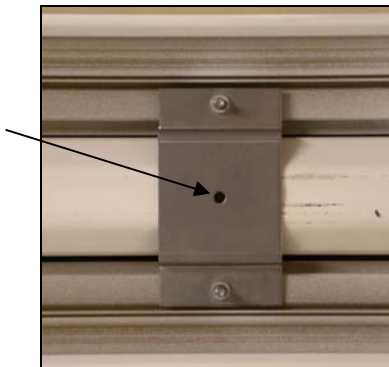
Figure 10: Bracket Detail

Switch assembly connector

Figure 11: Button Assembly

9. Start sliding the front panel assembly back. Attach the button connector first, when you are approximately halfway down the channel (Figure 12). Make sure that the wires are out of the way so that they do not get pinched. The easiest way to do this is to make sure that the wires are all on one side and placed inside the channel (right beside the pole).

Figure 12: Assembly of the Schedule Assembly

10. The LED connector should be connected when the front panel is completely pushed in place (this is where taping the connector to the top of the extrusion comes in handy).

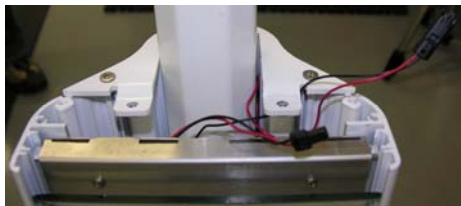11. Tuck the connector with wires inside the housing and away from the top housing.

Figure 13: Connecting LED Assembly to Harness

LED Assembly connected to the harness

12. Ensure that the wires are not pinched when the housing is reattached.

13. Reattach the top plate and test the system after you have installed the head where the batteries are located.

3.2.2 Button Assembly without Schedule

A separate button assembly is supplied when schedule illumination is not required. It does not contain the illuminated light pipe but does have two buttons that will activate the security down lighting and i-SIGNAL™ flashing beacon.

The installation is very similar to the schedule button assembly:

1. Drill a 3/4" diameter hole 42" from ground level instead of 52" as already described in Section *3.1 Pole Preparation*.

2. Thread the harness as outlined.

3. Follow Schedule Assembly to attach the housing to the pole.

The only difference is that there is only one bracket instead of two to be mounted on the back housing and there is no light pipe assembly; therefore, the LED connector on the harness will stay unused (connect only the button connector to the harness).

Figure 14: Button Assembly without Schedule

3.2.3 Schedule Material Selection

In order to ensure maximum visibility and life span, Carmanah recommends the timetable to be printed on a durable, transparent material like Vellum. In case of paper, the timetable material can be laminated for extra protection. Since water can permeate the housing, the ink will have to be waterproof. Print the timetable with pigment based inks, rather than dye-based, for greater UV stability. Carmanah recommends material for your timetable that is manufactured by a company called *Rexam* and the product name is *5 mil backlit film*; however there are a number of similar products made by other manufacturers, such as *3M*.

Tolerance level should be +/- 0.125". Scheduled insert size is 6.25" wide by 19.75" long.

3.3 *Head Assembly*

3.3.1 Mounting the Head on the Pole

The head is delivered completely assembled; the security downlighting and i-SIGNAL™ features are already installed and the battery is connected to the board (see Figure 15).

Note: if you would like to change the orientation of the head, please see section 3.3.2 before continuing with this installation.

Figure 15: Assembled Head with Security Downlighting and i-SIGNAL™

i-Signal™

Security Downlight

Bottom Collar

Connector to the Harness
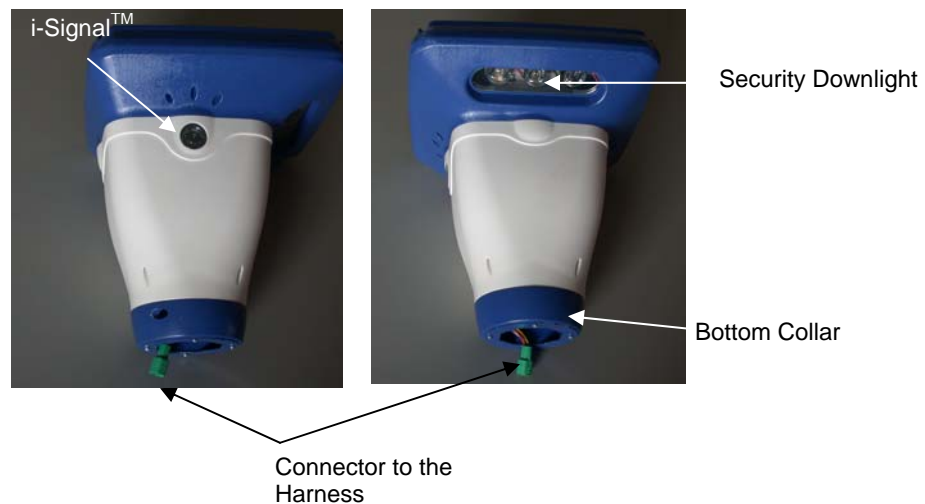
If the orientation of these two features is satisfactory, follow the steps below to mount the head on the pole:

1. The pole should already have two holes drilled, as per section 3.1.1, and the harness should be in place.

2. Connect the wire hanging from the bottom of the head (See Figure 15 & 16) with the harness coming from the top of the pole.

3. Mount the head on the pole, making sure that the notch on the metal bracket at the bottom of the head snaps into the pre-drilled 3/8" hole.

4. Firmly tighten the security fasteners located in the bottom collar with the supplied Allen key. The location of the screws is shown in Figure 16.

5. Check the function of the features by activating the button sensors on the schedule assembly.
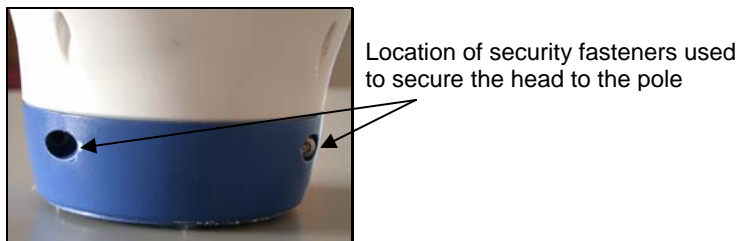

Location of security fasteners used to secure the head to the pole

Figure 16: Bottom Collar with Location of Security Bolts

3.3.2 Changing The Head Orientation

If you would like to change the default orientation of the i-STOP® features, the head will have to be disassembled to varying degrees, depending on the feature to be changed. It is recommended that all changes be made before the head is installed in the field. This will simplify making the required changes and will minimize the chance of damaging or losing parts.

3.3.2.1 Changing Security Downlighting Orientation

The security down lighting can be rotated in increments of 90° with respect to the i-SIGNAL™, for a total of four positions. Changing the orientation of the security down lighting is as follows:

1. Remove the solar panel assembly by unscrewing the four security fasteners at the top of the head (one in each corner of the solar panel). This will allow access to the top housing where the three downlighting LEDs are located.

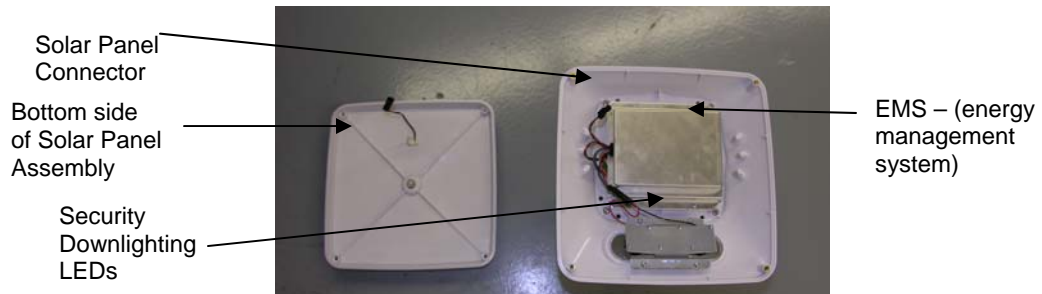2. Disconnect the solar panel connector (see Figure 17).

**Figure 17: Head with the Solar Panel
Assembly Removed**

Solar Panel Connector

Bottom side of Solar Panel Assembly

Security Downlighting LEDs

EMS – (energy management system)

3. Unscrew four fasteners at the bottom of the top housing as shown in Figure 18.

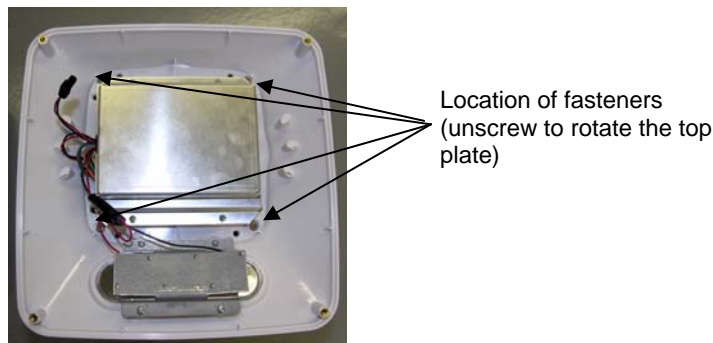Location of fasteners (unscrew to rotate the top plate)

Figure 18: Top Housing

4. Turn the top housing so that the Security Downlighting faces the required direction and reattach the top housing back to the head.

5. Reconnect the wiring of the solar panel assembly, fasten it to the head and reattach the wiring and mount head assembly to the pole as outlined before.

6. Test the LEDs by activating one of the button sensors.

Note: Pay special attention to wiring, ensuring that none of the wires are pinched or twisted. Security down lighting and schedule illumination will only work when it is dark, therefore the solar panel will need to be completely covered before testing theses functions.

3.3.3 Changing i-SIGNAL™ Flashing Beacon Orientation

The i-SIGNAL™ flashing beacon can be rotated in increments of 22.5° with respect to the bottom collar, for a total of 16 different positions. It is recommended to adjust the orientation of the i-SIGNAL™ flashing beacon before the head is installed. The head does not need to be disassembled; only the bottom collar needs to be remove:

1. Remove the four fasteners from the bottom of the head and separate the bottom collar from the rest of the assembly. The collar should still be located within the head assembly, not attached to it, and free to rotate.
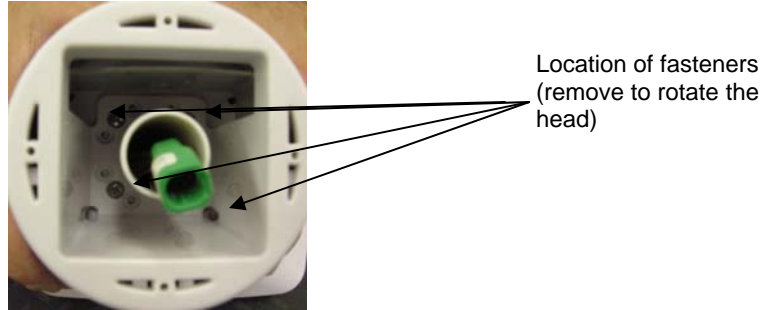
Location of fasteners (remove to rotate the head)

Figure 19: Bottom Side of the Collar

2. Rotate the head (or the collar) in increments of 22.5° until you are satisfied with the position of the flashing beacon. Each increment of 22.5° is preset and you will be able to "feel" each position as you turn the head.

3. Once you are satisfied with the position of the beacon, re-insert the screws and mount the head on the pole by following the instructions as outline in section 3.3.1.

4. Test the i-SIGNAL™ flashing beacon.

3.4   *Part Replacement for the Schedule Assembly*

3.4.1 Schedule Replacement

1. Unscrew the security fasteners from the top plate (see Figure 2, page 6) and remove the top plate.

2. Remove the timetable and replace with the new one.

3. Re-attach the top plate and fasten security fasteners. Test the system.

3.4.2 Glass Replacement

1. Unscrew the security screws from the top plate (See Figure 2) and remove the top plate.

2. Slide the glass up and replace with the new one.

3. Re-attach the top plate and fasten security fasteners. Test the system.

3.4.3 Light Pipe Assembly Replacement

1. Unscrew the security screws from the top plate (see Figure 18) and remove it.

2. Disconnect LED assembly from the harness and slide the light pipe assembly out of the front panel assembly.

3. Replace the light pipe assembly with new one and slide the light pipe assembly back into the housing.

4. Connect the LED connector to the harness. Tuck the connector and wiring out of the way.

5. Fasten the top plate and test the system.

3.4.4 Button Assembly Replacement

1. Slide the front panel from the housing by following the instructions outlined in section 3.2.1.

2. Remove the bottom plate by removing two security fasteners as shown in Figure 21.

Figure 20

Security Fasteners (remove to disassemble the button assembly from the front panel assembly)

Slide up the light pipe assembly.

Figure 21: Front Panel Assembly with Button Plate

Warning: Ensure that the LED and button assembly connectors are unplugged from the harness.

3. Slide the button assembly out of its position and replace it with new one.

4. Slide the front panel back inside the housing, making sure that both connectors (LED and sensor) are properly plugged back into the harness. Fasten the top plate back on and secure the front panel to the back housing assembly.

5. Test the system.

Figure 22: Removal of the Button Assembly

3.5 *Part Replacement for Head Assembly*

3.5.1 Battery Replacement

1. Remove the solar panel assembly and the top housing assembly by following the instructions outlined in section 3.3.2.

2. Disconnect the various connectors from the EMS assembly.

3. Remove the four fasteners that attach the EMS.

4. Remove four fasteners that attach the top unit to the housing unit.
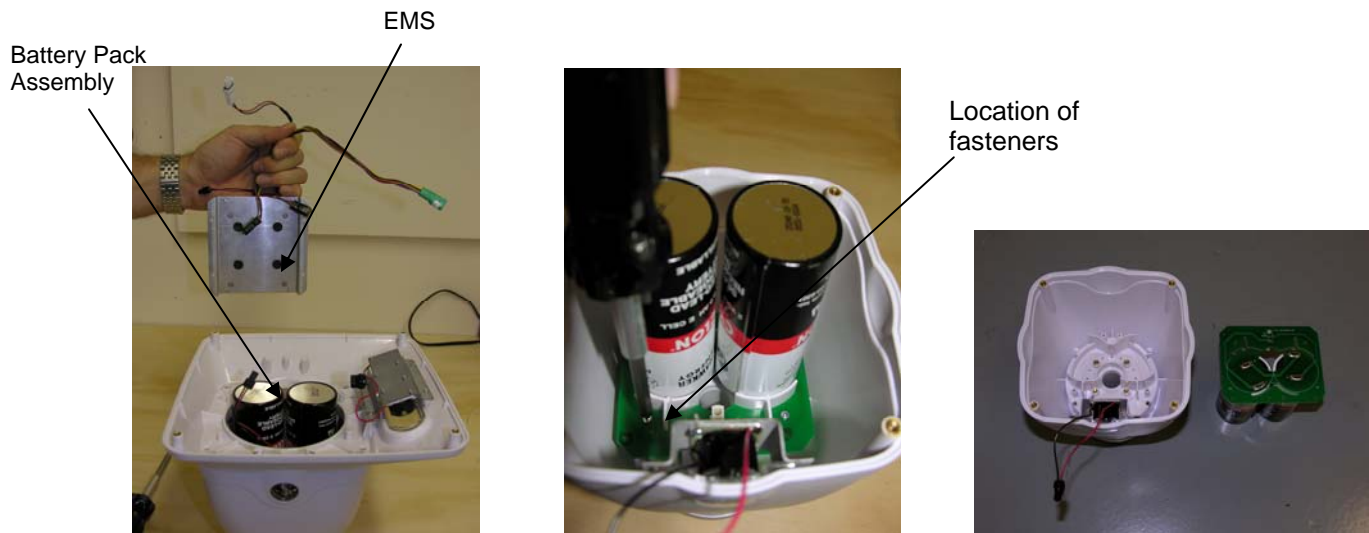
EMS

Battery Pack
Assembly

Location of
fasteners

Figure 23: Head Assembly with i-SIGNAL™ and Batteries

5. Remove old battery pack by unscrewing from housing.

6. Insert new battery pack and fasten with screws.

7. Reattach top unit.

8. Reconnect battery pack and various other connectors to EMS; feed wiring back into housing unit; reattach EMS to top unit.

9. Reconnect remaining harnesses.

10. Test the system.

3.5.2 i-SIGNAL™ Replacement

1. Remove the solar panel assembly and the top housing by following the instructions from previous sections.

2. Disconnect the i-SIGNAL™ from the EMS assembly.

3. Slide the i-SIGNAL™ bracket with the LED (Figure 22) from its "seat" and replace with the new part.

4. Ensure that lens of i-SIGNAL™ is still in place.

5. Reconnect the i-SIGNAL™ to the EMS assembly and reassemble the head assembly in reverse order.

6. Test the system.

3.5.3 Security Downlighting Replacement

1. Remove the solar panel assembly and repeat the steps as outlined in section 3.3.2. **Changing the Head Orientation**.

2. Disconnect the solar panel and the security downlighting LED assembly from the EMS assembly.

3. Remove the Security Downlighting Assembly by removing the four fasteners (see Figure 24) and replace with new Security Downlighting Assembly.

4. Tighten fasteners, reconnect wiring to EMS assembly, and reassemble the head assembly in reverse order.
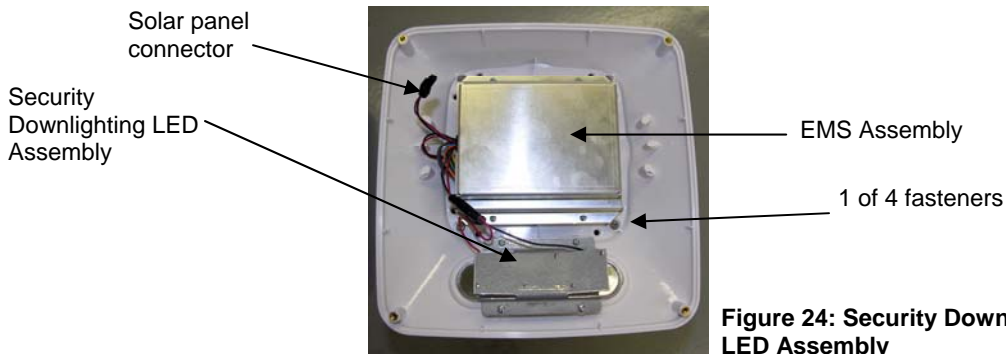
5. Test the LEDs.

Figure 24: Security Downlighting LED Assembly

3.6 *Removal of the NEX® Sign Support System*

The signpost can be removed using a slide hammer.

1. Place the slide hammer hook in the slot in the NEX® Wedge.

2. Lift the wedge by operating the slide hammer. Once the wedge is removed, lift the post out of the anchor. Although removing the NEX® Post with a slide hammer takes minimal effort and time, it is virtually impossible to remove the post without this tool—making the pole tamper resistant.

4.0 System Diagnostics

A diagnostic test can be initiated by a specific key press sequence. Any of the three buttons can activate the diagnostic test. The key press sequence is be a long press of at least 5 seconds, followed by 5 presses within the next 5 seconds.

The test will flash each of the light features in turn, including the button LEDs, at a "fast" rate of 4 Hz for 10 flashes. If the light is in low battery cut-off when the test is initiated, the flash sequence will be abbreviated to one "fast" flash of 200 ms of each light feature, 500 ms apart. The order or progression through the features shall be: pushbutton LEDs, Schedule Light, i-SIGNAL™, Security light.

5.0 Service and Product Information

5.1 *Service*

If the unit requires troubleshooting or warranty service, contact Carmanah's Technical Support team at:

Email: customerservice@carmanah.com

Toll Free in the U.S. & Canada: 1 (877) 722-8877
International: +1 (250) 380-0052

Fax: +1 (250) 389-0040

5.2 *Additional Products*

Carmanah offers a variety of solar-powered and energy efficient LED lighting products. For transit authorities, the i–SIGNAL bus signaling system and the i-SHELTER™ solar-powered LED lighting system enhance passenger safety and comfort during nighttime hours. For more information, please visit our website at: www.transitlights.com.