TAPCO®
Traffic & Parking Control Company, Inc.

Rectangular Rapid-Flashing Beacon: RRFB-XL™

with Bulldog Pushbutton, Solar Powered

User Guide

For Radio Binding, Flash Duration, Testing and Site Survey, refer to the separate BlinkerBeam® Radio Operation User Guide: please contact TAPCO if you need one.

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Read Warnings, Cautions and Notes First

Warning, Caution and Note Statements: Read Prior to Assembly and Installation!
Warning, Caution and Note statements are used to emphasize important and critical information in this guide. Read these statements prior to assembly to help ensure safety and to prevent product damage. The safety messages, symbols and their meanings are shown here.

If you have any questions that are not answered by this Guide, contact your Distributor or TAPCO Technical Support.

⚠ WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Heed the safety message in this box!

! CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It may also be used to alert against unsafe practices. Heed the safety message in this box.

NOTE: Used to notify you about information on installation, operation, programming or maintenance that is important but typically not hazard-related.

For Technical Support

- Phone 866-753-6255
- Email blinkertech@tapconet.com

In addition to the symbols and words explained here, each safety message identifies the hazard, describes what you can and should do to avoid the risk of exposure to the hazard, and tells the probable consequences of not avoiding the hazard.

Once again, although we have included many potential hazards you may encounter during the installation of this equipment, we cannot predict all of the possible hazards and this list should not be a substitute for your judgment and experience.

⚠ WARNING

Batteries normally produce explosive gases which can cause personal injury or death. Therefore, do not allow flames, sparks or lit tobacco to come near the battery. To prevent arcing, always **detach** the battery's negative terminal lead **first**; Always **connect** the battery's negative terminal lead **last**. When charging or working near a battery, always wear gloves, goggles and an apron, and provide ventilation. Batteries contain sulfuric acid which burns skin, eyes and clothing. Disconnect the fuses, battery and solar panel before removing or replacing any electrical components. Always remove the fuses, then the battery's negative terminal first. Always re-connect the positive terminal first.

⚠ WARNING

Always use Cut-proof Gloves; Safety Glasses; and OSHA-approved Protective Clothing and Devices while performing all procedures. Failure to do so could result in death or serious injury.

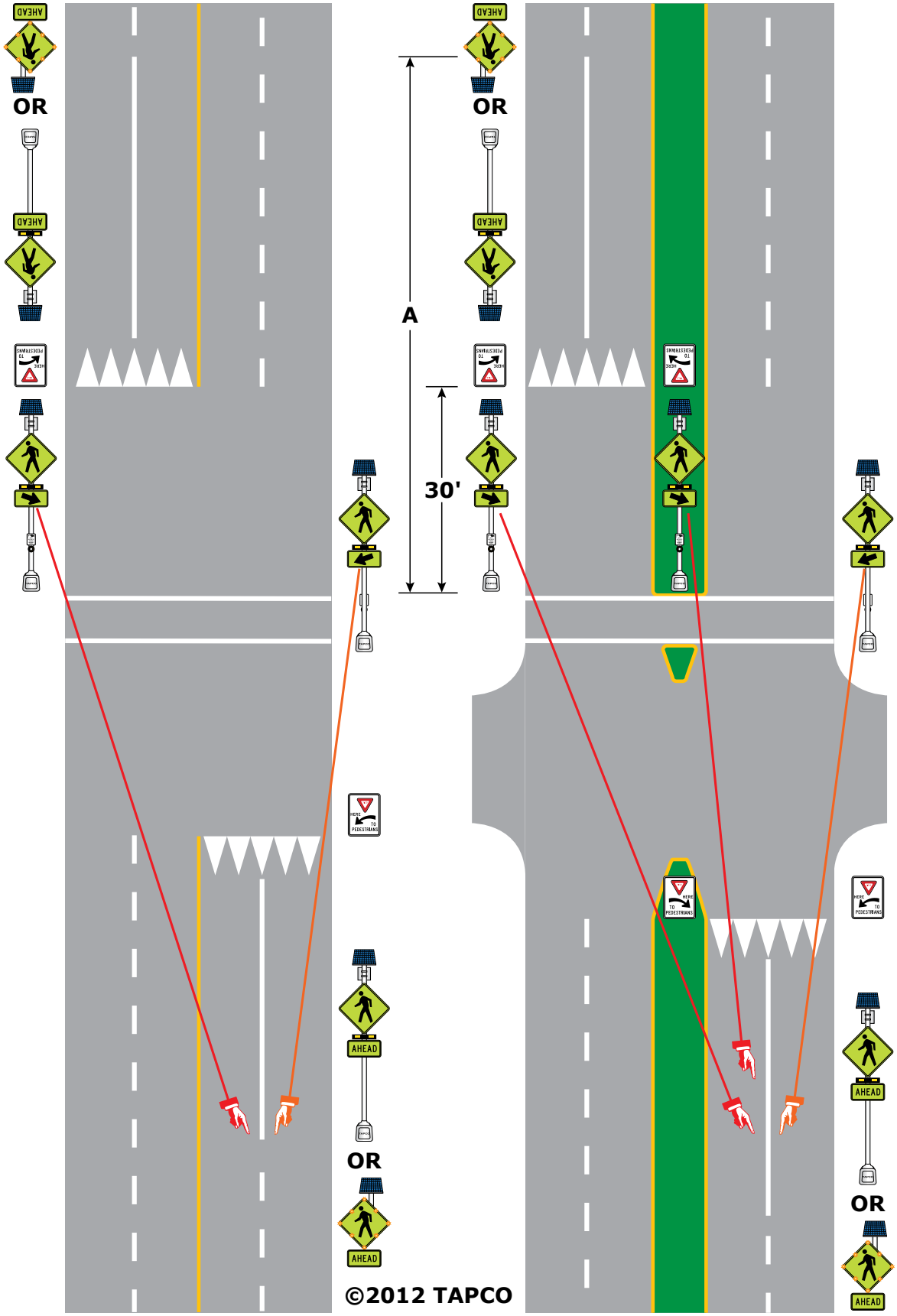
! CAUTION

Controller Damage can result from allowing solar panel power to be applied to it without having battery power applied to it. Do Not install the solar circuit fuse without having the battery connected. Do Not disconnect the battery without first removing the solar fuse. Either could damage the controller, voiding any warranty and requiring replacement. **When disconnecting power**, first remove solar fuse; then remove other fuses if desired; last, disconnect the battery. **When connecting power**, first remove solar fuse: next connect the battery leads and then the solar circuit leads; last, insert the fuse(s).

NOTE: Batteries must maintain a charge prior to use: if allowed to discharge completely they will fail to hold a charge. If not installing your system right away, charge the batteries ***monthly*** until used.

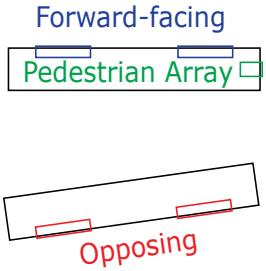
TYPICAL 4-LANE STREET RRFB LAYOUT

Suggested Signage and Pavement Marking (4-lane Roads)



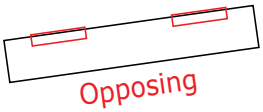
TYPICAL 2-LANE STREET RRFB LAYOUT

Align the signage and RRFB properly to maximize driver yielding compliance. Keep this in mind when mounting the components to the poles. First, align the RRFB housing to aim the forward-facing LED arrays toward approaching traffic ***nearest*** to that assembly, then tighten. Second, aim the opposing LED Arrays toward approaching traffic ***across*** from that assembly, then tighten.



R1-6, R1-6a signs provide additional guidance to yield.

MUTCD Section 2A.20
Sign Orientation Guidance:
01 Unless otherwise provided in the manual, signs should be vertically mounted at right angles to the direction of, and facing, the traffic that they are intended to serve...
On curved alignments, the angle of placement should be determined by the direction of approaching traffic rather than by the roadway edge at the point where the sign is located.



SPEED	A
30 MPH	140'
35 MPH	183'
40 MPH	234'

A=distance from Advance sign to crosswalk

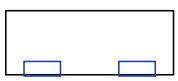
30'

R1-5 signs and yield lines provide additional guidance to yield.

A

YIELD LINES
A YIELD line is a series of white isosceles triangles, pointing toward approaching vehicles, and extending across a lane or lanes. It is used at midblock crosswalk locations where it supplements R1-5 "Yield Here To Pedestrians" signs.
See MUTCD Section 3B.16.

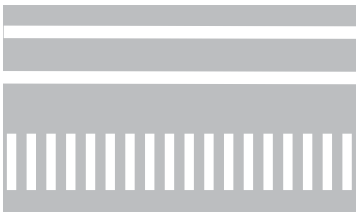
Advance RRFB are allowed only in conjunction with crosswalk RRFB.



OR

BlinkerSign® LED Signs
These signs can be linked wirelessly to flash once per second for the same flash duration of the RRFB.

OTHER TYPICAL CROSSWALK MARKINGS



RRFB-XL™ SOLAR PANEL & SIGN ALIGNMENT

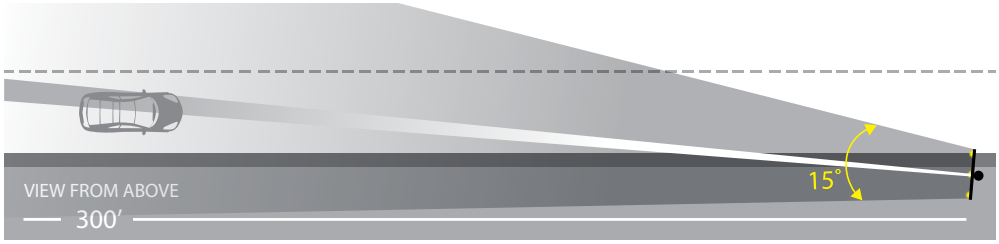
! CAUTION

Damage can result from applying solar panel power to the controller without having battery power applied to it. To prevent damage, Do Not install the solar circuit fuse without having a charged battery connected, and Do Not disconnect the battery without first removing the solar fuse. Either could damage the controller, voiding any warranty and requiring replacement at your expense.
When disconnecting power, first remove solar fuse; then remove other fuses if desired; last, disconnect the battery.
When connecting power, first remove solar fuse; next connect battery leads and then the solar panel leads; last, insert the fuse(s).

These instructions are for guidance only. Please read and fully understand them before proceeding. They are not to be construed as engineering-approved documents. You should consult a licensed professional engineer for approval of your site and erection plans.
Shade from trees, buildings, poles, etc. will reduce the solar panel's effectiveness, so select a site where the solar panel can receive the maximum amount of sunlight throughout the day. The collector typically needs to face due south to receive maximum sunlight, but may be adjusted slightly if doing so increases solar collection (due to partial solar obstruction). Visit the FHWA's MUTCD web site for further guidance on sign location and orientation:
http://mutcd.fhwa.dot.gov/pdfs/2009/part2a.PDF

MUTCD 2A.20 ...*signs should be vertically mounted at right angles to the direction of, and facing, the traffic that they are intended to serve...Signs that are placed 30 feet or more from the pavement edge should be turned toward the road.* ***On curved alignments, the angle of placement should be determined by the direction of traffic rather than by the roadway edge at the point where the sign is located...On grades, sign faces may be tilted forward or back from the vertical position to improve the viewing angle.***

On straight segments, orient the sign face's angle to maximize the visibility to oncoming traffic. On curved road segments (both horizontal and vertical), larger adjustments may be necessary to provide the optimal visibility of the LEDs and retroreflectivity of the sign face.



Once you've determined an appropriate location for the assemblies, prepare an appropriate foundation to which you'll mount the base(s). Allow any new concrete to cure fully before erecting the assemblies. Proceed with assembly.

⚠ WARNING

Always use Cut-proof Gloves; Safety Glasses; and OSHA-approved Protective Clothing and Devices while performing all procedures. Failure to do so could result in death or serious injury. Consider traffic control and lane closures to make installation less hazardous.

NOTE: Please examine all parts before assembly and installation. Contact TAPCO immediately if anything is missing or damaged.

Parts List (per assembly)

Refer to Sales Order for actual components.

Solar Panel, Cable and Bracket (pole-top or pole-side mount)
Extra-Large Rectangular Rapid Flash Beacon and Cable
RRFB Mounting Hardware, including U-bolt, nuts and washers
Bulldog Pushbutton and cable
Control Cabinet, complete with Radio and Circuitry
Cabinet Mounting Hardware
12VDC battery (see NOTE at right)

Optional Items:

W11-2 Pedestrian Crossing Signs
S1-1 School Crossing Signs
Pole
Base
Other Activation Devices

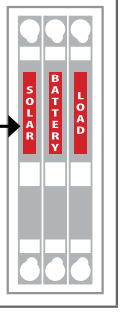
NOTE: Batteries must maintain a charge prior to installation! If allowed to discharge completely they will fail to hold a charge. Charge the batteries ***monthly*** until you install your system.

Suggested Tools

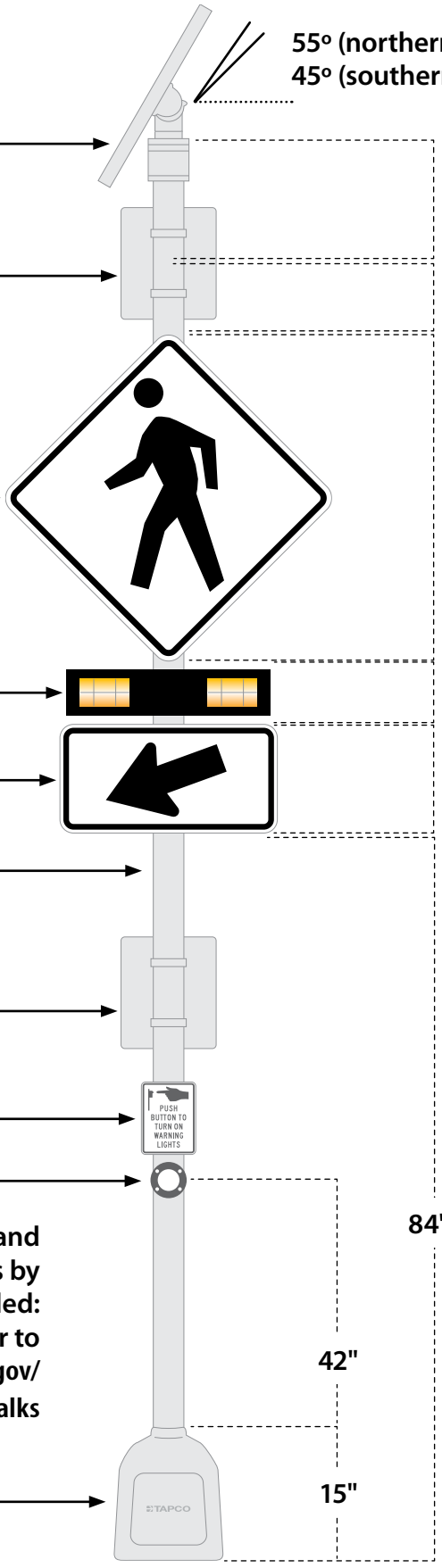
Torque Wrench
Tape Measure
Pole Strap Wrench
Electric Hand-held Drill, preferably corded with side handle
#7 or 13⁄64" bit and ¼"-20 tap for pushbutton
Metallic Hole Saws: arbor bits
Hole Reamer (to remove drilling burs)
Electrician's Fish tape
Hook to pull cables/wiring out of pole
Philips Head Screw Driver
Open/Box Wrenches
Socket, Deep Sockets
Ratchet/Driver and Extension
Wire Stripper/Terminal Crimper

! CAUTION

Controller Damage can result from allowing solar panel power to be applied to it without having battery power applied to it. Do Not install the solar circuit fuse without having the battery connected. Do Not disconnect the battery without first removing the solar fuse. Either could damage the controller, voiding any warranty and requiring replacement. **When disconnecting power**, first remove solar fuse; then remove other fuses if desired; last, disconnect the battery. **When connecting power**, first remove solar fuse: next connect the battery leads and then the solar circuit leads; last, insert the fuse(s).



TYPICAL RRFB-XL CONFIGURATION



Solar Panel: Tilt 45º (in southern latitudes) to 55º (in northern latitudes) and rotate assembly so collector panel will face due south

Control Cabinet: Can be mounted at any height, at installer's discretion

Pedestrian (diamond) or School Xing (pentagon) Sign: see actual heights of diamond signs at right

Rectangular Rapid Flashing Beacon RRFB-XL (Pedestrian Indicator LED faces crossing pedestrians)

Arrow Plaque

4½" outside diameter Round Aluminum Pole: see the pole height requirements and calculations at right

Control Cabinet: Optional Position

Crosswalk Sign*

Pushbutton*

*Mount optional Crosswalk Sign and Pushbutton for easiest access by pedestrians, bicyclists and the disabled: For more ADA guidelines refer to http://www.access-board.gov/guidelines-and-standards/streets-sidewalks

Pole Base (will determine assembly orientation)

Typical Sign Heights:

School	Pedestrian
30"	30"= 41" high
36"	36"=49" high
48"	48"=66" high

Typical Plaque Heights: 12",18"

To determine overall height of pole/base you'll need, sum up the heights of all:

Ground to bottom of plaque (typically 84");
Plaque;
Space required for RRFB(s);
Sign*;
Control Cabinet*;
Solar Panel*;
*plus spaces between last three items

*2009 FHWA MUTCD 2A.18 The minimum height, measured vertically from the bottom of the sign... where parking or pedestrian movements occur... shall be 7 feet.

⚠ WARNING

Always use Cut-proof Gloves; Safety Glasses; and OSHA-approved Protective Clothing and Devices while performing all procedures. Failure to do so could result in death or serious injury. Consider traffic control and lane closures to make installation less hazardous.

To determine the required height of the pole+base, add up all of heights your components as illustrated previously on the Typical RRFB Configuration page. To determine the overall height of pole+base you'll need, sum up the Heights of: Ground to bottom of plaque (typically 84"); Plaque; the space required for RRFB(s) (will depend on whether you install one or two back-to-back RRFBs); Sign; Control Cabinet; Solar Panel; plus the spaces between last three items.

NOTE: To ensure the proper alignment of all of the components, the pole must be screwed onto the base and tightened fully (a pole strap wrench is recommended) before proceeding with the measuring and drilling to mount the components onto the pole. The use of a tek screw is recommended.

1. Secure the pole tightly to its base with a strap wrench. Drilling and inserting an anti-rotation tek screw in the base's collar is recommended: it allows rotation after the assembly is erected. Determine the position you want the base's access door to face when installed, as the remainder of the component mounting positions will be based upon this orientation.

2. With tape measure and marking tool, measure and mark the mounting holes for the warning sign and plaque onto the pole per the MUTCD and your local sign regulations. **Allow 8½" clearance between the signs for a single RRFB, and 10½" for double, back-to-back RRFBs.** Refer to previous page and below for further measurement instructions.

3. Open the cover for the Control Cabinet. Use tape measure or the cable port as a template for hole placement. Measure and mark the cable hole that will allow the Control Cabinet to clear the Solar Panel and Warning sign(s).

4. If you are using a pole-top solar panel mount, no hole is necessary as the cable feeds in through the top of the pole.

If you are using a side-of-pole solar panel mount, mark for a hole where it will be convenient to feed in the cable beneath the collector face.

5. Drill the remaining holes required to mount the components, and to feed their wiring into the pole, based on port/stub size. Use a reaming tool to remove hole burs.

6. Remove the pushbutton cover. Use the mounting base as a template for hole placement that will provide the easiest access for pedestrians, bicyclists and the disabled. With tape measure and marking tool, measure and mark the mounting holes for the pushbutton (and plaque if used), 42" or more above ground. Drill an appropriately sized cable port hole. Ream off the burs.

7. Align the pushbutton mounting base with the drilled hole. Mark the two pushbutton mounting holes. Drill and Tap (#7 or 13⁄64" bit, and ¼"-20 tap required), or use your own self-tapping screws.

8. Feed the supplied pushbutton cable in though the pole's Control Cabinet hole and fish it back out through the pushbutton cable feed hole.

Place and secure the pushbutton mounting base onto the pole with your choice of the provided ¼"-20 bolts, or with your own self-tapping screws.

9. Strip the ends of the Blue and Brown leads and crimp a spade terminal onto each. If there are only two terminals, connect the Blue and Brown leads to the two pushbutton terminals in any order. Using the provided machine bolts, secure the pushbutton onto its frame.

Note: If you use an alternative pushbutton with three terminals, connect the Blue lead to the pushbutton's 'COM' terminal and the Brown lead to the 'NO' terminal. Do NOT use the 'NC' terminal.

RRFB LIGHT BAR WIRING AND MOUNTING

⚠ WARNING

Always use Cut-proof Gloves; Safety Glasses; and OSHA-approved Protective Clothing and Devices while performing all procedures. Failure to do so could result in death or serious injury. Consider traffic control and lane closures to make installation less hazardous.

SINGLE RRFB:

Remove the 4 screws on the RRFB enclosure and remove the cover. Hold the enclosure's bracket onto pole. Using the enclosure's cable feed port as a template, mark the pole in the center of the port. For a back-to back RRFB go to next step. For a single-sided RRFB, drill a 1½" hole in line with the Warning Sign and Plaque, so all will face toward oncoming traffic. Ream off the burs.

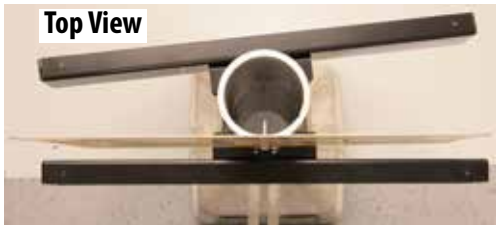
DOUBLE-SIDED BACK-TO-BACK RRFBs:

For installing double-sided, back-to-back RRFB the cable access holes drilled into the pole will need to be offset both horizontally and vertically. First, the enclosures need to be separated Vertically about ¾" to 1" so that the U-bolts will clear each other, as shown at right.

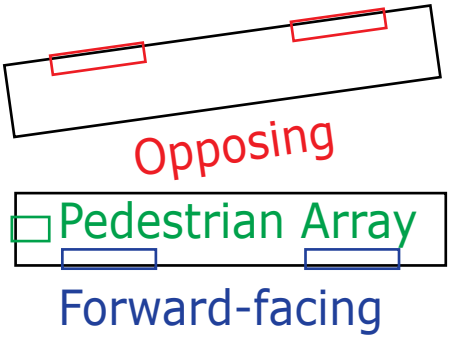
Second, while the RRFB facing oncoming traffic should line up with the warning sign and plaque, the opposing RRFB ideally should be rotated slightly to face traffic in the far lane(s), as shown at right, bottom. **If used, face Pedestrian Indicator LEDs toward crossing pedestrians. If used, orient Median-mounted Pedestrian Indicator LEDs so one faces in each direction. See page on Typical 4-Lane Street RRFB Layout.**

Using the second, opposing enclosure's cable feed port as a template, shift the enclosure up or down ¾" to 1" from the opposing enclosure so that the U-bolts will clear each other, then rotate the opposing enclosure so the LEDs will face traffic in the opposing lane, approximately ½" for a two-lane street or ¾" for a 4-lane street. Mark the pole in the center of the access port. Then drill the 1½" holes for each of the RRFB cable ports. Ream off the burs.

Sidewalk Side View



Top View



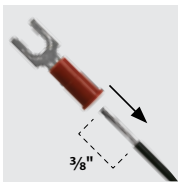
⚠ WARNING

Always use Cut-proof Gloves; Safety Glasses; and OSHA-approved Protective Clothing and Devices while performing all procedures. Failure to do so could result in death or serious injury. Consider traffic control and lane closures to make installation less hazardous.

With all the porting and mounting holes drilled and deburred, proceed by feeding the remaining cables into the pole through their respective holes, using a fish tape to pull them out through the pole's hole that will align with the control cabinet port. Then mount each of the components using the appropriate hardware, with the exception of the solar panel. Consider mounting the solar panel last if it facilitates fishing the cables through the pole and into the cabinet.



Excess cable can be left in the pole. If you'd rather trim cables, make note of their labels. Strip several inches off of the outer sheath of any cable that you've trimmed to length. Except for the solar panel wires, which already have ring terminals attached, strip each individual wire's insulation to expose about ⅜" of bare wire. Slide a spade terminal fully over the exposed wire, then firmly crimp the terminal to the exposed wire.

NOTE: Do not exceed the maximum torque of cabinet/solar panel bolts/studs! Maximum=1/4-20 @ 8ft-lbs., 5/16-18 @ 16ft-lbs.

Round Pole Mounts: Place the brackets onto the studs. Place a washer, lock washer and nut onto each stud, then use a wrench to tighten the nuts. Next, feed banding or the snap-lock brackets through each pair of slots. Feed the cables (fished out of the pole) in through the back of the control cabinet port. Wrap the banding around the pole and tighten with wrench.




Square Post/Flat Surface Mounts: Feed a carriage bolt through each bracket. Place a bracket onto each set of studs. Place a washer, lock washer and nut onto each stud, then use a wrench to tighten the nuts. Feed the cables (fished out of the pole) in through the back of the control cabinet port. Feed the carriage bolts through post. Add a washer, lock washer and nut to each bolt and tighten with wrench.




Pole-top Mounted Solar Panel: Mount the assembly atop the pole, aligning so it will face due south when installed. Hand tighten the square-head bolts (at right), then use a wrench to tighten **just until snug**. DO NOT OVERTIGHTEN! Overtightening will crack the cast housing cylinder. Next, loosen the pivot bracket nuts (far right)and, with a square, tilt the panel so it will receive the maximum solar input from the sun, to an angle of from 45º above horizontal in southern latitudes to a steeper 55º in northern latitudes. Tighten the U-bolt nuts securely.

Pole-side Mounted Solar Panel: Band or bolt the bracket to the south side of the pole so it will receive the maximum solar input from the sun*. Loosen the bolts that secure the pivoting arm to the pole bracket; then adjust the tilt of the solar panel pivoting arm to an angle of 45º above horizontal in southern latitudes, or a steeper 55º in northern latitudes. Tighten the bolts and nuts that secure the pivoting arm to the pole bracket.

*__Horizontally Mounted Solar Panel:__ If your assembly has a mast/trombone arm that points south and would block sunlight to the solar panel, you may optionally band or bolt the bracket to the top of the arm so it can be pivoted upward to receive the maximum solar input from the sun. Attach and adjust as described above.


TERMINAL BLOCK WIRING CONNECTIONS

! CAUTION

Damage can result from applying solar panel power to the controller without having battery power applied to it. To prevent damage, Do Not install the solar circuit fuse without having a charged battery connected, and Do Not disconnect the battery without first removing the solar fuse. Either could damage the controller, voiding any warranty and requiring replacement at your expense.
When disconnecting power, first remove solar fuse; then remove other fuses if desired; last, disconnect the battery.
When connecting power, first remove solar fuse; next connect battery leads and then the solar panel leads; last, insert the fuse(s).

Locate the labeled Terminal Block inside the cabinet, as illustrated at right. Your assembly's order of connections, as well as components, may differ from the ones shown here.

1. Attach the RRFB LED leads:

Attach the RRFB Cable's LED1+ wire to LED1+ on the terminal block.

Attach the RRFB Cable's LED1– wire to LED1– on the terminal block.

Attach the RRFB Cable's LED2+ wire to LED2+ on the terminal block.

Attach the RRFB Cable's LED2– wire to LED2– on the Terminal Block.

2. Attach Activation Device leads (pushbutton, keyswitch, motion/infrared detector, etc.): Note that Terminal Block Label could read either or 'PB NO' and 'PB Common', or simply 'N/O' (Normally Open) and 'Common': both connect identically.

Attach either wire from the Activation Device to terminal block's '(PB) Common'; tighten screw.

Attach the other wire from the Activation Device to terminal block's '(PB) N/O'; tighten screw.

3. Attach any Optional Device leads: Follow the instructions in all separate User Guides, as well as all QuickStart Guides located in a sleeve inside the cabinet.

If there are additional components that require power connections, connect them to their corresponding terminal block positions, or to the 12VDC terminals if appropriate.

Proceed to section on Erecting System; Attaching Battery and Solar.

BATTERY REPLACEMENT

Read Warning statements on this and following page. Batteries should provide years of use, but will eventually require replacement. Actual battery life will depend on climate, flash duration and LED intensity. With a replacement battery from TAPCO and heeding the Warning statements above, **first remove the fuses. Then, remove the negative ring connector** from the battery terminal; last, remove the positive ring connector. Remove the old battery. Then, follow the 'Attaching Battery' procedures to complete the replacement process. Always remove the negative terminal first and always connect the negative terminal last. Upon activation the LEDs should begin to flash. Dispose of all old batteries per local code. Do NOT incinerate.

NOTE: Stored batteries MUST be checked monthly and kept charged to 12V. If the batteries are not fully charged prior to installation, your LED devices will not function properly. While charging the batteries you may proceed with other assembly processes.

⚠ WARNING

Batteries normally produce explosive gases which can cause personal injury or death. Therefore, do not allow flames, sparks or lit tobacco to come near the battery. To prevent arcing, always **detach** the battery's negative terminal lead **first**; Always **connect** the battery's negative terminal lead **last**. When charging or working near a battery, always wear gloves, goggles and an apron, and provide ventilation. Batteries contain sulfuric acid which burns skin, eyes and clothing. Disconnect the fuses, battery and solar panel before removing or replacing any electrical components. Always remove the fuses, then the battery's negative terminal first. Always re-connect the positive terminal first.

! CAUTION

Damage can result from applying solar panel power to the controller without having battery power applied to it. To prevent damage, Do Not install the solar circuit fuse without having a charged battery connected, and Do Not disconnect the battery without first removing the solar fuse. Either could damage the controller, voiding any warranty and requiring replacement at your expense.
When disconnecting power, first remove solar fuse; then remove other fuses if desired; last, disconnect the battery.
When connecting power, first remove solar fuse; next connect battery leads and then the solar panel leads; last, insert the fuse(s).

Erect each RRFB-XL™ assembly and anchor it into place. If the control cabinet is installed too high to reach, use a bucket truck and OSHA-approved safety devices. Open the Control Cabinet and proceed with the numbered steps below for battery installation. Keep the two battery leads and their connectors accessible, as they will be connected to the battery terminals after it is inserted into the cabinet.

1. Inside of the cabinet, move the battery cables to the side so they will be accessible. Center the battery on the bottom of control cabinet with the Negative terminal to the left and the Positive terminal to the right (typically with label facing inward).

2. First, attach the ring terminal of the battery cable tagged **'Positive +' to the (+)** terminal on battery. Secure with washer and nut.

3. Last, attach the ring terminal of the battery cable tagged **'Negative –' to the (–)** terminal on the battery. Secure with washer and nut.

4. AFTER attaching Battery, attach Solar Panel leads:

   Attach Solar Panel Cable's Lead tagged (Solar–) to Solar– on the terminal block.

   Attach Solar Panel Cable's Lead tagged (Solar+) to Solar+ on the terminal block.

   Insert the Battery and Load fuses; Last insert the Solar Circuit fuse.

BLINKERBEAM™ RADIO MENUS

The BlinkerBeam® radio menus allow you to view a variety of radio settings and characteristics, as well as to modify and/or test the settings of some functions. Setting your Beacon Timeout is covered on the next two pages: for complete information refer to the separate BlinkerBeam Operation User Guide.

If a radio is not accessed for fifteen minutes, the LCD display will go into power-saving mode: you can re-activate the display by pressing either button. Upon power-up or activating, the BlinkerBeam® radio defaults to the *TAPCO menu in autoscroll mode, explained below.

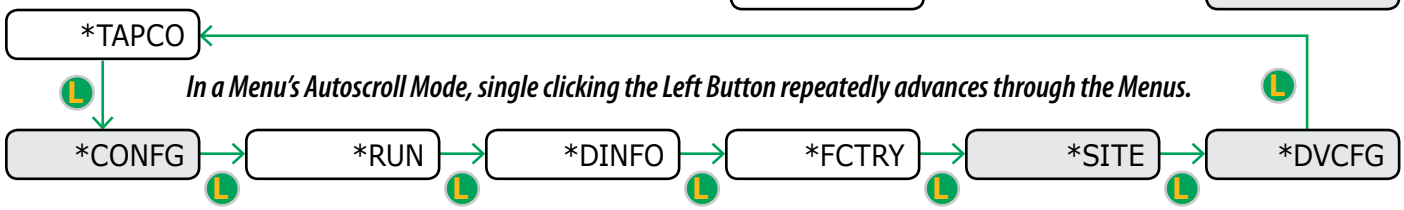
Menus in Autoscroll Mode (illustrated with a white background) automatically loop through their submenu/condition items without button pressing. The ***temporary*** **Manual Mode** (illustrated with a gray background) can be accessed by double-clicking the right button (R R) . Repeating the double-click of the right button toggles you back to autoscrolling mode, where you may advance to the other menus with a single click of the left button (L). All menu titles are preceded by an asterisk (*), with their submenus and conditions listed directly below them.

KEY FOR MENU NAVIGATION

- Single Left Click (L)
- Single Right Click (R)
- Double Right Click (R R)
- No Click: Automatic Scroll

MENU *TITLES: SUBMENUS have no asterisk

AUTOSCROLL **MODE TYPES** MANUAL



Each *Menu has two navigation Modes: Autoscroll and Manual.

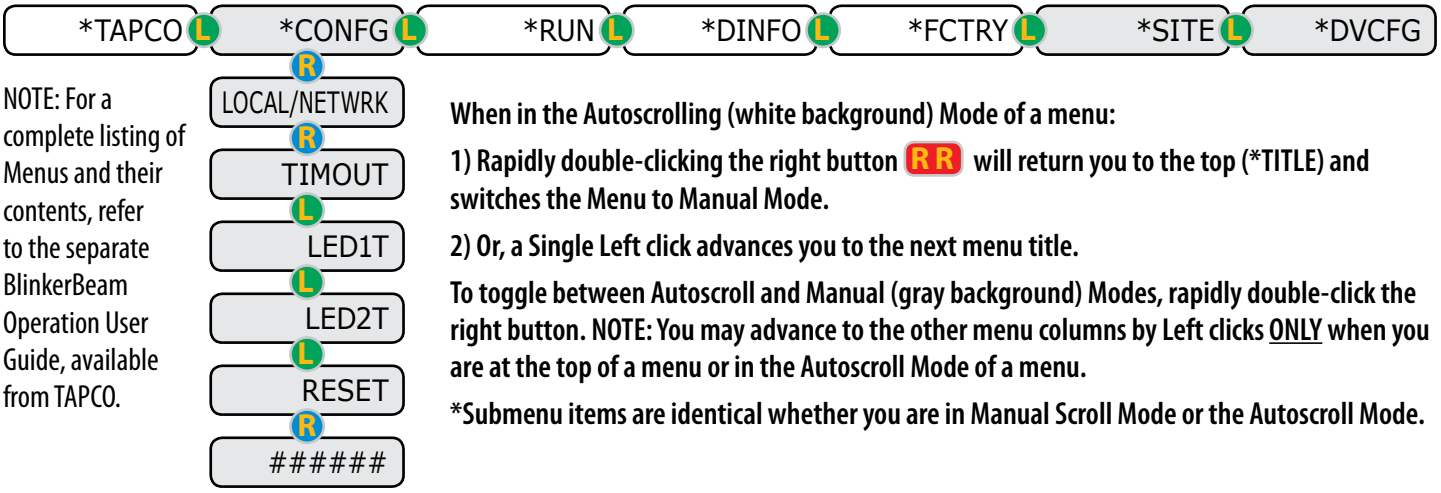
AUTOSCROLL

Menus in Autoscroll Mode (illustrated with a white background) automatically loop through their submenus/conditions without button pressing. Autoscrolling menus can be switched to a *temporary* manual mode by double-clicking the right button. Double-clicking the right button (R R) returns to autoscrolling mode, wherein a single left button click (L) advances to the next menu (to its right).

MANUAL

Menus in Manual Mode (illustrated with a gray background) ***always*** require button pressing (indicated with circled, colored icons) to advance through their submenu/condition items. Advancing through either menu type loops through the submenus and conditions, and back up to the title. From the *TITLE of any menu when in Manual Mode, you can also advance to the other titles with single left button clicks (L) .

Configuration (*CONFG) Menu:



NOTE: For a complete listing of Menus and their contents, refer to the separate BlinkerBeam Operation User Guide, available from TAPCO.

When in the Autoscrolling (white background) Mode of a menu:

1) Rapidly double-clicking the right button (R R) will return you to the top (*TITLE) and switches the Menu to Manual Mode.

2) Or, a Single Left click advances you to the next menu title.

To toggle between Autoscroll and Manual (gray background) Modes, rapidly double-click the right button. NOTE: You may advance to the other menu columns by Left clicks ONLY when you are at the top of a menu or in the Autoscroll Mode of a menu.

***Submenu items are identical whether you are in Manual Scroll Mode or the Autoscroll Mode.**

TIMEOUT SETTING (BEACON FLASH DURATION)

Radios need to be bound before Network settings will take effect. In the Configuration (*CONFG) Menu you can view, modify and/or test your settings on two levels: Device-specific settings within the +LOCAL menu, or System-wide settings within the +NETWRK menu. TIME OUT settings are independent of LED TEST settings: see separate Radio User Guide.

1. From the Autoscrolling Mode of the *TAPCO Menu, click the Left Button. When *CONFG is displayed, click the Right Button once to advance to the Local menu. Then, clicking the Left Button toggles between the Local & Network menus. Choose the level you want to view and/or modify: either +Local (that device) or +Network (all integrated devices) level.
2. The Timeout (TIMOUT) setting controls the Flash Duration of the Local device in +LOCAL Submenu, or ALL connected devices in +NETWRK Submenu. From either, click the Right Button once to enter the Timeout submenu. When the Timeout submenu is displayed (TIMOUT), clicking the Right Button advances to set the flash duration.
3. The Flash Duration (Timeout) of that device (in +LOCAL), or ALL radio-connected devices (in +NETWRK), sets the flashing duration by using a combination of the radio's Left and Right Buttons. With the time displayed in seconds, click the Right Button to advance through the digits (######). While the desired digit is flashing, increase its value by clicking the Left Button.
4. When all digits are set to the desired value, with the device/system flash duration displayed in seconds, press and hold the Right Button for 2 seconds until the display reads 'Saving'. It will then read out the saved Timeout value.
5. Rapidly double-clicking the Right Button (RR) returns the LCD Display to higher menu levels:

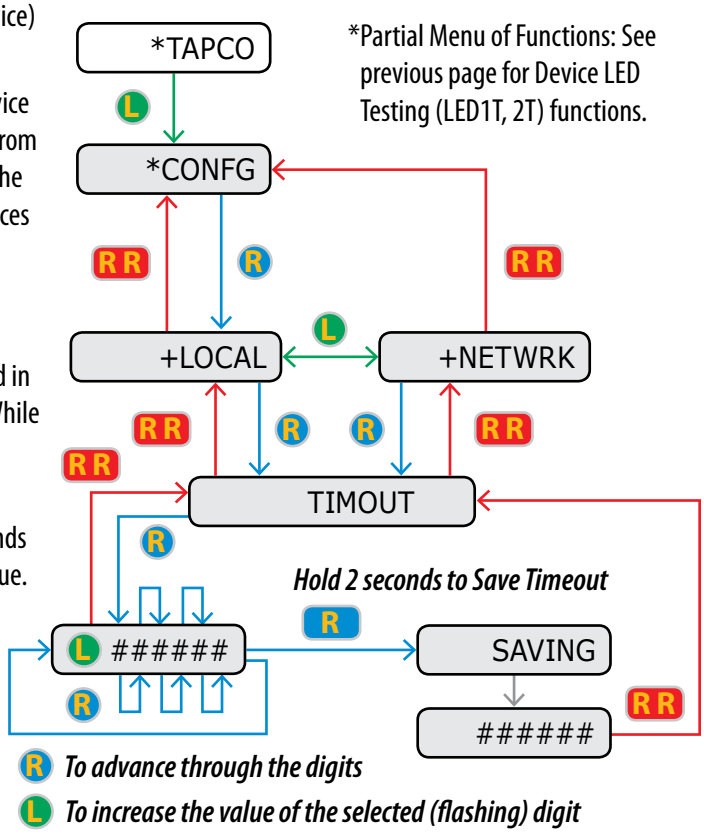
   From Duration, (RR) returns you to TIMOUT, TEST or RESET

   From TIMOUT, (RR) returns you to +LOCAL or +NETWRK

   From Local or Network, (RR) returns you to Configuration

KEY FOR MENU NAVIGATION

- Single Left Click (L)
- Single Right Click (R)
- Double Right Click (RR)
- No Click: Automatic Scroll



*Partial Menu of Functions: See previous page for Device LED Testing (LED1T, 2T) functions.

Step	TIMOUT Flash Duration User Action	Display	Notes
1	With the Display reading *CONFG, click the Radio's Right Button. The display will read +LOCAL. At this level, click the Left Button to toggle between the +Local and +Network menus.	*CONFG +LOCAL (or) +NETWORK	Choose the level which you want to view and to modify or test: +Local or +Network level. Then proceed to the Timeout or Test menu.
2	Click the Right Button to enter the Timeout menu. With the Display reading TIMOUT, click the Radio's Right Button. The display will read ######. At this level, click the Right Button to advance through the digits and the Left Button to increase the value of the selected (flashing) digit to program the number of seconds that the device(s) will flash. When the desired value is reached, press and hold the Right Button for two seconds to Save your settings. The saved value will be displayed again.	TIMOUT ###### SAVING ######	Timeout is the programmable flash duration of the Device(s). The readout indicates the present flash duration setting in seconds, and is independent of the Test Duration, not shown above.
		LED1T, LED2T (typically used ONLY for diagnostics)	Device LED Testing is accessed with a Left click from TIMOUT. Procedures are the same as for the TIMOUT Device Flash Duration: Test Duration is completely independent of the TIMOUT Device Flash Duration.
3	Rapid double-clicking the Right Button returns the Radio Display to a higher Menu level.	TIMOUT	See Flow Chart above.

SUNSAVER CONTROLLER CHARGING STATUS & BATTERY STATE

Note: To analyze this section, all devices and circuitry must be properly connected.

'CHARGING STATUS' LED

Normal Charging Status

SunSaver Controller: With adequate sunlight shining on the solar panel, the LED marked "CHARGING STATUS" (shown here, left) indicates the Controller charging status and any error indications.

When charging during the day, the Charging Status LED is on with an off 'heartbeat' flicker once every 5 seconds. The Charging Status LED is off at night, with an on 'heartbeat' flicker once every 5 seconds. These LED patterns indicate normal operating conditions.

Charging Status Warnings

The Charging Status LED (above, left) indicates charging status and any existing solar input error conditions. The Status LED flashes red whenever an error condition or conditions exist. For further explanation of warnings, refer to 'Protections' section.

Charging Status LED	Charging Indication LED Characteristics	Operating State
None	Off, with ON heartbeat[1]	Night
Green	On Solid, with OFF heartbeat[2]	Charging
Red	Flashing	Error
Red	On Solid, with OFF heartbeat[2]	Critical Error

[1] Status LED heartbeat indication flickers ON briefly, once every 5 seconds
[2] Status LED heartbeat indication flickers OFF briefly, once every 5 seconds

Battery Voltage State Of Charge

The Controller's three LEDs (top, right) indicate the battery's voltage state. If the Red SOC LED is lit, the battery charge is too low for the Solar Controller to function. In this event, disconnect the battery leads and use a 12VDC charger to charge it to a level of 12.6V. If you don't have a 12VDC charger, you may charge the battery with the solar panel in full sunlight without operation, but this procedure may require one or more full day's worth of sunlight.

BATTERY STATE OF CHARGE LEDS

These three LEDs indicate the battery's State Of Charge (SOC). The Green SOC LED should be lit before initially using the system. If yellow or red LED is lit, disconnect and charge the battery before using.

TERMINAL BLOCK

SOC (State Of Charge) Warnings

The three battery State Of Charge LEDs (above, right) indicate the level of voltage in the battery. The SOC indication is based solely on battery voltage setpoints, which provides only an approximation of the battery charge state. The amount of time between a green SOC indication and load disconnect will depend on many factors including:

- Rate of discharge (amount of load draw)
- Capacity of the battery
- Health of the battery
- LVD set point

As the battery discharges, the Battery State Of Charge SOC LEDs (top, right) will transition from green to yellow and then from yellow to flashing red. A flashing red SOC LED indication is a warning that a low voltage disconnect (LVD) event is imminent: if the battery discharges to the LVD set point, the load will disconnect and a solid red Battery Status LED indication will be displayed. Disconnect battery and recharge.

SOC LEDs	Indication	Battery Status	Load Status
Green	Fast Flashing[3] (2 Flashes/Second)	Full Battery: Equalize Charge	Load On
Green	Medium Flashing[3] (1 Flash/Second)	Full Battery: Absorption Charge	Load On
Green	Slow Flashing[3] (1 Flash/2 Seconds)	Full Battery: Float Charge	Load On
Green	On Solid	Battery Nearly Full	Load On
Yellow	On Solid	Battery Half Full	Load On
Red	Flashing[3] (1 Flash / Second)	Battery Low	LVD Warning (Load On)
Red	On Solid	Battery Empty	LVD (Load Off)
None	No LEDs On	Battery Missing	Load Off

[3] Multiple flashing SOC LEDs = Error Condition. See Error Indications.

CONTROLLER PROTECTIONS

NOTE: For troubleshooting purposes the following information is duplicated in a flow chart on the next page, with another flow chart page following that for System troubleshooting. If you still have unresolved issues, contact TAPCO Technical Support.

! CAUTION

Damage can result from applying solar panel power to the controller without having battery power applied to it. To prevent damage, Do Not install the solar circuit fuse without having a charged battery connected, and Do Not disconnect the battery without first removing the solar fuse. Either could damage the controller, voiding any warranty and requiring replacement at your expense.
When disconnecting power, first remove solar fuse; then remove other fuses if desired; last, disconnect the battery.
When connecting power, first remove solar fuse; next connect battery leads and then the solar panel leads; last, insert the fuse(s).

Solar Overload

(Charging Status LED flashing Red) If the solar current exceeds the maximum solar rating, the Controller will stop charging until the solar current returns to within its operational rating.

Load Overload

(Battery Status LEDs sequencing green&red – yellow) If the load current exceeds the maximum load current rating, the Controller will disconnect the load. It will then attempt to reconnect the load two (2) times approximately ten seconds apart. If the overload remains after the first two (2) attempts, the fault must be cleared by removing and reapplying power.

Solar Short Circuit

(Charging Status LED off) The solar input power wires are short-circuited. Charging automatically resumes when the short is cleared.

Load Short Circuit

(Battery Status LEDs sequencing green&red – yellow) Fully protected against load wiring short circuits. After two (2) automatic load reconnect attempts (10 seconds apart), the fault must be cleared by removing and reapplying power.

PV Reverse Polarity

(Charging Status LED off) Fully protected against reverse solar connection. No damage to the controller will result. Correct the mistake to resume normal operation.

Battery Reverse Polarity

(Battery Status LEDs sequencing green&red – yellow) Fully protected against reverse battery connection. No damage to the controller will result. Correct the mistake to resume normal operation.

Damaged Local Temperature Sensor

(Battery Status LEDs sequencing red – yellow – green; Charging Status LED on solid red) The local ambient temperature is short circuited or damaged. Charging stops to avoid overcharging or undercharging. This is a critical error. Contact TAPCO Technical Support for service.

Damaged Internal Temperature Sensor

(Battery Status LEDs sequencing red – yellow – green; Charging Status LED on solid red) The internal heatsink temperature sensor is damaged. This is a critical error. Contact TAPCO Technical Support for service.

High Temperature

(Battery Status LEDs sequencing red – yellow) The heatsink temperature has exceeded 85ºC (153ºF); the solar and load is disconnected. The controller will automatically reconnect when the heatsink cools to 80ºC (144ºF).

High Voltage Disconnect

(Battery Status LEDs sequencing red – green) The battery voltage has exceeded the controller's maximum regulation limit. The solar and load will be disconnected until the battery voltage decreases to the high voltage reconnect threshold.

'CHARGING STATUS' LED

BATTERY STATE OF CHARGE LEDS

CONTROLLER TIPS AND TROUBLESHOOTING

⚠ WARNING

Always use Cut-proof Gloves; Safety Glasses; and OSHA-approved Protective Clothing and Devices while performing all procedures. Failure to do so could result in death or serious injury. *Read the Caution statement on disconnecting the solar fuse before and during battery disconnection.

System tips and troubleshooting are covered on following page. For controller issues refer to the chart below.

SYMPTOM	POSSIBLE CAUSES	CORRECTIVE ACTION: *REMOVE SOLAR FUSE FIRST
Charging Status LED flashes red	Solar Overload	Controller will stop charging until solar current returns to normal rating limits.
Battery Status LEDs sequence green&red–yellow	Load Overload	*Disconnect Solar Circuit fuse, then remove and reapply power. Re-insert fuse*.
	Load Short Circuit	*Disconnect Solar Circuit fuse, then remove and reapply power. Re-insert fuse*.
	Battery Reverse Polarity	*Correct the Battery connections on the battery or terminal block.
Charging Status LED off	Solar Short Circuit	Charging automatically resumes when the short is cleared.
	PV Reverse Polarity	Correct the Solar Panel connections on the terminal block.
Battery Status LEDs sequence red–yel–green; Charging Status LED solid red	Damaged Local Temp Sensor	Critical Error. Contact TAPCO Technical Support for service.
	Damaged Internal Temp Sensor	Critical Error. Contact TAPCO Technical Support for service.
Battery Status LEDs sequence red–yellow	High temperature disconnect	Controller automatically reconnects when temperature reaches acceptable limit.
Battery Status LEDs sequence red–green	High voltage disconnect	Controller automatically reconnects when voltage reaches acceptable limit.

'CHARGING STATUS' LED

BATTERY STATE OF CHARGE LEDS

⚠ CAUTION

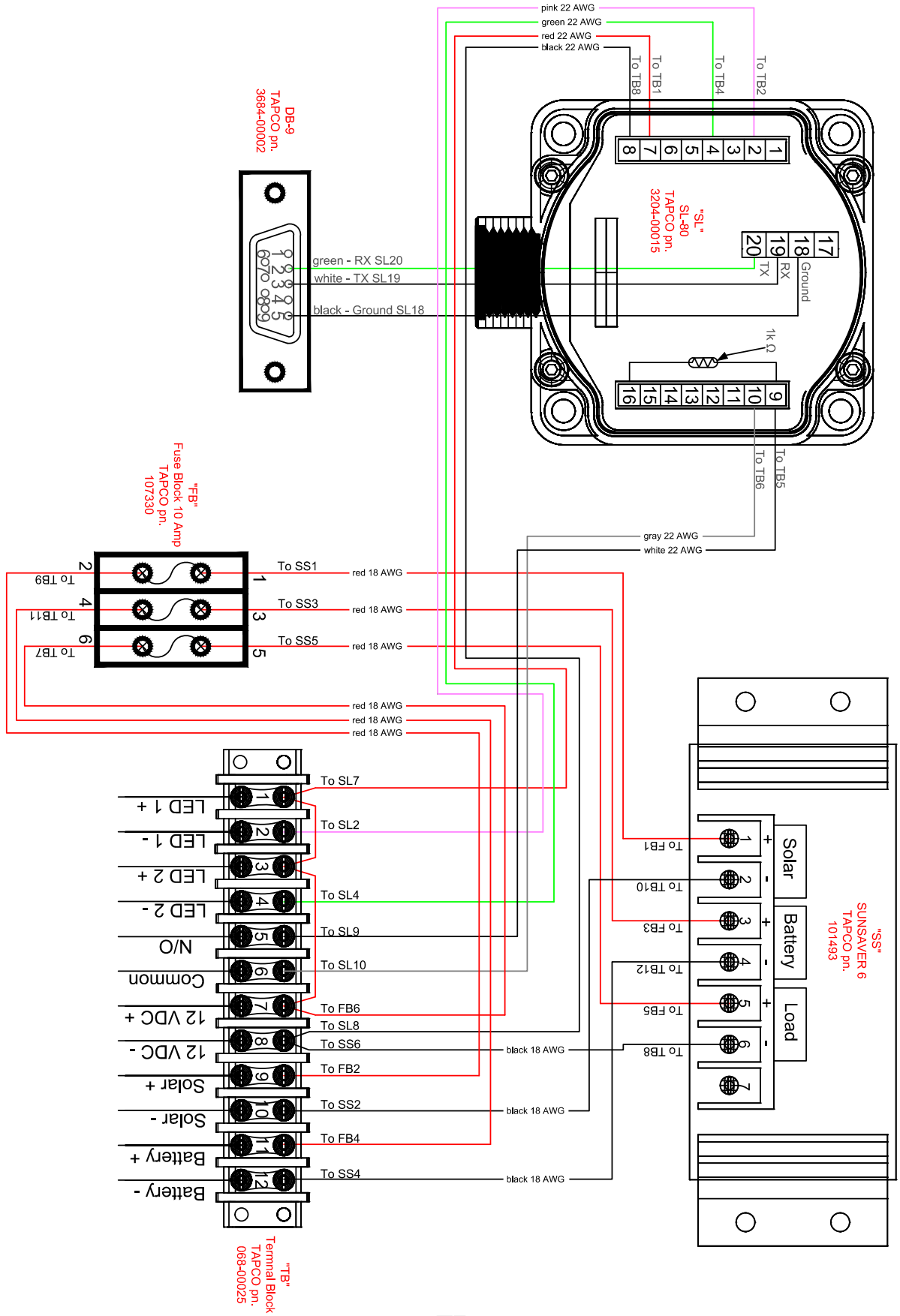
Damage can result from applying solar panel power to the controller without having battery power applied to it. To prevent damage, Do Not install the solar circuit fuse without having a charged battery connected, and Do Not disconnect the battery without first removing the solar fuse. Either could damage the controller, voiding any warranty and requiring replacement at your expense.
When disconnecting power, first remove solar fuse; then remove other fuses if desired; last, disconnect the battery.
When connecting power, first remove solar fuse; next connect battery leads and then the solar panel leads; last, insert the fuse(s).

⚠ WARNING

Always use Cut-proof Gloves; Safety Glasses; and OSHA-approved Protective Clothing and Devices while performing all procedures. Failure to do so could result in death or serious injury. Consider traffic control and lane closures to make installation and servicing less hazardous.

SYMPTOM	POSSIBLE CAUSES	CORRECTIVE ACTION: *REMOVE SOLAR FUSE FIRST
NOTE: Solar Controller indications and troubleshooting are covered on previous pages.	Battery is not fully charged or will no longer hold a charge: if fuses are in, remove them prior to proceeding.	Remove all three fuses. Test battery voltage across terminals: if below 12V, disconnect, remove and charge battery fully: then re-test with a battery load tester, available at some automotive parts suppliers. If not functioning, replace with new, fully charged TAPCO replacement battery or equivalent. Discard old battery per your local code.
	Loose connections or broken wires	Gently test each connection to ensure each is tight. If loose, tighten screw or nut until snug. If a wire is broken, strip and splice it with a shielded connector, or contact TAPCO or distributor for replacement part(s).
LED Array doesn't flash	BlinkerBeam® antenna is loose	Extend antenna straight out from radio and twist clockwise ↻ until snug.
	Insufficient Solar Charging: Make certain that collector face is facing south, tilted 45-55°, and is clear of debris, snow and any other obstruction that prevents sunlight from reaching the collector face.	Align solar collector so it faces due south, towards mid-day sun. If obstructed by trees, trim or remove them to allow more sunlight to reach collector. If obstructed by immovable object, such as a building, mountain or hillside, rotate so collector receives the maximum amount of sunlight. If obstruction is immovable or cannot be altered, consider replacement with larger solar panel or AC-powered system.
	In cabinet, make certain that white lead from solar panel is connected to the Solar+ terminal and the black lead is connected to the Solar– terminal.	Remove Solar Circuit Fuse, then test in sunlight with a DC voltmeter across the terminal block's 'Solar+' (with white lead connected) and 'Solar–' (with black lead connected) to ensure a charging voltage is present, typically 18-22VDC **in full sunlight**. If no voltage is present, open the junction box cover on back of solar panel. Inside the panel's junction box, test the voltage across the '+' and '–' terminals. If sufficient voltage is present, repair or replace the cable running from the solar panel to the cabinet. If no voltage is present, replace solar panel.
Individual LED doesn't flash	Loose wiring/circuitry	Make sure all leads are properly connected and tight, then reactivate.
	Inoperative LED	Contact TAPCO or distributor for replacement part(s).

RRFB WIRING SCHEMATIC



WARRANTY

Please follow the instructions below to Register your Product Warranty.

Warranty amended September 1, 2013: not applicable to systems delivered prior to that date

Traffic & Parking Control Company, Inc., (TAPCO), warrants to each purchaser of a RRFB-XL™ Rectangular Rapid-Flash LED Beacon (Product) for other than personal, family or household use, that the Product will be free from defects in material and workmanship for a period of three (3) years after the date of original purchase.

TAPCO warrants accessories, service parts and components purchased separately to be free from defects in material and workmanship for a period of one (1) year after the date of original purchase. If within such warranty periods any part thereof is proven to TAPCO's satisfaction to be defective, such part shall be repaired by TAPCO or its authorized distributor or, at TAPCO's option, replaced f.o.b. TAPCO's factory without charge, including labor costs at its standard rate incurred while repairing said Product.

TAPCO's obligation hereunder shall be limited to such repair or replacement and shall be further considered upon TAPCO's receiving written notice of any alleged defect and proof of original purchase within ten (10) days after its discovery and, at TAPCO's option, the return of the allegedly defective part to TAPCO f.o.b. its factory or to its authorized distributor.

This warranty shall not apply to any parts not furnished by TAPCO as well as any damage caused by such parts, or to parts which shall have been repaired or altered by others than TAPCO so as, in TAPCO's judgment, to adversely affect the same; or which shall have been subject to other than normal use or service, negligence, accident or improper installation, care or storage. TAPCO will not be responsible for any expense related to parts or labor which is unrelated to defects in material or workmanship of TAPCO Product, including but not limited to acts of God (Force majeure).

The foregoing warranties are exclusive and in lieu of all other express and implied warranties.

TAPCO's liability is limited expressly to the repair and replacement of defective parts as provided herein. TAPCO shall not be liable for any consequential, incidental, or contingent damages whatsoever, whether for breach of contract, breach of warranty, negligence or other tort, or on any strict liability theory.

John Kugel
President
Traffic & Parking Control Company, Inc.

REGISTRATION

The RRFB-XL™ Rectangular Rapid-Flash LED Beacon Assembly from TAPCO represents the latest technology in the field of LED-enhanced traffic control, and is designed to provide you with years of trouble-free service. Please take a few moments to record the serial number(s) below, and keep this document in a safe place for future reference. Registration is simple and will take just a few moments of your time. Please register your warranty on-line at: **www.tapconet.com/warranty**

MODEL NAME: RRFB-XL™ Rectangular Rapid-Flash LED Beacon Assembly

SERIAL NUMBER(s): _____ _____ _____

DATE OF PURCHASE: _____

OPTIONS PURCHASED: _____

INSTALLATION LOCATION: _____

OTHER NOTES:

Document Reference: RRFBXL_55W_BDog_ug_14054200

TAPCO®