

RACE **A** MERICA

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Track Safety Software Owner's Manual

for use with

*Intelligent Track Safety Lights
and Black Flag Displays*

rev C.1

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NOTE: This software program utilizes an internal TCP Server and/or TCP Client, and/or UDP Socket to communicate with other devices and software programs installed on a computer.

Many of the Windows operating systems will detect this type of operation and alert the user with a choice to block this type of communications using the Windows Firewall. In order for this software to communicate properly with other devices and software, insure all network types (Private, Home, Public, etc) are selected (if applicable) and ALLOW ACCESS and/or UNBLOCK is selected. If the user's response to this prompt is to KEEP BLOCKING or CANCEL or ASK ME LATER, Windows will restrict the communications between this program and other devices and

software and block the communications, limiting the effectiveness of this software program.

NOTE: These Windows Firewall prompts will occur only on the first time the Windows operating system encounters an attempt by this software to communicate. The user will not be prompted the next time this program runs making it invisible to the user of a blocked or unblocked communications path. The input at these prompts is stored by Windows Firewall and does not change after the computer is rebooted.



THEORY OF OPERATION

The Track Safety Software runs on a standard 32-bit or 64-bit PC using Windows XP, Vista, Windows 7 or 8 operating systems. The software communicates with the Intelligent Track Safety Lights (iTSLs) and Black Flag Displays through wireless or hardwired connections. For wireless, a USB port via a RaceAmerica 4520 or 4620 Wireless Data Comm Link, for hardwired, through a RS485 interface or Ethernet. The software operates in three basic modes; SETUP, RF MONITOR, and RUN.

Three config and setup modes, Track, Flag, & Lights configure all aspects of the software and hardware using drag and drop features. Track Setup mode provides the ability to move and rotate iTSLs on the PC screen to match their physical locations on the track using a user supplied track diagram image file to serve as the screen background. Brightness levels for the iTSLs can be adjusted and iTSLs can be grouped to illuminate the same flag by clicking on any one iTSL in the group. In Config Flag mode, 16 unique flags with 8 configurable segments each can be colored, animated, and interconnected to provide a series of flags to execute automatically. In Config Light mode, each iTSL can be enabled or disabled, assigned an ID and Panic Flag, and spare iTSLs can be swapped in and out of use.

RUN mode is designed for live practice or race event operation. RF Integrity and Battery levels for each iTSL can be monitored and displayed. If utilizing Black Flag Displays, numbers are entered through the number pad on the computer keyboard.

NOTE: Wireless communication integrity relies on proper placement of iTSLs and Black Flag displays. For more severe non-line-of-sight installations, antennas provided with the units may require extensions to insure consistent communications with the tower.

INSTALLING THE PC SOFTWARE

To install the Track Safety software double click the setup icon and follow the program prompts to automatically install the software and all necessary files.

Next install the drivers for the USB Wireless Unit by following the instructions in the INSTALLATION_INSTRUCTIONS.TXT file.

Once the drivers have been installed a second time, note the red LED on the wireless unit is illuminated and the yellow and green are no longer illuminated. This indicates the wireless unit is properly installed. If the yellow and green LEDs remain illuminated, re-install the wireless unit by unplugging the USB cable, wait 5 seconds, then plug in the USB cable and the Windows OS will begin the new hardware detection process.

NOTE: once a PC USB port has been configured for the wireless unit, insure the same port is always used to connect to the wireless unit otherwise the Windows OS will detect new hardware on a different port and start the driver install process again for that port.

The Track Safety software icon and the Owner's Manual icon will be placed on the computer's desktop. Double click the Track Safety icon to start the program.

ABOUT THE SOFTWARE

The Track Safety software maintains an audit trail file logging time stamped entries of flag selection and turn numbers as well as screen changes. The audit file can be used to determine if the correct flags were selected and displayed during an event. The audit trail is automatic and a file is saved when the software is quit with a new file created in the AUDIT FILES folder.

Figure 1 will prompt to choose the COM port connected to the PC Data Comm and to enable/disable program features. Click on the desired PC COM port to proceed. If the desired COM port is not listed, QUIT the program and check the USB cable connections and restart the program. All other features on this screen are discussed later after a bit of operational setup is discussed.

THE MAIN MENU

The Main Menu is the next screen displayed as shown in Figure 3. The Main Menu displays all the setup, run, and monitoring functions of the software.

LOAD - Use to load a previously saved Track Safety file with background image, iTSL placement, size and transparency, configured flags, and iTSL enabled IDs and Panic Flag. (*Note: the software comes pre-loaded with a few sample files*). LOAD will prompt with a list of previously saved files to select from. Click on the desired file

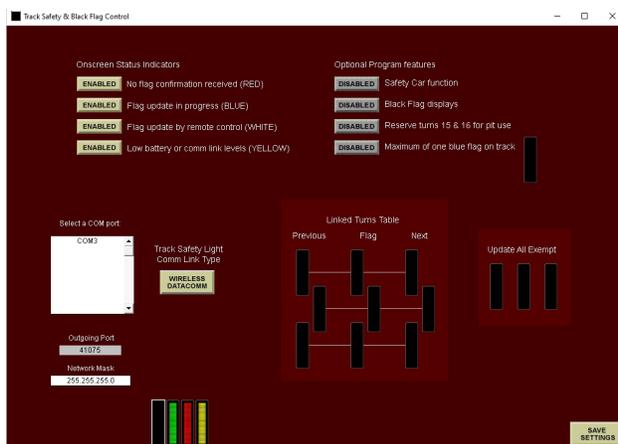


Figure 1 - Data Comm Port Selection

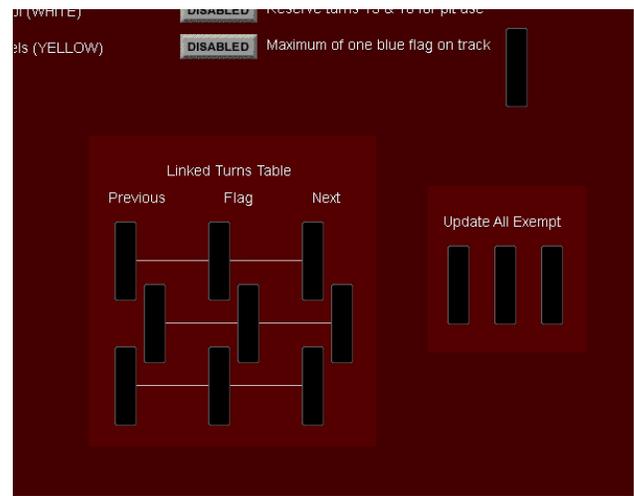


Figure 2 - Automated Flag features

to load and preview the image onscreen.

SAVE - Stores the current image, iTSL placement, size & transparency, configured flags, and iTSL enabled IDs and Panic Flag. Enter the filename to save the current settings for recall using the LOAD function.

RESET - Clears all configured track, flag, and iTSL settings and track image.

SYSTEM SETTINGS - Configure the software for type of communications and error reporting. The functions on this screen are discussed later in this manual.

RUN EVENT - Displays the screen used during a live practice or race event to control the flags displayed by each iTSL on track. The RUN EVENT screen is discussed in detail later in this manual.

TRACK SETUP - Use to select the background image, position the iTSLs onscreen to correspond to their physical position on track. The TRACK SETUP screen is discussed in detail on page 7 in this manual.

CONFIG FLAGS - Use to design and configure each of the 16 flags displayed by the iTSLs to meet track and racing needs. The CONFIG FLAGS screen is discussed in detail on page 9 in this manual.

CONFIG LIGHTS - Use to enable or disable each iTSL by ID number. Also used to swap out iTSLs and reassign spare units. The default Panic Flag is configured on this screen. The CONFIG LIGHTS screen is discussed in detail on page 10

in this manual.

RF MONITORING - Turns each iTSL into a live monitor and display of the RF signal strength received at each safety light on the track. The RF signal strength is displayed on each iTSL with a signal strength bar. The more segments illuminated indicates a stronger signal received.

TRACK SETUP SCREEN

This screen, displayed in Figure 4, is used to configure the onscreen overhead view of the track and position of each iTSL.

Each iTSL ID enabled on the Config Lights screen is displayed. IDs consist of a color (red, green, blue or yellow) and a number (1, 2, 3, or 4) combination. Position each iTSL by clicking on an iTSL ID and drag and drop in position on the track image. To rotate the iTSL to a horizontal orientation, right click the iTSL. Right click again on the iTSL to change back to a vertical orientation onscreen. It is very important to insure the iTSL ID screen location matches its physical location on track.

SELECT BACKGROUND - Click to select a file containing an overhead image of the track used by the software as the onscreen background track image. Compatible file formats are JPEG, JPG, BMP, GIF and PICT image files, either photos or drawings. The Track Safety program will prompt for the location of the track image file. After selecting the desired file, the software resizes the image to best fit the PC screen size. Higher resolution image files will result in clearer background images of the track.

RESET - Click to clear the track image file and reset the iTSL position onscreen.

iTSL TURNS - This function is used to group iTSLs together so all iTSLs in a turn group will always display the same flag when one of the iTSLs is selected. For tracks with difficult corners requiring multiple lights to effectively alert drivers, multiple safety lights can be grouped together to function as a single safety light. Sixteen (16) different turns are available designated as turn1 through 16. Notice in Figure 5, there are two turn group tables at the bottom of the screen

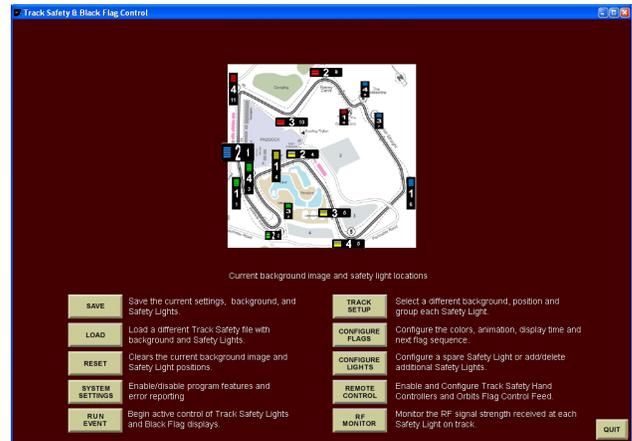


Figure 3 - Main Menu screen
(No image appears first time program is run)

containing all the iTSL IDs and eight turn numbers each, turns 1 through 8 in the left table and turns 9 through 16 in the right table. To link iTSLs into a turn group for a specific turn, locate the ID color and number, then move down to the desired turn number and click in the circle. The circle will change red and the iTSL onscreen will display the turn number selected. To remove a iTSL from a turn group, click on the red dot again. To change turn groups, click on the circle of a different letter and the iTSL will transfer to that turn group.

SIZE - To change the displayed size of the iTSLs, click and hold down while dragging the red bar up or down within the Size bar. Note the size of the iTSLs onscreen will change as the red bar expands and shrinks in size.

TRANSPARENCY - To change the displayed transparency level of the iTSLs



Figure 4 - Track Setup Screen

onscreen, click and hold down while dragging the red bar up or down within the Transparency bar. Note the onscreen iTSL will become more transparent as the red bar shrinks in size. Compare size and transparency settings and iTSLs in Figure 4 and Figure 6.

BRIGHTNESS - To change the brightness level of the physical iTSLs on track, click and hold down while dragging the red bar up or down within the Brightness bar. Note the brightness levels of the flags displayed on iTSLs on track will dim as the red bar shrinks in size. Brightness is also available on the RUN EVENT screen

HELP - To view a 'cheat sheet' explanation of the functions on this screen.

EXIT SETUP - Returns to the MAIN MENU screen.

NOTE: to expand the software screen to the maximum size, click on the maximize button located in the upper right corner of the window containing the program. The image will be expanded to best fit the new screen size.

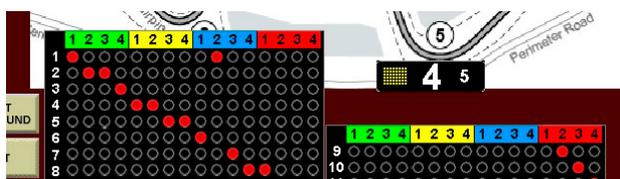


Figure 5 - iTSL Linked Turn Groups

CONFIG FLAGS SCREEN

Figure 7 illustrates the Config Flag screen layout. Each iTSL has a full size LED display panel designed with eight individually configurable segments of LEDs. Five segment colors are available, red, green, blue, and yellow and, of course, black or no color. The Config Flags Screen contains 16 configurable flags to meet the needs of the race event and safety flag requirements. When the software is first run, there are six flags preconfigured as examples. To change a segment on a flag, click the segment. Rotate through each available color by repeated clicking. To duplicate a flag, right click an existing flag, then drag and drop onto a second flag. The segment colors will be duplicated on the second flag.

FUNCTION KEY SHORTCUT - Once all eight segments of a flag are configured, a keyboard shortcut can be assigned using one of the 12 Function Keys generally available on a PC keyboard, F1 through F12. Click on the Function Key box directly below the flag to select a function key. Once selected, the function key is displayed on the flag.

FLAG ANIMATION - Each flag can be animated using one of the 16 pre-configured animation patterns listed on the right side of the PC screen. To select an animation, click on the Animation box directly below the flag to be animated. To view the flag animation with the color segments selected, click the TEST



Figure 6 - Size and Transparency example (compare to Figure 4)

ANIMATION button. All 16 flags will display their selected animation pattern using the color segments of each flag. Click EXIT ANIMATION to return to the Config Flags screen.

TIME TO ALTERNATE and

ALTERNATE FLAG - A sequence of flags can be interconnected to provide a more noticeable flag pattern to the drivers. An example would be to click on a flashing green flag that would change automatically to a solid green flag after 5 seconds and turn off the green after 10 more seconds. The flag to be displayed first would be configured for the number of seconds before the next flag is displayed. Enter the number of seconds (up to 999 seconds) into the Time To Alternate field directly below the first flag. Enter the next flag number in the Alternate Flag field below the number of seconds entered.

For example, enter 10 in the Time To Alternate field of flag #2 and a 6 in the Alternate Flag field of flag #2. When flag #2 is selected on the Run Event screen, it will display for 10 seconds then change to flag #6. Furthermore, also entering a 5 in the Time To Alternate field in flag #6 and a 10 in the Alternate Flag field of flag #6 will further extend the flag changing. Now selecting flag #2 on the Run Event screen will cause flag #2 to display for 10 seconds, then change to flag #6 which will display for 5 seconds before changing to flag #10. This function allows multiple color patterns and multiple animations to be used to more effectively

get the driver's attention separating the safety lights from other lighting on the track. When a flag is configured to change to an alternate flag, an arrow will appear in the upper right corner of the flag. Zero seconds disables the alternate flag function for a given flag.

NOTE: *When multiple flags are interconnected, there are times one of the alternate flags will never be used by itself. Removing intermediate flags from the Run Event screen is helpful to reduce flag selection error. To remove the flag from the Run Event screen, click on the flag number above a flag and a red X will appear to confirm.*

SAFETY CAR - To automatically illuminate all 'SC' Safety Car display around the track when a specific flag is selected, right click on the illuminated yellow SC then drag and drop to the desired flag. A yellow SC will appear in the lower righthand corner of the flag to indicate the SC display will automatically be illuminated on the track when the flag is selected on the Run Event screen. To remove the automatic SC function, right click on the gray SC and drag and drop on a flag displaying a yellow SC indicator.

IMPORT/EXPORT FLAGS - To save a copy of the 16 configured flags with function keys, animations, and alternate flags functions, use the Export Flags function and enter a filename. To load a previously saved set of flags, use the Import Flags function and select the filename for the desired set of previously exported flags.

HELP - To view a 'cheat sheet' explanation of the functions on this screen.

MAIN MENU - When finished configuring flags, click to return to the Main Menu. If a flag was altered or a flag set loaded, the software will prompt to keep the changes, discard the changes, or return to the Config Flags screen.

CONFIG LIGHTS SCREEN

Up to 16 safety lights can be enabled by the program and up to 3 spares safety lights can be made available to be swapped into service or added to the already enabled safety lights as shown

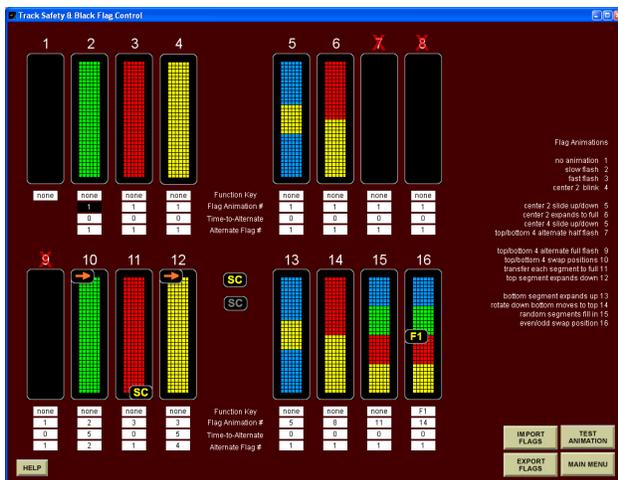


Figure 7 - Config Flags Screen

in Figure 8. When this screen is displayed, the program polls the track for all active iTSL IDs and spare iTSL IDs. All active iTSLs on track display their ID code as one of four colors (red, green, blue, or yellow) and a number of illuminated segments (1, 2, 3 or 4).

ENABLE/DISABLE ALL - To enable all IDs for use by the software, click the ENABLE ALL button. All onscreen IDs will be illuminated. To disable all iTSLs, click the DISABLE ALL button and all onscreen IDs will be grayed out. To enable a single iTSL, click on the onscreen ID and the ID will illuminate. To disable a single ID, click on an illuminated onscreen ID. All enabled iTSLs will be available for use on the Track Setup and Run Event screens.

NOTE: *It is important to insure only active iTSLs are enabled on this screen to maximize the efficiency of the communications between the tower and the on track iTSLs. IDs enabled onscreen but do not exist on the track will cause the software to repeatedly poll attempting to establish communications with the missing safety light.*

TIMEOUTS and PANIC FLAGS - When an iTSL responds, its on track ID is loaded below the corresponding onscreen ID as well as its Revision level, configured Timeout parameter and configured Panic Flag as shown in Figure 8. A Panic Flag will be displayed on an iTSL if there is a complete breakdown in communications with the

tower or an electrical failure occurs with the iTSL. This is a safety backup function to continue to insure the correct flag is displayed by each safety light on the track.

In Figure 8, ID Green 1 is configured to change to an all yellow flag if there is a communications breakdown or it is unable to communicate with the tower for 10 seconds. In the case of ID Blue 2, the Panic Flag configured in the safety light does not match any of the configured flags being utilized by the software and a question mark displays. To change the Panic Flag and/or Timeout, select a Default Panic Flag at the bottom of the screen and enter the number of seconds in the Timeout field, then click ASSIGN PANIC FLAG. A value of 0 seconds disables this function.

REASSIGN IDs and SPARES - To change the assigned ID of an iTSL on track, click on an existing ID. Note the flag sticks to the cursor until it is placed over a different ID and clicked again to reassign. The next software polling of the track will display the ID change and the iTSL will display the newly assigned ID.

HELP - To view a ‘cheat sheet’ explanation of the functions on this screen.

MAIN MENU - When finished configuring lights, click to return to the Main Menu.

RUN EVENT SCREEN

Figure 9 illustrates the main screen used when running a live practice session or race event. The track image, enabled iTSL placement, turn group assignments, and configured animated flags all appear on this screen. To assign a flag to a iTSL, first, click the desired flag and a blue frame appears to confirm. Second, click the safety light onscreen to assign and a blue frame will flash to confirm (if enabled in System Settings). The onscreen iTSL will display the assigned flag and animation while the program sends the new flag information to the iTSL on track. If other iTSLs are turn grouped with the selected iTSL, they will also be updated with the new flag and animation. If the desired flag is already highlighted with the white frame, click additional safety lights on screen to assign.

Two specialty flags are also available: all

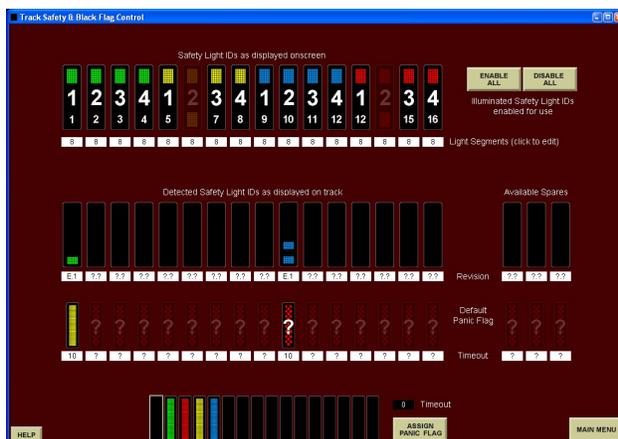


Figure 8 - Config Lights Screen

software will poll again attempting to confirm the all the above with each iTSL. If an error condition is detected by the software, a visual indicator will appear onscreen framing the iTSL where the failure has been detected.

If a response is not received from a safety light, the safety light onscreen is highlighted with a rapidly flashing red frame as shown in Figure 12a.

If a response was received from a iTSL but the RF Integrity level or reserve Battery level is below minimum levels, the detected iTSL will display a slowly flashing yellow frame as shown in Figure 12b.

If a remote hand control has overridden the last flag sent by the tower, the iTSL will display the new flag and frame the iTSLs effected with a rapidly flashing white frame as shown in Figure 12c. Until the tower has sent a new flag to the iTSL or cleared it, the white frame will continue to flash.

If a iTSL on track has been configured with a Default Panic Flag and Timeout AND has not received a poll from the tower for more than the Timeout, the Default Panic Flag is displayed until the iTSL receives a poll from the tower. Before this happens, the PC screen will frame the suspect iTSL with the red frame as shown in Figure 12a to alert the operator of a communication error and possible Panic Flag to be displayed. This is a safeguard against power loss, an accident with a safety light on track, a breakdown in communications, etc. to insure the iTSLs will be displaying a predictable flag controlled by the tower and the iTSL configuration selected by the

user.

SYSTEM SETTINGS SCREEN

Additional features can be enabled and disabled to further customize the automatic operation of the software and safety lights during the race event (see Figure 13).

SAFETY CAR FUNCTION - Click to enable or disable the Safety Car functions of the program and all onscreen references. If flags are configured with SC, they will be removed if disabled.

BLACK FLAG DISPLAYS - Click to enable or disable the Black Flag displays on track and remove the onscreen references. When enabled, the Black Flags positioned around the

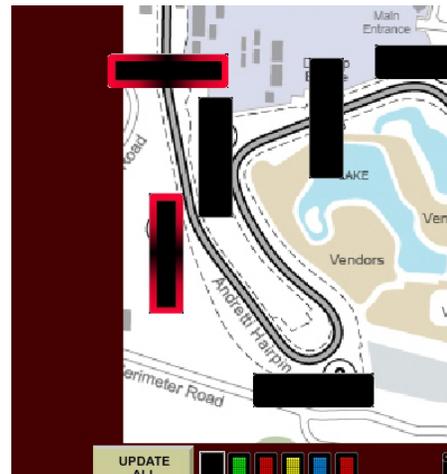


Figure 12a - No response from iTSL

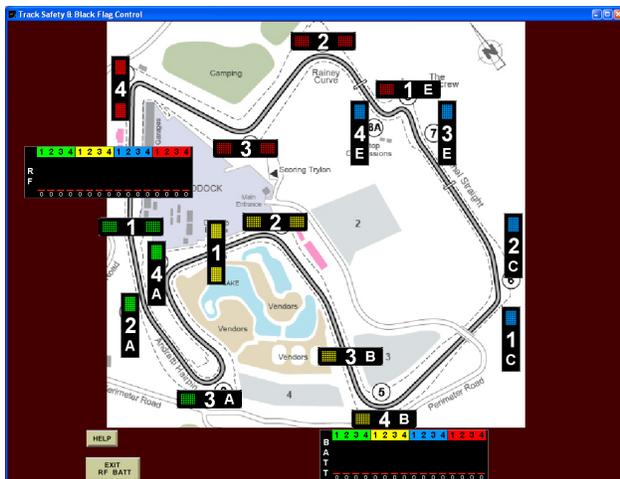


Figure 11 - RF/Battery Monitoring

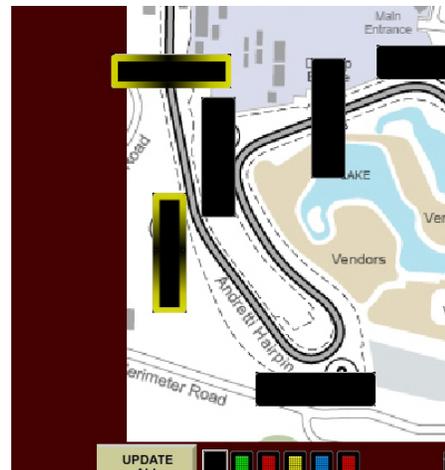


Figure 12b - Low RF Integrity or Battery

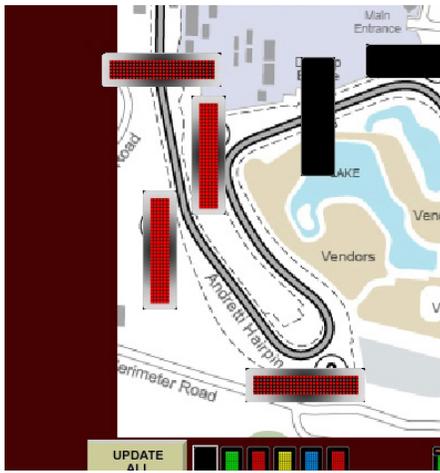


Figure 12c - Remote Override

track are included in the TSL polling.

RESERVE TURNS - Track Safety Lights can be used to control Pit In and Pit Out for the drivers controlled from a hand control or tower. Normally when a full track yellow or green occurs, all safety lights display the same flag. To reserve safety lights for pit use, enable this function and configure the Pit In safety lights on turn 15 and Pit Out safety lights on turn 16. When enabled, turns 15 and 16 will not display full track flags and can be controlled separately by the tower or a hand control using the TrackSafetyEX app and an iPad or iPhone or iTouch.

LINKED TURNS TABLE - NOTE: this feature requires group turn numbers assigned to lights in order around the track. Enabling this features will automatically set a selected flag on the previous turn and/or a selected flag on the next

turn. Select a flag at the bottom, then click in the appropriate Previous/Flag/Next box. Up to three (3) linked sets can be configured.

UPDATE ALL EXEMPT - Placing a flag in this area will prevent those flags from being replaced at any turn when UPDATE ALL is pressed assigning the same flag to all turns. This is useful when a debris flag is indicated at a turn and a full track yellow is sent to all lights.

MAX ONE BLUE - Enabling this features will allow only one turn to display a blue flag at a time. Enable the feature, then select a flag and place it in the box to the right.. When a turn is set to this flag, all other turns containing this flag will be turned off. This feature allows to flow with a driver around the track clicking the next turn with a blue flag and the previous turn blue goes out.

REMOTE CONTROL

Control of the iTSL's can be direct from the screen or from two remote sources, Mylaps Orbits software using the Rmonitor Feed, and RaceAmerica's Hand Control App using our Track Safety iPhone/iTouch/iPad App.

HAND CONTROL - To enable the Hand Control Server, enter a SERVER PORT number under the Hand Control Server, then click the ENABLE SERVER box to enable. When the server is enabled, a confirming message will be displayed. Up to eight Hand Controls can be enabled and assigned to control all turns or a specific turn. Up to five flags can be assigned to

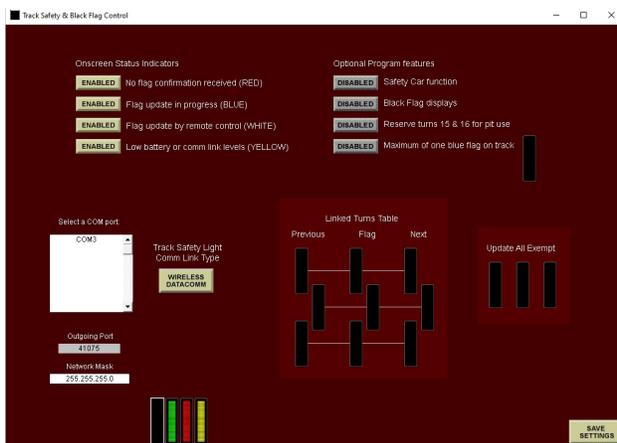


Figure 13 - System Settings Screen

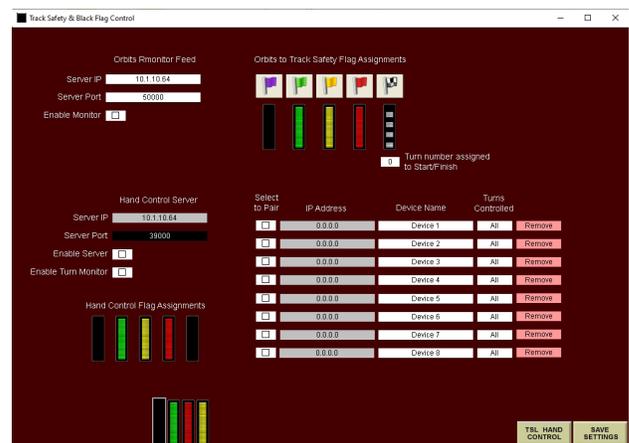


Figure 14 - Remote Control Screen

each Hand Control.

To 'pair' a Hand Control with the Track Safety software, start by clicking REMOVE in one of the rows to reset the current entry, then enter a DEVICE NAME to be assigned to the Hand Control. The software will edit out unusable characters as you type.

Next, click on the TURNS CONTROLLED column and select a specific turn number or ALL. ALL provides full control of all turns as well as individual control of each turn. Up to five flags can be assigned to each Hand Control by clicking on a flag at the bottom of the screen, then clicking in one of the 5 slots under HAND CONTROL FLAG ASSIGNMENTS.

Next, click the box in the SELECT TO PAIR column.

On the iPad/iPhone/iTouch, insure a 3G or WIFI connection is available and start the Track Safety App. Enter the server IP address and server port number into the Hand Control setup screen as shown in Figure 15. Click ATTEMPT PAIRING on the Hand Control to begin the pairing process. Once paired, the IP address of the Hand Control will appear in the IP ADDRESS column of the Track Safety software and the Hand Control will confirm with HAND CONTROL IS PAIRED, then press SAVE on the Hand Control to finalize the pairing and flag assignments. The iPad/iPhone/iTouch will display the turns enabled and the five flags assigned on the iPad/iPhone/iTouch. At any

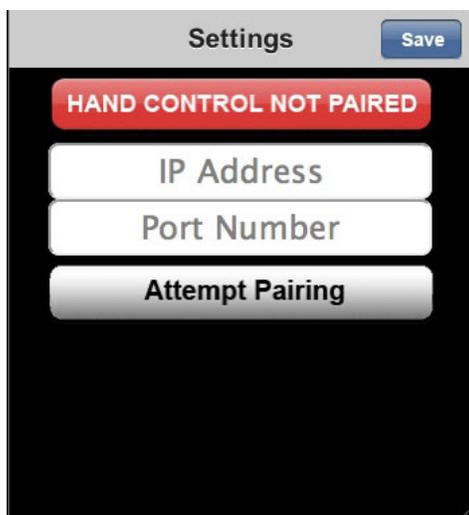


Figure 15 - Hand Control Setup Screen

time, the Track Safety App can be terminated and the turns and flags are stored. When the App is restarted, and the server is enabled in the Track Safety software, the pairing will be reconfirmed automatically. If any of the assigned flags have changed, a message will be displayed on the Hand Control and the new flags assigned and displayed on the iPad/iPhone/iTouch.

To enable Turn Status (flag at each turn) to be displayed on the iPad app, click the ENABLE TURN STATUS. On the iPad app, each turn assigned to a safety light will be updated with the current flag and indicate if the safety lights has confirmed if the flag is being displayed on track.

ORBITS SOFTWARE - To enable control of the iTSL's direct from the MyLaps Orbits software, go to the Scoreboard Settings screen in Orbits and copy the IP ADDRESS and PORT numbers displayed and enable the Scoreboard Feed. In the Track Safety software, enter the SERVER IP and SERVER PORT under the Orbits Rmonitor Feed. Click the ENABLE MONITOR in the Track Safety software to link with the Orbits software. When the monitor is enabled and linked, a confirming message will be displayed. Orbits offers five different flag conditions all displayed on the Remote Control screen in the Track Safety software. Click a flag at the bottom of the screen to highlight, then click the iTSL flag below the appropriate Orbits flag to assign. When a flag is selected in Orbits, the Track Safety software will assign the selected flag to all iTSL's ontrack and frame the onscreen ITSL's in white, if enabled.

HARDWIRED HAND CONTROLLER

Selecting the TSL HAND CONTROL button opens the screen to configure the flags assigned to each button on the 6718T Hardwired Hand Controller connection to each TSL as shown in Figure 16. Flags are selected along the bottom of the screen, then assigned to a button on the hand controller by clicking on a button on the hand controller pictured. Buttons default to a blank flag when not assigned. Once all buttons are assigned flags, press the ASSIGN FLAGS button to send the

flag assignments to each TSL. Use READ HAND CONTROLS to read the flags assignments from each TSL and display by ID and button onscreen.

The screens displays eight (8) ID's at a time so use the NEXT ID SET to advance to the next eight (8) IDs. When complete press SAVE SETTINGS or REMOTE CONTROL to backup one screen.

END PROGRAM

To exit the program, click on the QUIT button on the Main Menu screen. The software prompts to determine what to do with all the setup and configuration contained in the program as shown in Figure 17.

To restart the program and continue with all setting as they are, click YES to save settings to a file and have that file loaded automatically when the program is run again. The user is prompted for a filename to be used to save all settings and accessible in the future using the LOAD button on the Main Menu screen.

Clicking NO will end the program and not save any settings or configurations of lights or flags that may have changed since the program was started.

Clicking CANCEL will return to the Main Menu screen with nothing changed.

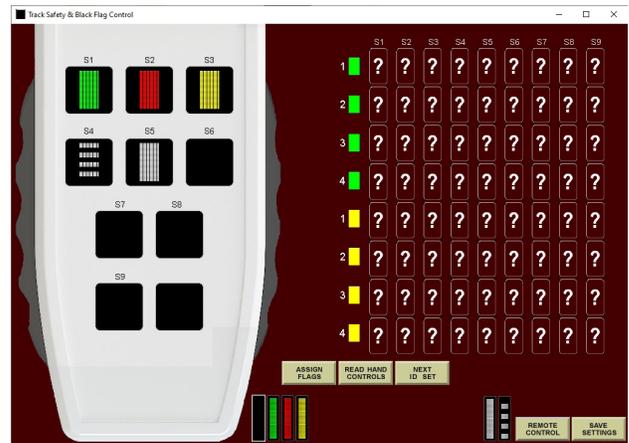


Figure 16 - Hardwired Hand Controller

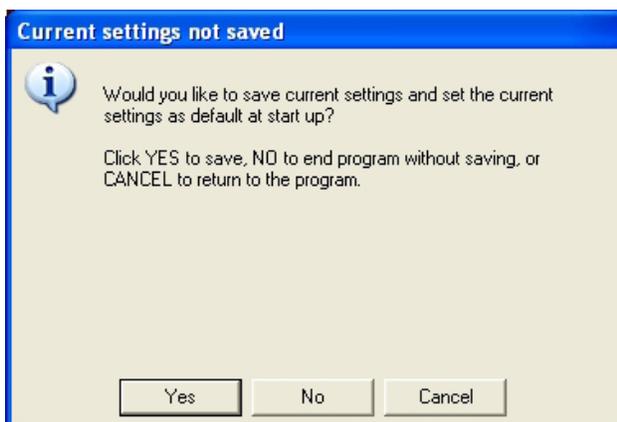


Figure 17 - End program prompt