REF LIGHTS

User Manual

(Wi-Fi Version)

Contents

Part 1: General Operation

This part of the document provides information to get you set up and running the WiFi version of Ref Lights at a competition.
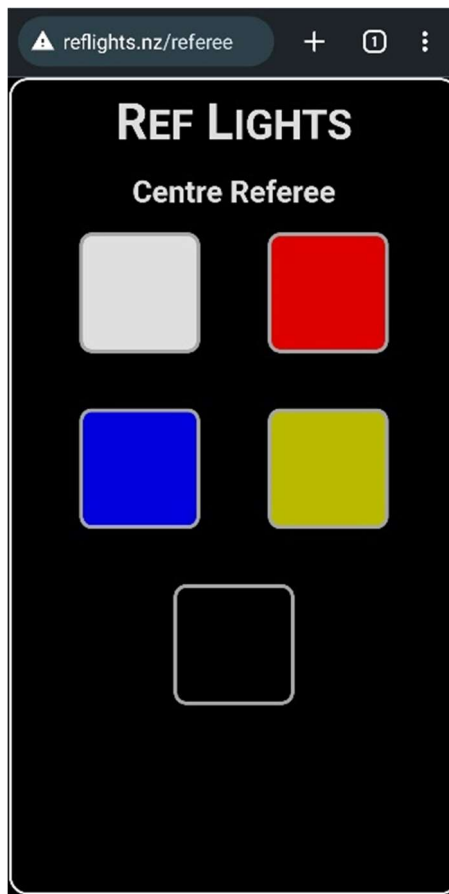
Part 2: WiFi Management deals with management of the WiFi-based components of the system built into the controller box.

General Description

Ref Lights is an easy-to-use system designed to signal referees' decisions in powerlifting or weightlifting events. White 'Good-lift' and red 'No-lift' lights are displayed on a video screen attached to a laptop/PC.

The system comprises a WiFi controller box and an HTML file. The file contains a JavaScript program that presents the lights and a countdown clock in a standard browser running on a Windows based PC or laptop.

In addition, each referee needs a smartphone running a browser in which a keypad used to indicate their decisions is displayed.

A video monitor or TV will also be needed to display the lights in a location visible to the lifters, officials and the audience.

WiFi Ref Lights Controller   Centre Referee's Keypad

Tapping a button on a referee's keypad sends a signal via WiFi to the controller box. The controller box then relays the signal to the PC/Laptop through a standard USB port.

Ref Lights also has an on-screen countdown clock that can be used to show the time remaining for the current lifter to commence their lift. You can also use it to count down the time remaining in session breaks during a competition. Smaller timers can also be used to help lifters and the competition timekeeper by displaying the time remaining for lifters to submit their next attempts to the desk.

The computer software is in a JavaScript/HTML file that runs in a Chrome, Firefox or Microsoft Edge web browser. The code in this file manages the display of the three referee lights and the various countdown clocks in the browser as well as providing for the setting of various configuration options.

> Always use the latest version of the HTML file, which is available for download on the web page: https://weighttraining.nz/ref-lights. Please report any bugs you find in the program so I can fix them promptly.

For powerlifting, Ref Lights can display the coloured infraction cards used by the International Powerlifting Federation (IPF). When the system is run in IPF mode, the cards appear below each 'no-lift' light. In IPF mode, the ref keypads have white, red, blue and yellow buttons for this purpose. When not using IPF mode, only the red and white buttons are used to signal decisions.

A small green spot appears in place of each light when a referee makes their decision. Once all three decisions have been signalled, the three lights will appear. The spots provide confirmation to the referees that the system has received their button presses. They also show when a ref may have forgotten to press their decision button, or when a button may have been pressed by accident.

Ref Lights is optimized to run on a screen with a 16:9 aspect ratio and a resolution of 1920 x 1080 pixels.

As well as the referees' keypad buttons, keys on the computer keyboard can also be used for certain functions as explained in the Lights Operation section of this document. See also: Summary of Keyboard Functions

Components

Essential:

- The WiFi 'Ref Lights' controller box
- The Ref Lights HTML file
- For each of the three referees: a smartphone (must have 2.4GHz WiFi capability and a web browser)
- PC/Laptop running Windows 10 (or higher) with keyboard, mouse and an available USB port
- An up-to-date version of the Chrome, Firefox or Microsoft Edge browser installed on the PC
- Driver program for the controller box
- A suitable external display screen, TV or projector

Although you can run Ref Lights on-line from the internet in your computer's browser, it's highly recommended that you download the HTML file to your computer or a USB memory stick and run it 'off-line'.

Optional:

- The supporting files in the compressed package **ref-lights.zip**
- Sound system to amplify the countdown timer warning buzzers.

The compressed file package contains sample warning buzzer sound files for the countdown timer, a sample banner file and a sample file for a customised lights shape. Users can replace any of these files with their own but must use the same file names. A banner file is used to display a static image on the screen, such as a club logo, before the competition starts or during session breaks. Two different banner files can be loaded and displayed at different times.

Setting Up for the First Time

Installing the Files on the PC/Laptop

Open your browser on the PC/Laptop on which you want to run the lights, go to the Downloads section of the Ref Lights web page https://weighttraining.nz/ref-lights and download the HTML file (**ref-lights.html**) and the zipped file package (**ref-lights.zip**). The files in the zip package are:

- **warning.mp3**   (lift countdown warning buzzer sound)
- **timeout.mp3**   (lift countdown time expired buzzer sound)
- **banner.jpg**   (sample banner file)
- **custom.png**   (sample customized lights file)

Extract the files in the zip to a folder in your file system (or a USB stick). *Make sure the extracted files are put in the same location as the HTML file*.

The only essential file is **ref-lights.html**. (Optionally, you can choose to run Ref Lights online from https://weighttraining.nz/ref-lights/ref-lights.html without having to download any files.)

Installing the Driver Program on the PC/Laptop

When you plug the controller into a given computer for the first time, a driver program may need to be installed on the computer. Make sure you have an internet connection at this time so the computer can check for driver updates. Once the driver has installed (you should see a message), unplug the controller and plug it in again. You may also need to restart the PC before the driver will work.

Setting the Passwords on the WiFi Controller

Before using in a live situation, you should change the Administrator password and the WiFi password in the Ref Lights controller box from their default values. Refer to *Part 2: WiFi Management* **for how to do this.**

Relaying to an External Monitor

Several methods can be used to relay the screen displayed on the PC/Laptop to an external screen for viewing by the lifters, referees and the audience. Only two will be mentioned here, each with its own pros and cons.:

- Video monitor or TV connected to the PC/Laptop by an HDMI cable and used with the second screen function available on most modern PCs or laptops.
- Running Ref Lights in a Chrome browser and using Google's Chromecast technology to relay the screen to an external TV which either has an inbuilt Chrome casting function, or a Google Chromecast dongle plugged into one of its HDMI inputs. (Select 'Cast...' in the Chrome browser's settings.)

Direct connection between the PC/Laptop and the external monitor via an HDMI cable has the advantage of not being reliant on the Internet and a local WiFi network for use and being able to drive more than one external monitor by using an HDMI splitter. The only disadvantage is that it requires sometimes quite lengthy HDMI cable(s) for interconnecting the devices. In my experience, this is the most used and a well-proven method of driving external monitors at lifting meets. The procedure for enabling and configuring a second screen can differ between computers, so you may need to consult your PC/Laptop documentation to find out how to do it.

Alternatively, the fewer cables on the floor around where heavy weights are being lifted – the better, and Chromecast has the advantage of not requiring an HDMI cable connected between the PC/laptop and the external monitor. However, it does require access to a reliable, local WiFi network with internet access at the site. Chromecast dongles are inexpensive and readily available so, if the TV doesn't have an inbuilt Chrome cast function, purchasing one shouldn't be a problem.

To the best of my knowledge, casting is also limited to one device at a time, so if you want more than one external monitor, you're going to have to get the HDMI cables out to interconnect them!

Finally, an issue has been reported with attempting to Chrome cast Ref Lights in some situations. Hopefully this has been resolved in version 4.3.4 of the HTML file. Feedback on any problems experienced with Chrome casting would be greatly appreciated.

At the Start of Every Use

- Check that the USB lead and plug on the WiFi Ref Lights controller box are not damaged and plug it into a USB port on the computer. The blue LED will flash ten times at about 7-second intervals while the controller scans for nearby WiFi channels in use before determining a suitable channel to use for the Ref Lights access point. (**N.b.**: *Controllers with a WiFi firmware version prior to 30.1.0 do not perform a scan and the access point always runs on channel 6 in the 2.4GHz WiFi band*.)
- The WiFi access point and a web server will then start up. Once these are running, the blue LED on the controller box will flicker rapidly for about a second and the controller is ready for use.

Open the browser on the computer and navigate to Ref Lights (either via the online link, or the ref-lights.html file that you downloaded). Bookmarking the location is handy!

If the browser has successfully detected the WiFi Ref Lights controller, it should now be displaying a message similar to the following (version numbers may differ):

Controller firmware version: 30.0.2
WiFi firmware version: 30.1.0

Tap a referee button to continue

If, instead, you see this message:

Ref Lights requires an up-to-date Chrome, Firefox or Microsoft Edge browser.
Referee lights controller not found

either you're using an incompatible browser, or the PC isn't communicating properly with the WiFi Ref Lights controller. Check that you're using an up-to-date version of Chrome, Firefox or Edge, that the USB cable is plugged in firmly and then reload the page (**Ctrl+F5**). If these don't solve the problem, there may be a fault with the controller or the USB cable.

Setting up Keypads on the Referees' Smartphones

Once the WiFi Ref Lights controller firmware is running and you're ready to set up the referees' smartphones to show the decision keypads, press the red Reset button on the controller. The blue LED will flash once.

Set up each referee's phone as follows:

1. **Connecting to the Ref Lights controller's WiFi access point**:
   Got to the phone's WiFi settings and look for the Ref Lights controller in the list of available WiFi networks. (The default network name is 'Ref Lights', unless it's been changed by the administrator as per the instructions in *Part 2: WiFi Management*.) Select the network and enter the WiFi password as previously set by the Ref Lights administrator.

2. Note that the access point is 'standalone', meaning It does not provide internet access. The phone may take a little longer than usual to connect to it while it (unsuccessfully) searches for a route to the internet. It will also usually warn that there's no internet available. In practice this shouldn't be a problem, since referees will be concentrating on the job at hand rather than using the internet. (They can, of course, disconnect from the Ref Lights WiFi during breaks and once their refereeing session is complete!) Phone calls and SMS messages will still work as usual via the local cellular network while the phone is connected to the Ref Lights WiFi network.

3. Once the phone has connected to the Ref Lights WiFi, open a browser and go to the web server's home page at:

   reflights.nz

   Again, note that this is not an internet address and will only be accessible while the phone is connected to the Ref Lights WiFi!

4. At the home page select either IPF or Other as the button layout that will be used and then select the position at which the ref will be located: Left, Centre or Right.

5. Once the button layout and position have been selected, the referee' decision keypad will show and their reffing position has been 'claimed' by the phone.

   [Once the *first* ref has claimed a position, the button layout is automatically set for the other referees, based on the layout chosen by the first ref.]

Once a ref has claimed a position for their phone to be used at, they won't be able to change it until the positions are reset at the controller box.

If the referee positions need to be changed, the positions must be reset at the controller by pressing the 'Reset' button. This could be necessary because a referee didn't choose the correct position or because they need to hand their position on to another ref who will be using a different phone. Once all three ref positions have been claimed, no-one else can take them, without having access to reset them on the controller.

Following a controller reset, any action by a referee on the Ref Lights site (e.g. button press, page reload, etc.) will take them back to the home screen where they can re-select the button layout and ref position.

Because *all* three refs must re-select their positions following a reset, the controller should be kept under supervision so it can't be reset by an unauthorised person during competition sessions.

Configuring the Options

Once the keypads are set up on the referees' smartphones, pressing any of the buttons on a ref's keypad will clear the firmware version message on the PC/Laptop screen and display a "Configuration Selection" screen, where you can select the various options you want to use for the session. The on-screen descriptions of each option are mostly self-explanatory, but note the following:

The black buttons on the keypads are the 'Clear' buttons. They're used to clear green spots or lights from the screen.

In addition to the clear function, you can select an option that allows the Centre Ref's black button to also function as the start button for a 1-minute lift countdown. With this option selected, priority is given to the button's "clear" function when one or more spots, or the lights, are showing on the screen.

Saving configuration selections as your favourite is covered in a later section.

Assuming you're not going to save a favourite configuration at this point, click on the "Use this configuration" button. The screen will then clear and the browser will switch to full-screen mode, ready for you to start using the lights.

Lights Operation

Once you've clicked "Use this configuration" and the browser is in full-screen mode, operating the lights is simple:

- Each ref presses a button to signal their decision on a lift (WHITE, RED, BLUE or YELLOW when configured for IPF mode, otherwise WHITE or RED). As each ref makes their decision a green spot will appear on screen in the corresponding position. Once all three refs have signalled their decisions, any time showing on the lift countdown clock (see later) will automatically clear and the lights will show. You can also choose to have a short delay before the lights appear.
- Right up until when the lights appear, any ref can press another button to change their decision.
- A *Side* Ref's BLACK button clears a spot showing for that ref only. (Effectively cancelling their decision or clearing an accidental key press.)
- The *Centre* Ref's BLACK button clears *all spots or lights* on the screen. They can also be cleared from the keyboard.

Keyboard

A large countdown clock in the centre of the screen can be used to indicate the time within which the current lifter must commence their lift, or to time a session break. Countdowns can be set in 1-minute increments.

Keys used to operate the countdown clock:

- **Numeric keys:** These start a countdown for the corresponding number of minutes. So, pressing **1** starts a 1-min countdown. A *Lift* countdown can be set for between 1 and 5 mins. *Lift* countdowns are automatically cleared from the screen once all three refs have pressed a decision button.

  Countdowns of 10 to 30 minutes can be set for timing longer periods, such as *session breaks.* For example, press **2** immediately followed by **0** to start a 20-minute countdown. Unlike a shorter *lift* countdown, the *session break* countdown clock is unaffected by pressing buttons on the refs' keypads.

- **Zero:** Pressing the zero key cancels the current *lift* or *session* countdown – unless it was immediately preceded by a **1**, **2** or **3** key press to start a 10-, 20- or 30-minute *session* countdown.

- **Spacebar:** This pauses/resumes a *lift* countdown. The clock display turns grey when paused. In typical operation, the timekeeper would pause the clock when a lifter commences their lift, leaving the time at which the lift commenced visible for the referees and timekeeper until the lights appear. You can't pause a *session break* clock – it continues until it times out or until **0** is pressed.

- **+ and – keys:** These keys add or subtract a minute on the fly while a *lift* countdown is in progress. They're primarily intended for quickly correcting errors made by the timekeeper.

Keys used for other functions:

- **Backspace**, **Delete** or **End:** (Clear keys) Pressing any of these keys allows the timekeeper to clear all spots or lights from the screen in the same manner as the BLACK button on the Centre Referee's keypad.

- **B and Shift+B:** (Banners) These toggle the display of a banner image (for example, to show a club logo before a competition or during session breaks).

  A banner can only be displayed in full-screen mode and with no *lift* countdown in progress. The banner is dimmed if a *session break* timer is running to make the countdown easier to read.

  To use your own banner, replace the sample banner file with a JPG file with the name **banner.jpg**. The image will fill the full height of the screen, regardless of its width. Press **B** to display this banner.

  You can use a second banner, with the file name **shift-banner.jpg**. Press **Shift+B** to display this banner. Only one banner can be displayed at a time! Pressing either **B** *or* **Shift+B** hides whichever banner is currently being displayed.

- **H:** (History) This shows a summary of the 15 most recent decisions made since Ref Lights was last started. You can toggle the history on and off only in full-screen mode while no spots or lights are showing. The details displayed for each decision are: Date and time of decision, colours of left, centre and right lights/cards and the time remaining on the lift countdown clock when the lights appeared.
  Any banner or clock running will be temporarily hidden while the history is displayed.

- **Esc:** The escape key exits full-screen mode and returns to the configuration menu.

Additional Notes

- Unlike some referee lights systems, Ref Lights will accept lift decisions at any time while the browser is in full-screen mode and the lights are not already showing. There is no action required to signal when the system should start recognizing referee button presses.

- **'Ref decisions pending':** This message appears on the screen if all three refs fail to signal a decision within 8 seconds of each other or if, say, a referee's keypad malfunctions, and the system can't record that referee's decision. The message will clear once the controller box has received a decision from all three refs.
  If the message arises from a referee accidentally pressing a button at some random time, either that ref or the Centre Ref should clear it with their BLACK button, or the timekeeper can do so using the **Backspace**, **Delete** or **End** key.

It's important to clear this message from the screen well before the next lift commences. This avoids any decisions that may still be held in the system from the previous lift from being counted for the next lift! This is a consequence of using a system that will accept ref button presses at any time throughout a session.

- **Lift countdown warnings:** At a time specified in the options, the *lift* countdown clock turns orange, and a buzzer sounds to warn that time is running out. The clock turns red, and another buzzer sounds when time expires. If not cleared beforehand, the clock automatically clears shortly after timing out.

- **Light shape:** Round or square lights can be selected in the options. It's also possible to use an image file to customise the shape of the lights or cause a silhouette or 'watermark' to appear in them. This feature was incorporated following a request from a user! Instructions for creating and using a custom file are in a separate pdf on the web site. The zip file package also contains a sample custom image file.

- **Centre Ref starts lift countdown:** This option allows the Centre Referee to use their BLACK Clear button to also start a *lift* countdown after calling 'Bar loaded.'

  When this option is enabled, the BLACK button functions as usual to clear any spots or lights showing but, if no spots or lights are showing, it starts a **1-minute** *lift* countdown clock. For *lift* countdowns longer than a minute, or for corrections to the time, the keyboard must be used. Pressing the BLACK button again once the timer is running will just restart the 1-minute clock.

- **Lift submission countdowns:** An option allows **1-minute** timers to be displayed at the bottom of the screen to show the time remaining for lifters to submit their next attempt to the desk. When enabled, the timers run automatically: As soon as the decision lights appear for a lift, a 1-minute submission countdown clock appears at bottom-centre screen. On expiry, the clock display turns red and clears from the screen shortly afterwards. If a lifter completes their lift before the previous lifter's submission timer has cleared, the first clock display shifts to the right and a new one starts in the centre for the current lifter. Up to three timers can display concurrently - corresponding to the three most recent lifts.

Changing Options During a Session

Press the **Esc** key to exit full-screen mode and return to the configuration screens. Any countdown clocks will continue to run, but lights will be cleared when exiting full-screen mode.

Saving a Favourite Configuration

If you run Ref Lights *offline* you can save your favourite configuration in a file. With a favourite configuration file in place, the next time you load/reload the Ref Lights HTML file, you'll get the choice of using your favourite configuration or selecting a new one. The file must have the name **ref-lights.config** and must be in the same location as all your other Ref Lights files.

Here's how to create the file:

1. On the "Configuration Selection" screen, select the options you want to save as your favourites.
2. *There's a note at the bottom of the screen reminding you of the location and name the file must have.*
3. Click the "Save as favourite" button and, depending on your browser's Download settings, you'll either be able to choose a location and file name in a 'Save As' dialogue box, or the file may just be written directly to your browser's Download location.
4. If a 'Save As' dialogue box opens, make sure you select the correct location and file name before you save it.
   If no dialogue box appears, you'll have to look for the file in your browser's Download folder and move it to the correct location.

It's the same procedure if you're replacing an existing favourite configuration, except that Windows will remind you that you're about to replace a file.

The favourite configuration feature is not available when you run Ref Lights *online*. However, if your browser has cookies enabled, it stores your *online* configuration in a cookie. If the cookie is there next time you run Ref Lights *online* with the same browser and machine, the "Configuration Selection" screen will show with your last-used options already selected.

Summary of Referee Keypad Functions

| Button Colour	Function
White	Signals a Good Lift.
Red	Signals 'No Lift'. **In IPF mode:** Signals 'No Lift' due to a red-carded infraction of IPF rules.
Blue	**In IPF mode only:** Signals 'No Lift' due to a blue-carded infraction of IPF rules.
Yellow	**In IPF mode only:** Signals 'No Lift' due to a yellow-carded infraction of IPF rules.
Black **(Centre Ref)**	Immediately clears the lights or any placeholder green spots showing on the screen. (Same function as the **Delete**, **Backspace** or **End** keys on the keyboard.) **With option selected:** The button can also start a 1-minute lift countdown clock. (No lights or green spots must be showing on the screen when using this function.)
Black **(Side Ref)**	Clears only that referee's placeholder green spot from the screen.

Summary of Keyboard Functions

Key(s)	Function – General
S	Starts simulation when HTML page is first loaded or reloaded in the browser. There must be no Ref Lights controller plugged into the computer.
Esc	Exits full-screen mode, returning user to the Configuration screen.
1, 2, 3, 4, 5	Starts the lift countdown clock for the corresponding number of minutes.
0, 1, 2, 3, 4, 5, 6, 7, 8, 9	Start a session break countdown of 10 to 30min when pressed straight after **1**, **2** or **3**.
0	Clears a currently running countdown clock.
+	Adds 1 minute to a lift countdown clock while it's running, to a maximum of 4:59s.
-	Subtracts 1 minute from a lift countdown clock while running, to a minimum of 1s.
spacebar	Pauses a running lift countdown clock. Resumes a paused lift countdown clock.
Delete, Backspace, End	Use any of these keys to clear any green spots or lights that are showing on the screen.
H	Toggles display of the 15 most recent lift decisions on or off.

B	Turns on display of the banner.jpg file. Turns off display of either banner file.
Shift+B	Turns on display of the shift-banner.jpg file. Turns off display of either banner file.

Simulation Mode

Starting from version 4.0 of the HTML file, you can simulate the operation of Ref Lights without needing referee phones and controller – a handy feature for learning how to use Ref Lights. Keys take the place of the buttons on the three refs' keypads as indicated in the photo.
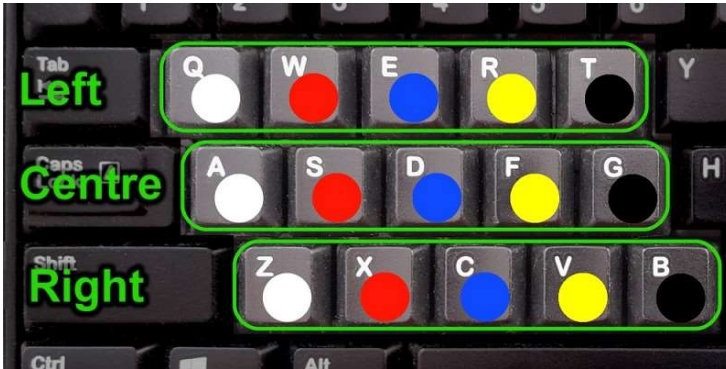
To run Ref Lights in Simulation mode:

- Make sure no controller is plugged in.
- Open the HTML file in your browser.
- When **Referee lights controller not found** appears, press the **S** key.

You'll see on-screen prompts to remind you which key represents each ref's button.

In all other respects Ref Lights will behave exactly as when using ref keypads and a controller.

Ref Lights remains in Simulation mode until you exit from or reload the HTML file.

| Keys	Function in Simulation Mode
Q, W E, R, T	Act, respectively, as the Left Ref's White, Red, Blue, Yellow and Black buttons.
A, S, D, F, G	Act, respectively, as the Centre Ref's White, Red, Blue, Yellow and Black buttons.
Z, X, C, V, B	Act, respectively, as the Right Ref's White, Red, Blue, Yellow and Black buttons.

Sample Screenshots
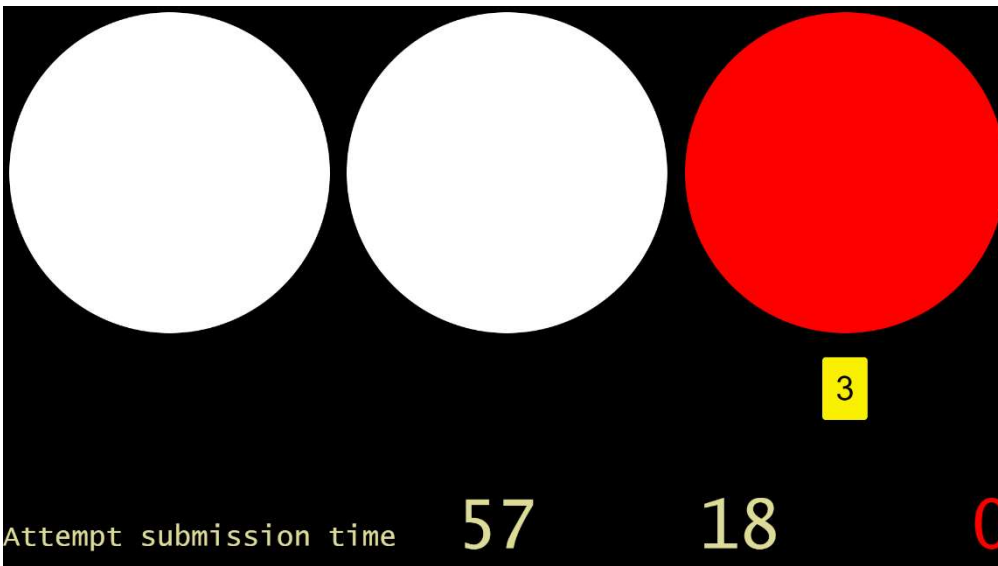
This indicates a good lift (two-to-one majority). IPF cards are in use and the Right Ref gave the lift a yellow card. The lights appeared just 3s ago, so the lifter has 57s to submit their next attempt, the previous lifter has 18s to have submitted their next attempt and the attempt submission time for the lifter before that has expired.

The timekeeper paused the lift countdown (clock grey) at 44s when the current lifter commenced their lift. The Centre and Right Ref's have signalled decisions, but the clock won't clear and the lights won't show, until the Left Ref also signals a decision. The previous lifter has 18 seconds left to submit their next attempt to the desk.
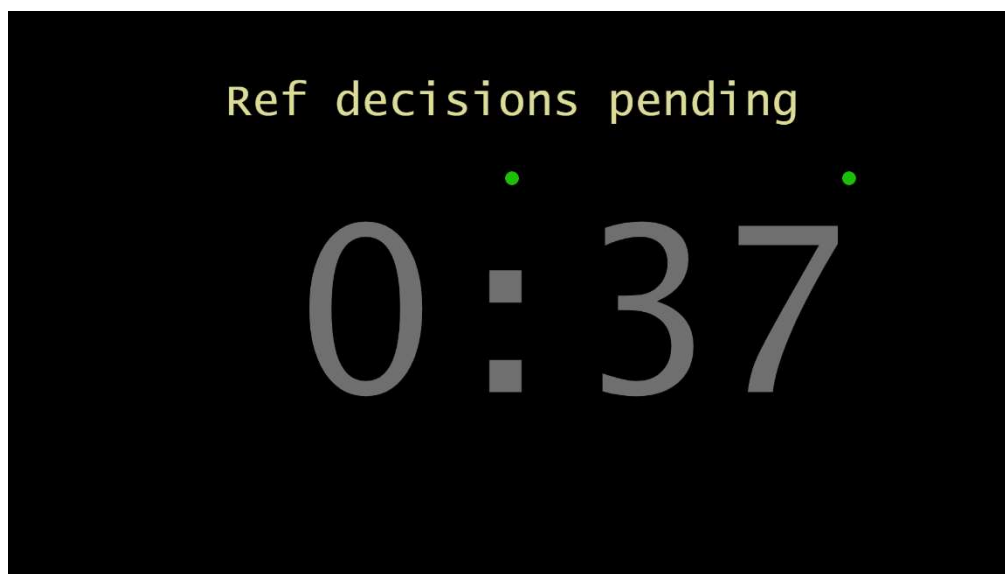

Two refs made decisions, but the Left Ref's phone malfunctioned and the delay caused the warning to show. It's important to clear this before the next lift because, for example, if the Left Ref is first to signal a decision for that lift, the system will have decisions for all three positions and *the lights will show a mix of decisions for that and the previous lift*.
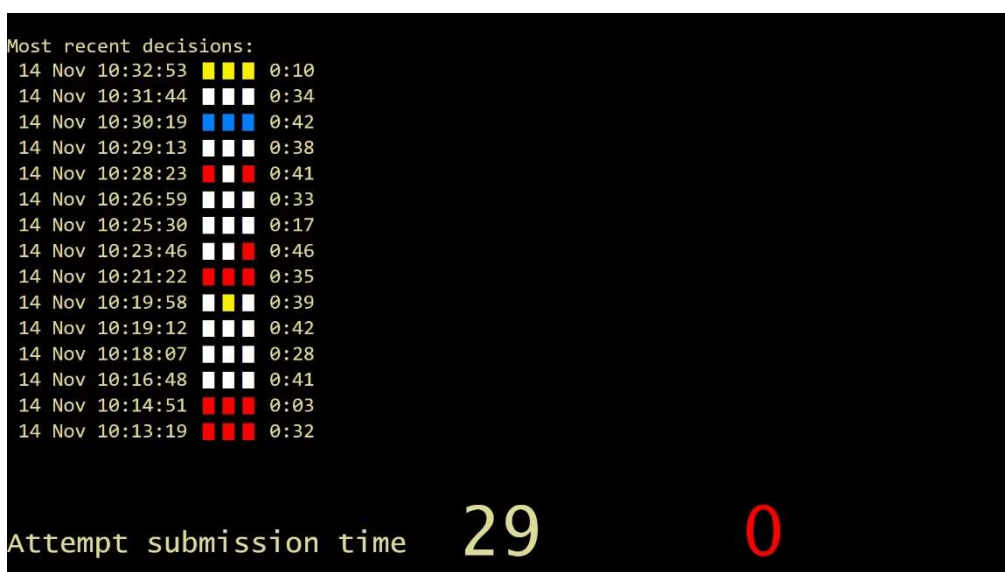
History has been toggled on to review the 15 most recent lifts.

A banner image has been toggled on. Because the session break countdown is also being displayed, the banner is dimmed to make the clock easier to read.
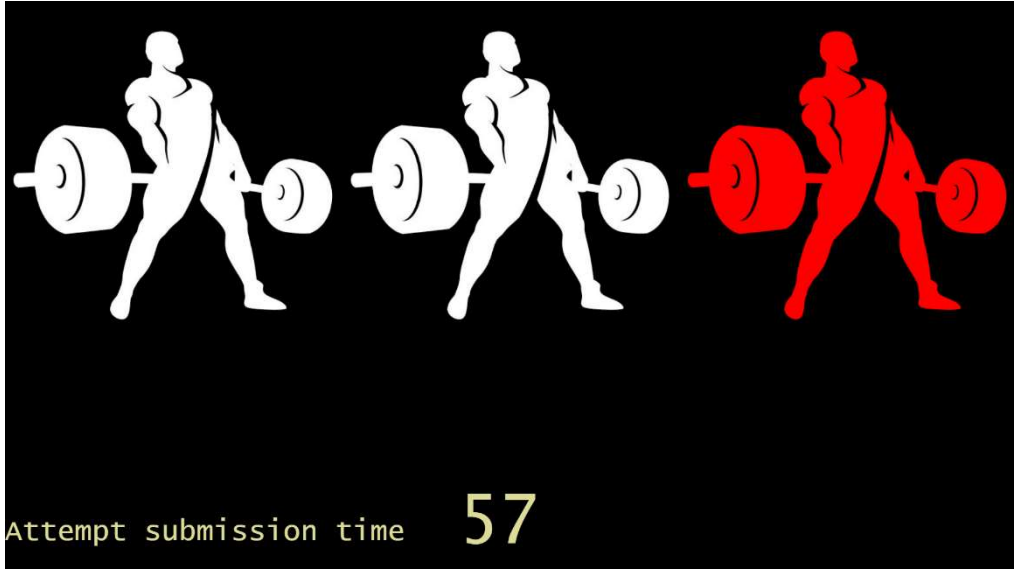
Here are two examples of a custom image file being used to change the lights' appearance.

On the left, the outline of the lights has been completely changed; while a watermark effect has been created in the lower example.
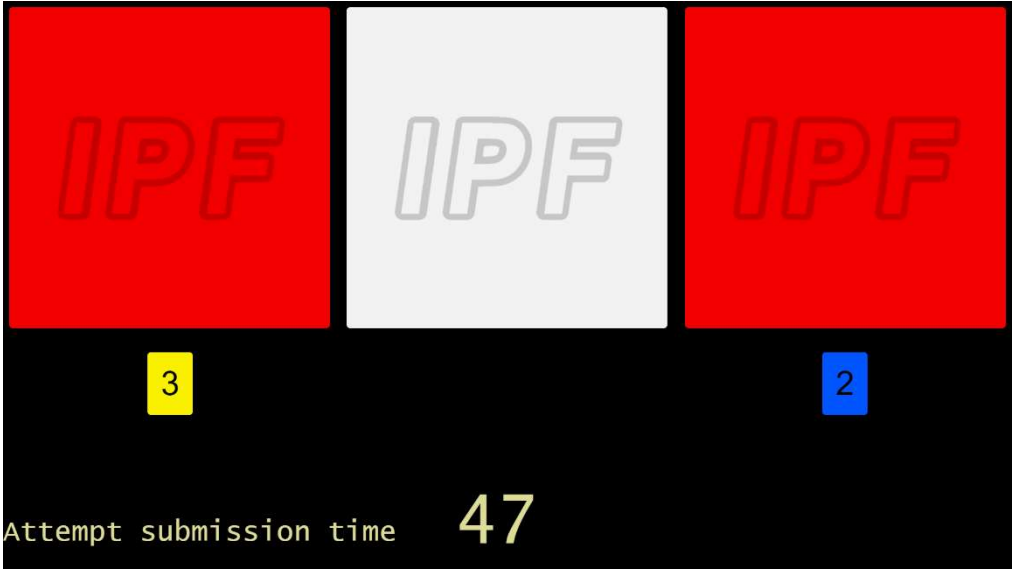
Part 2: WiFi Management

Changing the Administrator and WiFi Credentials

The WiFi Ref Lights controller has an administrator user ID, an administrator password, a WiFi SSID and WiFi password. All four of these are configurable through an administration screen. There is only one administrator user ID and password.

The 'factory' default values are:

User ID:	Admin	WiFi SSID:	Ref Lights
Password:	P@ssw0rd	WiFi Password:	No1nose!

It's very important to keep the administrator credentials secret and, since this document is available to the public, as a minimum you should change the default administrator password before using the system for the first time. Set the password to something which will be very difficult to guess.

The administrator can also change the WiFi SSID (network name) and the WiFi password. As the number of referees who have been given the *WiFi* password grows (and will usually have it saved in their phones' WiFi configuration), it's a good idea to change that password periodically as well – to minimise the chance of some unintended person connecting to the system and hijacking it.

From a security point of view, it's not necessary to change the SSID, and "Ref Lights" does make it easy to find when setting up WiFi on a phone. The security lies in choosing strong passwords, not the SSID and admin user ID!

1. Plug the WiFi Ref Lights controller into a USB socket on a PC and wait for the LED to flicker rapidly – indicating that the WiFi access point and web server are both running.
2. Connect the PC's WiFi to the Ref Lights access point, wait for the connection to be confirmed, then open a browser and navigate to the administrator log-in screen at:

   reflights.nz/admin

   At the log-in screen, enter the administrator user ID and password and click "Continue".
   The eye with the red slash through it means the password will not be shown on the screen. You can click on it to toggle visibility of the password on or off.

3. The next screen allows you to change any of the four configurable items: Admin User ID, Admin Password, WiFi SSID & WiFi Password. Again, the button with the eye toggles password visibility.
4. Make any changes that you want to apply to the items, noting that you only get one place to enter them, so check them CAREFULLY before you click the "Save" button!
5. *Once saved, changes made to the admin User ID and/or password take effect immediately BUT changes to the WiFi credentials won't apply until next time the controller is powered on.*
6. There's a link on the screen to the rules governing SSID, admin user ID and passwords. Check these out before you make changes! The Save button will not show unless all four items comply with the rules. Use the Cancel button if you make a mess of entering passwords or if you don't want to save your changes. Once you press Save or Cancel, you're effectively 'logged out' of the administration function.
7. Finally, if you lose track of what the credentials have been changed to, there's a "factory reset" button inside the controller.
   To return the four configurable items to their default values, you need to open the controller box (unplug it first and be careful not to damage any internal components), press and hold down the button labelled RESET near where the cable enters the controller, plug the controller in and wait for at least two seconds before releasing the button. Unplug the controller and replace the lid making sure not to jam any wires against the reset buttons, round the edges or where the screw holes are. Next time you power up the controller the credentials will have their default values.
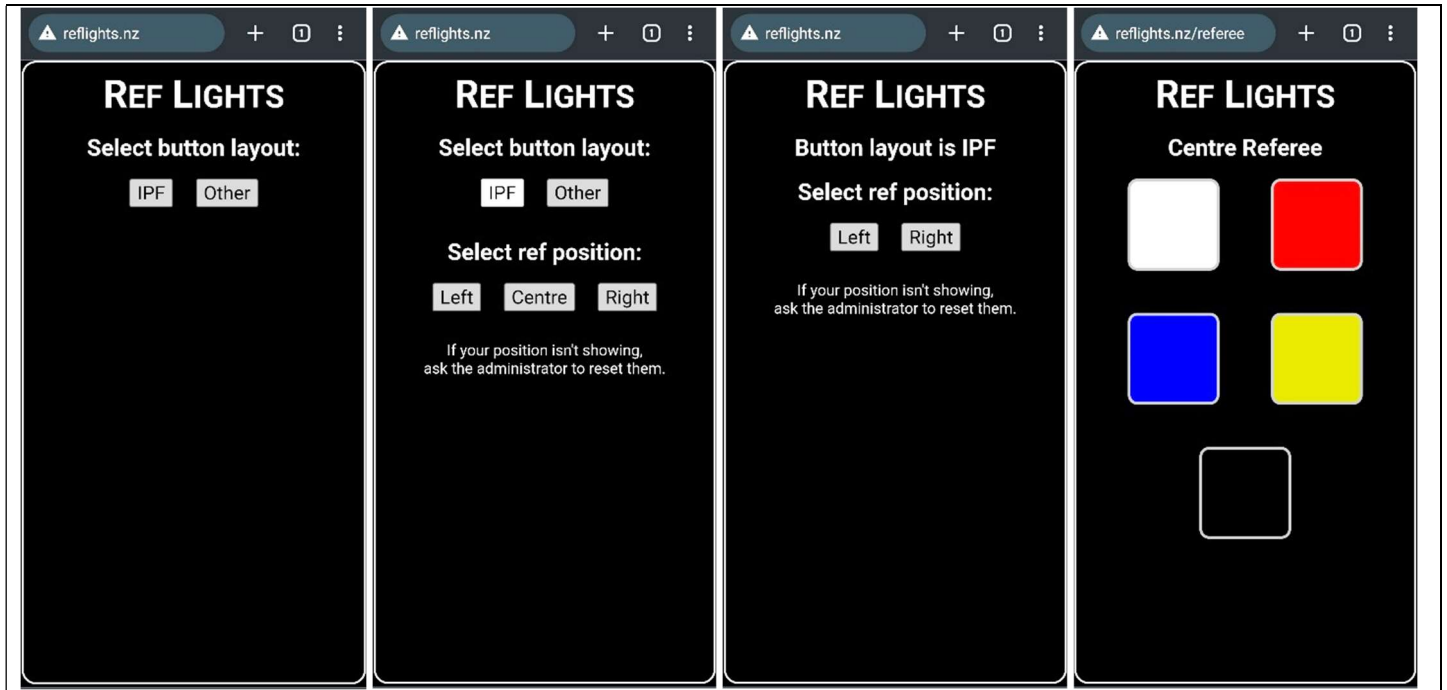
Sample Referee Screenshots (left to right)

First ref – Select button layout

First ref – Select referee position

Second ref – Select from remaining unclaimed referee positions
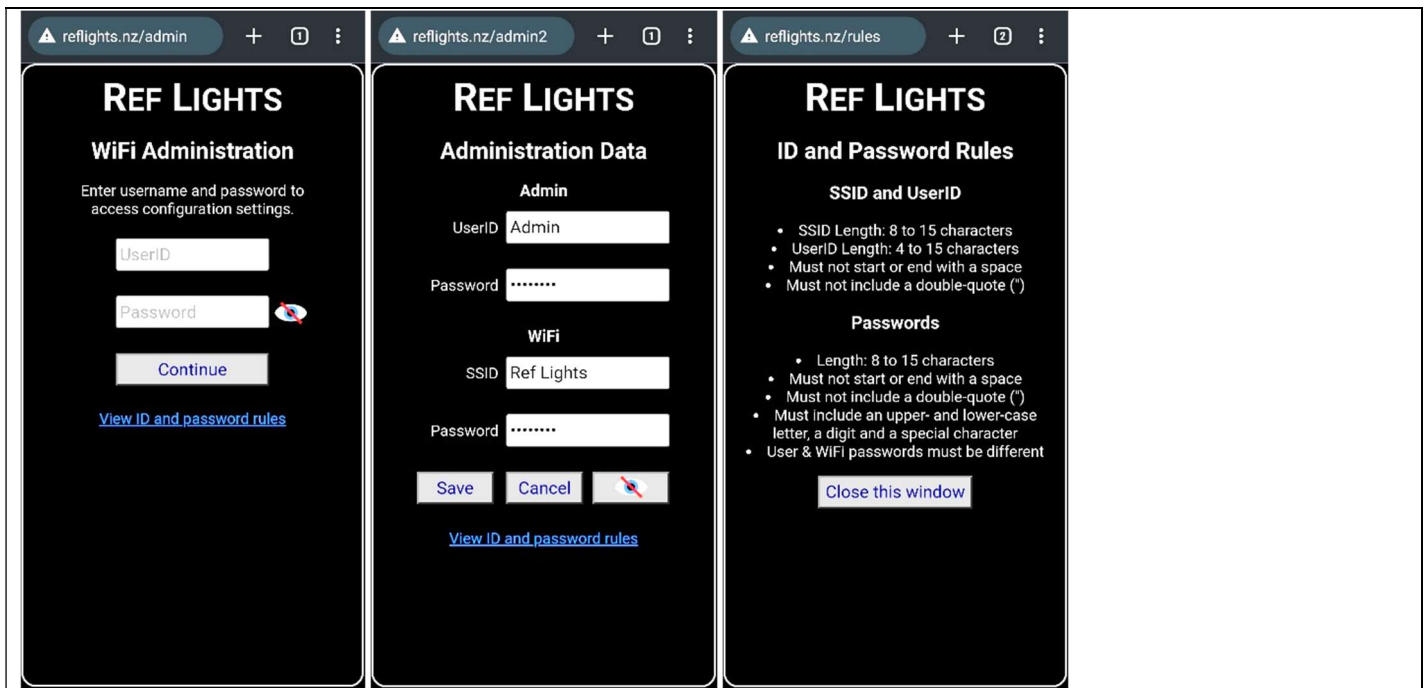
Centre Referee's decision buttons

Administrator Screenshots (left to right)

Administrator 'log-in'

Credentials editor

Rules for setting credentials

Claiming and Resetting Referee Positions

As mentioned in section 1, when a referee selects a position via the Left, Centre or Right button showing on their smartphone, that position is 'claimed' by their phone. In other words, only their phone can access the keypad for that position until the Reset button on the controller is pressed or the controller is unplugged. Furthermore, once all three referees have selected their positions, no-one else who has access to the WiFi password will be able to take control of any of the three positions via another phone, since they've all been claimed. They'll still be able to connect to the home screen, but no unclaimed position buttons will show, so they're effectively unable to do anything.

However, if an unauthorised person manages to get to the home screen before all three referees have claimed their positions they could, of course, claim a position ahead of a referee, thereby blocking the ref from rightfully claiming their position. Should this ever arise, the controller should be reset with the referees physically close to the controller and ready to tap their position buttons as quickly as possible following the controller being discreetly reset. The possibility of this behaviour occurring is hopefully unlikely – particularly if the WiFi password is only made available to genuine referees and changed by the administrator from time to time between competitions.

Optimising the WiFi Connection

- Set up the WiFi controller box well above the floor, preferably on a tabletop and not too close to electronic equipment (PA systems, computers, WiFi routers etc.)
- Ideally there should be a clear pathway between the controller box and each of the referees – no walls, or large metal objects.
- Generally, the shorter the distance between the controller and the referees, the stronger and more reliable the WiFi signal will be. If possible, try to keep the straight-line distances under about 8 metres.
- Perform a test run before the competition proper begins to make sure there are no problems with the Ref Lights WiFi communications. There may be some environments in which other, stronger WiFi access points may interfere with the functioning of the Ref Lights controller. In these cases, it may not be possible to find a resolution and flags will have to be used in place of the lights.

If you suspect a controller is faulty, contact me to discuss the symptoms in more detail. Faulty controllers will be repaired or replaced free of charge (excluding shipping) if the fault occurs within 12 months of purchase, provided the fault isn't the result of mistreatment or failure to follow the instructions in this document.

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