Ball Comparison

Ball Comparison

Ball Comparison follows the same procedure as Club Comparison but allows the performance of different balls to be compared.

- Start by selecting "Ball Comparison" on the main screen.
- Enter the names of two or more balls to compare. There are two ways of ball entry: Simple and Advanced. Toggle between the two by clicking on the Tab marked **Advanced** or **Simple**

  In the **Simple** entry mode, add a ball using the [+] key, type in the ball name and press the Enter key to add.

  The **Advanced** tab provides lists of balls by manufacturer and model. Select and edit balls from these lists. Ball names can be edited after entry if needed.

  To delete a ball entry, select the ball name and use the [-] key to delete. To delete all entered balls at once, select Delete All from the [-] drop list.
- Press **Continue** to proceed.

Ball Fitting Centre

FlightScope's Advanced Ball Fitting uses Advanced Golf Solutions[1] ball performance data of actual ball performance tests as a subscription feature. A 10-day "free trial" is provided for evaluation.

How to use Ball Fitting

Fitting starts by entering the Player and then selecting a reference ball to test from the list provided.

Continue to play several shots (3 to 6 recommended) with the reference ball. Delete wayward shots if needed so that a representative sample is obtained.

The "best" ball fit is now evaluated depending on chosen criteria of Distance, Accuracy, and Control. These are set on the Dials provided on a scale of 0% to 100% for each.

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Distance is traded off against Accuracy. For example, if the golfer wants the best ball for distance, the dials are set to 100% Distance and 0% Accuracy. If the player wants the best combination of Distance and Accuracy, the dial is set for 50% Distance and 50% Accuracy. Note that the two dials add to 100%.

"Control" represents Accuracy Dispersion. The relative "weight" of between 0% and 100% can be set independently from the other criteria.

The Ball Fitting routine evaluates total distance, carry distance, accuracy dispersion, ball speed, launch angle, and spin for all balls or for a selected sub-range in the database. Measurements from the reference ball are applied to the other balls in the database with consideration of the selected weights.

The best performing balls will be ranked in a list from "best" to "worst".

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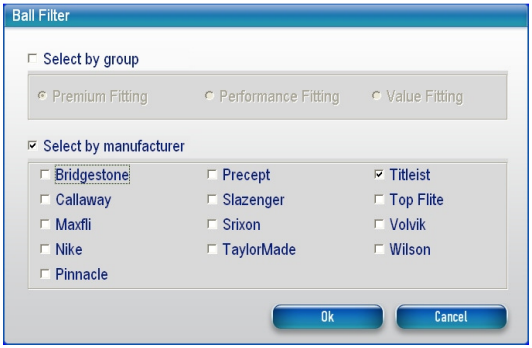
Limiting the Ball Range

Use **Settings** to select the range of balls used for comparison.

Filters can be selected to limit the choice of balls to specific manufacturers (0ne or several) or to a price range (Premium, Performance, or Value).



Modifying Fitting Criteria

The user can re-evaluate the ranking for different criterion settings, e.g. by adjusting the relative weight of the Distance dial, and noting the new ranking.

[1] http://www.agsballfit.com/ "proprietary software and equipment specially designed to conduct golf ball testing" et al.

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Publishing reports

What can be published

A report can be published from any screen with the Publish icon, or from the Advanced Menu (F10 > Publishing)

A report can be of current session data, or of saved History data (retrieved by **Load History)**.

Publish format can be:

- Data Table
- Trajectory graphs
- Screen image:
    - Current screen
    - All screens

Publish options

Reports can be published to a Printer, or to a PDF file, or to the email address associated with the player.

Publish to printer:

- Ensure that your printer is connected to the Computer, switched on, and has sufficient paper for printing.
- Check that the data on the screen represents the data you wish to print (player name, date, etc.)
- Click on the Publish icon to display the Publish window.
- Select "Printer" and paper size (A4 or Letter).
- Select "Trajectory" (for graphs) or "Table" (for tabular report) from the "Style" section, and click on the "Ok" button.
- Select or confirm the printer from the "Print" dialog and click on the "Ok" button to start the printing.
- Wait for the printer to complete printing.

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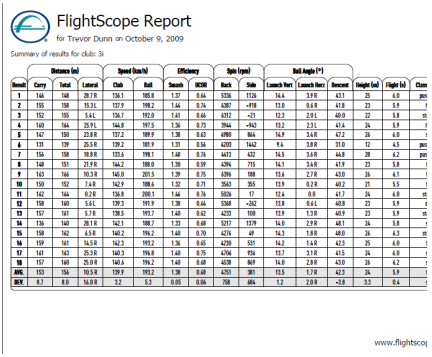
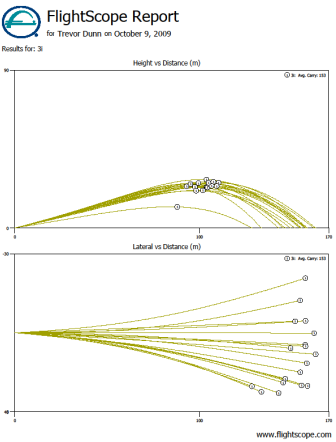


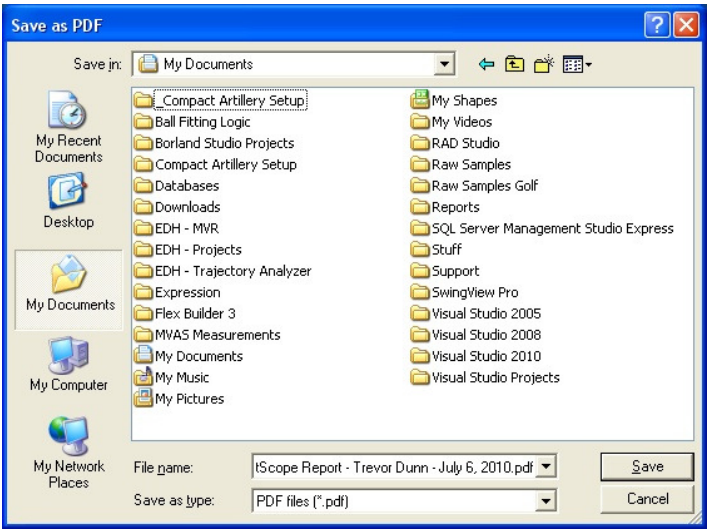
Table Report



Trajectory Report

Publish to PDF file:

- Check that the data on the screen represents the data you wish to print (player name, date, etc.)
- Click on the Publish icon to display the Publish window.
- Select "PDF" and paper size (A4 or Letter) from the Publish To section.
- Select "Trajectory" (for graphs) or "Table" (for tabular report) from the "Style" section, and click on the "Ok" button.
- Select a location and filename where the PDF file should be saved from the "Save as PDF" dialog (see below) and click on the "Save" button.
- Wait for the PDF file to be opened by the default PDF program.



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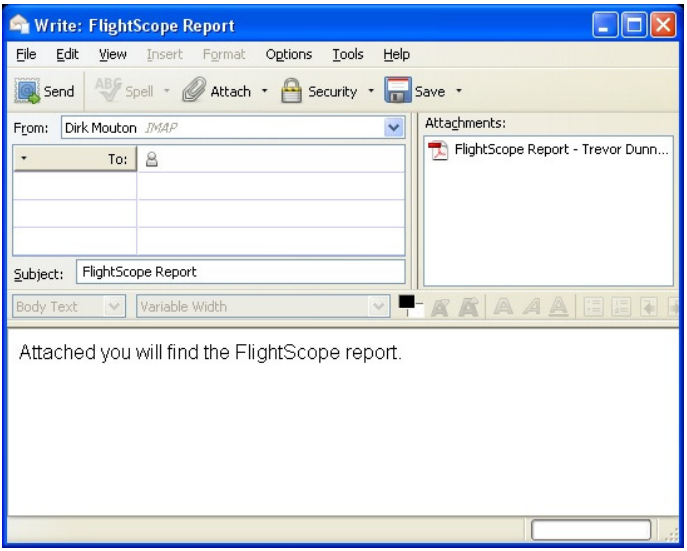
Publish to Email:

- Check that the data on the screen represents the data you wish to print (player name, date, etc.)
- Click on the Publish icon to display the Publish window.
- Select "Email" and paper size (A4 or Letter) from the Publish To section.
- Select "Trajectory" (for graphs) or "Table" (for tabular report) from the "Style" section, and click on the "Ok" button.
- The default Email program will display a new Email dialog (similar to image below) with the report attached as a PDF file.
- Enter the Email address where the report must be sent to. Click on the Send or similar button to send the email.
- Wait for Email program to send the email.



Label Printing

There is also a Label printing option.

Before publishing to a Label Printer, the label alignment must be set up.

Use the Advanced Publishing menu under the Advanced Menu (F10 > Publishing > Advanced). Follow the Label Alignment Wizard steps. The Label Alignment Wizard assists in setting up the printing of labels.

Reset Labels Printed resets the last label printed.

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Sensor Status Indicators

The status of the Sensor is displayed in the upper right hand corner of the Main screen:

State 1 – Connected, Standby

State 2 – Connected, Ready

State 3 – Disconnected

USB Port Status

This indicates the status of the USB port is "open" or "closed". If the icon is **I/blue** the USB port is "open" and usable. If the icon is **0/red**, the USB port is closed. A port will usually be automatically opened unless it is occupied by another program.

If required, use the **Re-open Connection** function on the **Advanced Settings** menu to connect to the sensor. If **"Re-open Connection"** fails after repeated attempts, check that the USB communications cable is plugged into both the PC and the sensor. Also, investigate if another program is running on the computer occupying the USB port.

Connection Status

Connection Status indicates if the sensor is connected to the correct port and responds normally to commands and messages. If true, the icon will be blue.

When the sensor is disconnected the icon will turn red, indicating that the sensor is not responding to messages from the computer.

A gray icon (along with red on the Port Status indicator) indicates that the USB port is not open, and a connection attempt cannot be made.

The indicator will be red when the sensor is not switched on. If this occurs check the power to the sensor or cycle the sensor power off and on to attempt to reconnect the sensor to the computer.

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Ready/Idle

The Ready/Idle indicator (right side) indicates if the sensor is active (ready) or inactive (idle).

A green icon indicates that the sensor is active and ready to measure the next shot.

When the sensor is not measuring (idle) the icon is blue. A gray icon indicates that the sensor is not connected.

Battery Level

The Battery Level indicator shows the approximate amount of charge available in the batteries.

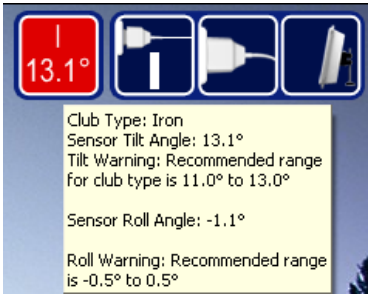
NOTE –battery level indication is approximate as it is strongly dependent on the way in which the FlightScope is used as well as environmental factors (hot or cold, etc.).

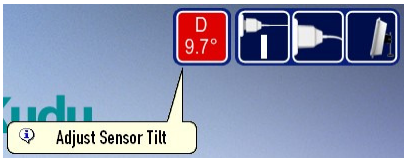
Tooltips

Place/Hover the mouse over any of the sensor status indicators to see a short description of the indicator.

Club Type and Roll/Tilt indicator:

Click this indicator to set the club (D: Driver, W: Wedge, I: Iron) you would like to optimize for. The indicator also displays the sensor's tilt and roll angles. The user is warned when the sensor is not in the optimal tilt range or roll range. When the roll angle is within an acceptable range, only the tilt angle is displayed.





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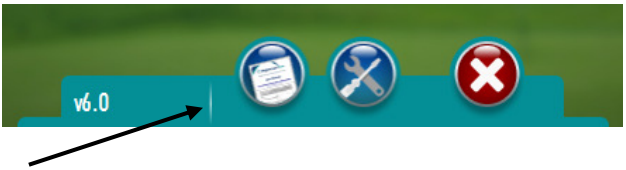
User Manual



The User Manual button on the Main Screen menu opens a PDF copy of this manual.

Alternately it can be opened from the Advanced Settings Menu

(F10 > Help > User Manual).

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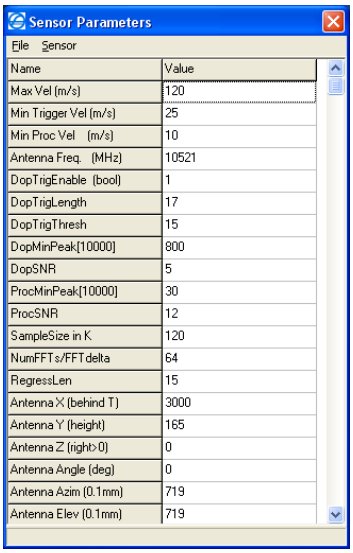
Advanced Settings

Enter the **Advanced Settings** menu by clicking on the button on the Main screen, or alternatively by pressing the **F10** key.



Sensor

Re-open Connection

Scans all available ports for a connected sensor, and connects if found.

Setup Wizard

Runs the Setup Wizard

Parameters

Advanced technical use only.

Parameters used in the sensor can be viewed and modified. The user should never modify these unless specifically instructed by a qualified FlightScope engineer.

NOTE – not all parameters displayed are available on all FlightScope systems

Detection Mode Select Outdoor or Indoor mode, as appropriate. Incorrect selection may affect measurement results.

Enable/Disable/Video Capture Enables or disables video capture

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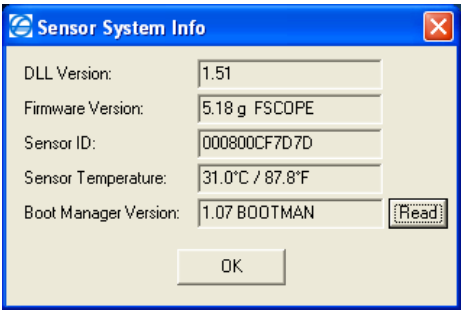
mode



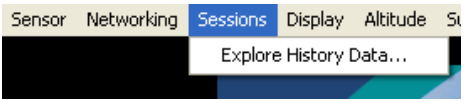
System Info The System Info submenu feature, available in the Sensor advanced menu, gives technical information about the tracking sensor and software. This is usually checked when the system is maintained.

Raw Data Download, Processed Data Download

These diagnostic functions are for advanced users and service engineers exclusively.

Networking

If you wish multiple FlightScope screens, set the application connected to the FlightScope as the Server, and the others as Clients. See also below "extended desktop mode"



Sessions

Enables data saved from sessions done with previous versions of FlightScope to be re-integrated with the current software release.

Display

Handedness

Choose left or right-hand player.

Units

Club Units can be set differently from other measurements to allow flexible data displays

Screen & Display settings

Choose to display or not, the Shot Plot, Ball Trajectory, Ball Fitting screen, and Swing Labs club analysis.

Face angle can be set relative to either "target line" or "club path"

Dynamic Loft set relative to either "Vertical Axis" or to "Attack Angle"

For display of averages, choose Normal or Absolute.

Tour Player Data - Drivers

Tour Player Data

View FlightScope-measured data of tour players with both drivers and irons. Rank players by different criteria.

Tour Player Data - Irons

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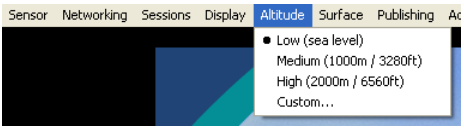
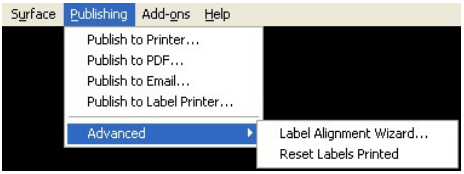


Altitude

Adjust altitude (height above sea level) to match the location. At locations higher than 1000m (3300ft) above sea level the High setting is recommended. Depending on the type of sensor, this setting may not be adjustable.

Surface

Surface may be adjusted to suit the landing conditions.



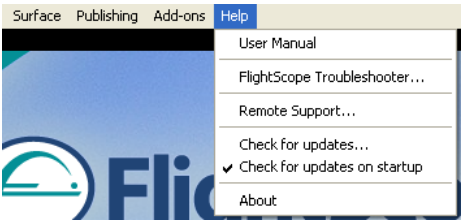
Publishing

Publish session data to printer, PDF, email or label printer. The Label Alignment Wizard assists in setting up the printing of labels. Reset Labels Printed resets the last label printed.

Add-ons

Click on "Add-ons" to be taken to a web page where add-on download and install instructions are listed

Enable the optional SwingViewPro video analysis function.



Help

Click on "User Manual" to view this document or the Swing Labs manual... Start Troubleshooter, engage Remote support, and check for updates of the software.

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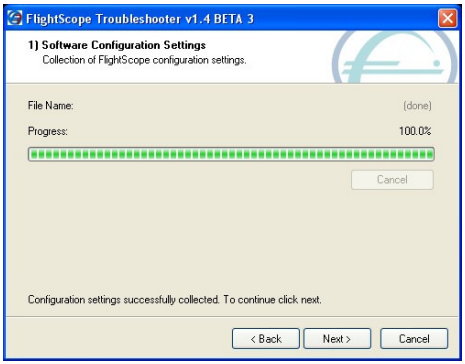
FlightScope Troubleshooter

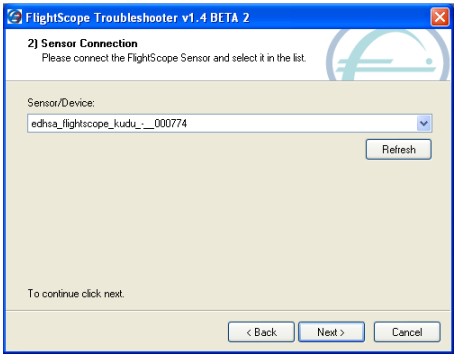


Click on "FlightScope TroubleShooter" to carry out a troubleshooting session.

Troubleshooter sessions have 5 parts:

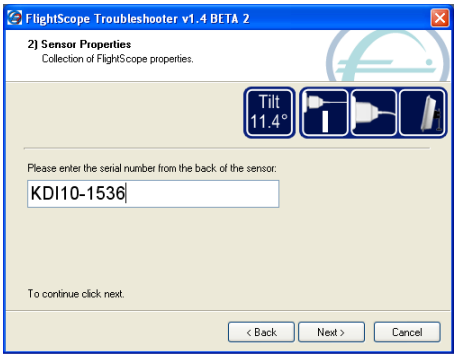
1.

Collect Configuration settings. This stores the software settings



2.

Connect to the sensor, and record its serial number.



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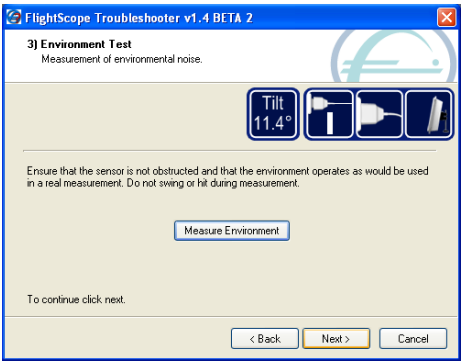
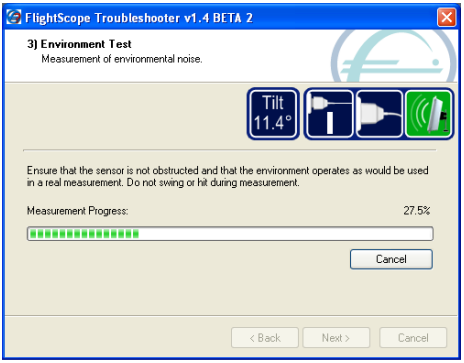


3.

Measure the electromagnetic environment and the quality of the radar signals in the local environment

.



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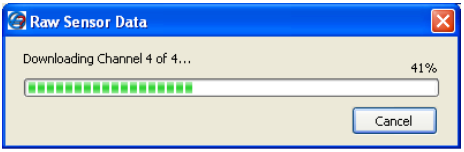
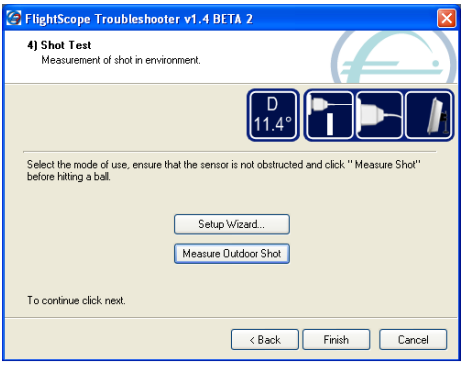


All channels are downloaded of the environment



4.

Data from a shot is now recorded, so that a file can be sent to the FlightScope Support team for analysis of the client situation.

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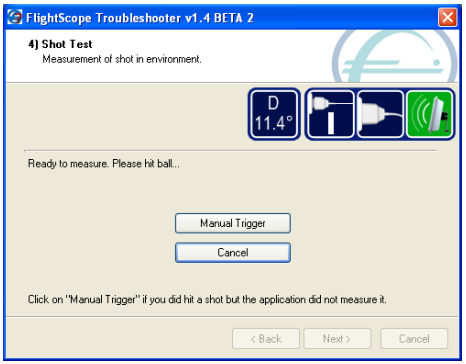
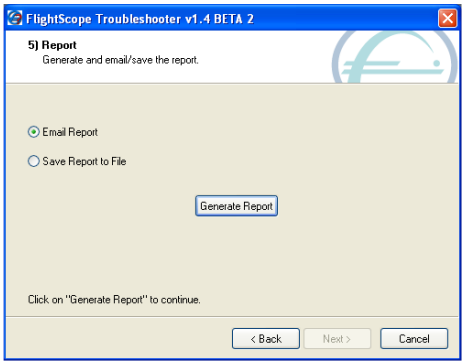


If the unit does not trigger, use Manual Trigger immediately after the shot is played.

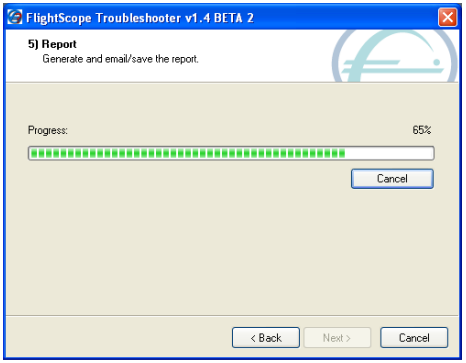
Click finish.



5.

Generate the Troubleshooter Report file, which creates an email that can be sent to FlightScope Support.

Send this email.



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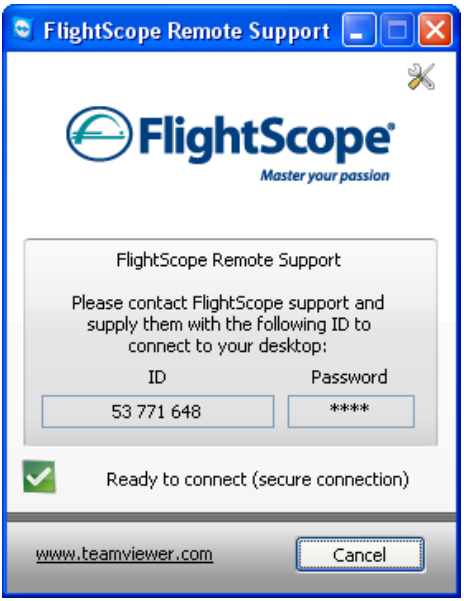

Remote Support

Remote Support is a facility that enables a FlightScope Support Engineer to view your FlightScope screens directly.

To use Remote Support, your PC must be connected to the Internet.

Click on "Remote Support" to activate a Remote Support connection.

Note that the FlightScope Support Engineer will need the ID number of your system to start a remote support session.

The **"About"** screen states the software version and activation status installed.

Connecting a Video Camera

FlightScope can capture a video clip of a shot from a connected video camera. This can be used for visual feedback of the player's motion during the shot.

Prerequisites

In addition to the FlightScope radar, software and PC, you require:

- Digital Video camera with "Firewire" (IEEE13894) or USB interface to PC
- Tripod for camera
- FlightScope Media Player software (supplied)

NOTE: Consult your PC and/or camera vendor to ensure that the PC and camera have compatible interfaces and the required interface driver software

Hooking up the camera

With the FlightScope set up as usual:

- Set up the camera on a tripod to one side of the tee with a good view of the tee and of the player hitting a shot.
- Connect the video camera to the PC using the "Firewire" or USB interface port (whichever is applicable)

Switching on the Video Capture mode

Configure the FlightScope software by executing the following steps:

- Press the **F10** button or press the **Advanced Settings** button on the main screen.
- **Select Sensor → Enable Video Capture**.

This will enable the video capture mode, which will become active only after quitting and restarting the FlightScope program.

Configuring the Video Capturing

If or when the video capture mode is enabled, configure the video capture controls under the **Advanced Settings** menu (or press **F10**), and selecting: **Sensor → Video capture…**

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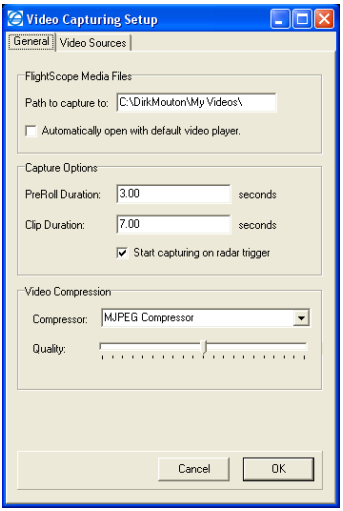
❑ On the "General" Tab:



Set the media files location (Path to capture to..)

(It is strongly recommended that you allocate a different folder for each recording session, so that the FlightScope Media player only takes the video files that you are interested in).

Tick "Open video with default media player" to open automatically the last recorded video file with the default media player.

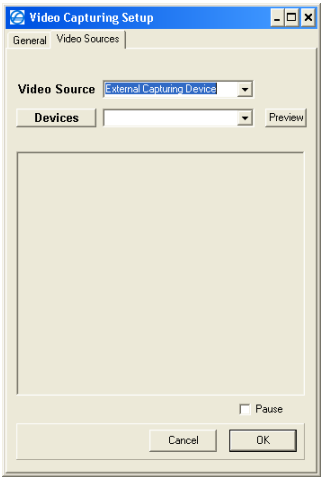
Set capture options

- Pre Roll Duration = Recording time before trigger moment (default is 3 sec)
- Clip Duration = Total length of recording (default 7 sec)
- Tick the "Start capturing on radar trigger" box

Set Video Compression

Compressor: compression type used (MJPEG default)

Quality: Amount of compression (Default 50%)



❑ Select Video Sources tab:

Select Video Source type (default is External Capturing Device)

Select Device (default automatically registered by the PC when the video camera is attached).

Press Preview button to test if video source is functioning

Do not select the Pause box

Press OK to complete setup. The video system is now ready to use.

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Operating the video system

1. On the main screen, select the mode (e.g. Club or Player comparison)
2. On the Player Comparison Screen, enter players' names/clubs/balls.
3. Press **Continue** to ready the system for shots.
4. FlightScope will now record a video clip with each shot.
5. On the Video screen, the shot data, trajectory plot, and video clip will be displayed.
6. The Next shot can be played as soon as the previous clip is saved (automatic). (The clip is saved with date and time information.)

If "Automatically Open with Default Media Player" is validated, you see

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Playback of video clips

Run the FlightScope Media Player to play back (view) stored video clips:
START > All Programs > EDH > FlightScope V5.x.y > FlightScope Media Player

Right-click on the screen to open the controls:

LOAD FILE	Loads a single file for replay
LOAD DIRECTORY	Selects directory to play (all files in sequence)
LOOP DIRECTORY	Will automatically start at the first file after finishing the last, in a continuous loop
STOP	Ends the replay
SET RESULTS DELAY	Custom settings for replay presentation
SET RESULTS DURATION	Custom settings for replay presentation
PAUSE UNTIL KEY PRESSED	Manual control for replay presentation

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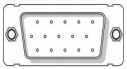
Setting up "Extended Desktop Mode"

If FlightScope is run on a PC with another software application, it may be desirable to view the FlightScope screen on a secondary monitor connected to the PC. This is called "extended desktop mode".

For example, FlightScope as well as video swing analysis software may be run on a single PC. The video analysis screen can be displayed on the PC while the FlightScope results are displayed on a second monitor.

Connecting a second monitor

Connect the second monitor to the "VGA" connector on the PC. This is commonly a D-shaped connector with 15 pins.



Alternately, a DVI connection may be used on PC's that has a DVI output

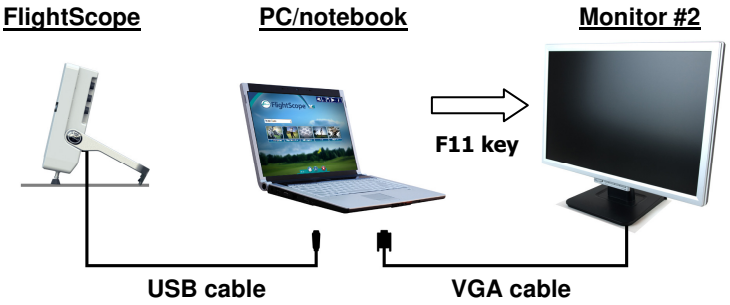
Setting FlightScope to display on the second monitor

NOTE

Display mode must be set to "Extended Desktop" mode

- Select the FlightScope application (which should be running at this time)
- Move mouse cursor to desired screen, and press the F11 key

FlightScope will now be displayed on the second connected monitor.



Connecting a second monitor

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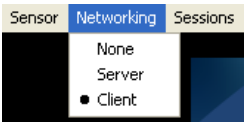
Setting up additional FlightScope Screens

If you require FlightScope to display simultaneously on multiple screens, with DIFFERENT data views, you need to install the FlightScope software for each screen, whilst ensuring the monitor(s) is (are) connected to the PC. (see Extended mode above)

Setting FlightScope to display on the second monitor(s)

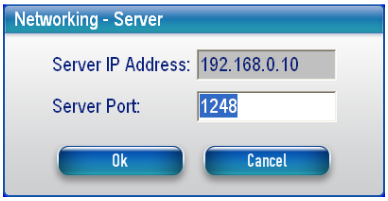
- Start the FlightScope application connected to the FlightScope
- Set this application in "Server" mode, in the networking menu

- Move mouse cursor to desired screen, and press the F11 key
- Start second installation.
- Set second (and any additional screens) application(s) to "Client" , in the networking menu



Default settings are:

Server settings



Client settings

Consult FlightScope Support to change these settings if necessary.

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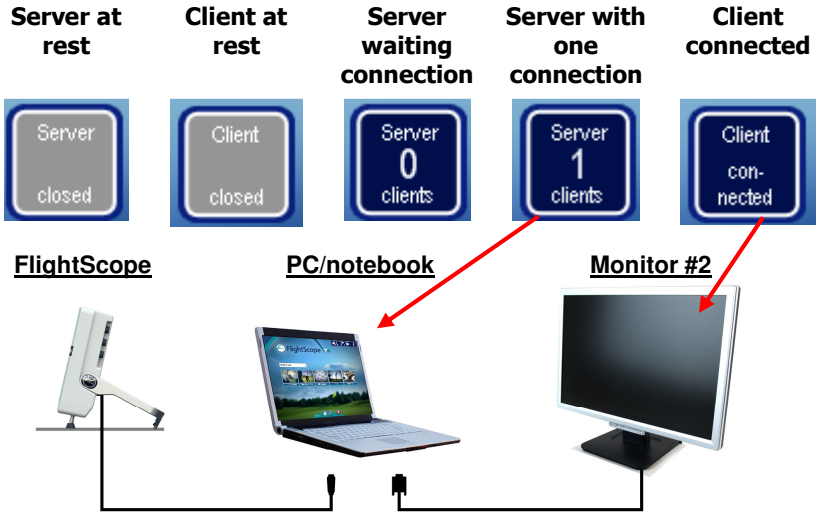
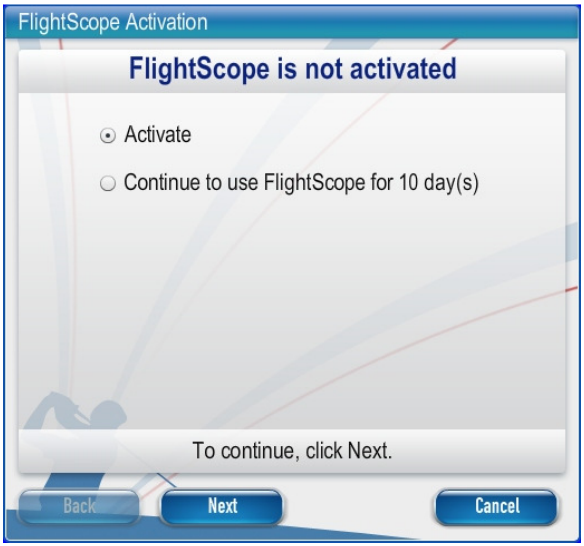
The FlightScope software, including real time tracking, will now operate on the additional monitor(s) with status icons showing connectivity status.



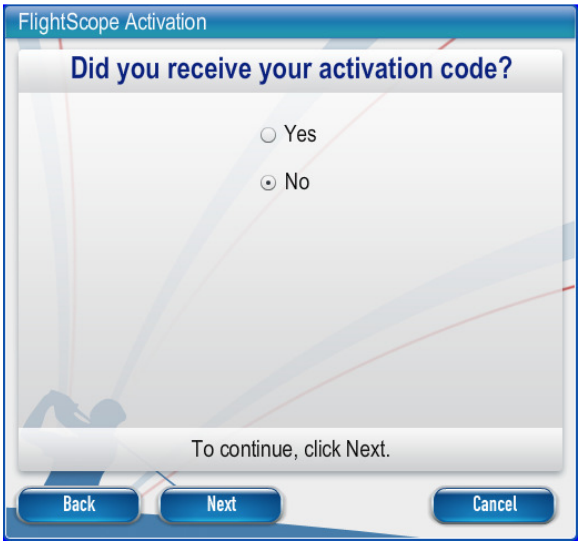
Connecting a second FlightScope screen

Software Activation

Whenever there is a new installation of FlightScope software on a PC, a process of activation is required. This ensures that the user is informed of the latest releases, and can operate the FlightScope in optimum conditions.



If your software is not activated, you can continue for a 10-day window period prior to activation.



To activate your software, you must request activation file if you have not already received it. Click on No if you need an activation file.

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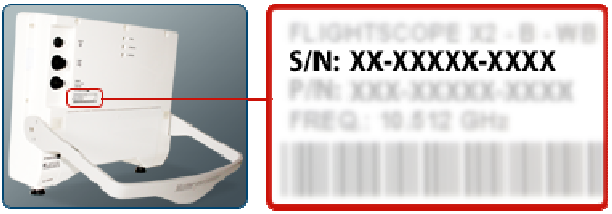
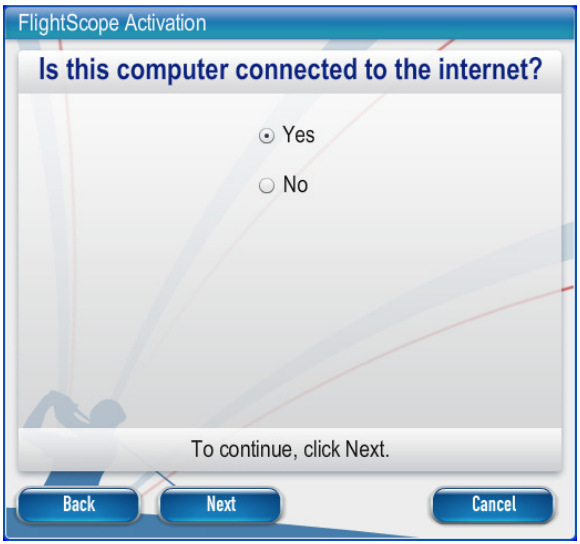
Ensure that your activation code request is made from the computer that is connected to the FlightScope!

Enter the FlightScope Unit's serial number, in the space provided, with the software running on the PC to be used.

(See below)



The serial number is marked on the ID plate to the rear of the unit.



Mark if the computer that is connected to the Sensor is also connected to the internet

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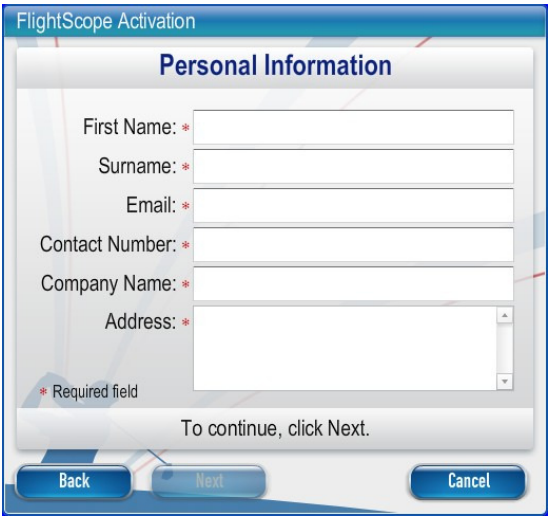
Select whether the unit is used Indoors, Outdoors or both.



Also enter your contact details so that you can continue to receive updates.

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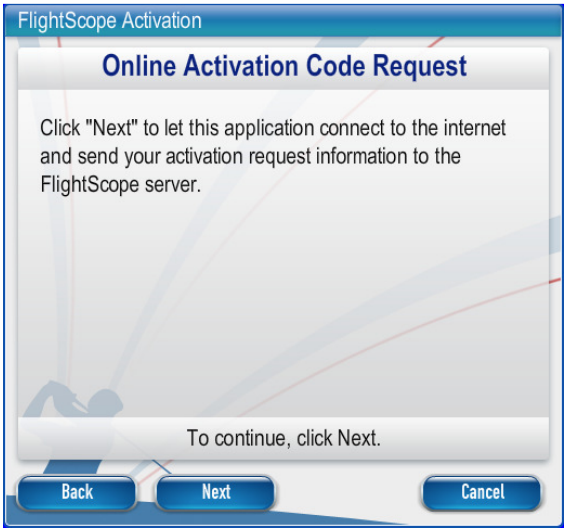
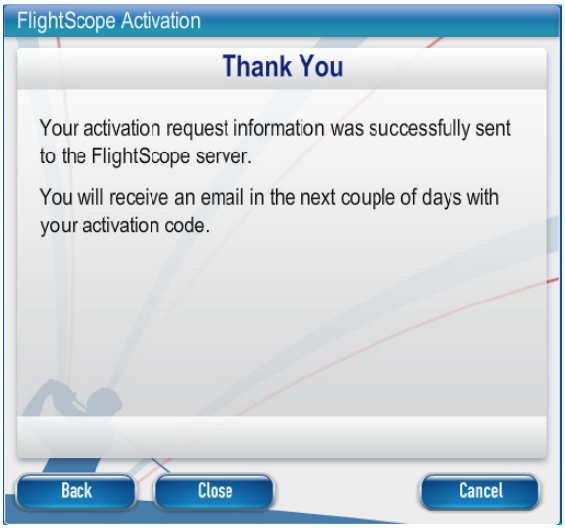


See screen… for online activation code request



If your PC is connected to the internet, your activation request will have been sent.

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If you are not connected to the internet, phone the USA number or Europe/Other number for your activation request.

NOTE

The Installation ID **for your installation** must be provided when calling.

OPERATION WITH APPLE TABLETS AND SMART PHONES

Running the software

Make sure the X2 sensor is switched on and in standby state (**Status** LED flashing green, **Comms** LED lit blue)

Click the FlightScope icon on the desktop to start the software. The application will communicate wirelessly with the FlightScope X2 sensor.

The application will open on the Shot Plot screen, or on the last screen used before (if any).

3D Shot Plot on Apple device

Measurements of each shot will be displayed in numbers and graphically on the current screen.

It is possible to scroll back and forth through shots by touching the Shot number display (lower left on the screen).

Slide screens sideways or up and down to view other displays of data.

The Screen Map button provides an easy way to navigate between various screen displays. Touch any screen in the map to select.

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The graphic display screens available are:

- 3D Shot Plot
- Real time track
- Club Analysis (Attack paths, Speed, Acceleration)

Additional screens include

- Table of shots (To open: Place finger on data bar at bottom and hold. To close select **Resume**)
- Data (of individual shots)
- Results (for session)

Status Indicators, Display Map and Settings icons are displayed at the top of all screens. Measured data are displayed at the bottom of each screen.

Screens Map

Table View

Club Analysis Views

Several club measurement screens can be selected.

Settings

Press the Settings icon at the top of the screen to open the Settings menu:

Session

New

Create a new session - type in a name for the session. Press **Continue**

Select the mode: Club, Ball or Player Comparison:

Club Comparison

Press + to add a club. Enter the club name, type (driver, iron, wedge), make, model, and other desired data of the club. As a minimum, a name and type must be entered.

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Press +Group to add a pre-defined group. This list will be empty when first used. A group can be created by entering several individual clubs and then selecting **Save Group**.

Club entry data can be edited and changed at any time. Press Edit and press the > key next to the club name to change its details.

Press Continue to start playing.

Ball Comparison

Press + to add a ball. Enter the ball name, make, and model.

Press +Group to add a pre-defined group of balls. This list will be empty when first used. A group can be created by entering one or more balls and then selecting **Save Group**.

Ball entry data can be edited and changed at any time. Press Edit and press > next to the ball name to change its details.

Press Continue to start playing.

Player Comparison

Press + to add a Player. Enter the player name. For convenience, the software will name successive player entries "Player 1", "Player 2", etc. for fast entry.

Press +Group to add a pre-defined group of players. This list will be empty when first used. A group can be created by entering one or more players and then selecting **Save Group**.

Player names can be edited and changed at any time. Press Edit and press > next to the player's name to edit. Save to complete.

Press Continue to start playing.

Player

Opens the list of Player(s) in the session, allowing adding, deleting, or changing players.

Clear Shots

This will delete all measurements in the session, for example if you want to clear the display for a fresh start

Send to e-mail

Opens an email window where a recipient's email address can be entered, so that a file of the FlightScope "session data" can be sent.

Connection Settings (Advanced Technical Users Only)

Host and Port

FIXED SETTINGS - DO NOT MODIFY IN NORMAL USE

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Host lists the IP address used for wireless connection to the FlightScope. The standard setting is 192.168.2.1

Port specifies the port number used for wireless connection to the FlightScope. The standard setting is 5100

Environment Settings

Detection Mode

Select Indoor mode when ball flight is below approx. 20 meters (60 ft.).

Select Long Indoor mode when ball flight is above 20 meters (60 ft.), but a net or other arresting device is used to restrict ball flight (e.g. at a trade fair hitting area)

Select Outdoor mode when ball flight is unrestricted, e.g. on a golf course or driving range with no nets.

Sensor to Tee distance

Enter the distance from the sensor's face to the tee/hitting spot.

Tee surface height

Enter the height of the tee surface (*not the Ball Tee*) above the surface on which the FlightScope is placed.

Altitude

Enter the altitude where FlightScope is used, e.g. coast, etc.

Some devices allow "automatic" altitude setting. Set On if available.

Personal Settings

Handedness

Enter Right or Left hand.

Measurement System

Enter Metric or Imperial units to be displayed.

Accept Shot

Set how shot measurements will be accepted.

About

Displays FlightScope software version information.

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Club Select

Press the club icon at the top of the screen to select the next club in the session (if more than one).

The club type (e.g. Driver) is illustrated for type confirmation.

Player Select

Press the player icon (only visible in the Player Comparison mode) at the top of the screen to select the next player in the session.

Ball Select

Press the ball icon at the top of the screen to select the next player in the session (if any).

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SENSOR FIRMWARE UPDATING

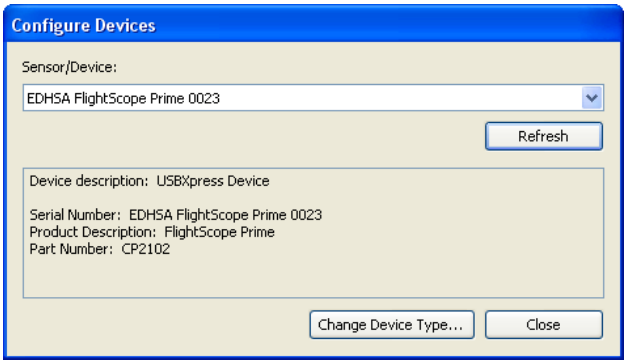
This section describes the procedures to update Sensor firmware.

CAUTION

Sensor firmware programming is a critical task that requires the power supply and USB connections to be uninterrupted while in process. Do not run this process under battery power.

1. With the sensor connected and switched on, open the Firmware Writer program.
2. After the application has opened click on **Configure Devices** on the welcome screen.

3. Select the sensor. Only one sensor should be connected when programming firmware, so that a wrong selection is not made.



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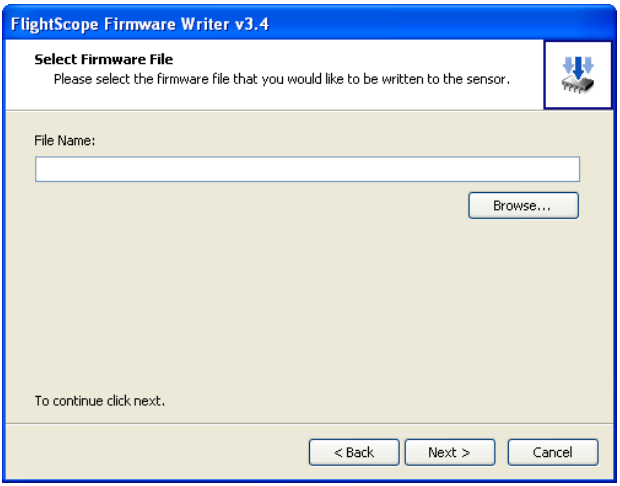
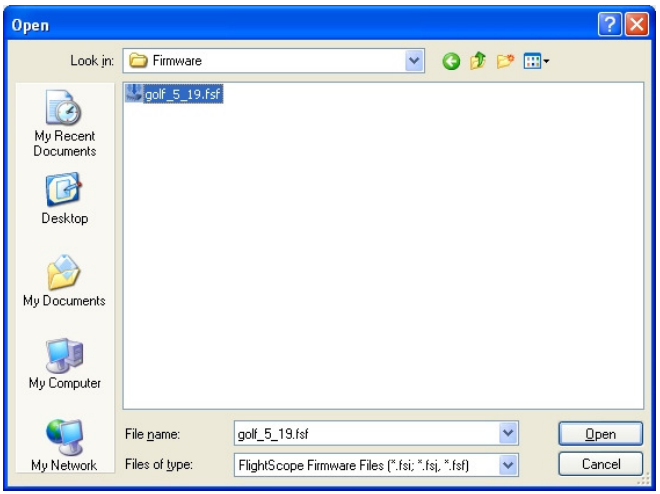
4. Use the **Refresh** button to update the list if a sensor is removed and re-connected to the PC. If no sensors are listed after pressing the refresh button when a sensor is connected then the PC may still be installing software drivers.

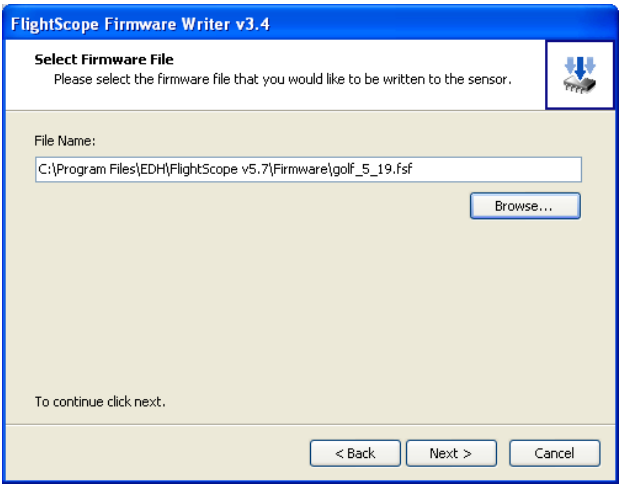
5. On the next screen, click **Browse** to locate the firmware file.



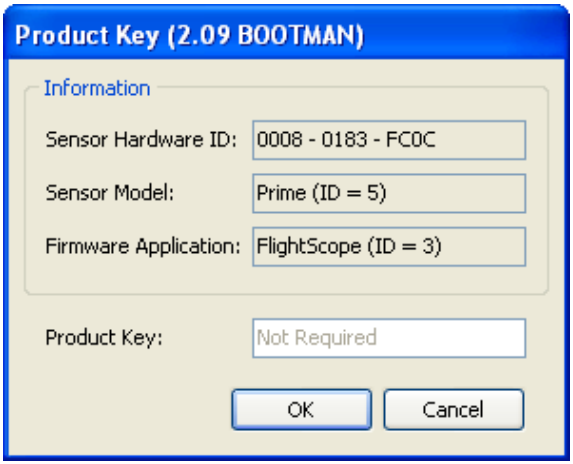
6. From the open dialog box find and select the **golf_5_xx.fsf** file and click on "Open" .The file will normally be located in the Firmware directory on the CD, or within the program files PC directory:



7. Press Next to proceed with the selected firmware file.



8. The Product Key dialog box will indicate if a product key is required.



9. If the message "Please contact EDH for a product key to run this firmware", you will be asked to supply the information provided in the product key window. Click "OK" and make a note of the information. This information must be supplied to an EDH support engineer by email on support@flightscope.com. The product key to enter will be provided on return. Enter the product key obtained in the Product Key field and click "Next".

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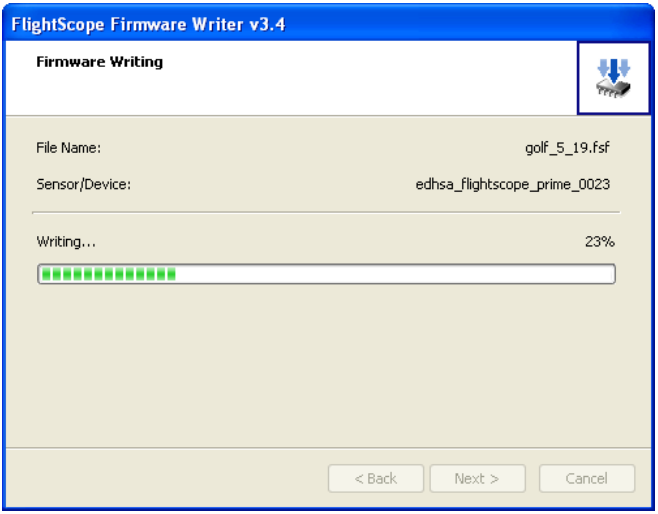
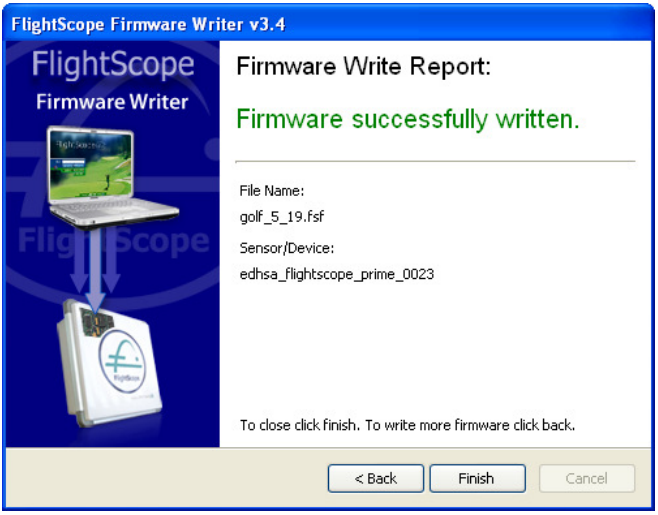
10. The firmware will now be written to the sensor:



11. On completion of writing, cycle the power on the Sensor to reboot, and then click on **Finish.**



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SPIN MEASUREMENT

FlightScope measures the spin of a ball accurately both outdoors as well indoors where ball flight distance/time is limited.

CAUTION

Balls in poor condition or of poor quality (for example damaged balls) should not be used when measuring spin because the marks on the ball may cause incorrect spin to be reported.

Spin measurement methods

FlightScope directly measures the spin rate of the ball both indoors and outdoors.

Marking and placing a ball for spin measurement

NOTE

This procedure is only required when measuring spin indoors.

A ball flight distance of at least 14 ft. (4.2 meters) is necessary.

A metal foil disk or patch is used to assist FlightScope to detect the spin of the ball reliably in a hitting cage where the flight time is limited:

Stick a single metal foil disk or patch of approximately 5mm (1/4 inch) diameter/dimensions to the surface of the golf ball.

Tee the ball up with the metal disk facing forward, away from the sensor.

Spin measurement rule:

Outdoors	Indoors
Use unmarked balls in good condition	Use with balls marked with metal sticker

Metal sticker order info: Part# 77715A33 Foil from www.mcmaster.com

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DEFINITION OF PARAMETERS

Carry Distance: Distance in a straight line from the tee-off spot to where the golf ball touches the ground again. Roll excluded.

Clubhead Speed: The club speed at the point of impact.

Ball Speed: Speed of the golf ball at the start of flight, in the direction of flight.

Smash Factor: This is a factor of shot efficiency. It provides a very good idea of how sweetly the ball was struck. Even on perfect shots, the Smash depends on factors such as balls used, coefficient of restitution of the club, and loft.

HINT: The process allows the fitter to wait for acknowledgment from the client on a good shot on a specific club, before proceeding and accepting following shots that have the same or better Smash results (higher value). When changing to the next club, the process is repeated.

Launch Angle: Also known as vertical angle or elevation angle. The launch angle is the angle at which the ball departs from the tee position from the horizontal plane.

Direction: Also known as horizontal angle or azimuth angle, it is the angle at which the ball travels from the tee position relative to the pointing direction of sensor in the horizontal plane. Positive angles are to the right (clockwise) and negative angles are to the left (counter-clockwise).

Vertical Descent Angle: The angle at which the ball hits the ground relative to the horizontal plane.

Height: The apex (maximum height) that the ball reaches during its flight.

Classification: The classification of the shot is made based on the measured trajectory direction and curvature of the flight path.

Attack Angle: The angle in the vertical plane relative to the horizontal, at which the club head is delivered to the ball. A negative number angle indicates a descending club and a positive angle indicates an ascending club.

Face Angle: The horizontal angle of the clubface at ball impact relative to the line of play. The angle is displayed with an R (Right – for club face pointing to the right) and L (Left – for club face pointing to the left).

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Club Path: The direction of the club movement relative to the target line at the position of ball impact. The angle is displayed with an indication R (Right - for in-to-out movement) and L (Left – for out-to-in movement).

Dynamic Loft: The vertical angle of the club face relative to the horizontal at ball impact. This angle is made up of the club loft (most dominant) as well as the position and flex of the club shaft at impact.

Swing Plane (H+V): The swing plane is the plane in which the club head moves. The horizontal angle (H) is relative to the target line. The vertical angle (V) is relative to the ground) e.g. 90° would be upright; 0°is parallel to the ground).

Ball Spin Axis: The spin axis indicates the orientation of the ball spin. A ball with pure backspin only will have a spin axis of 0°. A positive spin angle will indicate ball movement to the right due to spin.

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SYSTEM SPECIFICATIONS

Description

FlightScope is a proprietary golf ball tracking system that provides shot statistics and performance reports for professional golf club comparison and club calibration applications. It is a valuable tool for coaching, club fitting, player evaluation, and golf equipment sales.

System Functions

The Startup screen provides navigation buttons for:

Primary Functions	Utilities
• Club Comparison	• Online User Manual
• Player Comparison	• Advanced Settings
• Ball Comparison	• Setup Wizard
• Play mode	

Club Comparison

A number of clubs to be compared can be entered. A series of shots played with each club. Ball flight data as well as club swing data are collected and displayed for each shot. The running average performance of each club is calculated. Odd shots can be excluded from statistical calculations. As the player progresses through the list of clubs, the comparative average statistics are provided for the selection of the most suitable club.

Player Comparison

As with clubs, a number of players can be entered and their individual results compared.

Ball Comparison

As with clubs, a range of balls can be entered into the system. The shot results are analyzed with average value statistics for determination of the most suitable ball.

An optional advanced Ball Fitting feature is available.

Play

This function allows free play of shots without the need to set up a session.

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Technical capabilities

Specifications below represent typical performance.

Balls and Clubs

All regulation tournament balls and good quality practice range balls. All woods and other clubs.

Measurement zone

The sensor measures ball flight in a spatial volume of approximately 30 degrees vertical by 20 degrees horizontal around its pointing direction.

Launch velocity

Up to 400 km/h (250 mph)

Launch angles

Vertical and horizontal (direction) angles, within the measurement zone.

Carry and lateral distances

Landing position of the ball.

Height

The height the ball reaches along its flight path.

Clubhead Speed

The club head strike speed.

Spin

Ball spin at launch. This spin rate is directly measured and requires the use of good quality balls. Poor ball quality may affect accurate measurement of spin rate. The ball must be marked when testing indoors (see section on **Spin Measurement**).

Physical characteristics

Dimensions

Approx. 325 x 300 x 100 mm (12¾ x $11^{7}/_{8}$ x 4 in) (W x H x D)

Mass

Sensor: approx. 3.6/4.9 kg (8/10¾lbs.) without/with battery cells

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Environmental Specifications

Ambient temperature:

Recommended operating range 0ºC to 45ºC (32ºF to 104ºF)

Ingress protection:

IP54 / NEMA-4.

Electrical characteristics

Electrical supply:	100-240 V AC @ 0.2 Amp, 50/60Hz single phase
Communications:	USB 2.0 Hi Speed WiFi (IEEE 802.11b/g) Bluetooth Class 1 version 2.0 (Factory Option)
Electromagnetic compatibility:	Meets FCC, Industry Canada, and CE standards

Earthing

An earth connection must be provided to the power supply.

Requirements for Outdoor Installations

The following are typical requirements for an outdoors installation:

- (Safe) mains supply point (100 - 240 V AC, 0.2A, 50/60 Hz, single phase)
- Tee on grass or hitting mat
- Level surface

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PC AND OTHER DEVICE SPECIFICATIONS

PCs and Notebooks

Most new PCs or Notebook computers with the following minimum requirements can be used with FlightScope:

Processor/speed:	Any
Memory (RAM):	1 GByte or more recommended
Hard disk storage:	80 GByte or more
CD/DVD ROM drive	
Display:	1024 x 768 pixels or more [1]
Interface ports:	USB 2.0 Hi Speed, DC supply current to 500 mA [2]
Operating system:	Microsoft Windows XP, Vista, or Windows 7.

1 A sunlight-readable screen is strongly recommended if used outdoors

2 Consult your PC vendor to determine if your computer's technical specifications meet the USB port requirements.

Apple Products

Mobile devices from Apple Inc. can be used with FlightScope. Current compatible products include iPod, iPhone, and iPad.

Android-based Products[3]

Mobile devices from various manufacturers operating Android operating software can be used with FlightScope. Compatible products include Samsung Galaxy Tab, and certain smart phones from Google, HTC, LG, Motorola, Samsung, Sony Ericcson, and other suppliers.

Current versions of Android supported by FlightScope:

Operating system version	Supported
Android 3.0 (Honeycomb)	Yes
Android 2.3.3 (Gingerbread)	Yes
Android 2.3 (Gingerbread)	Yes
Android 2.2 (Froyo)	Yes
Android 2.1 (Eclair)	Yes
Android 1.6 (Donut)	No
Android 1.5 (Cupcake)	No

3 Android devices must use Bluetooth to connect to FlightScope. FlightScope must be custom fitted with Bluetooth at factory. Consult your FlightScope representative at time of purchase if you want to use an Android device.

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MAINTENANCE AND TROUBLESHOOTING

FlightScope is designed to operate reliably with a minimum of maintenance for many years. This section tells you how to care for your FlightScope to ensure that you achieve this.

Basic Care

1. DIRT AND GREASE: Keep the sensor clean. Clean occasionally with a damp cloth using a light detergent if necessary. WARNING: As a safety precaution, always switch electrical supplies off when working or maintaining electronic equipment.
2. TRANSPORTATION: Place your FlightScope in its original shipping carton or case, to prevent it from damage when transported in a vehicle or aircraft. Contact your FlightScope distributor for advice on transport packaging options in case your original packaging is not available.
3. ALIGNMENT: The alignment of the sensor is important to ensure good results.
4. AREA: The performance of the system may be affected if used where the ground of floor is not reasonably level. There must also be no obstructions between the sensor and the tee.
5. PARAMETERS: Do not change the sensor **Parameters** that are accessible under the **Advanced Settings** menu, unless instructed by a FlightScope Support engineer. If parameters are changed, the function and performance of the system may be compromised.
6. RAIN: Although the sensor is sealed and will not allow rain and dust to enter, the mains power supply connection may be unsafe if wet. When it rains, switch the system off and take it undercover or cover the sensor and especially power cables and AC adapter with a waterproof covers as a precaution.
7. MECHANICAL SHOCK: The sensor contains sensitive microelectronic circuits that may be damaged or altered by hard impacts. Therefore, take care not to drop the sensor, hit it with a club or ball, or cause any other impact to it if possible.
8. CABLE DAMAGE: Check your power supply and communications cables occasionally for damage or wear. Repair or if necessary replace damaged or worn cables.
9. CABLE HANDLING: Take care not to pull, twist or kink cables when handling, to prevent possible damage and ensure long life. When disconnecting cables, coil the cables loosely before packing. Replacement cables are available from your FlightScope distributor.

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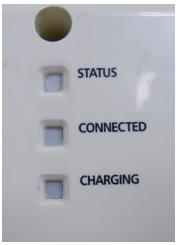
10. SENSOR DAMAGE: Regularly check the sensor for signs of damage. If enclosure is damaged it can be repaired at a FlightScope service location.
11. REPAIRS: The sensor contains no user serviceable parts. If necessary the sensor must be returned to your supplier for repairs. Unauthorized opening and repair actions may invalidate warranty.

Rear Panel LED Indicators

Three color LED indicators are located on the rear panel of the sensor.

The LED's are:

Status
Connected
Charging



Status LED

This is a multicolor indicator that indicates equipment status as follows

Color	State	Description
None	OFF	Power is OFF or Sensor defective. Check power connection/send for servicing.
Blue Blinking	System switching on	After switch on
Green flashing (fast)	Processor Initialization	System is powered ON and the signal processor is running normally.
Green flashing (slow)	Idle	System is powered ON and signal processor is running normally. System is not armed.
Red/Green flashing	Armed	System is running and ready to measure a shot.
Red/Off	Low Battery	Batteries are run down

Connected LED

This blue LED blinks when a **Wireless** data connection (WiFi or optional Bluetooth) is established with the PC. The LED will be OFF when a USB cable connection has been made with a PC.

A broken connection can often be re-established with the "Reopen Connection" function. (Press **F10** key on PC keyboard, select **Sensor**, select **Reopen Connection**)

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Charging LED

This amber LED will blink while the battery is charging.

It will be off when

- the battery is fully charged, or
- the AC adapter is not connected.

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FREQUENTLY ASKED QUESTIONS (FAQ)

Q: What is FlightScope?

A: FlightScope is a low-power 3D Doppler tracking radar for Golf and other sports. It accurately measures the launch and flight of balls and clubs and provides quantitative data about player and equipment performance.

Q: How does FlightScope work?

A: FlightScope creates a low level electromagnetic field through which the golf ball and the golf club move. The movement creates a disturbance that is detected and processed to extract position and speed. The measured launch and flight data is displayed on a PC program in various views, and also stored. Measurements include: ball and clubhead speeds, launch angles, spin, carry distance, smash factor, and more.

Q. How is FlightScope different from other golf measurement systems?

A: FlightScope is fundamentally different from most other launch monitors because it measures ball speed, position and direction continuously along the ball's flight path using **Doppler radar** technology.

FlightScope is not only a launch monitor, but also measures what the club and ball are actually moving. It is therefore a more accurate and comprehensive measuring instrument for golf than a camera or light beam based system that take only single or at most a few launch data points and estimate what the ball will do after launch.

FlightScope is not dependent on ambient lighting conditions (it can work in complete darkness), it does not create blinding flashes of light.

Q: How accurate is it?

A: FlightScope represents the state of the art in measuring technology for projectiles in flight. It is in a different class to launch-only monitors, and is able to track speeds extremely accurately and determine ball positions to within single yards.

Q: Where must I stand to use the system? Which direction must I hit?

A: The sensor is typically placed approx 2.4-4.2 meters (8-14 feet) behind the tee. The ball is hit away from the sensor along its pointing direction.

Q: Can FlightScope help me make the right club selection to play a particular shot?

A: FlightScope measures the performance (launch conditions and launch results) of golf shots and provides data to a player or club fitter to make scientifically justified decisions about the right clubs and balls.

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Q: Is the sensor portable? How must it be mounted?

A: The sensor has been calibrated to be placed or mounted on the floor or ground. To measure accurately, the sensor must be carefully aligned with the tee and the ground. Follow the prescribed setup procedures.

Q: Can FlightScope only be used outside on a golf course or driving range?

A: No. FlightScope is a versatile instrument that can be used both indoors and outdoors (e.g. at a driving range or golf course).

Q: How much ball flight distance is required by the FlightScope in order to display a result?

A: Typically at least 14 feet of ball flight is required.

Q: How far back must FlightScope be set up behind the tee?

A: A good practical distance is between 2.4m and 4.2m (8 to 14ft). There is no perfect distance, although a good rule of thumb is 3m/10ft.

Q: How is alignment of FlightScope done?

A: In order to get accurate club and ball measurements, always align the sensor mechanically using a measuring tape and a set square so that the distance and pointing direction are accurate. Also level the sensor. Use the software Setup Wizard to assist or check the alignment.

Q: How long does it take to align the unit?

A: A trained user can set up and align the FlightScope within the time it takes to start up his computer.

Q: Must I use special balls?

A: FlightScope measures any ball that is used. Even non-standard balls are measured accurately. To measures the actual flight of every specific ball, making no assumptions about the type or quality of the ball.

However, for accurate measurement of ball spin during a short distance indoor shot, it is recommended that a ball be marked with a small metal foil disk/patch. A marked ball enhances the ability of the system to measure spin accurately.

Q: How does shot classification work?

A: The actual path of the ball is determined by various factors like spin, lift, drag, aerodynamic coefficient, air pressure, humidity, etc. By measuring the actual ball flight, FlightScope can determine the type of shot (fade, draw, slice, etc.)

Q: Will I receive future enhancements of FlightScope?

A: You have a standard 12-month warranty on hardware and software.

In addition though, you can subscribe to an annual support agreement enabling you to receive upgrades for your system when they become available.

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Q: Can FlightScope be used in the rain?

A: Although the FlightScope sensor is sealed and will not suffer ingress of water it is not intended to be used in rain as it is powered from a mains electrical supply. For safety reasons power down and cover the system, or move it indoors when it rains.

Q: Can slow swing speeds be detected?

A: FlightScope discriminates against too low swing speeds, to reject false measurements from other movements in the area. For weak golfers and children who are not able to swing a club powerfully, the system can however be set to "wedge" mode, enabling the detection of shots.

Q: What type of lighting can be used with FlightScope?

A: The best lights to use are solid state or incandescent lighting, or certain halogen types. Fluorescent lights for example can influence Doppler measurements. This can however be effectively screened if it occurs. Consult your FlightScope representative for assistance with lighting problems.

Q: Can FlightScope only be used for golf?

A: FlightScope is a brand name for a range of sports tracking technology products and services, but it is currently well known in the golf market. FlightScope technology is also used in cricket, tennis and other sports. The various sports however use different software, and a system for Golf cannot be used directly for example for Tennis.

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