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Client: EDH (South Africa) (Pty) Ltd
Model: FlightScope X2
Standards: FCC 15.245/IC RSS-210
FCC/IC ID: QXP-PT238/4612A-PT238
Report #: 2011040

Appendix J: Manual

Please see the following pages Á[¦Á´å¹ïÆÁ[¬Ã¿@¶Á[¬æ}ˇ æ¢ÐÁ´å¹ïÃ¾æˇà{¬ãï·¸å¹¶Á¬æ¶^]¬æ¬æï·Á¹ï^.

3D Golf Ball and Club Tracking Radar

User Manual

Doc No. E19-WA082 Issue A5.7

GENERAL AND SAFETY NOTICES

Summary

The following notices and general safety precautions must be observed during the operation, service and repair of this equipment. Failure to comply with these precautions or with warnings elsewhere in the manual violates standards of the design, manufacture and intended use of the equipment. EDH accepts no liability for failure to comply with these notices.

Operation of the device in any country may require approval in accordance with local telecommunications and safety regulations.

Sheltered and Clear Weather Use Only

The equipment has been designed for sheltered or in clear weather use and must not be used outdoors under rainy conditions.

FCC Statement

Changes or modifications not expressly approved by EDH (South Africa) (Pty) Ltd could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in an office or residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to other electronic equipment, which can be determined by turning this equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Increase the separation between the equipment causing and experiencing the interference
- Install a radio frequency shield between the equipment causing and experiencing the interference
- Consult your dealer for help

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- this device may not cause harmful interference, and
- this device must accept any interference received, including interference that may cause undesired operation.

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IC Statement

This device complies with Industry Canada Rules for license-exempt radio devices. Operation is subject to the following conditions: (1) the device may not cause harmful interference, and (2) the device must accept any interference received, including interference that may cause undesired operation.

Déclaration IC

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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INTRODUCTION

Congratulations on purchasing **FlightScope**®, the world's first-ever 3D Doppler tracking radar for golf.

FlightScope measures how a player hits golf balls, providing information about the player and the equipment (clubs and balls).

Here are a few examples of what FlightScope can do:

- Test clubs and balls to find the best equipment for a player
- Measure performance of a player
- Golf instruction
- Calibrate golf clubs in a player's bag
- Compare performance with other players including top golfers
- Evaluate personal progress
- Provide instructional and entertaining data about golf shots not known to most golfers
- Research on club and ball performance

As a professional club fitter or golf instructor you can measure the performance and progress of a player and his/her equipment accurately and scientifically, find the best equipment fit, and evaluate progress.

As a player, you will be able to go out onto the course knowing your yardage and shot making capabilities. This will improve your scores and enjoyment of the game.

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GETTING STARTED

Before FlightScope can be used, the sensor and other hardware and software must be installed.

System Components

Your X2 system needs either a PC/Notebook computer or a handheld device such as a smartphone or pad to install and use FlightScope.

The components included with the system are:

- Sensor Unit
- USB Cable
- AC Adapter
- Mains Power Cord
- Software on CD
- User Manual
- Carry Case

The system is intended for use with a PC, notebook computer, or certain tablet or smart phone devices. See section on **PC and other device Specifications** for details of compatible devices.

Setting up the sensor

Position

The sensor must be placed between 2.4 to 4 meters (8 to 14 ft.) behind the tee.

Ground Surface

The sensor should be used on a level surface, (grass, carpet, or hard floor).

Handle

CAUTION

The handle is locked in position by spring loaded plungers. Release the plungers before moving the handle. Do not force the handle while locked.

Release the handle by sliding the two thumb sliders inwards to release the spring loaded pins that lock the handle position. At the same time pull the handle backwards.

When free, move the handle to the "down" position. The spring loaded pins will again lock the handle in the down position.

In the down position, the handle acts as the rear support for the sensor.

Leveling

The sensor should be set up with no roll (sideways angle) and tilted at the optimum angle of approximately 10 degrees (leaning backwards).

The X2C model has a built-in automatic leveling mechanism that will adjust the sensor to the correct roll and tilt angles for operation.

Other X2 models do not have automatic leveling: in this case the sensor roll and tilt angles must be set manually by adjusting the feet of the sensor and/or by modifying the work surface to achieve the correct sensor angles.

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Placing the Sensor

FlightScope Layout

13 - 14 feet / 4m min (ball flight)   8-14 feet / 2.4 - 4.2m behind tee

Sensor

Display Computer
-wired or wireless
connection
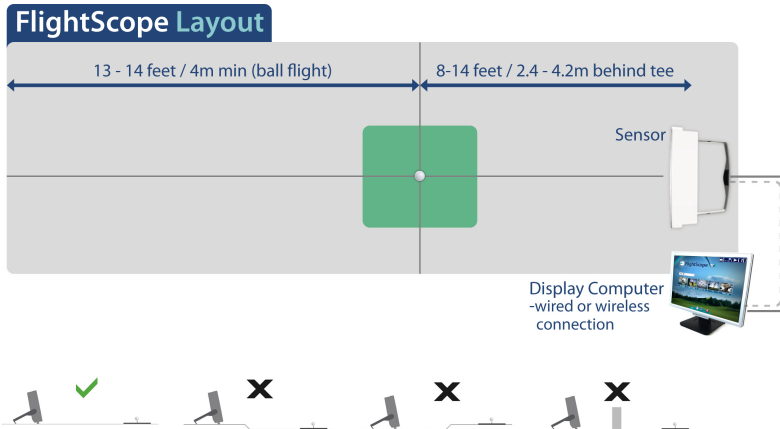
NOTES

Use FlightScope on a level surface. There must
be no obstructions in front of the sensor.

Hooking up the cables

CAUTION

Ensure that connectors are inserted with the correct orientation.

The connectors are keyed to ensure that they are inserted correctly. Do not force the connectors when inserting.

USB Cable Connection

Insert the Communications Cable (USB) to your PC and connect the other end to the COMMS connector marked with the symbol ⋅⟜ .

Insert the connector and fasten the nut lightly.

Power Supply Connection

Insert the AC Adapter connector into the Power connector on the rear of the sensor.

The connector is keyed and can only be inserted one way.

Insert the connector and fasten the nut lightly.
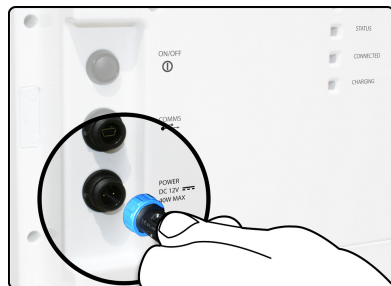
Switching On and Off

Switching On

Switch the sensor on by pushing the **On/Off** pushbutton on the rear panel.
A brief Push-then-Release action is needed.

When switched on, the **Status** LED indicator lamp will light up and blink. See
LED Indicator states below.

Switching Off - Normal

Switch the sensor off with a brief push and release of the On/Off pushbutton.
The sensor will shut down gradually starting by retracting the feet and also
performing other shutdown procedures.

The Status LED indicator will turn <u>Blue</u> while the shutdown is in progress,
and be <u>off</u> when the shutdown is completed.

Switching Off - Forced

To force rapid switch-off, push and hold the On/Off pushbutton. When the
button has been held for more than 1 second, the sensor will shut down
immediately, not retracting the feet.

Use this mode only if needed. The feet cannot be pushed in manually and
this form of shutdown will cause the feet to be extended and will not fit the
carry case.

All LED indicators will be off when completed.

POWER SUPPLY AND BATTERIES

Using the system with AC supply

The system can be connected to an AC supply (100-240 V AC single phase) instead of battery power. This can be done at any time.

Connect the AC adapter to the sensor's 12V DC input connector, and to a mains outlet.

Batteries

WARNING

The product uses Nickel Metal Hydride (NiMH) rechargeable batteries.

Do not use other battery types rechargeable or not (e.g. Alkaline, NiCd, Mercury, etc.) as this may lead to malfunction, damage, or explosion.

CAUTION

Batteries contain hazardous chemicals that pose a health risk if not used or disposed of in a proper manner.

Do not expose batteries to extreme heat.

Do not puncture or open battery cells.

Discard old batteries in accordance with your local waste regulations.

Battery life

Battery life depends on the battery cells' specified capacity, age, and charge state (level) when switching on. With cells of 10,000mAh capacity at full charge, the sensor can typically operate for at least 8-10 hours before requiring recharging.

Specification of battery cells

The FlightScope X2 is powered with 6 rechargeable 1.2V D-size Nickel Metal Hydride (NiMH) cells. Cells with capacity of 10,000mAh are recommended.

Charging the batteries

NOTE

Batteries and charging circuits generate heat when
being charged. It is normal that parts of the sensor will
become warm while charging batteries.

Connect the AC adapter (power supply unit), disconnect the computer from
the sensor, and switch the sensor on (push button switch). The sensor will
start up in the standby mode (**Status LED** blinks **blue)**

Charging will start if the batteries are run down fully or partially. The amber
Charging LED will blink when charging is in progress.

The Charging LED will stop blinking (off) when the batteries are fully
charged. Charging time is typically 14-18 hours, depending on the battery
state.

NOTE

If a computer is connected to operate the FlightScope,
battery charging will be interrupted.

Batteries run down

When the batteries run down, the sensor **Status** LED indicator will blink RED
as a low battery warning. When this occurs, connect the AC adapter to
continue using, or charge the batteries. Otherwise, the system will shut down
after a few minutes.

Inserting or removing batteries

NOTE

Battery cells should be replaced when they reach end of
life (e.g. when they do not hold charge any more).
Replace batteries with new NiMH cells of the same
capacity from the same manufacturer.

Ensure that new batteries are "conditioned" by pre-
charging them independently to full capacity in an
external NiMH battery charger before inserting.

First, open the battery compartment. Undo the screw beneath the sensor
that holds the battery cover in place. Then slide the battery panel down to
remove. Remove the cells from the cell holders, taking care to correctly
orientate the cells according to the indicated polarity direction for each cell
location.

Replace new, reconditioned NiMH cells in the cell holders, taking care that all the cells are placed with the correct polarity orientation. With the cells securely in place, replace the cover, and fasten the battery cover screw (bottom).

Resetting the battery charge level monitor

If the batteries are inserted for the first time, or removed and inserted for any reason, the battery charge level monitor circuit may not be able to determine the charge state of the batteries accurately.

To reset the monitor, proceed as follows:

- Switch the sensor on (connected to a computer but no AC adapter connected) and let the batteries run down completely. This will be when the sensor status indicator starts to bling "blue" or goes off completely.

- Now, connect the AC adapter, disconnect computer, and switch on the power button to start charging. Amber Charging LED will light up. Leave to charge for around 14 hours continuously. At the end of charge, the amber Charging LED indicator turns off.

The system can now be used normally, and the charge level monitor will be correctly set.

INSTALLING PC SOFTWARE

Prerequisites

Any recent Laptop, Notebook, or Desktop Computer with processor speed of 1 GHz or more, and with 1 GByte memory, CD/DVD ROM drive, and at least one USB interface port;

Microsoft® XP, Vista or Windows 7 operating systems;

FlightScope installation software (on CD).

Installation Procedure

🔴 Switch Computer on and wait for operating system to start up.

🔴 Insert FlightScope CD into the computer's CD/DVD ROM drive. The installation software will start automatically.

🔴 Follow the steps and instructions provided by the installation software. Press "Next" when asked and accept "default" options if unsure about any selection.

🔴 Once the installation is complete, remove the CD from the computer and store it in a safe place.

🔴 If the default options were selected, the FlightScope software will be available as an Icon on the computer's Windows Desktop.

INSTALLING APPLE DEVICE SOFTWARE

FlightScope software for mobile iDevices (manufactured by Apple, Inc. e.g. iPad or iPhone) must be downloaded from the Apple iTunes App Store, category Sports.

Prerequisites

An iPhone, iPod touch, or iPad manufactured by Apple, Inc., with operating software iOS 3.0 or later.

You must also be registered with Apple iTunes application store, and have an **Apple ID** for App Store purchases.

Installation Procedure

- Find and press the App Store icon
- Enter your Apple ID
- Use the SEARCH function to search for FlightScope applications
- Select the FlightScope application, and when you are sure of the selection, press the "purchase" button to request and download the application to your iDevice.
- The download and installation will proceed. When completed, the software is ready to run.

WIRELESS CONNECTIONS

Wireless Network (WiFi) Connection

NOTE

This connection can be used with PC's or devices with
WiFi capability (IEEE 802.11b/g). Ask your PC or device
vendor or consult its manual to find out if your
PC/device is WiFi capable.

FlightScope X2 can connect to your PC/device wirelessly, without any cable connection, by means of Wireless Network connection (WiFi).

Setting up the WiFi connection – first time use

Before the WiFi connection can be used, it has to be set up by following your PC/device's wireless network setup procedures.

1. Switch the FlightScope X2 on (USB cable <u>NOT CONNECTED</u>).

2. On a <u>Windows PC</u>, run the tools for setting up a Wireless Network. E.g. right-click the icon (right) on the toolbar, **Scan** for available networks and **connect** to the visible FlightScope unit.

3. On <u>Apple devices</u>, run the Apple **Settings** App (the tool for managing wireless network connections) (see icon). Set Wi-Fi ON. Choose a network – FlightScope. Scroll down for FlightScope – ensure Radar Device Direct Connection is ON. Switch On if necessary.

Once the connection is established, the FlightScope program will display "Connected" status and the system can be used.

WiFi connection - next time use

If the PC/device has been connected to the X2 by wireless network before, it will automatically connect to the X2 when both are switched on.

If the PC/device has been set up to connect to more than one wireless network, the prevailing priority settings could make the PC/device connect to another network on startup, instead of the FlightScope. If this happens, you can connect to the FlightScope manually by using the PC/device's Connection Management tools, and manually "Connect" to the X2. After this the FlightScope software will detect and use the WiFi network connection.

If desired, you can modify the priority list of your PC/device's wireless connections to make FlightScope X2 the top choice.

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PC OPERATION

Running the software

The FlightScope software has been designed for "ease of use".

Ensure that the sensor power is switched on. (The sensor may be left permanently powered on)

- Place the Computer near the Sensor within reach of the Communications Cable (USB) (if used). Connect the cable to the Sensor as well as a USB port on the Computer, and start up the Computer OR

- If used wirelessly, make sure the wireless connection is working.

- Click the FlightScope icon on the desktop to start the software.

    o If the computer is connected to the internet, the software checks at startup if a newer software version is available. This automatic check can be disabled (F10->Help->"Check for updates on startup")

    o Updates can also be forced by F10->Help->"Check for updates"

- On the Main screen the following selections are available:

    o Club Comparison, Player Comparison, Ball Comparison, Play mode, and Setup Wizard

- The following additional controls are available at the bottom of the screen: User Manual, Advanced Settings and Exit

<u>Startup Screen</u>

Setup Wizard

NOTE

Do set-up at least the first time the system is
used.

The Setup Wizard is a step-by-step procedure to be followed before using the FlightScope. It can be skipped if the set-up remains unchanged between use events (e.g. if it is a fixed hitting cage installation), but must be updated if the set-up changes (e.g. if the system is used at different locations).

The Setup Wizard can be started from the Main screen menu or from the Advanced Settings (F10) menu.

NOTE

Follow all Setup Wizard steps to set the system correctly.

Step-by-step procedure

Setup 1.   Connect the sensor to the PC and power on.

Setup 2.   Click **Open** to select the sensor to connect to. Click **Refresh** to update list of devices connected.

When the sensor is successfully connected the Port Status and Sensor Status on the top right of the screen icons will appear dark blue as follows:

Click **Next** to proceed.

Setup 3.   Align target direction

This step registers the direction of the target to compensate for slight sensor pointing error.

NOTE

Applies only to X2 systems
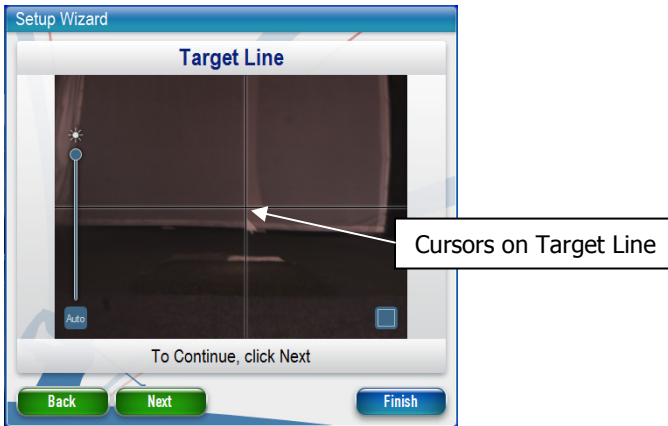fitted with Alignment Camera

Adjust slider if necessary to compensate for low or bright conditions.

The cursor lines will appear in the center of the picture, indicating where the sensor is pointing:

Identify the desired target in the picture (e.g. flag, tree or other object that marks the target line), and drag the cursor lines on to the target.

Click **Next** to accept and proceed.

Setup 4. Set up the sensor mode and geometry.

➢ Set the Detection Mode to **Indoor** if the system is used indoors e.g. in a hitting cage with limited ball travel distance. Set to **Outdoor** mode if hitting outdoors e.g. on a driving range or golf course.

➢ Choose the **Units** of measurement (Metric or Imperial) for the hitting geometry.

➢ Enter the **Sensor to Tee distance**, which is from the tee/hitting spot to the sensor face.

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

➢ The height of the ball tee, used with a Driver, can be specified in addition in the **Tee height for Drivers** field. This value is used when the club type is specified as "Driver". For other clubs, this height is assumed to be 0 (zero).

Press **Next** to continue.

Now, adjust the Tilt, Roll, and Ball Origin. This step will ensure that your sensor correctly orientated and points in the right direction.

The wizard will indicate roll (sideways angle) and tilt (forward/backward angle). Roll angle must be between +0.5 and -0.5 degrees, and tilt angle in the range from 10-13 degrees.

Adjust the sensor feet to correct the roll and tilt angles.

Then adjust the pointing direction. For this the ball needs to be hit from a position within a 52 cm (20 in) radius from the sensor's expected tee position. As a rule the ball origins (blue dots) will be near the center of the red circle if the sensor pointing direction is more or less correct.

Select the club type to use for the test (iron, driver or wedge).

Then hit a 3 or 4 shots with the ball placed each time as closely as possible on the chosen tee position.

The ball origin for each shot is displayed as a blue dot. The most recent shot will be a dark while earlier shots are displayed in a lighter shade.

The displayed origins should overlap. An outlier shot can be rejected ("Reject Shot")> Further test shots can be played if desired.

The Horizontal Offset value (the pointing direction offset) is displayed. This value should be approximately 0 (zero).

<div align="center">

HINT

Get this value small to reduce lateral (sideways) ball tracking errors. Horizontal Offset of 1° causes 2.5 meters sideways error at 150 meter distance; 0.2° offset adds only 0.5 meters error.

</div>

The pointing direction can be corrected by slight clockwise or counterclockwise rotation of the sensor, after which the test must be repeated to verify the Horizontal Offset.

The "Ball Origin" can be checked at any time during system operation from the Advanced Settings menu (F10 > Sensor > Ball Origin).

<u>Set Altitude</u>

Choose the units for altitude (meters or feet).

Select the correct altitude (**Sea Level**, **Medium** or **High**). A custom value can be set by selecting the **Custom** option in the Altitude Selection list and entering the desired height above sea level in meters or feet.

Press **Next** to continue.

Setup 5. <u>Select the units of measurement for data (Metric or Imperial).</u>

To complete the setup, press **Finish**.

NOTE

FlightScope allows different units of measurement to be selected for Club, Ball Speed, and General (other) data, to meet different international practices and needs.

The system is now ready for use.

Re-alignment

If you move the FlightScope and want to set up in different location, you have to set up the sensor geometry for the new location. Run the Setup Wizard and repeat at least Setup 3 as described in the Setup Wizard above.

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Daily Start-up

Check/confirm that the sensor is switched on (LED flashing) and is in the correct position.

Start the software.

Check that the PC/device is connected to the sensor.

Select or enter the name of the player. A new player's name will be saved for future data retrieval.

Select the mode to use: Club Comparison, Player Comparison, Ball Comparison, or Play.

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Club Comparison

Starting a Session

Click on **Club Comparison** to test and compare clubs.

On the Player Information screen, enter a new player's data, or check correct an existing player's data. If this is up to date, this test's results can be added to the global FlightScope golf database that you will be able to access.

Press **Continue** to proceed.

In the Club Comparison Center screen, enter the clubs to be tested.

For each club, set the type (Driver, Iron, or Wedge) for correct handling of club types. It is typical to compare similar clubs (e.g. Drivers, or 7-Irons), although it is also possible to set up to measure the performance different club types (e.g. of each club in a players bag).

After clubs are entered, their names can be edited by selecting the club in the left hand column, and typing the desired name in the "Name:" box on the right hand side. Confirm the name change using "Enter".

For convenience, clubs can also be added individually or as groups. Add either a standard bag, or standard irons.

Delete All or the club selected.
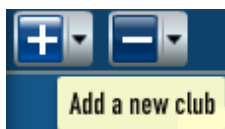
<u>Individual Clubs</u>   **<u>Groups</u>**

The **Advanced** tab provides more assistance with club definitions, e.g. to select/add club details (type/make/model/loft/shaft/flex).

To go back to edit Player Information, click on the button so named.

Click on **Continue** to start club comparison.

Playing Shots

<div style="text-align:center">

CAUTION

**Always check that Player and Club displayed on
the screen corresponds with the actual player
and club, so that data is correctly captured.**

</div>

The session opens by default on the 3D shot plot screen.

Step to other screens by clicking the **<** or **>** arrows on the lower left and right of the screen, or by using the Left/Right keyboard arrows.

3D Shot Plot

The **3D Shot Plot** screen displays shot trajectories in a 3 dimensional view.

The key club and ball data for each shot is displayed on the screen, with the plot of the ball flight path.

Navigation through shots: Step through all shots for a particular club by means of the Up/Down keyboard arrows, or by clicking on the up/down arrow icons on the screen.

A chosen shot can be replayed (animated) by pressing the ▶ button above the Shot Number, or by pressing the keyboard Space bar.

All shots can be replayed (animated) by pressing the ▶▶ button above the Shot Number, or by pressing Ctrl+Space on the keyboard.

Golf Course or Driving Range Display: Click the icons on the right hand side of the screen to display measurements in aspect view or from behind on a Golf Course or Driving Range.

Club selection: On the left edge side of the display is a button that opens a list of clubs being used. Select a different club to display its data. Minimize the list if not needed.

Table View

The Table View displays a list of measurements for each club, as well as running averages and deviations.

	Driver														
	Distance (yds)			Speed		Smash	Spin (rpm)		Ball Angles (°)				Height	Time	R
Shot	Carry	Total	Lateral	Club (mph)	Ball (mph)		Back	Side	Launch Vert.	Launch Horz.	Descent Vert.		(ft)	Flight (s)	Classification
1	157	168	2.8 R	79.7	107.4	1.35	5047	458	18.8	1.5 L	43.3		83	5.8	fade
2	149	160	13.6 R	81.9	103.4	1.26	4940	808	19.6	1.2 R	42.5		76	5.5	fade
3	160	199	3.5 L	79.4	112.4	1.42	2337	224	13.8	2.8 L	27.5		47	4.4	fade
4	163	191	4.2 L	77.4	110.5	1.43	3103	211	14.3	2.8 L	31.0		53	4.8	fade
5															
6															
7															
8															
9															
10															
AVG.	157	179	2.2 R	79.6	108.4	1.36	3857	425	16.6	1.5 L	36.1		65	5.1	fade
DEV.	6.04	18.6	8.25 R	1.86	3.91	0.076	1350.2	279.1	2.99	1.92 R	7.99		17.4	0.61	-

Next Club   Clear Club Date   Edit Clubs   View All Results   Driver Optimizer

Master your passion

You can play as many shots with each club as you choose.

Basic Controls:
Navigate between shots with the mouse or up/down arrows.

Use the DEL key to remove a shot from the test data (it becomes grayed out). Press DEL again to bring it back.

> **CAUTION**
> **If a shot's data is permanently deleted,**
> **it cannot be recovered.**

Press SHIFT+DEL to delete a shot permanently.

Select the next club to play with, or scroll between clubs using **Next Club**.

The "Next Club" button will display data of the next club in the sequence (if available).

Clear Club Data will erase data from the table.

Edit Clubs will return to the club entry screen where club names and types can be modified or further clubs can be added if required.

To view comparative results between measured clubs measured, click on **View all results**.

Manual Shot Acceptance:
By default the system accepts every shot.

If you wish to manually Accept or Reject shots, for example for pre-emptive elimination of poor shots, click on the **GO** button (see left hand figure below). It will then change into a **YIELD** button (see right hand figure below). You will then be prompted to Accept or Reject each shot manually.

Go/Yield Button:

Accepted shot data will be saved to a file on the computer.

View all results table:

In this view you can rate clubs according to various criteria.

Results can also be printed.

Click **Resume** to return to return to the Table View.

Screen Navigation

Basic Screen Selection

While playing in the Club Comparison mode, you can scroll between the Shot Table and other views including: Dashboard, Grouping, 3D Shot Plot, Club Analysis, Ball Trajectory, and Tracking Info by clicking on the navigation buttons (see right),

or

by pressing the left and right arrow buttons on the keyboard (see right).
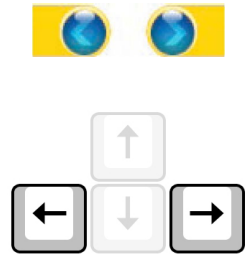
Screen Map

All working screens are just 2 clicks away with FlightScope's Screen Map.

To move to a new screen, simply click the Screen Map icon (top, left), and the Screen Map (below) will appear.

Select a screen, and click. The selected screen will open.

Driver Optimizer

The **Driver Optimizer** button will be visible if the club type is set to "Driver". This function is described in more detail in the following section.

The FlightScope Driver Optimizer determines the LAUNCH ANGLE and BALL SPIN that will produce the longest carry distance (alternatively total distance) for a particular player.

The Driver Optimizer can be selected from the **Club Comparison** mode (see section on **Club Comparison**).

Optimization can be done for either carry distance or total distance.

> **CAUTION**
>
> **To be used for fitting DRIVERS only.**
> **Not suitable for irons and wedges**

How it works

STEP 1 - Using any driver, the player plays a set of typically 3-6 shots to provide a statistical sample of his performance with the club.

STEP 2 - Inspect the shots to determine if there were any problem shots (e.g. out-of-pattern readings). Delete (DEL key) all outliers from the shot records.

STEP 3 - Select the DRIVER OPTIMIZER function. The OPTIMIZER screen will display a graph and associated data.

NOTE
Driver Optimizer assumes player can achieve
a smash factor of 1.50

NOTE
Driver Optimizer uses a "medium" surface
hardness to determine the optimum
distances

Graphs

The graphs show the calculated Optimum trajectory for the player. A colored band shows the envelope of trajectories of the shots played. If more than one driver was tested, select them in turn by Next Club.

The user can select to optimize for Carry or Total Distance, for which the Launch Angle and Spin values will be calculated.

The screen shows:

- ➢ Average spin and launch angle of the shots played
- ➢ Optimum spin and launch angles
- ➢ Potential carry (or total) distance
- ➢ Adjustments to spin and launch angle to achieve optimum distance
- ➢ Resultant optimum distance (carry and total)
- ➢ Form (or shape) of the trajectory
- ➢ A graphic tool for viewing the actual spin and launch angle relative to the optimum
- ➢ Controls to tune spin and launch angle values relative to the optimum
- ➢ Spin and launch angles can be adjusted in the text boxes or by clicking on a position in the contour graph.

> ➢ The "o" symbol shows the optimum and the "x" marks the adjustable point

The user can tune the spin rate or the launch angle for which a corresponding "best" trajectory will be calculated. The resultant distance (carry and total) as well as the shape of the resulting trajectory is shown.

Play-offs can be made between spin and launch angle combinations, carry distance and total distance for the player, helping to gain an understanding of sensitivity of the carry or total distance to launch angle and spin.

Grouping View

The **Grouping** view displays the grouping of the ball landing positions and the grouping radius. Either Single Club or Consolidated View (all clubs) can be selected.

Zoom in/out: The PC mouse or touchpad can be used to zoom in or out on this screen. Zoom in by holding down the left hand mouse/touchpad button while making a clockwise movement with the pointer. Zoom out by holding down the left hand mouse/touchpad button while making a counter-clockwise movement with the pointer.

Grouping of a Single Club

Consolidated Grouping view – all clubs

Club Analysis View

Three screens are available in this view:

Graphs: Club Trajectory, Speed and Acceleration

Table: with Club Graphs

Angles: Club Face, Loft, 3D Club, and Ball Spin Axis

Club Attack Angle This is the direction the clubhead is traveling with respect to the ground at the moment of impact with the ball. A negative value indicates a club traveling downward and a positive angle indicates a club traveling upward.

Club Path This is the swing path of the club at the moment of impact with the ball. It is measured relative to the target line. The angle is displayed with an indication of R (Right) for in-to-out movement and L (Left) for out-to-in movement.

Dynamic Loft This is the effective loft with which the ball is struck, combining the club loft and the club path and attack angles, that causes actual ball launch which is the result of the swing path of the club at the moment of impact with the ball. It is measured relative to the target line. The angle is displayed with an indication of R (Right) for in-to-out movement and L (Left) for out-to-in movement.

3D Club This displays the movement of the clubhead in an arc in the swing plane, relative to the ground. The swing plane vertical angle and the direction of the swing plane at the position as well as the ball direction at the moment of ball impact are displayed.

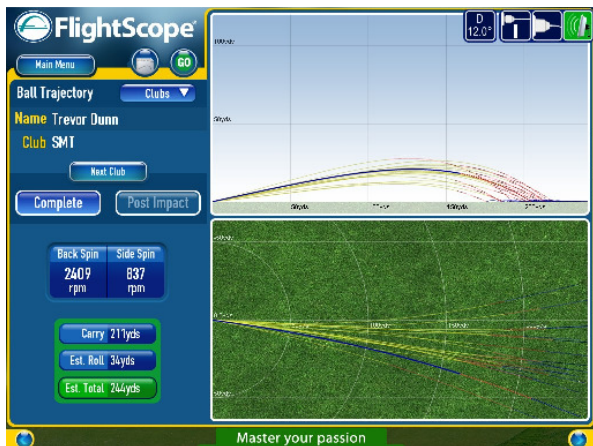Choose between various views e.g. "3D", Side, Top, or Rear.

The club movement is animated (press ▷ to play).

Ball Trajectory View

This displays the ball trajectory in side and top views, with additional data.

The estimated roll, based on the selected surface type, is added.

Complete trajectory

Shows the real time trajectory of the golf ball in side and top views, to scale.

NOTE

All shots in a session, by club or combined, can be displayed for comparisons of shots e.g. trajectory or distance.

NOTE

Tracking the final part of the ball trajectory requires strong "tracking filtering". The measurements provide a trajectory estimate which is displayed as a dotted line.

Dashboard View

The **Dashboard** view displays the results of a single shot in large format.

Player Comparison

Player Comparison follows the same layout and procedure as Club Comparison but allows the performance of different players to be compared.

➢ Start by selecting "Player Comparison" on the main screen.

➢ Enter the names of two or more players to compare. Type name in box and hit enter to add a player. Use + - (also delete all) to adjust the player list. Press **Continue** to proceed.

➢ Allow each player in turn to play a selection of shots. This will usually be with the same or similar club. Each player will attempt to repeat his shots as closely as possible to get a good statistical sample of his performance.

➢ During each player's turn, any unwanted shots can be deleted. This can also be done after all players have completed their turns.

➢ After all players have completed their shots, the detailed results of each player can be reviewed to detect any unrepresentative shots. These can be deleted temporarily or permanently from the data.

➢ Finally, the All Results screen can be used to view the comparative statistics of the players.

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Play

➤ **Play mode** is a simple and effective way to use FlightScope. You do not need to set up a session. You can play shots immediately.

➤ When you select Play, your player name is "Player".

➤ Select a "Driver", "Iron" or "Wedge", by pressing Next Club.

➤ You can add clubs if required.

➤ However if you need to save the results under a particular player's name, it is recommended to use the "Club Comparison" mode instead.

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