Forward Looking Sounders

Standard & Professional

- **FLS Gold**
- **FLS Silver**

Instruction Booklet

ECHOPILOT™

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ECHOPILOT™

Thank you for purchasing this FLS instrument.

Your new EchoPilot instrument has been manufactured to the highest standards by the dedicated staff of a company with many years of experience in marine electronics. You have invested in the most up to date technology available and in a product rigorously tested in the laboratory and at sea.

All goods of our manufacture are backed by a 2 year warranty. Expert advice and guidance is always available by Telephone 01425-476211/2 - just ask for FLS customer service. If you are outside the UK you can still call us or any of our overseas distributors. We welcome the opportunity to talk to our customers.

Nobody enjoys reading manuals, but please continue to read this one! Installing your instrument correctly is vital to get the maximum performance, pleasure and safety from your FLS, so please take the time to read the instructions.

Please observe the following warnings:

Please do not cut the transducer cable - it is a fine threaded multi-core cable matched to its transducer.

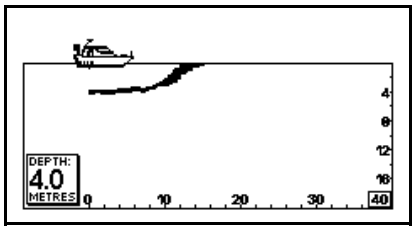
Please do not remove the transducer plug from its cable - if a hole is too small make the hole bigger! Any join in the cable will reduce sensitivity / performance.

FLS Silver/Gold Operating Instructions

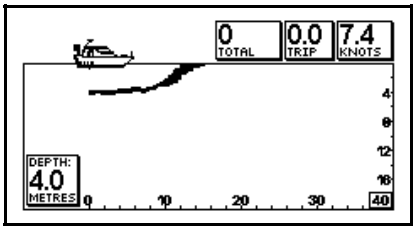
To switch on

Press and release the **POWER** switch .

The FLS Silver / Gold will start with a welcome introduction display that includes the instrument software version, followed by the standard forward looking display.



FLS display with no LOG option



FLS display with LOG option

The instrument display should look like one of these two images, depending on whether or not you have a log installed with the system. If you have a log transducer connected, you will not see the log displays at first. This is because the FLS automatically detects the log and displays the log information boxes after the speed has gone above 1 knot. The boxes will then be visible until the set is turned off.

If however, the vessel moves a short distance (more than 0.1 NM), the log display boxes will remain present for the life of the instrument.

To switch on in demonstration mode

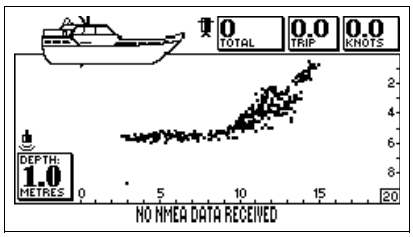
The FLS Silver / Gold contains a simulator to enable the user to practice operating the instrument with simulated readings.

Press and hold the **POWER** switch until a second beep is heard.

FLS Silver/Gold Operating Instructions

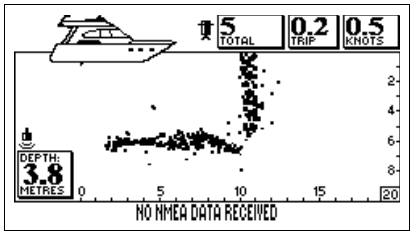
To Change Range

If you wish to change range, use the **up arrow** and **down arrow** keys - the range will change through values 20, 40, 60, 80, 100 and 150 metres (or 60, 120, 180, 240, 300, 450 feet).



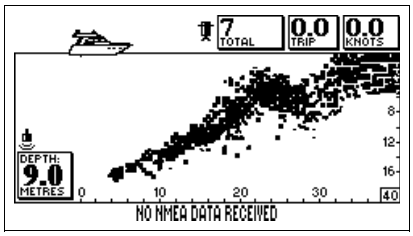
20 Metre range.

Mud bank at 10-12 metres distance ahead. (Keel Offset set to 3.0 metres)



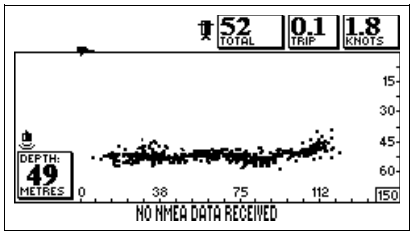
20 Metre range.

Submerged section of Quay wall at 11 metres distance ahead.



40 metre range.

Approaching close to Black Rock.



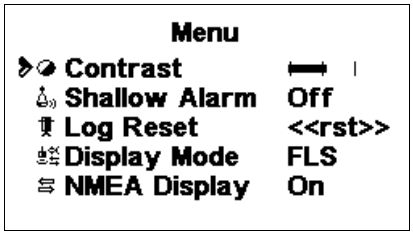
150 metre range.

Looking 120 metres ahead in 50 metres of water depth.

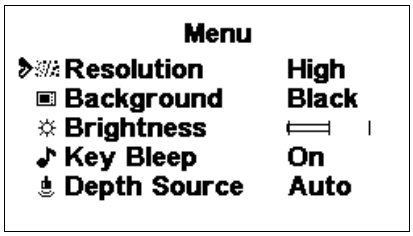
FLS Silver/Gold Operating Instructions

Menu

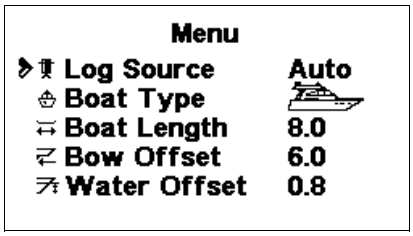
To provide access to change operating parameters a **menu** system is used.
Pressing the menu key brings up the '**Menu**' list of items:



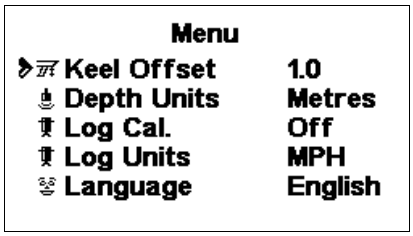
The 'icons' (pictures) by each menu item are used to aid understanding of each parameter, e.g. a depth transducer icon for depth, log transducer for log, a boat icon for boat type select etc.



To **scroll** through the menu items, press **and** release the **menu key**. On each release of the **menu key**, the list of menu items moves up the screen one place. If the **menu key** is held for 2 seconds, or alternatively no key is pressed for 10 seconds, the display will revert back to the previous display. On an FLS Silver this is the FLS display, on the FLS Gold this could be either FLS or NMEA Viewer, which ever is selected in the menu option.



The menu item at the top of the list is the one you can change. To change a menu item, you use the **up arrow** and **down arrow** keys. All menu items will be stored in the FLS permanent memory store as soon as the menu disappears.



The Menu is arranged so everyday items are at the top (as these may be required for alteration frequently - e.g. Contrast), followed by the infrequent items (e.g. LCD background colour) and finally at the bottom are the items that need only be set when installing the FLS unit (e.g. Boat type, Length, Bow offset etc).

We will now discuss how to change the various items which you will need to access.

FLS Silver/Gold Operating Instructions

Adjusting Contrast

If picture appears too light or dark, press the **menu key** to get the menu, and use the **up arrow** key to darken or **down arrow** key to lighten.

Adjusting Shallow Alarm

The FLS Silver / Gold contains a forward looking shallow alarm system. An alarm depth is set by the user which corresponds to the depth **below the transducer and vessels keel** (if a keel offset value set). If the FLS software detects an object ahead and above this line, or the sea bed goes over the line, then an alarm will sound.

To set the Shallow alarm, enter the menu, and scroll down to **Shallow alarm** :

To switch on the alarm press the **up arrow** key. To turn off the alarm, reduce the value below 1.0m using the **down arrow** key. The setting will be retained after power down. Settings from 1.0 - 20.0 metres in 0.1 metre steps are available.

Resetting LOG trip

The log system within the FLS Silver / Gold retains the trip distance in it's memory even after switching off the unit. To reset trip to zero, use the menu key to scroll down to **Log reset** and press the **up arrow** or **down arrow** key to reset.

Selecting Display Mode

FLS Gold Only

The FLS Gold offers the option to display the normal FLS forward scanning display, or an NMEA Viewer display, which acts a GPS / Loran C / Decca repeater display, by means of the NMEA system. This can detail the ships latitude and longitude, next waypoint information (name (ID), latitude and longitude, course/ bearing, distance, cross track error, direction to steer and closing velocity) and UTC time of observation. The GPS / Loran C / Decca unit will require configuring to output the required NMEA information for the FLS Gold to display.

Press the **up arrow** key to select NMEA Viewer and the **down arrow** key to select FLS display.

FLS Silver/Gold Operating Instructions

Selecting NMEA (Brief) Display

FLS Gold Only

The FLS Gold allows the ships current Latitude and Longitude, plus the current waypoint ID name and course to be displayed at the bottom of the FLS display. This enables the FLS Gold to operate as an FLS **and** NMEA repeater.
Press the **up arrow** or **down arrow** keys to toggle Brief display on and off.

Selecting Echo Resolution

The manner in which the echoes are displayed on the FLS display is selectable between **High** and **Low**. When set to **High** the size of the echoes is dependent on its strength, this builds up a detailed picture of the sea bed, but it can be thin at times. In contrast, the **Low** setting will produce a thicker and more chunky sea bed, with reduced detail resulting. **Note:** The **High** setting can be very useful for locating wrecks, as the extra detail can uncover deviations in the sea bed.
Press the **up arrow** or **down arrow** keys to toggle resolution **High** / **Low**.

Selecting LCD background colour

The FLS Silver / Gold display can be viewed in black-on-white or white-on-black modes. The menu item **Background** alters the display colour in use.
Press the **up arrow** or **down arrow** keys to toggle between the two types.

Adjusting Backlight brightness

The brightness of the CCFL backlight can be adjusted from **Off** to full brightness. A high brightness level creates a high contrast on the LCD, whilst there may be call for the backlight to be turned off (to preserve power for example).
Note: Turing the backlight off will cause a reversal in the LCD colours - White-on-Black will become Black-on-White and vice versa).
Press the **up arrow** key to increase, or **down arrow** key to decrease brightness.

Selecting Key bleep

The FLS produces a 'bleep' to acknowledge key presses to the user. If you wish to silence these bleeps press the **up arrow** or **down arrow** keys to toggle.

FLS Silver/Gold Operating Instructions

Selecting Depth Input Source

FLS Gold Only

The FLS Gold has a digital depth readout on the FLS display. The operator can choose (using the ⮝ **up arrow** / ⮟ **down arrow** keys) which depth input source this value comes from:

⇒ **FLS** - generated from the FLS data on screen
⇒ **DBT** / **DPT** - a particular NMEA sentence
⇒ **Automatic** - any NMEA sentence that contains depth information (DBT or DPT), unless no such sentence received, when source reverts back to FLS input.

Note: If in any doubt, set Source to **FLS** for normal depth operation.

Selecting Log Input Source

FLS Gold Only

Just like the Depth input source, the FLS Gold allows the log source to be selected. This source is used to obtain the values of speed, trip distance and total distance travelled, which are displayed in the three boxes above the water line:

⇒ **FLS** - generated from speed pulses from the log transducer
⇒ **VTG** / **VHW** / **RMC** / **RMA** - a particular NMEA sentence
⇒ **Automatic** - any NMEA sentence that contains log information, unless no such sentence received, when source reverts back to FLS input.

Note: If in any doubt, set Source to **FLS** for normal log operation.

FLS Silver & Gold **Important note:** A log transducer has to be connected to the instrument **AND** the speed from it must go above 1 knot before the three log boxes will appear. However, once the total trip has increase above 0.1 NM, the boxes will always appear from then on, regardless of transducer speed. The log boxes are always visible with NMEA source & NMEA data received.

Changing the Boat type

The FLS Silver / Gold is capable of showing eight types of boat on screen **:** **Motor boats** ("Nelson", "Sealine" and "Sunseeker"), **Yachts** (Racing and Traditional) and **Power boats** (Traditional, "Bayliner", and RIB).
Press the ⮝ **up arrow** or ⮟ **down arrow** keys until the best match of boat is shown.

FLS Silver/Gold Operating Instructions

Adjusting Boat length

The boat length of the on screen boat may be altered to match the length of your boat - boats from **4.0** metres to **14.0** metres may be represented.

Press the **up arrow** key to increase, **down arrow** key to decrease boat length.

Adjusting Bow offset

The bow offset represents the position of the FLS transducer position measured from the bow - this means your bow will be represented correctly on the screen to enhance your hazard judgement. Bow offset may be set from **0.0** metres up to the selected boat length (see above), by pressing the **up arrow** key to increase, and **down arrow** key to decrease bow offset.

Adjusting Water Offset

(Software versions 1.00 to 1.06 only)

The FLS Silver / Gold allows complete control over the boat settings, this enables the on screen boat graphic to match closely to reality. Water offset is the distance below the water level that the transducer is positioned on the vessel. This setting enables the sea bed echoes to be placed at the correct depth with respect to the sea surface. As usual, use the **up arrow** and **down arrow** keys to adjust.

Note: Maximum and minimum values are limited by boat length. Maximum is **12.5%** of the boat length (e.g. 8m boat allows 1m water offset). Minimum is **2%**.

Adjusting Keel Offset

The final setting to match the boat graphic to reality is the keel offset. This is a **safety** setting, as any part of the vessels keel that is **deeper** than the transducer must be subtracted from the transducer generated depth value. This means that the digital depth is the actual **clearance** depth to the deepest part of the keel, rather than the depth below the transducer.

Use the **up arrow** and **down arrow** keys to adjust the keel offset..

Note: If the boat type selected is a yacht, the keel offset value actually resizes the keel of the yacht graphic to help visualise the physical clearance below the keel.

FLS Silver/Gold Operating Instructions

Selecting Depth sounder units

The FLS Silver / Gold instrument can display the depth in metric units (**metres**) or in imperial units (**feet**). To change between the two types of units display, access the **Depth Units** section of the menu, and use the **up arrow** or **down arrow** keys to toggle units between **Metres** / **Feet**..

Adjusting Log transducer calibration

The **optional Log transducer** supplied with the FLS Silver / Gold produces pulses which are proportional to the speed of the boat. It is these pulses which the FLS Silver / Gold measures to give you your speed. However, due to boat hull design, the water flow at the sensor can be faster or slower than the actual water speed of the boat. The FLS Silver / Gold allows for the Log Speed, Trip and Total Trip displays to show between **45% - 150%** of the actual log sensor reading.
As usual, use the **up arrow** and **down arrow** keys to adjust calibration.

Selecting Log units

The log units can be changed between **Knots** (the normal speed units), **KPH** or **MPH** (can be useful for internal waterways speed limits). To change between the three types of units displayed, access the **Depth Units** section of the menu, and use the **up arrow** or **down arrow** keys.

Selecting a Language

English, German, French, Swedish, and Finnish are currently available on the FLS Silver / Gold. Use the **Menu** key to scroll down to **Language** and use the **up arrow** or **down arrow** key to change it to your preferred language.

Operation of a Repeater Unit

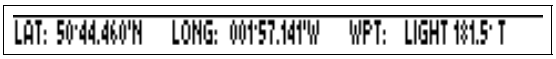
EchoPilot FLS Repeaters operate exactly the same way as the master, except the master unit must be switched on before the Repeater will work, otherwise the Repeater will display the message "**Waiting for data from Master unit**".

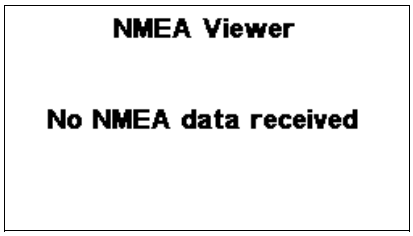
FLS Gold Operating Instructions

NMEA Displays

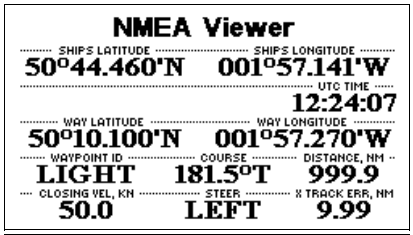
FLS Gold Only

The FLS Gold is capable of displaying NMEA data that it receives from a GPS, Loran C or Decca unit. As previously mentioned, the current ships latitude and longitude, and the next waypoints name ID and course can be displayed at the bottom of the FLS standard display (by setting "**NMEA Display**" to **On** in **menu**) :

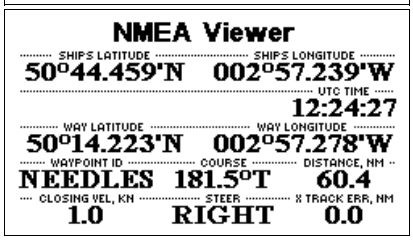




Alternatively, the main NMEA display can be accessed by setting the "**Display Mode**" in the **menu** to **NMEA.** When the instrument then returns from the menu, it will display one of two possible screens. If no NMEA data has been received, this will be the display.



If NMEA data is received, then this display will appear and as many details as possible will be extracted from the received data and put into their appropriate positions.
If any of the details can not be found in the available data, the display will indicate "no data" by showing the value as this "———".



To return to the normal FLS display, press the **Menu** key to access the menu, and set the "**Display Mode**" option back to **FLS**. When you return from the menu this time, the normal FLS display will appear.

If the "**Depth Source**" or "**Log Source**" settings have been set to NMEA sentences, or **Auto** and NMEA data received, the values in the respective boxes will be derived from the incoming NMEA data. When this occurs, the depth and/or log transducer icons (pictures) will be replaced with the NMEA icon shown above. This indicates that the values being shown in the boxes are no longer being generated by the FLS, and their **accuracy cannot be guaranteed by the FLS**.

FLS Technical Specifications

Specification	FLS Gold	FLS Silver
Voltage	12v or 24v DC	
Current Consumption	200 mA with backlight off, up to 400 mA with backlight on full	
Operating frequency	200 kHz	
LCD type	Transmissive, CCFL Backlighting	
Viewing Area	120 x 70 mm 240 x 128 pixels	110 x 60 mm 228 x 116 pixels
Forward Ranges	20 to 150 metres	
Maximum Depth Range	10 to 75 metres	
FLS Display Update Rates	Dependent on range. Shorter range, faster updates. 20m: 2-3 updates / sec, 150m: 1-2 updates / sec	
Integral Simulator	Yes	
Built-in Test Equipment (BITE)	Yes. FLS monitors various voltages and systems to help diagnose problems, if it becomes necessary	
Second Station	Yes	No
Alarm	Shallow	
Log Trip	0.1 NM to 99.9 NM	
Log Calibration	45% to 150%	
Display Units	Metres or Feet for depths. Knots, KPH, MPH for log	
Bow, Water and Keel offset calibrations	Bow: 0.0m to length of boat (14m Max) Water and Keel: 0m to a proportion of boat length	
Transducers	FLS Standard or Professional (12m), with 8m extension cable if necessary, plus **optional** log unit	

Tips and guidance on use

The Digital Depth Display

This ADDITIONAL information (in the bottom left-hand corner) is **the derived AVERAGE depth** over the first (left hand) third of the screen on display. Therefore, for good results do not select a deep long range when in shallow water, or a shallow short range when in deep water. Try to fill the screen with the sea bed echoes for the best results with this digital display.

Practice

When learning to interpret the screen practise with clear targets, e.g. a quay wall. Try backing off an obstruction very gently to see what the maximum range is that different targets become visible.

!!!!! WARNING !!!!!

If approaching a target select a range longer than you think you need. Most people (including us!) seriously underestimate distances to quays, buoys, walls etc.

Note that going astern can push turbulence past the transducer reducing sensitivity or sometimes obliterating all the picture so take care! Manoeuvre with the minimum use of astern (reverse) power, especially with the propeller (on twin screw vessels) on the side of the transducer.

Turbulence from other vessels, especially in shallow water can also adversely affect performance. Algae (normally in spring), Plankton and pollution can all show up as 'noise' on the LCD screen.

Interference

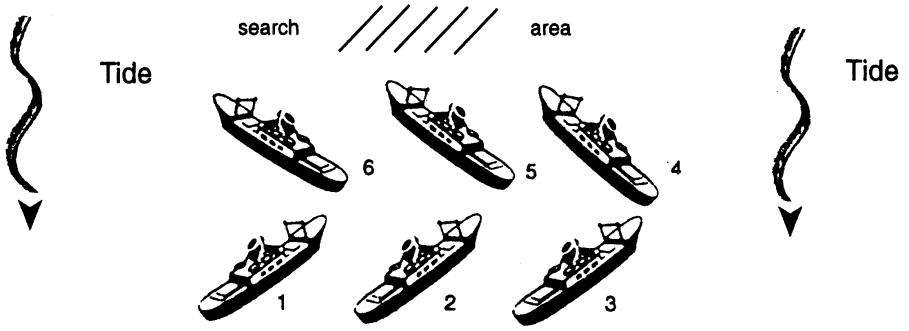
Other depth sounders that operate at 200 kHz must be wired so they can be switched off if interference occurs. (This may appear as 'submarine' like echoes coupled with a reduction in sensitivity).

The EchoPilot **SuperMaxi range** operate at 150 kHz and so do not cause direct interference to the FLS , allowing both to operate in unison.

Tips and guidance on use

Wrecks

Your EchoPilot FLS may be used as an aide to finding a wreck for diving or fishing. Approach should be made from down tide, very slowly with the boat at a slight angle to the tide so the boat traverses across the search area.



The wreck may be spotted appearing to 'float' above the sea bed with a section of sea bed beyond the wreck not showing. This is a sonar shadow formed by the sound waves being prevented from reaching the sea bed beyond the wreck due the impenetrable barrier to sound formed by the wreck's hull.

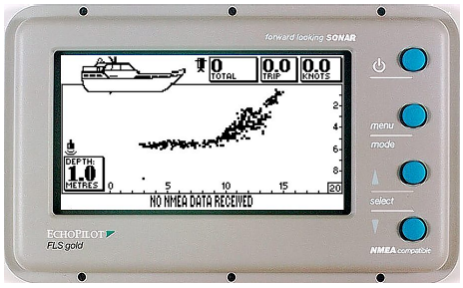
Operating an FLS at Speed

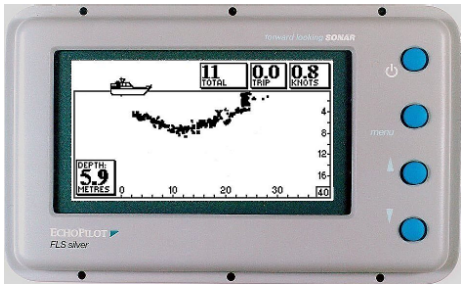
Ultrasonic signals travel well through solids and liquids but are greatly attenuated in air. It follows that a stream of turbulence and air bubbles will limit the performance of the FLS system, or any depth system for that matter.

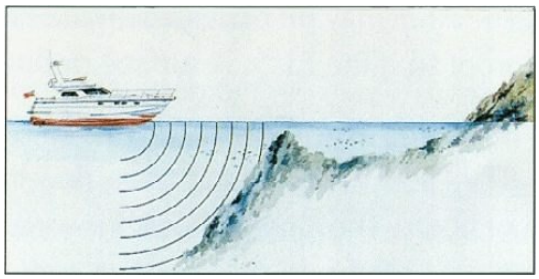
However, if a place can be found on the hull where there is a clear flow of water, even when the vessel is pitching, then good results can be obtained even at speed.

NOTE: All depths are from the transducer, so the water offset (distance from the water surface to the transducer) and Keel offset settings must be accurately entered to match your vessel to the true scaled boat graphic on the display. In this way, the picture of the sea bed on the LCD will match closely to reality.

How FLS technology works

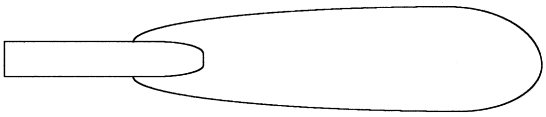






The EchoPilot FLS is a unique and patented invention. When working it can see through a full arc of 90 degrees, from straight ahead to straight down. A useful analogy is to think of the FLS as an underwater radar that is on its side and scanning in the vertical plane rather than the horizontal.

It does not scan from side to side but has a fairly narrow beam of approximately 18 degrees. In practice as sensitivity reduces with distance (especially at the edges of the beam) the polar diagram looks more like an elongated balloon.

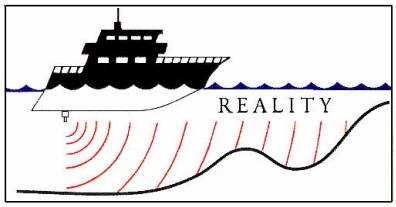


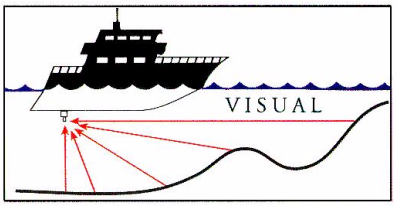
The FLS is not a fish finder - it is a collision avoidance system. Some fish finders have a fixed beam looking ahead at 45 degrees but only the FLS has our unique, patented **real time** scanning system.

How FLS technology works

Distance Ahead

The distance ahead that the FLS can see depends on the depth of water below the vessel, and the laws of physics. The transmit 'ping' radiates at all angles down and forward of the vessel, hits the sea bed and some of it is returned to the transducer's receiver.





As the 'ping' travels further away from the boat, it hits the sea bed at an increasingly acute angle. At a certain point the angle will be so acute that the 'ping' is not returned, and the sea bed information is lost - this determines the maximum view ahead.

When on a flat muddy bottom (e.g. river or estuary) the FLS will show the seabed up to three to five times the depth ahead. This ratio increases to eight to nine times if the seabed shoals upward - a more dangerous position **AND** you can see further ahead. Rocky bottoms are better targets than muddy ones, and hard vertical surfaces like quay walls, rocks or coral reefs will often be seen at 100 to 150 metres.

SAFETY

The transducer provided is designed to shear off (in the event of a severe impact), flush with the hull, leaving the solid epoxy filled portion in the through hull fitting, and thus poses no risk of water ingress.

MAINTENANCE

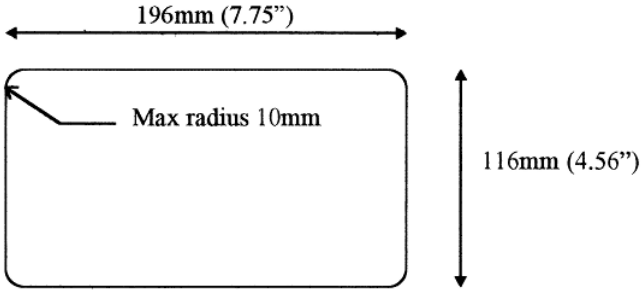
Keep transducer 'O' rings and locking ring thread well greased with a waterproof grease. Protect plugs and cables from chafe. Clean the transducer face regularly and check for barnacles etc. With care, this may be done afloat. If you have never done this before, phone us first! You may anti-foul the transducer. Avoid long term exposure of the LCD to direct sunlight - please use the white cover provided whenever possible.

FLS Silver/Gold Installation Instructions

Fitting the display

The EchoPilot FLS Silver / Gold is designed to be flush mounted on an instrument panel or bulkhead.

- Select a suitable site, visible by the helmsman.
- Cut a rectangular hole, of dimension 196mm by 116mm. Alternatively, a correctly sized sticky label template is supplied for this purpose.



- Fit the instrument on a back of suitable sealant & if required use the two studs & knurled wheels to secure. **Do not** over tighten the knurled wheels.

Note: It is very important to protect the rear cable entry points from water ingress.

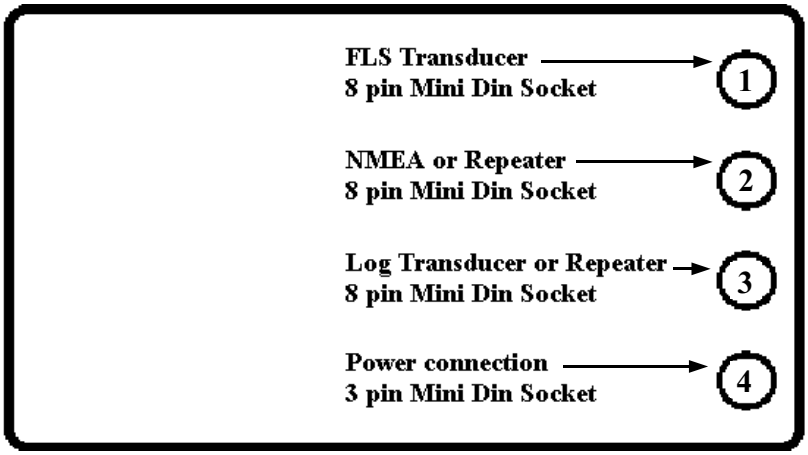
Alternative fitting

The EchoPilot FLS Silver / Gold may also be fitted from the rear of a panel (normally 3mm lacquered aluminium panels). For this application four nuts and bolts are removed from the FLS Silver / Gold, and four studs are normally spot welded to the rear of the panel (to line up with the four removed bolt holes). The holes may then be drilled out (with core) to 4mm diameter.

FLS Silver/Gold Installation Instructions

Plugs & Sockets

The EchoPilot FLS Silver / Gold case has four cable entry points. However, the FLS Silver model will not use any NMEA and/or Repeater cables that are connected.



These are: FLS Transducer, NMEA or Repeater, Log Transducer or Repeater and Power. Looking at the rear of the unit, the four entry points are as shown above.

Note: Sockets **2** and **3** are both protected beneath small black plastic covers which must be removed if the sockets are to be used. Using a small flat-bladed screwdriver, remove the cover to expose a second protective plug of white silicon compound. Most of the silicon will be removed with the cover, however, any remaining should be carefully removed. The respective cable(s) can now be connected (as detailed below).

- **First step -** If a log transducer connection is required plug cable into socket **3**.
- **Second step -** If an NMEA connection and/or a Repeater is required, plug the NMEA/Repeater flying lead provided into socket **2**.

To facilitate the insertion of plugs, the 'O' rings in the sockets may be greased. **Silicon grease must be used for this purpose**. Any manual grease or petroleum based grease will cause the 'O' ring to swell and prevent correct insertion of the plug. Sealants other than silicon based sealants will have a similar effect. Vegetable oil should also not be used.

FLS Silver/Gold Installation Instructions

Connecting the Flying end of the NMEA cable

FLS Gold Only

The FLS Gold requires connection to an NMEA source (GPS, Loran C or Decca) to allow the navigational information to be displayed. The plug end of the NMEA cable should have already been connected to the FLS as detailed on page 19. The other, flying end of the cable has eight individually coloured tinned wires.

The two FLS NMEA input wires must be connected to the two NMEA output wires of the NMEA source. In addition, if the FLS NMEA output data is required for another instrument (e.g. Autohelm), the FLS NMEA output wires must be connected to the input wires of that equipment. The wire labels in the table below should match those found in the instruction booklet of the NMEA source (GPS, Loran C or Decca) being used. If they do not, a suitably qualified electrician should be consulted.

NMEA cable colour	Description / Label
Brown	NMEA Input Positive +
Blue	NMEA Input Negative -
Orange	NMEA Output (Positive +)
White	NMEA Output (Negative -)

Connecting a Repeater

FLS Gold Only

The FLS Gold Repeater is connected to the master Gold instrument via the NMEA/Repeater flying lead and the Repeater flying lead provided. The plug end of the NMEA/Repeater cable should have already been connected to the FLS as detailed on page 19. The plug end of the Repeater cable should be inserted into the NMEA/Repeater socket (**2**) on the Repeater instrument. The other, flying end of both cables have eight individually coloured tinned wires.

The two cables should then be connected as detailed in the table opposite, using a connector block.

IMPORTANT NOTES:-

- **The REPEATER OUT wire from the master instrument should be connected to the REPEATER IN wire from the Repeater instrument.**
- **The REPEATER IN wire on the master instrument should be connected to the REPEATER OUT wire from the Repeater instrument.**
- **The screens of both cables should be connected.**
- **All unused wires from the flying lead (Repeater and NMEA) MUST be terminated so that they are prevented from shorting to other wires.**

NMEA/Repeater cable	Repeater Cable
Power (Green)	Power (Green)
Repeater Out (Yellow)	Repeater In (Black)
Repeater In (Black)	Repeater Out (Yellow)
Signal Ground (White)	Signal Ground (White)
Screen	Screen

Power

The FLS Silver / Gold will run on 12 or 24 volts DC and is reverse voltage protected. Therefore if the battery voltage is connected incorrectly no damage will occur, but the FLS will not turn on.

- The battery power is connected using the 3 pin Mini Din short cable. Connect the **Red** wire of this cable to the positive supply from the battery, and the **Black** wire to the negative. Plug the cable into socket **4** (see diagram on page 19).

Current consumption will depend on the setting of the CCFL backlight intensity (set in the Menu) : if set to minimum (off), current consumption will be approximately 200mA, whilst at full brightness the figure will be closer to 400mA.

AN NMEA/REPEATER CONNECTION DIAGRAM CAN BE FOUND AT THE END OF THIS BOOKLET.

FLS Silver/Gold Error Codes

Error Codes

The FLS Silver / Gold has Built-In Test Equipment (BITE) to help identify potential problems, and then indicates them to the operator when they occur in the form of an error code and error value. The table below details all the possible error codes, the possible causes for such an error occurring, and possible solutions.

Error Code	Error Value	Reasons and possible solution
A	95 to 50 *	Battery input voltage has dropped below 9.5 volts. This will impair the performance of the FLS. If voltage goes below 7.0 volts the FLS will inform user to turn it off as voltage is too low for correct operation. **Check the battery condition.**
A	300+ *	Battery input voltage is above the recommended maximum limit of 29 volts. If allowed to continue, could damage the FLS unit. FLS will ask to be switched off. **Check battery and any alternator connected for charging the battery.**
B	80 to 20 *	Transducer transmit voltage has gone below 8.0 volts. This will degrade FLS performance. Voltage can never be higher than battery volts - 2 volts. **Check the battery condition.**
B	< 20, or 125+ *	Transducer transmit voltage below 2.0 volts, or above 12.5 volts. Exceptional condition. **Check transducer and its cable are not damaged. If ok, FLS will have to be returned to EchoPilot.**
C	1,2 or 3 **	The indicated receiver channel is not functioning correctly. This could caused by the FLS unit or the FLS transducer. Contact EchoPilot. **Check transducer and its cable are not damaged. If ok, FLS will have to be returned to EchoPilot.**
D	< -80, or > -145 *	LCD contrast voltage has gone beyond its correct operating values. The LCD display may not function during this error, in which case an alarm will sound. **The FLS will have to be returned to EchoPilot.**

FLS Silver/Gold Error Codes

Error Code	Error Value	Reason and possible solution
E	1	RAM error detected. This may render the LCD unreadable (as it relies on the RAM), in which case an audible alarm sound may be heard. **The FLS will have to be returned to EchoPilot.**
F	1 - 5	EEPROM error detected. The place where all menu settings and log trip distances are kept when the power is turned off. This fault will cause some or all of the settings and readings to be lost. **The FLS will have to be returned to EchoPilot.**
H	1 or 2	NMEA communications error detected. A problem with the NMEA data, in either receiving from another instrument (Error value 1), or in transmitting to another instrument (Error value 2). **Error Value 1 would suggest possibly too much data coming from the supplying instrument (e.g. GPS). Try reducing the number of sentences output by the GPS, or the repeat rate. Error Value 2 could be a possible fault. If it persists, contact EchoPilot Ltd.**
I	1 or 2	Repeater (Second Station) communications error. A problem with the link from (value 1), or to (value 2) the connected FLS Second Station. **If error persists, contact EchoPilot Ltd.**

* The error values indicated by the error message are the measured voltage multiplied by 10 (e.g. 9.5 volts equals 95).

** Indicates the number of the FLS channel at fault.

Transducer Installation Instructions

Transducer installation

The choice of transducer position will have a major effect on final performance so please consider carefully all factors and if in any doubt, telephone the factory.

Motor boats

On a planing hull fit as far aft as reasonably possible. On a stern drive boat (inboard or outboard), typically fit just in front of the engine(s). On a shaft driven boat (not V drive) forward of the shaft log or stern gland, but behind the gearbox.

Keep inboard of the spray rail if possible.

Do not fit downstream of any other through hull fittings (for example intakes, log, toilet sea cocks, etc.).

The transducer should ideally be vertical in the fore and aft plane at running trim. If it leans forward, the sea bed appears to creep up, and if it rakes aft too much surface clutter may show. Some 'heel' to port or starboard is acceptable (above 5° is noticeable, and 10° is the maximum supported).

Avoid the temptation to fit the transducer too far forward. The transducer may leave solid water when at speed, or when pitching. Also remember the transducer looks down as well as ahead, so when manoeuvring in confined waters you may wish to see there is water for the propellers and rudders.

Sailing boats

On a fin keeled boat, alongside the keel (perhaps 60 cm or 2 feet out) is often a well protected position (but **not** on a boat with a winged keel or a large bulb). Just forward of the keel is an alternative, but take care when hoisting the boat in a sling!

Resist the temptation to fit the transducer too far forward. The transducer will come out of the water when pitching. Remember that the transducer looks ahead as well as down - you will need to see what is under your boat as well as what is ahead. When manoeuvring in confined spaces, you wish to know what is under the keel or rudder.
A long keel boat is harder.

Transducer Installation Instructions

Choose the position with the minimum angle of deadrise (i.e. the flattest area), fit the transducer with a wedge shaped chock if necessary to make the transducer as near to vertical as possible with the boat upright. On boats with slack bilge's it may be necessary to fit the professional transducer, even on a small boat (as it's skin fitting has more useable thread).

Fitting the skin fitting (FLS and Log)

A hole in the boat must be taken seriously! - If in doubt use an experienced shipwright.

- For an FLS Standard or log transducer - cut a 45 mm ($1\,^{3}/_{4}$") diameter hole.
- For an FLS Professional transducer - cut a hole 60 mm ($2\,^{1}/_{2}$") in diameter.

- Fit the skin fitting with reinforcing pads if needed or wedges if required to ensure the transducer is as near to vertical as possible (in fore **and** aft planes).
- Use plenty of underwater sealant, but take care to clean off the thread thoroughly afterwards.
- Secure with the nut on the inside. Do not use excessive force on the nut.
- If the vessel will be floated **before** the transducer is fitted, the blanking cap provided must be fitted to seal the skin fitting. (N.B. for our American customers, for "skin fitting" read "thru-hull fitting").

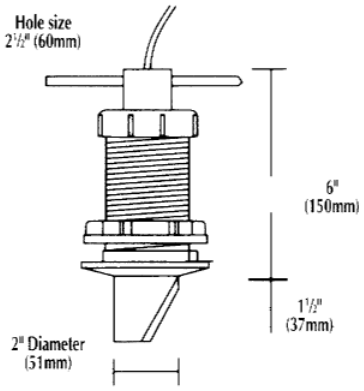
Fitting the FLS transducer

With care, this may be done afloat. However, if you have never done this before, please phone us first!

- If the vessels is afloat, place the FLS transducer close to hand near the skin fitting, remove the blanking cap and quickly :
- Place the transducer into the skin fitting, making sure that the **sharp** pointed **end** of the bronze handle is pointing **towards** the vessels **bow**. Using only your hand, screw down the securing nut onto the top of the skin fitting.
- Connect the plug of the transducer cable to socket **1** (see diagram on page 19).

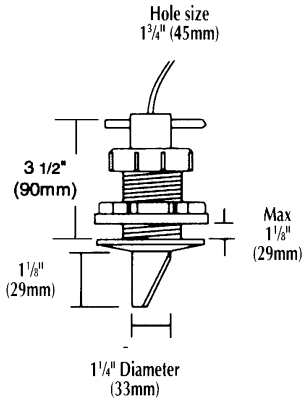
FLS Transducers

Maximum hull thickness:
75 mm (3")



Professional Transducer

Maximum hull thickness:
25 mm (1")



Standard Transducer

Professional or Standard?

The professional (Grey) transducer has a narrower beam, which gives a more accurate representation of the seabed. However, the standard (Red) transducer can appear better simply because it is collecting data from a wider sea bed area.

A thick hull or one with a steep dead rise will usually require the professional transducer as the bronze skin fitting has 75 mm (3") of useable thread whereas the Glass Filled Polypropylene one has 25 mm (1") of useable thread.

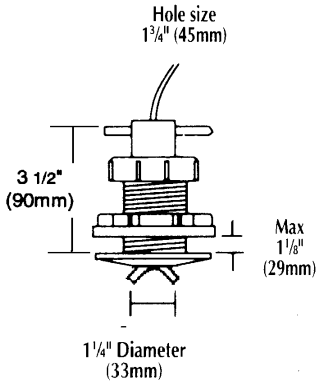
Transducer cable extension

The standard cable length is 12 metres, but this can be extended in multiple's of 8 metres.

The transducer is of an active design, that is to say that it requires power from the display unit to operate its transmitter and receiver circuitry. This has the advantage of allowing greater cable runs than were possible with the old passive type of FLS transducer.

There is obviously a small, but additive loss of performance on any cable length of 28 metres or more. The maximum cable length possible does depend on the area that the vessel will be operating in: with hard seabed's, and shallower maximum depths allowing for longer cable runs.

FLS Transducers



Log Transducer

Log Paddle Wheel Transducer

Standard EchoPilot paddle wheel.

Supplied as an optional extra.

Two types are available:

Low Speed: 0.5 to 28 Knots
High Speed: 0.5 to 40 Knots

Ultrasonic Log Sensor

No moving parts log transducer system. Will not be fouled by the marine growth that plagues **any** mechanical log transducer.

Supplied as an optional extra.

Currently only available in the bronze skin fitting design type pictured here.

We hope you enjoy using your EchoPilot FLS SILVER or FLS GOLD.
WE ARE ALWAYS PLEASED TO TALK TO OUR CUSTOMERS.

IF YOU REQUIRE HELP OR ASSISTANCE, PLEASE PHONE, FAX OR E-MAIL US (See front cover for details).

Notes

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Website: www.echopilot.com

NMEA/Repeater Connection Diagram