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Easyfisher

Electronic Aquatic Ecological Survey

MODEL 'EFU-1'

ELECTRIC FISHING

CONTROL UNIT

OPERATOR'S MANUAL

Easyfisher EFU-1
Electric Fishing Control Unit

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1. SAFETY NOTICES

This unit is only to be operated by personnel who have been trained correctly in the safe use of electric fishing equipment. It should be used in compliance with the Environment Agency's best practice guidance for fish capture by electric fishing.

Electric fishing equipment **MUST NOT** be used by one operator alone.

This unit is designed to be powered by a generator specifically intended for electric fishing use. **UNDER NO CIRCUMSTANCES** is this unit to be powered from a public electricity supply.

This unit and its connected equipment **MUST NOT** be used if there is any moisture, electrical or mechanical damage evident to any cable, connector or enclosure.

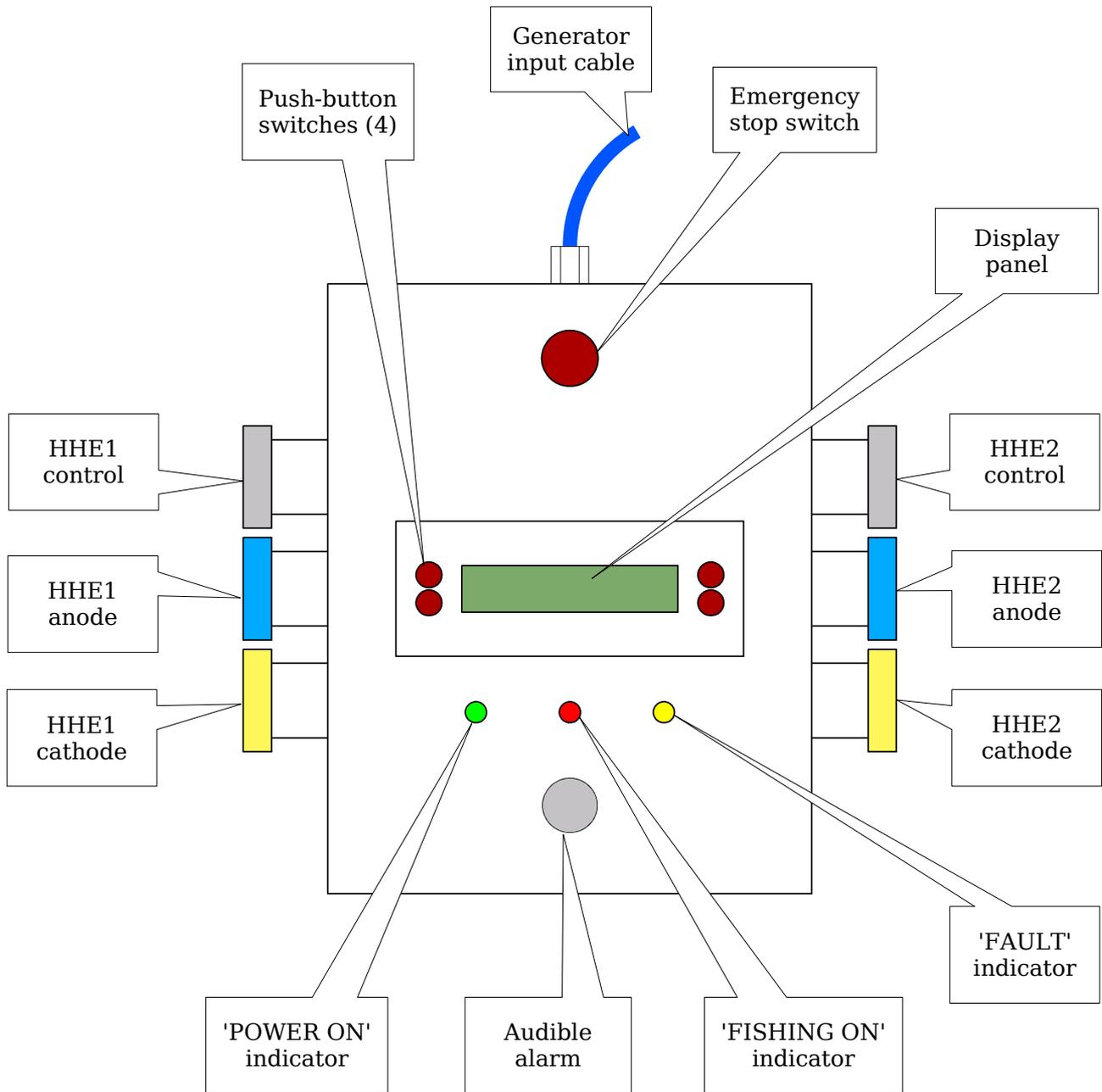
It is **STRICTLY FORBIDDEN** to open this unit's cover in the field.

Before opening the unit's cover, **ALL** cables (generator, anodes and cathodes) **MUST** be disconnected. A period of at least **TWO MINUTES** must then be allowed to elapse before the cover is opened, in order to allow sufficient time for the unit's internal capacitors to discharge.

If, upon opening the cover, any of the on-board LED indicators is observed to be still glowing, then **NO CONTACT** must be made with any internal part until **ALL** indicators are fully extinguished.

Improper servicing may compromise the safety and/or EMC integrity of the unit and will invalidate the guarantee; therefore all servicing should be carried out by the manufacturer or the manufacturer's approved agent.

2. FRONT PANEL AND CONNECTIONS



3. GENERAL DESCRIPTION

The Easyfisher EFU-1 electric fishing control unit has been designed to be as user-friendly and intuitive in operation as possible, whilst maintaining high levels of reliability and operator safety.

A monitoring and control system using twin microprocessors continuously checks the operation of the unit and inhibits all fishing outputs if any abnormality is detected. A fault-reporting system alerts the operator to any faults detected by the monitoring system.

Up to ten different fishing profiles may be programmed into the unit. Each fishing profile has voltage, frequency and duty-cycle parameters associated with it. Once a profile has been programmed and stored, the settings of its parameters are retained in memory until re-programmed. Any profile may then be easily and speedily recalled for use.

A large illuminated display panel mounted centrally on the unit's front panel provides a comprehensive indication of the unit's current status, including output settings and output current. The output current indication is presented both graphically by means of a bargraph display and also numerically. This aids readability at a distance.

The unit is programmed by a series of simple steps using four large push-buttons, which have been chosen to provide good tactile feedback and to allow easy operation, even by a gloved finger.

Three daylight-viewable LED indicators also provide at-a-glance indications of basic unit status and an audible alarm provides additional useful feedback of the unit's operation and draws the operator's attention to any problems which the monitoring system has detected.

4. CONTROLS AND INDICATORS

This section describes the operational controls and indicators provided on the control unit. Reference should be made to the diagram 'FRONT PANEL AND CONNECTIONS' to assist in identifying and locating the items described.

4.1. EMERGENCY STOP SWITCH

The emergency stop switch is pressed in to disconnect input power to the unit. Once pressed, the button latches into this 'OFF' position. To release the button in order to apply power to the unit, the button is twisted; this will cause the button to pop out again.

4.2. DISPLAY PANEL

The display panel incorporates a 4-line liquid-crystal display with green background illumination. This provides good visibility in both bright sunlight and subdued lighting.

The display normally indicates the current status of the unit. It is also used in set-up mode to indicate the selected fishing profile, the values of the parameters of that profile and the number of Hand-Held Electrodes (HHEs) in use. Furthermore, it provides information on any fault conditions that are detected.

Finally, the display provides labels for the four push-button switches mounted at its corners. These switches have different functions, depending upon the modes selected on the display; the displayed labels change appropriately, in order to facilitate user-friendliness.

4.3. PUSH-BUTTON SWITCHES

There are four push-button switches, one at each corner of the display panel. These

switches control the starting up and setting up of the unit and are also used to acknowledge and clear any fault warnings.

The switches have different functions, depending upon the display mode. The function of each switch in any particular mode is indicated by labels shown on the display panel. Any switch not having a label in any particular mode is inactive in that mode and pressing it will have no effect.

4.4. 'POWER ON' INDICATOR (GREEN)

The green 'POWER ON' indicator provides the following indications:

| <u>INDICATION</u> | <u>MEANING</u> |
|--------------------------|--|
| Off | Unit not receiving power. |
| Flashing | Power applied, waiting for operator to press 'EXIT'. |
| On (continuous) | Unit operating normally. |

4.5. 'FISHING ON' INDICATOR (RED)

The red 'FISHING ON' indicator provides the following indications:

| <u>INDICATION</u> | <u>MEANING</u> |
|--------------------------|---|
| Off | Fishing output(s) off. |
| On (continuous) | High voltage present at HHE output(s), conditions normal. |
| Flashing | Output current limited at maximum allowed value. |

If the indicator is flashing, this will be accompanied by an audible warning - see 'AUDIBLE ALARM' paragraph, following.

4.6. 'FAULT' INDICATOR (YELLOW)

The yellow 'FAULT' indicator will flash if any fault condition is detected by the unit's safety monitoring system. This will be accompanied by the audible 'fault' warning signal and an appropriate message on the display panel, informing the operator of the nature of the fault.

4.7. AUDIBLE ALARM

An audible alarm is located on the front panel just below the three indicators. This gives one of four different audible signal patterns, as follows:

| <u>PATTERN</u> | <u>MEANING</u> |
|----------------------------|---|
| pip.....pip.....pip | Output current limited at maximum level. |
| pip-pip...pip-pip... | Output current overload (e.g., short-circuit). |
| pip-pip-pip....pip-pip-pip | Internal temperature approaching maximum limit. |
| bleep--bleep--bleep | Fault detected - observe display for details. |

With these four signals, it is possible for an operator to be aware of the various conditions which may be encountered whilst fishing, without it being necessary to have sight of the front of the unit continuously.

5. CONNECTIONS

This section describes all connections made to the control unit. Reference should be made to the diagram 'FRONT PANEL AND CONNECTIONS' to assist in identifying and

locating the items described.

5.1. GENERATOR INPUT

The flexible cable, through which power is supplied to the unit from the generator, emanates from the top of the unit and is terminated in a 4-pin blue plug specifically designed to connect to an electric fishing generator. **UNDER NO CIRCUMSTANCES** is this cable to be connected to any other form of power supply.

5.2. HHE1 OUTPUT

The group of three sockets on the left-hand side of the unit are for connection to Hand-Held Electrode 1 (HHE1) and its corresponding cathode. The top socket takes the grey 4-pin plug from the HHE. This connector carries the low-voltage control signals from the switch mounted on the HHE. The middle socket takes the blue 3-pin plug from the HHE. This connector carries the high-voltage fishing current to the anode ring at the end of the HHE. The bottom socket takes the yellow 3-pin plug from the cathode. This socket carries the high-voltage fishing current to the cathode braid.

If the unit is set to operate with only one HHE, then this group of sockets is the group that is used.

5.3. HHE2 OUTPUT

The group of three sockets on the right-hand side of the unit are for connection to Hand-Held Electrode 2 (HHE2) and its corresponding cathode. The top socket takes the grey 4-pin plug from the HHE. This connector carries the low-voltage control signals from the switch mounted on the HHE. The middle socket takes the blue 3-pin plug from the HHE. This connector carries the high-voltage fishing current to the anode ring at the end of the HHE. The bottom socket takes the yellow 3-pin plug from the cathode. This socket carries the high-voltage fishing current to the cathode braid.

If the unit is set to operate with only one HHE, then this group of sockets is internally disconnected electrically. In this case, care should be taken to ensure that the sealing caps are correctly fitted and secured over these unused sockets to preserve the water ingress protection rating of the unit.

6. OPERATING PROCEDURE

The unit has been designed to make operation as straightforward and as intuitive as possible. The following sub-sections describe the preparative and operational steps required:

6.1. CONNECTION OF GENERATOR AND HHE(s)

With the generator stopped, the blue 4-pin plug at the end of the unit's blue supply cable should be plugged into the generator's output socket. The generator's emergency stop switch (if fitted) should be latched in to its 'OFF' position.

The cables from the HHE(s) should be connected to their appropriate connectors on the side(s) of the unit. If only one HHE is in use, only the sockets on the left side of the unit are used. The sockets are colour-coded to match the HHE plugs: the grey 4-pin plug (control) connects to the top socket and the blue 3-pin plug (anode) connects to the middle socket.

The yellow 3-pin plugs from the cathodes connect to the bottom sockets. It should be borne in mind that the right-hand cathode socket is disconnected (along with the corresponding anode socket) if single HHE operation has been selected.

Unused sockets must always have their protective covers fitted and secured to prevent ingress of moisture or foreign particles.

6.2. START-UP

Before starting the generator, the control unit's emergency stop switch must be latched into its 'OFF' position. With all cables connected correctly and the cathode(s) placed as required in the water, the generator's emergency stop switch (if fitted) should be released to turn on the generator's output. The generator may then be started.

With the generator running and power applied to the control unit, its emergency stop switch should be released to commence operation. As soon as the unit is powered up, it executes a self-test routine, as part of which the three front-panel indicators will flash briefly, accompanied by a sound from the audible alarm. This is to verify that the indicators and alarm are functioning correctly. The display will indicate the firmware revision levels of the unit's control systems.

When the self-test routine has completed, a message will be displayed: 'Press EXIT to start'. The green 'POWER ON' indicator will flash. This is a safety measure to ensure that power can never be applied to the HHEs unexpectedly following an interruption to the supply.

At this point, the 'EXIT' push-button should be pressed. This causes the green 'POWER ON' indicator to illuminate constantly. The display will now assume its normal 'status display' mode, in which the selected fishing profile is indicated, together with confirmation of the parameters currently set for that profile. Also displayed is the number of anodes in use, the status of the fishing output(s) (i.e., 'ON' or 'OFF') and the output current, the latter being displayed both numerically (as an horizontal bargraph) and also numerically to the right of the bargraph.

If the fishing profile is already set as required, no further action is required on the part of the operator before fishing can commence.

6.3. FISHING PROFILE SET-UP

With the display showing its normal 'status display' mode, the 'MENU' (upper left-hand) push-button may be pressed to enter the set-up mode. In set-up mode, the display lists the following parameters:

- Fishing profile in use (the 'current' profile),
- Output voltage for current profile,
- Pulse frequency for current profile,
- Duty-cycle for current profile.

The value of the first parameter in the list (fishing profile) will flash, indicating that this parameter is selected for adjustment.

All four push-button switches are active in set-up mode and they have the following labels and functions:

| <u>LOCATION</u> | <u>LABEL</u> | <u>FUNCTION</u> |
|------------------------|---------------------|--|
| Top left: | NEXT | Selects the next item in the parameter list. |
| Top right: | + | Increments the selected item by 1 step. |
| Bottom right: | - | Decrements the selected item by 1 step. |
| Bottom left: | EXIT | Exits set-up and returns to status display. |

Pressing the '+' or '-' push-buttons when the fishing profile number is flashing will cause another fishing profile to be selected. As each profile is selected, the voltage, frequency and duty-cycle parameters stored for that profile are displayed and may be selected in turn for adjustment by pressing 'NEXT'.

It should be noted that it is not necessary to select every parameter in the list before

pressing 'EXIT'; the set-up mode may be exited at any point and the values shown for each parameter at that point will be the ones stored in memory for the fishing profile selected.

All values stored in memory will remain set permanently until again adjusted in set-up mode. They are not affected by removal of the unit's supply.

6.4. NUMBER OF HHEs IN USE

Whilst in set-up mode with the parameters for a fishing profile selected, pressing 'NEXT' when the last parameter in the list (duty-cycle) is selected causes the display to indicate the number of HHEs (anodes) in use. The '+' and '-' push-buttons can now be used to adjust this value if required.

It should be noted that the number of HHEs selected will remain set at its current value, even when another fishing profile is selected. The HHE setting, like all of the fishing profile settings, is maintained in memory permanently once set.

6.5. FISHING

With the desired fishing profile, together with its parameters, set correctly, the unit is ready for fishing. As soon as the unit is first powered up (after pressing 'EXIT') or when a different fishing profile has been selected, or when a fault warning has just been cleared, the unit will adjust the output voltage to the selected level. This may take a few seconds to stabilise, during which time 'WAIT' will be displayed in the top right-hand corner of the status display. As soon as the unit is ready to fish, this will change to 'READY'.

If only one HHE is in use, the output voltage will appear at the HHE1 output sockets as soon as the HHE's switch is operated. If both HHEs are in use, then both HHE switches must be operated before the output voltage appears at the HHE sockets.

It should be noted that output voltage is not applied to the HHE sockets during the time that 'WAIT' is displayed in the status display, even if the HHE switches are operated. This is a safety feature to ensure that the voltage appearing at the HHE(s) is stable at the required value.

With the HHE switch(es) pressed and output voltage appearing at the HHEs, the red 'FISHING ON' indicator will illuminate steadily to warn that high voltage is present at the HHEs. The output current bargraph on the status display will indicate the current flowing in the HHEs.

6.6. OUTPUT CURRENT OVERLOAD PROTECTION

If the output current rises to the maximum allowed (as indicated by the 'cross-hatch' pattern at the right-hand end of the bargraph), the red 'FISHING ON' indicator will start to flash and the audible alarm will emit its 'output current limited at maximum level' warning signal - see 'AUDIBLE ALARM' paragraph. This serves as a warning that the unit's current limit has been reached. However, this is NOT a fault condition and fishing may safely be continued indefinitely in this condition without detriment to the unit. If the output current attempts to rise even further, the output voltage will begin to fall in order to keep the output current at the maximum allowed. Once the output current falls below the limit (e.g., by increasing the distance between the anode and cathode), the current-limit system will automatically reset and the output voltage will be restored to the programmed value.

If the anode and cathode should be allowed to come into contact with each other (thus placing a short-circuit on the unit's output), the red 'FISHING ON' indicator will flash (as for current limiting) and the numerical output current value shown on the display will indicate 'OVERLOAD'. The audible alarm will emit its 'output current overload' warning signal - see 'AUDIBLE ALARM' paragraph. This indicates an overload condition and provides an audible differentiation between overload and current limit. Again, the unit will not sustain any damage

with the anode and cathode shorted together. Normal fishing will resume as soon as the short-circuit has been removed.

6.7. EXCESS TEMPERATURE PROTECTION

If the unit is used for extremely long and sustained spells of fishing at high voltage, high current and high duty-cycle (particularly when the ambient temperature is excessive, e.g., due to being in direct sunlight for long periods), the internal temperature may begin to rise excessively. At approximately 10°C below the 'excess temperature' limit, the audible alarm will emit its 'internal temperature approaching maximum limit' warning signal - see 'AUDIBLE ALARM' paragraph. This audible alarm will be accompanied by an intermittent flashing message '*** WARNING: HIGH TEMPERATURE ***' on the display panel. If the temperature continues to rise, a fault condition will be indicated and fishing will be inhibited until the unit has cooled sufficiently. Selecting a lower duty-cycle (or a lower output voltage) will help to limit the temperature rise in these conditions, as will shielding the unit from strong direct sunlight.

6.8. FAULT DETECTION

A comprehensive fault-detection and reporting system is incorporated into the unit. If any fault is detected, a message 'System Fault - Code: xx' is displayed, where 'xx' is a two-digit code identifying the fault. A brief description of the nature of the fault is also displayed. The yellow 'FAULT' indicator on the front panel will also flash and the audible warning device will emit its 'fault detected' warning signal. All fault codes and their descriptions, together with possible causes, are listed in the following table.

As soon as a fault is detected and displayed, the HHE outputs and generator input are disconnected internally, thus preventing any further fishing operation until the fault condition is acknowledged and reset by the operator, by pressing the 'CLR' push-button. The fault indication will also be cleared if the supply is interrupted.

When the fault message is displayed, the indicated fault code can give an engineer invaluable assistance in tracing the cause of the fault, and MUST ALWAYS be quoted ACCURATELY, together with the operating conditions at the time of occurrence, in the event that a fault has to be reported.

It must be borne in mind that vague reports of faults or codes are as good as useless when requesting engineering assistance. A small amount of intelligent observation, however, will ensure speedy correction of any problems.

The codes indicated for faults detected, together with possible causes, are as follows:

FAULT DESCRIPTION & POSSIBLE CAUSE

- | | |
|----|---|
| 21 | PSU temperature too high. The internal temperature of the unit has risen to a point above which components may be excessively stressed. Further fishing is inhibited to prevent internal damage. The unit will be ready for use again once it has been allowed to cool. |
| 35 | Voltage regulation failure. The control system is unable to produce the value of output voltage set by the operator. This fault may possibly occur if the generator output voltage is out of specification. Otherwise an internal failure is indicated and the unit must be returned to the manufacturer for repair. |
| 37 | Regulated voltage too high. A component failure is causing an output voltage which is in excess of that set by the operator. The unit must be returned to the manufacturer for repair. |

- 41 Anode 1 switch fault.
The safety monitoring system has detected that the switch in HHE1 is not operating correctly. This may occasionally occur if the switch is worn and also it is not operated (i.e., pressed and released) smartly. An incorrectly inserted or dirty HHE grey 4-pole connector can also cause this fault. If the fault persists once the connector has been checked, the HHE should be replaced.
- 42 Anode 2 switch fault.
The safety monitoring system has detected that the switch in HHE2 is not operating correctly. This may occasionally occur if the switch is worn and also it is not operated (i.e., pressed and released) smartly. An incorrectly inserted or dirty HHE grey 4-pole connector can also cause this fault. If the fault persists once the connector has been checked, the HHE should be replaced.
- 53 Modulator always off.
The modulator unit (i.e., the part which is responsible for turning the output voltage on and off to produce pulsed current) has failed and no output current is flowing in the HHE(s). The unit must be returned to the manufacturer for repair.
- 54 Modulator always on.
The modulator unit (i.e., the part which is responsible for turning the output voltage on and off to produce pulsed current) has failed and output current is flowing continuously in the HHE(s). The unit must be returned to the manufacturer for repair.
- 55 Safety relay always open.
The safety monitoring system has detected a problem in the fail-safe mechanism which disconnects the generator input and HHE outputs in the event of the various parts of the unit not communicating with each other correctly. Since this is a SAFETY-CRITICAL part, no further fishing operation should be attempted if the fault persists. The unit must be returned to the manufacturer for repair.
- 56 Safety relay always closed.
The safety monitoring system has detected a problem in the fail-safe mechanism which disconnects the generator input and HHE outputs in the event of the various parts of the unit not communicating with each other correctly. Since this is a SAFETY-CRITICAL part, no further fishing operation should be attempted if the fault persists. The unit must be returned to the manufacturer for repair.
- 63 System PSU failure.
The safety monitoring system has detected an abnormality in one of the unit's internal power supply regulators. The unit must be returned to the manufacturer for repair.
- 64 AC supply voltage too low.
The generator supply voltage is too low for correct operation of the unit. This fault may occur if the generator in use cannot supply sufficient power to the unit whilst fishing at high voltage and/or high current. The fault may also be caused by the generator engine not running at the correct speed.
- 71 Panel data-link failure.
The safety monitoring system has detected a problem in the communication between the unit's control systems. The unit must be returned to the manufacturer for repair.
- 75 Firmware incompatibility.
This fault can only occur when one of the unit's internal electronic sub-assemblies has been replaced with an incorrect part. The unit must be returned to the manufacturer to have any repairs effected correctly.

7. MAINTENANCE

Maintenance of the unit is limited to keeping the exterior of the enclosure clean and ensuring that the HHE sockets and generator plug are kept clean and free of moisture and foreign particles.

Operator access to the inside of the unit is completely unnecessary. There are fuses fitted inside the unit; however, these will open only in the event of catastrophic failure, which would necessitate return of the unit to the manufacturer for rectification. Operator-induced fault conditions, such as overloads or anode-to-cathode shorts, are normally dealt with by the automatic protection system.

The front-panel indicators are sealed long-life LED units which do not require periodic replacement.

In the event of failure of the unit to perform as expected, reference should be made in the first instance to the TROUBLE-SHOOTING GUIDE. If this fails to provide an answer, the unit should be returned to the manufacturer for repair, together with an accurate report of the symptoms of the failure and any fault codes indicated on the display panel.

8. TROUBLE-SHOOTING GUIDE

Should a problem be encountered whilst operating the electric fishing control unit, the following list of possible symptoms and causes may help to pinpoint the problem and effect a cure:

8.1. UNIT DOES NOT POWER UP

Check that the generator's engine is running at the correct speed.

Check that the generator's emergency stop switch (if fitted) is released.

Check that the unit's blue 4-pin plug is correctly engaged in the generator's output socket.

Check that the unit's emergency stop switch is released.

8.2. GREEN 'POWER ON' INDICATOR FLASHES

The unit is waiting for the operator to confirm start-up. Refer to 'START-UP'.

8.3. UNIT POWERS UP BUT WILL NOT FISH

Check that the number of HHEs connected to the unit matches the number of HHEs selected on the set-up display. Refer to 'NUMBER OF HHEs IN USE'.

If using only one HHE, ensure that it is plugged into the left-hand group of sockets (HHE1). Refer to 'CONNECTION OF GENERATOR AND HHE(s)'.

Check that all HHE grey 4-pin control plugs are correctly engaged in their respective sockets.

Check the HHE(s) by substitution.

8.4. RED 'FISHING ON' INDICATOR FLASHES

Refer to 'OUTPUT CURRENT OVERLOAD PROTECTION'.

Increase the distance between the anode(s) and cathode(s).

Reduce the output voltage.

Check the conductivity of the water.

8.5. RED 'FISHING ON' INDICATOR ILLUMINATES BUT NO/LITTLE OUTPUT CURRENT IS INDICATED

If using a single HHE, check that its cathode is plugged into the left-hand lower output socket.

Check that the HHE blue 3-pin anode plug is correctly engaged in its respective socket.

Check the HHE(s) by substitution.

Increase the output voltage.

Reduce the distance between the anode(s) and the cathode(s).

Check the conductivity of the water.

8.6. YELLOW 'FAULT' INDICATOR FLASHES

Check the display panel for information relating to the fault that has been detected. Refer to 'FAULT DETECTION'.

8.7. AUDIBLE ALARM SOUNDS REGULAR PULSED TONE

Refer to 'AUDIBLE ALARM'.

Observe the status display and check if '*** WARNING: HIGH TEMPERATURE ***' is flashing intermittently on the display. If so, refer to 'EXCESS TEMPERATURE PROTECTION'.

Reduce the output voltage or duty-cycle to reduce the load on the unit.

Increase the distance between the anode(s) and cathode(s) to reduce the load on the unit.

Shield the unit from strong direct sunlight.

Observe the red 'FISHING ON' indicator. If it is flashing, refer to 'OUTPUT CURRENT OVERLOAD PROTECTION'. Also see under 'RED 'FISHING ON' INDICATOR FLASHES' in this section.

8.8. ANODE x SWITCH FAULT OCCURS REPEATEDLY

Check that the HHE's grey 4-pin control plug is correctly engaged in its respective socket.

Check that all pins on the HHE's grey 4-pin plug are clean, bright and undamaged.

Check the HHE by substitution.

Ensure that the HHE's switch is pressed and released firmly and smartly.

9. TECHNICAL SPECIFICATION

- Supply: Floating 230V AC 50Hz from fishing generator.
Recommended minimum generator rating 2300W continuous.
Lower powered generators may be used when full output power is not required.
It is strongly recommended that only generators using inverter technology should be used with this unit.
- Output voltage: 50 to 300V DC, selectable in 10V steps.
- Output current: Maximum 10A at 50V, dropping to 5.3A at 300V; determined by overall limit of 10A, and also output voltage and overall power limit of 1600W.
- Output modulation: Frequency range 10 to 100Hz, selectable in 10Hz steps.
Pulse-width duty-cycle variable from 1% to 100% (smooth DC).
- Output protection: Automatic protection against indefinite overload or direct short-circuit conditions. Automatic reset when overload/short circuit is removed. Audible and visible operator indication of activation.
- HHE controls: The control circuits connected to the HHE-mounted switches operate at 12V DC and use a floating supply for safety. These controls use a 4-wire double-pole switching arrangement.
- Safety monitoring: Twin microprocessors continuously monitor each other's operation. Additionally, an independent hardware safety circuit only allows the power input and outputs to be enabled if both microprocessors are operating as intended and the monitoring system has not detected an abnormal condition. The operation of the unit is continuously monitored by the microprocessors. Any conditions arising which would compromise safety or impair the operation of the unit are indicated on the display and accompanied by a flashing yellow light and audible alarm signal. When this occurs, the unit's generator input and HHE outputs are disconnected internally until the operator acknowledges the fault condition and clears the warning, whereupon normal operation will resume.
- Environmental: The unit is protected to IP55 with all connectors correctly fastened and the front panel correctly secured. Unused connectors must have their sealing caps fitted and secured correctly to maintain the protection.
- Accreditation: The unit is CE-marked in accordance with Environment Agency requirements. EMC testing has been carried out and certified by an approved independent EMC test-house.

WARNING: **There are NO user-serviceable parts inside the unit.**

ALL cables (generator, anodes and cathodes) MUST be disconnected from the unit for at least TWO MINUTES before the cover is opened. If, upon opening the cover, any of the on-board LED indicators is observed to be still glowing, then NO CONTACT must be made with any internal part until ALL indicators are fully extinguished.

10. EMC TEST CERTIFICATE

Page 1 of 1
Copy No. 1



Certificate of Test 4351/1

European Directive 2004/108/EC regulating electromagnetic compatibility of equipment. The unit noted below has been partially tested against the EMC limits of the harmonised standards listed in accordance with the conformity assessment procedure for apparatus described in Annex II. This is a certificate of test only and should not be confused with a notified body opinion. Other standards may also apply.

| | |
|--|--|
| Equipment: | Easy Fisher |
| Model Number: | Mk. 1 |
| Unique Serial Number: | 0831004P |
| Manufacturer: | East Anglian Electrical Services 7 Wilkinson Way Melton Woodbridge IP12 1SS |
| Customer Purchase Order Number: | GDP083:1004P |
| R.N. Electronics Limited Report Number: | 06-979/4351/1/10 |
| Test Standards: | EN 61000-6-3: 2007 (Class B) ↳ EN 55016-2-3: 2006 EN 61000-6-1: 2007 ↳ EN 61000-4-2: 1995, A1, A2 ↳ EN 61000-4-3: 2006, A1 ↳ EN 61000-4-4: 2004 Signal Leads Only ↳ EN 61000-4-6: 2007 Signal Leads Only |

NOTE:

The above list is incomplete as only partial tests conducted at request of the manufacturer. For details refer to section 3 of this report. Certain tests were not performed based upon manufacturer's declarations. For details refer to section 3 of this report.

DEVIATIONS:

Deviations from the standards have been applied. For details refer to section 4.2 of the report.

This certificate relates only to the unit tested as identified by a unique serial number and in the condition at the time it was tested. It does not relate to any other similar equipment and performance of the product before or after the test cannot be guaranteed. Whilst every effort is made to assure quality of testing, type tests are not exhaustive and although no non-conformances may be found, this doesn't exclude the possibility of unit not meeting the intentions of the standard or the requirements of the Directive, particularly under different conditions to those during testing. Any compliance statements are made reliant on the modes of operation as instructed to us by the manufacturer based on their specific knowledge of the application and functionality of the unit tested. Statements of compliance, where measurements were made, do not include the measurement uncertainty. The measurement uncertainty, where stated, is the expanded uncertainty based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Date of Test:
For and on behalf of
R.N. Electronics Limited
Technical Manager.

14th June 2010

| | |
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| Paul Darragh h | Digitally signed by: Paul Darragh DN: CN = Paul Darragh C = GB O = RN Electronics Ltd Date: 2010.07.09 16:57:07 Z |
|----------------------|--|

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11. WIRING DIAGRAM

