

# *National Rivers Authority*



NRA

## **CODE OF PRACTICE FOR SAFETY IN ELECTRIC FISHING OPERATIONS**



ISSUE ONE  
APRIL 1991



*National Rivers Authority*

**CODE OF PRACTICE FOR SAFETY IN ELECTRIC  
FISHING OPERATIONS**

ENVIRONMENT AGENCY



099485

No.	Authority
Class No	<i>NRA FISHERIES</i>
Accession No	<i>AKJY</i>

# CONTENTS

	Page
SECTION 2 – Personnel	3
SECTION 3 – Equipment Design Criteria	5
SECTION 4 – Protective Clothing, Safety Equipment and their use	11
SECTION 5 – Hazards Associated with Electric Fishing	13
SECTION 6 – Recommended Working Procedures	15
SECTION 7 – Emergency and Accident Procedure	19
Appendix 1	21
Bibliography	23

# *National Rivers Authority*

## **CODE OF PRACTICE FOR SAFETY IN ELECTRIC FISHING OPERATIONS**

### **INTRODUCTION**

Electric fishing is an essential and effective technique for fishery management of lakes and rivers but the admixture of electricity and water makes it a potentially hazardous activity.

The Health and Safety at Work etc Act 1974 places an obligation on employers to establish for their employees (inter alia) safe systems of work, safe equipment to work with and sufficient information and training to enable them to carry out their allotted duties without risk to themselves or others who may be affected by the work being done. Under the Electricity at Work Regulations 1989, electric fishing falls into the category of working near live conductors and, as a consequence, it is a requirement that suitable precautions are taken to prevent injury.

This document is a code of practice for employees of the National Rivers Authority (and those who are working with them or under their control) who carry out, or are associated with, electric fishing operations. The Electricity at Work Regulations 1989 place a duty on the employer to ensure that every work activity is carried out in such a manner as not to give rise to danger. However, it is essential to note that the employee also has a duty to co-operate with the employer so that safe systems of work are properly implemented.

Electric fishing uses the physiological effect of an electric field in water produced by immersed electrodes to stimulate a fish's nervous system so that it swims towards the operator or is unable to swim away, and can be caught. Electrodes, usually comprising metal rings on the end of non-conducting hand held poles, are energised by batteries or portable generators via a control box. In shallow streams the operators are likely to wade in the water and use long electrode cables to reach from the portable power source lodged on the bank. In rivers and the margins of still waters, similar equipment is deployed from a boat. In very large water bodies, many electrodes may be suspended from a custom built boom which is mounted on the bow of the fishing boat. Typical components of electric fishing gear are shown in Figure 1. The equipment most commonly in use at present operates in the order of 240 volts and produces outputs of alternating current (AC), pulsed direct current (PDC) or direct current (DC). Current may be in the order of 0.5 amp for small electrodes in low conductivity water to 20 amps, or so, for large electrode systems in highly conductive waters. It must be recognised that any equipment producing an effect of this sort is potentially dangerous, but in the case of electric fishing the danger cannot be overcome by containing the electric field as the equipment would no longer work.

Nevertheless, electric fishing can be carried out safely when appropriate rules are followed. This code of practice describes requirements for all aspects of electric fishing so as to ensure that the personnel are fit for the task, the equipment is safe and fit for the task and the work activity is governed by safe operational procedures. This code of practice must, therefore, be complied with in full.

### **Legislation**

Health and Safety at Work ect Act 1974

The Electricity at Work Regulations 1989

# ***National Rivers Authority***

## **CODE OF PRACTICE FOR SAFETY IN ELECTRIC FISHING OPERATIONS**

### **SECTION 2 – PERSONNEL**

#### **SELECTION**

Staff must be fit for the task that they are being asked to carry out. When personnel are selected for electric fishing duties, the type of work they will have to undertake should be borne in mind. Selection for electric fishing duties must only be made after a suitable medical examination. Any person with a known heart or respiratory complaint must not be directly involved with electric fishing operations. Direct involvement means that the risk of coming into contact with dangerous free pathways of electricity can be clearly identified, e.g. handling energised electrodes or netting fish associated with electrodes. Involvement in other duties associated with electric fishing operations is not restricted. If a person knows that he suffers or has suffered from a heart or respiratory complaint, the onus is upon that person to declare it to the responsible officer. In this context, a respiratory complaint means one such as asthma, chronic bronchitis, etc.

#### **TRAINING**

No person shall take part in electric fishing operations unless they:

- 1 Have had the theory of how electric fishing works properly explained to them.
  - 2 Have been instructed by a competent and experienced officer on site in the appropriate safe working procedures outlined in this code of practice.
  - 3 Have received proper instruction in the use of any new equipment whenever such is acquired.
  - 4 Have been trained in the administration of artificial respiration and dealing with the results of electric shock.
  - 5 Participate in 'refresher' training sessions, with respect to the above, at least once every three years.
  - 6 Are able to demonstrate post training competence in all aspects of electric fishing and have received a certificate to this effect.
-

# *National Rivers Authority*

## **CODE OF PRACTICE FOR SAFETY IN ELECTRIC FISHING OPERATIONS**

### **SECTION 3 – EQUIPMENT DESIGN CRITERIA**

#### **ELECTRICAL EQUIPMENT**

All components of the electrical equipment must be suitable for exposure in a wet outdoor environment. Particular attention should be given to standards of enclosure, robustness, construction, mounting and electrical protection of components, terminations, plugs and sockets.

Equipment must be manufactured so as to meet industry standard testing procedures for quality of construction and insulation.

The minimum specification for electrodes, control boxes and connectors used as electric fishing gear should be IP 677 for switches and cable glanding on electrodes and IP 667 for the ancillary control boxes and connectors (IP = Index of protection; 1st numeral, 6 = no ingress of dust; 2nd numeral, 6 = waterproof against jets of water of similar force to heavy seas; 2nd numeral, 7 = protected against the effects of immersion; 3rd numeral, 7 = protected against an impact energy of 6.00 joules). Each piece of electric fishing equipment must be marked with the warning sign (comprising a black edged yellow triangle with the zig-zag electricity symbol in black) to indicate the potentially hazardous nature of electricity.

#### **POWER SUPPLIES**

Power must not be fed from the power source to any fishing electrode, but must be fed via a control box. The control box must be employed to interrupt the current path from generator to electrodes (whether or not it also modifies the nature of the supply).

#### **BATTERIES**

Wet cell batteries must be of a sealed, spillproof type housed in non metallic containers.

#### **GENERATORS**

The output from the generator must not be earthed but must be isolated from the frame and arranged so that power can enter the water only via the electrodes. As electric fishing generators are not earthed they should not be used for other purposes and should be labelled as follows:

## **WARNING**

This generator is dedicated to electric fishing survey work.

Do not use for any other purpose.

The operators must be protected from any electro-mechanical hazard which could be brought about by accidental bodily contact with the generator and its frame. Contact with electrical components, moving parts and the exhaust should be prevented by the provision of appropriate guards, either integral or custom made.

The generator output must be controlled via a manually operated double pole switch. Other than where the control box is mounted on the generator frame, this switch must take the form of a large red button marked 'STOP' and which will latch in the 'off' position when pushed.

## **MAINS ELECTRICITY**

Electricity supplied direct from the mains must never be used to energise a control box as the power output of the electrodes could be shorted to the earth potential of the Public Supply. Mains supply can only be used indirectly via an isolating transformer of suitable working size and built to withstand an industry standard test.

## **CONTROL BOXES**

Each control box should comprise an independent enclosure, not forming any part of a generator assembly. The control box must be water resistant, made from non-conductive material of high impact strength and meet IP 667. The control box should be labelled as follows:

### **WARNING**

*Connect to electric fishing generator only*

All fittings such as handles control knobs, sockets and cable feed must be of non-conductive material. (As plastic screws do not have the tensile strength necessary for compressing mounting gaskets, metal machine screws are permissible for the purpose of mounting sockets but they must be mated to self-locking nuts so that they cannot be unfastened from the outside).

Internal electrical components should be firmly secured to a separate chassis plate to prevent undue strain on component terminations. Adequate provision must be made to dissipate heat without damage to any component within the box and arrangements must be made to avoid danger and damage resulting from a short circuit between output terminals. Particular attention should be paid to the protection of semi-conductors and thyristors. Such heat, voltage or current trips as are used should be able to be reset by means of an external button.

The power cables supplying the control box should be permanently glanded into the box which should include a label showing details of the appropriate supply.



Outputs from the control box must be via socket connectors and these must be separate for power output and control circuit (see 'cables and connectors,' below).

The control box should incorporate visual indication to show when the unit is energised and when power is available at the electrode connectors.

Any knobs, switches or buttons used for adjusting or resetting control box output whilst in the field must be accessible only on the outside of the housing.

Power must not be fed direct from any power source or control box to any fishing electrode but must be switched on each output by at least one interrupting device controlled from an extra low voltage control circuit employing electro-mechanical relays or by means of a pneumatic system designed to 'fail-safe'. Solid state relays must not be used. The control circuit or pneumatic system must be consciously maintained by the electrode operator and immediately interrupt the power supply to the electrodes when the safety circuit/system is released.

Switching of power must be arranged such that electrodes cannot be energised independently of each other but can receive power only when all persons using an electrode have their 'dead-man' switches depressed.

The control box must have a large, red 'STOP' button, which will latch in the 'off' position when pushed, to interrupt the supply from the power source to the control box circuitry.

## **CABLES AND CONNECTORS**

The rated voltage of cables used to deliver power to fishing electrodes must be in excess of the output voltage from the control box. The cables must also have suitable oversheath qualities to resist damage in this application. When available in appropriate power ratings, high visibility cables should be used.

Power and control circuit cables should not be extended or fitted with connectors of any type except at the control box or at the output from a generator.

Anodes and AC electrodes normally require cables of three cores, one core for the electrode head itself and two cores for the safety circuit supplied from an isolating transformer or a battery source, at a voltage not exceeding 50v and not referenced to earth. Cathode cables need to be single core or have all cores joined to act as single core. All cables should be suitably protected at cable entry to relieve stress and prevent excessive bending at the point of entry of the cable into the gland or connector.

Plugs and/or socket connectors used for electric fishing must be kept and wired exclusively for the purpose. All connectors must be non-interchangeable and polarised so that generator, anode/AC-electrode, cathode and control circuit connectors are separate and not compatible with each other. Industrial waterproof, lockable DIN plugs and sockets are recommended. Assuming such connectors are used, consideration should be given to the following colour coding and pin configurations:-

Control box to generator – blue, 4 pin

Anode/AC electrode to control box – blue, 3 pin

Extra low voltage, ‘dead man’ switch to control box – white, 3 pin

Cathode to control box – yellow, 3 pin

## **ELECTRODES**

Anode handles should be made from a tubular insulating material, (not wood or material liable to wick) fitted with a suitable ferrule for the attachment of the electrode head. Connection to the electrode and any attached safety control device, must be within the tubular handle. Water proof glanding must be provided at the point of cable entry into the handle.

Extra low voltage switches (where fitted) should be of ‘immersion-proof’ type to IP 67 with suitable connection arrangements to maintain this standard and must be of a fail-safe variety such as snap action or reed. To facilitate the use of separate switch circuit and power output plugs (see above) terminal cores should be parted using an industry style ‘trouser junction’ and the cables resheathed.

Connections to the cathodes should be appropriate to cope with working under water. When cathodes are trailed behind boats, appropriate strain relief cords should be used.

Electrode rings must not be used as dip nets.

When the number of hand held electrodes being used becomes difficult to co-ordinate, consideration should be given to mounting the electrodes on a boom. Where such boom mounted multiple electrodes are in use, electrodes should be wired so that the entire array can be operated by means of a single interrupting device as if it were one giant electrode. For such an array, foot controlled switching is recommended. Booms should be of high visibility.

## **BACK-PACK EQUIPMENT**

Only electric fishing units specifically designed for the purpose can be carried whilst energised. In addition to all the requirements outlined above, the following rules apply:-

The power source can only be that of spillproof battery. Engine driven generators are not permitted.

The backpack unit must be mounted on a quick release harness to enable rapid removal from the person carrying it.

The control box must contain a mercury tilt switch, which is capable of interrupting the power input from the battery whenever the unit ceases to be carried less than 45° from upright, and a float operated switch, which is capable of similarly interrupting power if the unit enters the water. These switches must operate electronic trips such that manual reset via external button, and by an accompanying operator, is required before the control box can be re-energised.

## **BOATS**

When selecting boats for use in electric fishing operations the following points must be considered.

The boats must be large enough to accommodate both the crew and equipment without overcrowding and must provide adequate flotation consistent with degree of loading.

The boats must be as stable as possible, taking into account the work activities of the crew. Boat decks should have a non-skid surface.

Provision must be made for securing the electric fishing equipment against accidental movement in the boat.

Boats used for electric fishing must be constructed of non-conducting material.

Any anchoring, mooring or shore lines used in conjunction with boats should be non-conducting, e.g. ropes, synthetic fibre and not wire rope or chain.

## **ANCILLARY EQUIPMENT**

Equipment such as buckets, landing net handles and fish containers, must be made of non-conducting material. Outboard motors should have non-conductive engine covers and have insulated steering and gear change levers. If this is not practicable then the outboard operator must wear insulating gauntlets appropriate to the voltage of the fishing machine.

## **CHECKLIST OF FEATURES**

Difficulties inevitably arise when prospective users, manufacturers or vendors have to decide whether items of electric fishing equipment fully comply with the design criteria laid down in this code of practice. A checklist of features, which electric fishing gear must possess in order to meet the safety requirement, is therefore given in Appendix 1.

# ***National Rivers Authority***

## **CODE OF PRACTICE FOR SAFETY IN ELECTRIC FISHING OPERATIONS**

### **SECTION 4 – PROTECTIVE CLOTHING, SAFETY EQUIPMENT AND THEIR USE**

#### **CLOTHING**

Appropriate protective clothing must be provided by the employer to those engaged in electric fishing.

Clothing worn for electric fishing should be appropriate to the conditions and should not be so long as to trail in the water as this could introduce an electrical hazard from stray current paths. Clothing should not have buttons or buckles which could snag on cables and landing nets.

#### **BOOTS**

Operators must always wear rubber boots in good condition. If studded boots are needed to avoid slipping, the studs must not penetrate the sole of the boot so far as to destroy its insulating properties.

#### **CHEST WADERS AND DRY SUITS**

Chest waders and dry suits made from non-conductive material provide a useful means of staying dry but chest waders must not be used without protecting against their potential hazards with respect to drowning. If the average depth of water is too deep for operators to wade at less than thigh depth for the majority of the fishing exercise, then fishing should be carried out from a boat. Water deeper than hip height must never be waded due to the risk of partial buoyancy causing a loss of footing. Life jackets must always be worn when using chest waders.

#### **LIFE JACKETS**

Only when wading in water which is less than knee depth or when dry suits are being worn are life jackets not considered necessary. At all other times during electric fishing operations, life jackets equal to or exceeding BS3595 (1981) must be worn by anyone associated with the water. Life jackets must always be worn when working from a boat.

---

#### **FIRST AID AND RESCUE EQUIPMENT**

An appropriate first aid kit in accordance with the First Aid Regulations 1981, must form part of the equipment.

## **FIRE FIGHTING EQUIPMENT**

Fire extinguishers suitable for electrical and petrol fires must be readily available within the vicinity of the fishing gear. These extinguishers should be annually serviced and inspected in accordance with the manufacturers recommendations.

## **HEARING PROTECTION**

Operators must be able to maintain audio communications and so noise should be reduced at source if measurements indicate a need.

## **WHISTLES**

Whistles or air horns should be provided for use in conjunction with agreed and understood signals where members of the operating team are working sufficiently far apart to impede clear verbal communication in an emergency.

# ***National Rivers Authority***

## **CODE OF PRACTICE FOR SAFETY IN ELECTRIC FISHING OPERATIONS**

### **SECTION 5 – HAZARDS ASSOCIATED WITH ELECTRIC FISHING**

#### **ELECTRICAL HAZARDS**

Electric shocks may themselves injure or kill, or may cause indirect injuries by making a worker recoil so that he endangers himself and others by sudden movement. Direct effects include electrical burns, heart failure or interference with breathing. The main sources of potential risk of electric shock during electric fishing operations are:-

- (a) Bodily contact with energised electrodes of opposite polarity.
- (b) Bodily contact with water within the radius of the electric field where there is a dangerous voltage gradient.
- (c) Shocks from inadequately constructed or insulated equipment.

#### **OTHER HAZARDS**

- (a) Drowning  
When working on or near water there is almost always a risk of drowning. Lifejackets must be worn when necessary (see 'Lifejackets') during electric fishing operations.
- (b) Fire  
Electric fishing equipment powered by petrol driven generators can become hot. When this is the case, the danger of fire must be recognised.
- (c) Tripping and falling  
Cables and ropes must be kept clear of machinery and should be routed so as to avoid tripping operators.

Operators working where space is restricted should take care not to injure others when wielding landing nets, electrodes, poles and oars.

Operators should be careful not to jerk boats, causing others to lose their footing.

#### **INTERNAL COMBUSTION ENGINE EXHAUST-GASES**

~~There must be adequate ventilation and operators should be made aware of the dangers of concentrations of exhaust gases and where possible keep upwind of engine exhausts.~~

## **MANUAL HANDLING**

Serious injuries can result if heavy equipment is not properly handled. The incorrect use of any equipment may result in minor cuts, bruises, grazes and burns.

# *National Rivers Authority*

## **CODE OF PRACTICE FOR SAFETY IN ELECTRIC FISHING OPERATIONS**

### **SECTION 6 – RECOMMENDED WORKING PROCEDURES**

#### **GENERAL**

The method of operation adopted will vary with the requirements of the work, but should always take into account the need to guard against the hazards listed in section 5.

An experienced team leader must be appointed to every team of operators and should have on-site responsibility for safety, first aid and for the equipment and protective clothing. However, every member of the team has a responsibility to work in a safe manner and to inform the leader of any deficiencies. Regional management must issue formal guidance as to the appointment and responsibilities of the aforementioned team leader. Due to the particular hazards associated with electric fishing, drinking of alcohol during the working day should not be allowed.

#### **SIZE OF FISHING TEAMS**

All electric fishing teams should comprise a minimum of three persons. However, keep teams of operators as small as practicable for the job in hand. Not more than one person in the team should be without previous experience of the work. The only permissible exception is when inexperienced users are being trained and are working under the separate supervision of a competent officer, not directly involved with the fishing activity.

#### **AT THE DEPOT**

Storage of electric fishing equipment must be under secure, safe, dry and clean conditions. After use, all equipment should be returned to storage in such a manner that it is suitable for use on the next occasion.

Prior to the equipment being taken into the field for use it shall be the duty of an appointed officer to inspect the equipment, paying particular attention to generator, electrical control gear and cable insulation. An equipment checking schedule should be devised. Simple equipment, suitable for testing whether gear is working or not, should be provided and responsible officers trained in its use. No electrical repairs can be carried out on site and so correct spare units should be carried for equipment which is likely to go wrong.



## **ON SITE**

Portable telephones or radio communications must be provided. On arrival at site it must be confirmed that such apparatus will work in the desired location. If radio-telephone communication is not possible, the location of the nearest working telephones during the course of travel in the day's work should be known. Regional management must establish satisfactory procedures to enable the whereabouts of fishing teams to be known.

A clear system of working signals should be laid down before operations begin and followed by all members of the team.

Before the start of each day's work the team leader must brief the team on the work to be done and specify the tasks each person has to perform.

Equipment should be re-checked on site when fully assembled and while electrically dead, paying particular attention to electrical connectors to ensure that they are correctly fitted and joints fully tightened. A system for checking equipment should be established and followed. This must include checks on the mechanical operation of safety switches before the equipment is energised.

The equipment must not be used if any part of it appears not to be working.

If the result of the electrically dead examination is satisfactory, the generator should be started to prove the operation of the systems and safety switches with the electrodes immersed in water before actual fishing begins. Fishing electrodes must never be energised unless immersed in water.

## **SPECTATORS**

Where fishing activity is likely to attract spectators, temporary warning signs should be erected to indicate "Danger, electric fishing in progress". Spectators should be warned to keep away from the water and equipment. Animals must also be kept away. Fishing must stop if persons or animals come within five metres of the electrodes.

## **START UP PROCEDURE**

Generators should be started and control units energised only when the electrodes are in the water and each team member has verbally acknowledged he/she is ready for operation.

## **ELECTRICAL SAFETY**

Do not put unprotected parts of the body in the water when electric fishing equipment is operating.

Do not touch any metallic part of an electrode unless it is physically disconnected from the electricity supply. Nothing should be taken from the electrode by hand; fish and debris should be transferred to a non conductive container before being handled.

Whenever the equipment is operating, the electrodes should be treated as being live, even when safety switches are known to be off. Electrodes must not be left unattended when connected to a live power source.

The manufacturer's instructions for use for each type of fishing gear should be provided to all personnel involved with its use.

## **FIRE HAZARDS**

Smoking must not be permitted in the vicinity of petrol supplies. Petrol tanks should be filled before work begins. A petrol tank must not be filled when the engine is running or hot. A funnel or can with a filler-spout must be used to avoid petrol spills. Spare fuel should be stored and carried in HSE approved containers, at a safe distance from generators.

## **WHEN WORKING FROM A BANK**

Ensure the generator and control gear are secure to prevent them falling into the water. Unless specifically designed for the purpose (see 'back-pack equipment') a control box must not be carried while energised. The generator must not be moved when it is running. At all times there must be ready access to the power 'STOP' button.

Lifejackets must be worn when necessary (see 'Life Jackets').

## **WHEN WORKING FROM A BOAT**

All members of the electric fishing boat crew must be familiar with the principles and practice of safe boat handling. The generator and control gear must be securely fastened to prevent movement. At all times there must be ready access to the power 'STOP' button. Also, to prevent water reaching the generator and control box during operations, with its attendant dangers to operators and damage to equipment, the bilges of the boat must be kept dry by pumping, bailing or mopping as necessary. Energised control boxes must not be carried by personnel.

To minimise the risks of boat instability, and operators' tripping, equipment must be securely stowed.

Care must also be taken to avoid tipping or jerking the boat which may cause operators to lose their balance. Life jackets must be worn at all times.

## **MAINTENANCE**

Electric fishing equipment must be properly maintained and be checked regularly for mechanical and electrical faults. Regional Management must establish suitable test and maintenance schedules and should do this in accordance with advice given by the manufacturer. Service intervals may be related to the degree and conditions of use but not be greater than three months for electrical safety checks and not greater than twelve months for full service.

These regular checks must be performed by suitably qualified personnel who must keep suitable records. To facilitate the keeping of records equipment items should be individually identified.

Any fault which is found during inspection of equipment prior to its being used, or discovered whilst fishing, must be reported to the responsible officer. The equipment must be taken out of commission and be clearly labelled as to the defect, pending repair.

# *National Rivers Authority*

## **CODE OF PRACTICE FOR SAFETY IN ELECTRIC FISHING OPERATIONS**

### **SECTION 7 – EMERGENCY AND ACCIDENT PROCEDURE**

If there is an accident, immediately:

- 1      Switch off the electrodes**
- 2      Switch off the power source**
- 3      Stop the generator**
- 4      Remove electrodes from the water**

If a casualty is unconscious, check pulse and respiration and start resuscitation if either is absent. Any casualty who has been rendered unconscious must be examined by a doctor as soon as possible, even if he appears to have recovered.

In the case of serious injury, call for an ambulance by the quickest available means as this is the fastest way of obtaining medical care. Electric fishing operations are frequently carried out in remote areas with difficult access. In these circumstances, consideration should be given to using on-site transport to move the casualty to the nearest point where medical help can be obtained, but the possible saving in time must be balanced against the risk of aggravating the injury.

Where injuries are minor, apply first aid as necessary. Do not neglect minor burns, cuts and abrasions which should be cleansed and covered with a waterproof dressing.

All accidents should be reported in accordance with the national standard and regional procedure.

Equipment malfunctions must be reported as detailed in 'Maintenance', section 6.

# *National Rivers Authority*

## CODE OF PRACTICE FOR SAFETY IN ELECTRIC FISHING OPERATIONS

### APPENDIX 1

#### Checklist of safety features for electric fishing apparatus

In order to meet the safety requirements of the Code of Practice, a "YES" answer is necessary in all cases.

GENERATOR	Earth link is disconnected	YES/NO
	Labelled "For Electric fishing survey work only"	YES/NO
	Output socket only compatible with control box	YES/NO
	Double pole latching 'STOP' button on output	YES/NO
	Moving parts and exhaust adequately guarded	YES/NO
CONTROL BOX	Control box independent of generator assembly	YES/NO
	IP667 enclosure	YES/NO
	Non-conductive fittings	YES/NO
	Waterproof glanding on switch button and shafts	YES/NO
	Hazard warning signs	YES/NO
	Components firmly secured to chassis plate	YES/NO
	Circuit protection trips/fuses appropriate to task	YES/NO
	Semi conductor/Thyristor protection	YES/NO
	Adjustment and reset controls only accessible from outside	YES/NO
	Robust, high visibility cable properly glanded	YES/NO
	Label detailing type of supply required	YES/NO
	Double pole latching "STOP" button on input	YES/NO
	Input plug only compatible with e/f generator	YES/NO
	Separate switch circuit & power sockets	YES/NO
	Anode & cathode sockets non-compatible	YES/NO
	Electro-mechanical extra low voltage switching system	YES/NO
	Electrodes cannot be energised independently	YES/NO
	Load switched by secondary relay	YES/NO
	All power switching double pole	YES/NO
	Power to cathode socket turned off in AC mode	YES/NO
	Protection against arcing on DC contacts	YES/NO
	Series suppression not shunt suppression	YES/NO
	Bleed resistors if capacitor discharge unit	YES/NO
	Indicator lamps to show operational state	YES/NO
	Ammeter and voltmeter glasses cannot be touched	YES/NO

HAND HELD ELECTRODES	Tubular non-conductive handle	YES/NO
	Cable and connections within handle	YES/NO
	Waterproof and strain resistant cable entry	YES/NO
	Robust, high visibility cable	YES/NO
	Separate switch circuit & power plugs	YES/NO
	Immersion proof "dead-man" extra low voltage switch	YES/NO
	"Dead-man" switch of fail-safe variety	YES/NO
	Immersion proof head end of electrode	YES/NO
	Electrode head without dip net mesh	YES/NO
CATHODE	Electrical connection suitable for immersion	YES/NO
	Robust high visibility cable	YES/NO
	Plug non-compatible with anode	YES/NO
	Strain relief cord for trailing cathodes	YES/NO
BOAT	Constructed of non-conductive material	YES/NO

# *National Rivers Authority*

## **CODE OF PRACTICE FOR SAFETY IN ELECTRIC FISHING OPERATIONS**

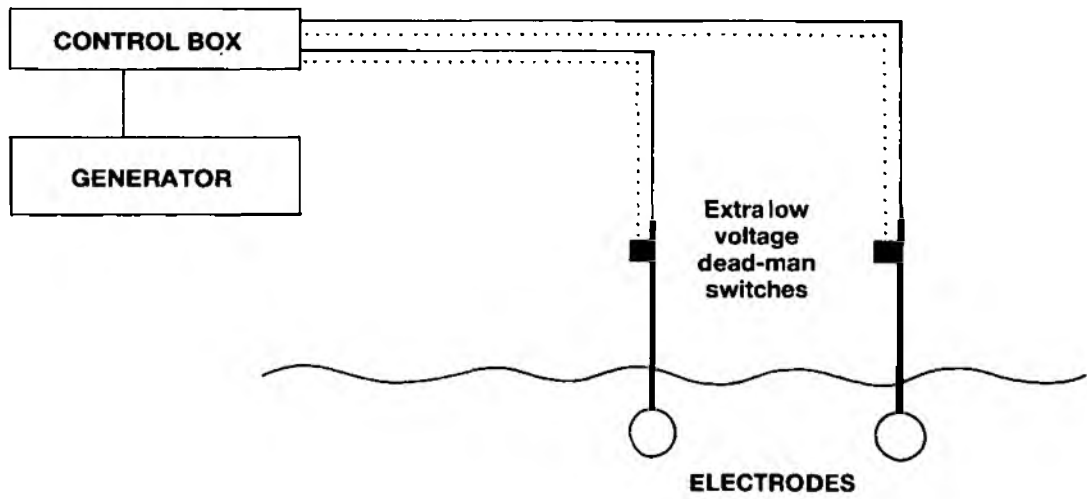
### **BIBLIOGRAPHY**

- Fishing with Electricity. Edited by Cowx, I G and Lamarque P (1990).  
Fishing News Books, Blackwell Scientific Publications Ltd, Oxford.
- Developments in Electric Fishing. Edited by Cowx, I G (1990).  
Fishing News Books, Blackwell Scientific Publications Ltd, Oxford.
- Memorandum of guidance on the Electricity at Work Regulations 1989.  
Her Majesty's Stationery Office (1989), Health & Safety Series booklet HS(R) 25.
- National Rivers Authority Code of Practice for Electrical Safety.

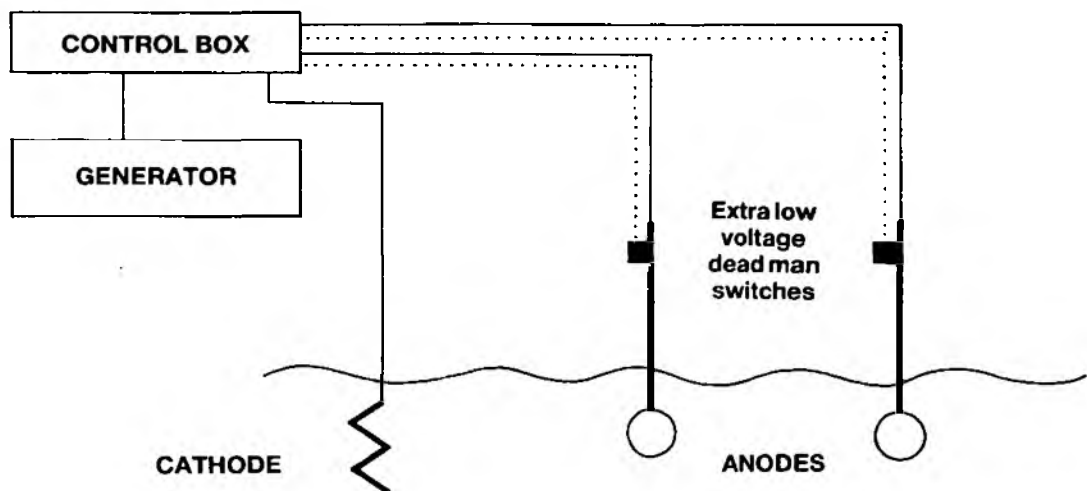
Figure 1. Typical components of electric fishing equipment.

\_\_\_\_\_ Power supply      ..... Extra low voltage switch circuit

**a) AC, wading or boat**



**b) PDC/DC, wading or boat**



**c) PDC/DC boom electrode array, boat only**

