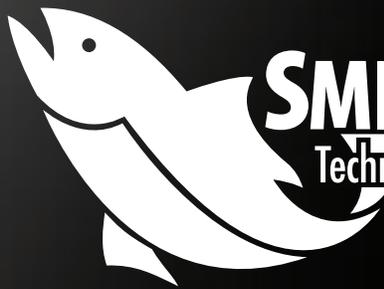


Since 1964, the leader in effective, safe and reliable products for fisheries conservation.  
Knowledgeable biologists depend upon Smith-Root equipment.

# PRODUCT CATALOG



**SMITH-ROOT, INC.**<sup>™</sup>  
Technology For Fisheries Conservation



# CONTENTS

## Electrofishers

LR-24 Electrofisher .....	2
Carry Cases.....	3
LR-20 Series Electrofishers .....	4
Batteries.....	5
Battery Chargers .....	5
Electrode Poles.....	6
Electrodes.....	6
GPP Electrofishers .....	7
Model 1.5KVA Electrofisher.....	8
Type VI-A Electrofisher.....	8
VVP-15B Electrofisher .....	9
Tote Barge .....	10
Electrofisher Accessories .....	11
Electrode Booms.....	12
Electrode Arrays.....	13

## Boats

H & EH Model Electrofisher Boats.....	16
Boat Model Comparison .....	18
Boat Motors & Trailers .....	19
Optional Boat Equipment .....	19
Electrode Arrays.....	20
SR-17 CataRaft .....	21

## Fish Barriers & Guidance

Barrier & Guidance Theory .....	24
Graduated Fields.....	25
Upstream Barrier System .....	26
Downstream Guidance & Repelling System .....	27
Safety .....	28
FBTCS Monitoring System.....	29
Pulsators .....	30
Cast Culvert Barrier .....	31
Plastic Culvert Barrier .....	32
Portable Array.....	33
Equipment Building .....	34
Tailrace Barrier .....	35
Canal Barrier.....	36
Intake Barrier.....	37
Louvered Intake Barrier.....	38

## Aquaculture

Electroanesthesia System.....	40
Fish Counting Systems .....	41
SR-1101 Fish Counter & Accessories.....	42
SR-1601 Fish Counter & Accessories.....	43

## Field Accessories

Dip Nets & Handles .....	46
Generators .....	47
Warning Signs.....	49
Electrician's Gloves .....	49
Electric Field Probe .....	49

## Payment Terms

Smith-Root accepts VISA, MasterCard, American Express, cashiers check, money order, electronic wire transfer, company check or pre-approved purchase order as valid forms of payment. Buyer's credit card will not be charged until products are shipped. Payment of all applicable taxes, assessments, or duties which may be imposed upon the shipment or sale of the products covered by these Terms will be Buyer's sole responsibility and will be paid by Buyer.

## Refunds & Returns

Customers returning equipment in new condition within 30 days of accepting delivery of Smith-Root, Inc. merchandise will be given a refund within five days from the date of the return. Valid equipment returns include, but are not limited to, ordering incorrect equipment, funding deficits, and defective equipment returned for reimbursement. A completed Equipment Return Form (<http://www.smith-root.com/support/forms/>) must accompany all returns. All returns are subject to a restocking fee and applicable shipping charges. The restocking fee is figured at 10% of the purchase price but not less than \$20.00. Customers receiving equipment in damaged condition will be referred to the shipping company for insurance reimbursement.

## Patent Notice

Smith-Root, Inc. Electrical Field Fish Barrier systems are protected by patent. Ideas, arrangements, drawings, and specifications are the sole property of Smith-Root, Inc. and are intended for this specific catalog and shall not be used for any other purpose, without written consent of Smith-Root, Inc. U.S. - 4,750,451 Canada - 1,304,442

## Warranty

Smith-Root, Inc. built boats are covered by a two year warranty. All other Smith-Root, Inc. manufactured products are covered by a one year warranty. Items manufactured by companies other than Smith-Root, Inc. carry the original manufactures warranty. Please contact product manufacturer for return instructions.

Prices are subject to change without notice. SRI reserves the right to make changes of products at anytime without notice.

Rev. 2009Q4-11112009



No surcharge for Credit Card purchases.



# ELECTROFISHERS



**SMITH-ROOT, INC.**<sup>TM</sup>  
Technology For Fisheries Conservation

# LR-24 ELECTROFISHER

## BATTERY-POWERED BACKPACK ELECTROFISHER



The LR-24 Electrofisher is a rugged 24 volt battery powered electrofisher. It is suitable for extensive field work in any weather conditions. The LR-24 uses premium electronic components and circuitry housed inside a custom molded plastic case.

The LR-24 is the most advanced electrofisher ever produced. The user interface is designed to make the LR-24 quick and easy to use. This has allowed us to offer a number of special features not available on previous backpack electrofishers.



### FEATURES

#### Quick Setup

Quick Setup will select a voltage level necessary to achieve 25 watts average power output through the water between electrodes. This setup uses a default setting of a pulsed DC waveform with a frequency of 30 Hertz (Hz) and a 12% duty cycle (equivalent to a 4 milliseconds (ms) pulse width). All settings can be adjusted up or down from this starting point to achieve levels necessary for fish capture. This is very useful when electrofishing in a new area and unsure of what settings to use.

#### Dual Output

This feature allows the operator to set up two completely independent sets of waveforms and voltages and toggle between them in less than one second simply by releasing and pressing the anode pole switch. This can be very useful if working in waters with multiple age classes, or multiple species where the optimal settings may be quite different.

#### Safety Features

Emergency stop switch, twin audible alarms, tilt and immersion sensors and Anode-Out-of-Water sensor, combined with the quality of manufacture make the LR-24 the safest backpack electrofisher in the field today.



#### Power Limit Key and Power Limit Mode

The Power Limit Key allows the user to limit the maximum average output power. It is defaulted to 400 W, which is the maximum average power output that the LR-24 is capable of producing. It can be changed easily to a lower limit, which can be useful if a study requires staying within a certain power level. The user can decide whether the frequency or the voltage will be automatically decreased in order not to exceed the output power at that limit.

#### Precise control over output settings

Voltage can be adjusted in 5 volt increments, frequency in 1 Hz increments, and duty cycle (pulse width) in 1% increments. This is very desirable given study results which indicate that fish injury rates decrease corresponding to decreases in all of these settings. Exact control of the settings allows for much greater control of the output waveforms.

#### Numerous waveform choices

The LR-24 can produce straight DC, pulsed DC, and Burst of Pulses (previously known as CPS waveform).

#### Storage locations for up to ten user selected settings

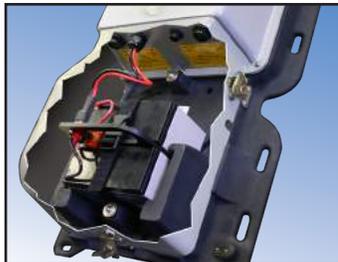
There are ten storage locations available either to pre-program desirable settings or to store settings currently in use. These storage locations are filled with Factory Default Stored Waveforms, but can be replaced one by one with settings the user prefers. These can be pre-programmed before going in the field or saved and stored while in the field. This can be very useful if a setting has been found to be very effective with a particular species, or it can be of use if a project supervisor wants to standardize sampling and provide settings for crews to use in the field. Factory default stored waveforms can be restored if desired.

# LR-24 ELECTROFISHER

## BATTERY-POWERED BACKPACK ELECTROFISHER

### Rugged ABS Construction

Offers tough structural support in a lightweight pack-frame and integrated control box enclosure. The removable battery cover protects all cable connections from environmental conditions and wear and tear.



### Suspension System

The easy-to-fit Cordura suspension harness allows for quick adjustment, making multi-user operations fast, simple and convenient. The quick release function makes it safer to operate in rough field conditions.



### STANDARD EQUIPMENT

- LR-24 Backpack Electrofisher
- Adjustable suspension system

Order Number..... **06856**

### LR-24 COMBO

- LR-24 Backpack Electrofisher
- Adjustable suspension system
- 6 ft. two-Piece Electrode Pole
- 11 in. Aluminum Ring Electrode
- Rat-tail Cathode
- Two 24V 7Ah Batteries
- UBC-24 Battery Charger
- Wheeled Travel and Storage Case

Order Number..... **06826**

### CARRY CASE

#### LR-series travel and storage case with wheels and retractable handle.

Durable, hard shell plastic thermoformed case with built-in wheels and TSA locking latches. ATA Rated case provides a practical solution to transporting your backpack electrofisher. These industrial cases are designed to exceed the ATA 300, category 1. Case includes custom closed-cell polyethylene foam designed to securely hold electrofisher and accessories. This case will hold a two-piece 6 foot pole, electrode ring, rat-tail cathode, extra battery and BC-24PS battery charger, in addition to an LR-24 or LR-20 backpack electrofisher.

These cases are fully warranted against defects in materials and craftsmanship for the life of the case to the original owner. Locks, handles and wheels are field replaceable and will be replaced at no charge.

Order Number.....**09632**



### LR-24 SPECIFICATIONS

Conductivity Range	10 to 1500 microsiemens/cm <sup>3</sup>
Input Voltage	24VDC Nominal
Input Current	20A Max.
Input Monitoring	Battery voltage and current plus fuel gauge type display for battery voltage
Output Voltage	50 to 990V in 5V steps
Output Current	40A peak max, 4A continuous at 100V
Output Waveforms	Smooth DC, Pulsed DC, Burst of Pulses DC
Output Frequency	1 to 120Hz in 1Hz steps (Burst of Pulses frequencies up to 1000Hz)
Duty Cycle	1% to 99% in 1% steps
Waveform Storage	Save voltage, frequency, duty cycle and pulse type for 10 different waveforms
Output Power	400W maximum continuous, 39,600W peak
Operational Duty Cycle	40% Max. (192 seconds on 288 seconds off) at 40° C ambient 400 VA output
Overload Protection	Excessive peak current, average current, or over-temperature will shut down the unit before damage can occur. Resets automatically when condition is corrected
Output Indicator	Audio tone for 30 VDC and greater and increasing pulse rate for output power, Flashing red light, Status display for output voltage both average and peak, output current both average and peak and output power
Output On Timer	0 to 999,999 seconds, resettable via menu
Environmental Requirements	Operational altitude: -400 to 3000 meters; Relative humidity: 10% to 90% noncondensing; Operating temperature: 0° to 40° C; Storage temperature: -15° to 50° C
Construction	Sealed molded polyethylene and ABS case NEMA 4, IP 65
Safety Devices	Tilt switch: Forward 50°, backward 40°, sideways 45° all ± 10°, Immersion sensor, Electrode out of water sensor, electrode pole switch, Emergency stop switch, Battery compartment interlock, Battery fuseable link, Quick release pack
Battery	24V, 7Ah, sealed, deep discharge with 40 A fuseable link, 12 lb. (5.45 kg)
Battery Life	40 minutes continuous at 100W
Size and Weight	Height: 27.5 in (69.9 cm); Width: 14.5 in (36.9 cm); Depth: 14.5 in (36.9 cm); Weight: 33 lb (17 kg) with battery

Specifications are subject to change without notice.



# LR-20 SERIES ELECTROFISHER



The LR-20 Series of backpack electrofishers offer the safety and ruggedness of the LR-24 Electrofisher with the simplicity of our classic Model 12 Electrofisher. The LR-20 is available in **200W** and **400W** configurations and is an ideal transitional unit from older backpack electrofisher models. The LR-20 Electrofisher shares the setup and control conventions of the Model 12 as well as the safety, reliability and accessories of the LR-24 Electrofisher.

## FEATURES

### Easy to Use Interface

Simplified manual control knobs, streamlined settings allow adjustment over output frequency and duty cycle settings. All controls are housed inside of a non-conductive, waterproof enclosure with a shatter resistant hinged, latched cover. The easily accessible external anode, cathode, control plugs and battery connector make the connection of electrode devices and battery pack quick and simple.

### Output Controls

The rotary Output Frequency switch controls the frequency (pulses per second) of the LR-20 in 5 and 10 hertz increments. The Duty Cycle switch controls the percentage of time the output pulse is on. It also allows switching to straight DC or gated bursts of either 2 or 3 pulses. The timer reset button resets the number of seconds the output of the LR-20 has been active.

### LCD Display

The easy-to-read backlit LCD display shows real-time status of output voltage and current, fuel gauge-type display of the battery life, output time in seconds, unit temperature and waveform settings.

### Safety Features

Many built in features assure that the LR-20 is safe for both operator and collectors. The audio alarm provides a loud audio warning whenever 30 volts or more are present between the anode and cathode. A bright red warning light also flashes once per second while output is active. The emergency shutdown switch turns the unit on when the switch is in the up position but allows the unit to be readily shut down by flipping the red cover down in the event of an emergency. The front cover - which is secured by two over-center toggle latches - must be closed for the output of the LR-20 to be activated. An immersion sensor automatically turns the output off should water come in contact with the unit case and a tilt sensor shuts off output if the unit is tilted over too far.

### Packframe and Suspension Harness

The packframe and suspension harness allow for various positions of the shoulder straps and waist belt to fit most people comfortably. The straps and belt all have quick release latches that allow the LR-20 to be removed quickly if the operator falls into deep water or becomes injured.

### Cross-unit Compatibility

The LR-20 shares the same connectors as the LR-24, making all electrode devices and battery packs and related accessories interchangeable between units. This will increase your flexibility in large field operations and increases the versatility of your inventory of electrofishers.

## LR-20 SERIES SPECIFICATIONS

Conductivity Range	10 to 1500 microsiemens/cm <sup>2</sup>
Output Voltage	50 to 400V in 50V steps, 500V, 700V, 990V
Output Power	LR-20: 200W continuous, 4,000W peak LR-20B: 400W continuous, 24,000W peak
Output Frequency	10 to 50Hz in 5Hz steps, 60 to 120Hz in 10Hz steps
Duty Cycle	5 to 50% in 5% steps, 60 to 80% in 10% steps, Gated Burst 2 pulse, Gated Burst 3 pulse, DC
Overload Protection	LR-20: 15A circuit breaker and 40A safety fuse LR-20B: 25A circuit breaker and 40A safety fuse
Timer	6 digit computer controlled seconds counter
Metering	Average output current, Average output power, Battery voltage, Battery current
Battery	Choice of 24V sealed, deep discharge batteries. 2.2Ah, 7Ah or 12Ah
Size and Weight	Height: 29.75 in ; Width: 13.75 in; Depth: 13 in; Weight: 24.5 lb. with battery

Specifications are subject to change without notice.

## STANDARD EQUIPMENT

- LR-20 Series Backpack Electrofisher
  - Adjustable suspension system
- LR-20 200W ..... 09438**  
**LR-20B 400W ..... 10114**

### LR-20 SERIES COMBO

- LR-20 Series Backpack Electrofisher
  - Adjustable suspension system
  - 6 ft. Two-Piece Electrode Pole
  - 11 in. Aluminum Ring Electrode
  - Rat-tail Cathode
  - Two 24 7Ah Batteries
  - UBC-24 Battery Charger
  - Wheeled Travel and Storage Case
- LR-20 200W ..... 09627**  
**LR-20B 400W ..... 10115**

# BATTERIES & CHARGERS

## 24 Volt Battery Packs

Smith-Root offers three different sealed 24 volt batteries. These batteries are compatible with the LR-20, LR-24, Model 12 and older 24V battery powered electrofishers. Adapter cables may be needed for non-LR-series units. The recommended battery for use with the LR-24 or LR-20 is a 7 amp hour (Ah) battery that weighs 12.2 pounds (lb.). Also available are an 18.6 lb. 12 Ah battery and a 2.2 Ah battery weighing just 3.8 lb.

The trade-off with smaller batteries is that they contain less power, and will run down more quickly at high discharge rates. Maintaining a modest 4 amp (100 watt) discharge rate will extend electrofishing time.

<b>24V, 12 Ah Battery</b> .....	<b>06682</b>
<b>24V, 7 Ah Battery</b> .....	<b>06681</b>
<b>24V, 2.2 Ah Battery</b> .....	<b>07466</b>



## MC-24 Maintenance Charger

The MC-24 Battery Maintenance Charger is specifically designed for proper battery maintenance; it trickle-charges up to four 24 volt batteries at once. Trickle-charging optimizes battery shelf life by reducing cell deterioration. Keeping batteries fully charged can greatly increase battery life. Comes with adaptors for use with all models of Smith-Root 24V batteries.

The MC-24 constant trickle-charge eliminates the hassle of shuffling batteries from shelf to charger, and keeps batteries properly charged and ready for service. With the built-in battery evaluation load-test function, you can see the state of charge and condition of each battery to identify low-charged and worn-out batteries. Charging batteries using the MC-24 Maintenance Charger takes between two and four days.

**Order Number**.....**06811**

## Guest Universal Battery Charger

24 volt (V) three stage electronic battery charger. Runs from a generator as well as standard 115 V/60 hertz (Hz) AC outlet. Ideal for field use. Rainproof, lightweight, silent, and completely automatic. It produces 24V DC at 5 amps. After recharging your battery in three to five hours, it then supplies just enough power to compensate for the charge that a battery loses during storage. Features red and green LED lights to let you know the unit is recharging and maintaining your battery.

**Order Number**.....**06973**



## UBC-24 Battery Charger

The UBC-24 Battery Charger is a 24 volt battery charger designed to charge the batteries used in the LR-24 and LR-20 Series Backpack Electrofishers. The UBC-24 features a fully automatic, three stage charge sequence with an electronically timed routine and a desulfation mode.

*Power cord for United States included. Power cords other areas must be ordered separately, see below.*



### SPECIFICATIONS

Input Rating	Nominal 90 to 264VAC / 47 to 63Hz
Output Power	60W
Timer	2 hours ±30%
Input Connection	3 pin IEC 320
Output Connection	Battery clips
Size and Weight	Height: 1.73 in (44 mm); Width: 3.15 in (80 mm); Depth: 5.31 in (135 mm); Weight: 0.77 lb. (350 g)

Specifications subject to change without notice.

**Order Number**..... **10167**

## Power Cords for UBC-24 & MC-24

<b>Australia Power Cord</b> .....	<b>06066</b>
<b>UK Power Cord</b> .....	<b>05575</b>
<b>European Power Cord</b> .....	<b>04807</b>

## BAT-01 Battery Analysis Tool

The Battery Analysis Tool operates in conjunction with the UBC-24 Battery Charger. It tests all models of 24 volt backpack batteries (adaptors included) and in a clear and concise manner gives the usable battery life remaining.

**Order Number**..... **08041**



12 Volt Battery Packs and Battery Adapter Cables for older electrofishers and chargers are listed on catalog page 11.

# POLES & ELECTRODES



## ELECTRODE POLES

### NEW! Adjustable Telescoping Electrode Pole

Finally, one size really does fit all! Smith-Root's new Telescoping Electrode Pole for the LR-24 is designed to accommodate a wide range of users in varying field conditions. The Telescoping Electrode Pole's innovative design allows crew members of varying heights and pole handling preferences to set the length of the pole exactly where they want it – and keep it there firmly.

An easy-to-use adjustment collar allows you to adjust the length of the pole between 4½ feet and 6½ feet or any point in between in just seconds.



All Smith-Root Electrode Poles feature a magnetic hand-switch to control the electrofisher output and a flexible curl-cord extends 6 feet for complete freedom of movement.

Electrode Poles are also available in a 6 foot one piece, 6-foot two piece and 9-foot two piece configurations.

### Electrode Pole & Cathode Tester

Test both electrode and cathode with this easy to use unit. Uses both an audio tone and light combinations to diagnose problem. Comes with adaptors to test LR-series electrode poles and cathodes.

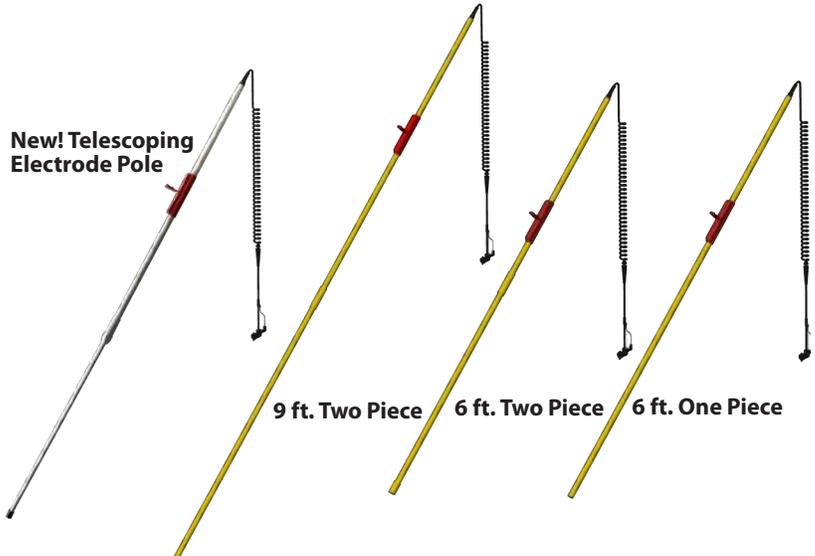


**Order Number..... 08115**

### Adapter for 4-Pin AMP Plug Poles

Required adapter to use Electrode Pole & Cathode Tester with poles designed for Model 12, Model 15 and all GPP Electrofishers with 4-pin AMP plug.

**Order Number..... 08508**



### Selecting the right pole

When ordering Electrode Poles it is important to select the proper pole for the type of Electrofisher you will be using. LR-series Backpack Electrofishers use one type of pole, while the Model 12, Model 15 and all GPP Electrofishers use a different pole. Be sure to select the correct Electrode Pole when ordering.

<b>Telescoping Electrode Pole (LR-series Style) .....</b>	<b>09369</b>
<b>9 ft. Two Piece Electrode Pole (LR-series Style) .....</b>	<b>07576</b>
<b>6 ft. Two Piece Electrode Pole (LR-series Style) .....</b>	<b>07575</b>
<b>6 ft. One Piece Electrode Pole (LR-series Style) .....</b>	<b>07574</b>
<b>9 ft. Two Piece Electrode Pole (4-pin Connection) .....</b>	<b>05008</b>
<b>6 ft. Two Piece Electrode Pole (4-pin Connection) .....</b>	<b>05007</b>
<b>6 ft. One Piece Electrode Pole (4-pin Connection) .....</b>	<b>05006</b>



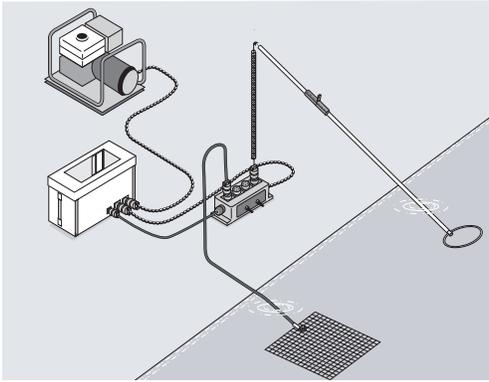
### Electrodes

For use with Electrode Poles. Our new Adjustable Electrode Ring allows the user to set the angle between the pole and electrode. No welds used in construction. Available in Aluminum or Stainless Steel.

<b>6 in. Electrode Ring.....</b>	<b>03584</b>
<b>11 in. Electrode Ring .....</b>	<b>03297</b>
<b>11 in. Adjustable Electrode Ring (Aluminum) .....</b>	<b>07613</b>
<b>11 in. Adjustable Electrode Ring (Stainless Steel) .....</b>	<b>08679</b>
<b>18 in. Electrode Ring .....</b>	<b>05273</b>
<b>Diamond Shaped Electrode.....</b>	<b>03980</b>
<b>Rat-tail Cathode (LR-series Style).....</b>	<b>06821</b>
<b>Rat-tail Cathode.....</b>	<b>02885</b>

# GPP ELECTROFISHERS

## GENERATOR POWERED ELECTROFISHERS



**Streambank GPP Electrofisher Systems include a custom-wound generator and all required cables and switches. Generators are mounted on durable vibration dampers and come with a spark-arresting muffler, carry protection frame and gas tank.**

Smith-Root Streambank Generator Powered Pulsator (GPP) electrofishers are unsurpassed in quality and performance. Our years of experience in manufacturing electrofishers has helped us to produce the most complete line of generator powered electrofishers ever offered. Ranging from 1.5 to 9 kilowatts (kW), Smith-Root manufactures electrofishers to handle all fresh or brackish water conductivities. A complete electrofishing system consists of an engine, a generator, an electronic pulsator, an anode, a cathode, cables, and switches.

Generators are custom-wound to supply the optimum voltages for electrofishing, and eliminate bulky and hot power transformers.

Smith-Root GPP's offer the flexibility of shore-side use or in-boat operation. Smith-Root offers everything needed to convert your Streambank model into a boat mounted setup.



### 2.5 GPP Electrofisher System

The 2.5 GPP has sufficient power capabilities for low to medium conductivity water. It will also work in high conductivity water using smaller electrodes and a reduced capture area. Variable voltage pulsed AC and DC output modes are standard. Five pulse settings and a percent-of-range selector shape your waveform. Includes recoil start Honda generator.

**Includes:** Generator, output cables, single foot switch with 15-foot cables, control box and instruction manual.

**Order Number ..... 01868**



### 7.5 GPP Electrofisher System

The 7.5 GPP has power capabilities for low to very high conductivity water. This model features a front facing control panel. Includes electric start Vanguard generator.

**Includes:** Generator, cathode cable, anode cables(2), single foot switch with 15-foot cables, control box and instruction manual.

**Order Number ..... 02746**

### 5.0 GPP Electrofisher System

The 5.0 GPP has power capabilities for low to high conductivity water. Variable voltage pulsed AC and DC output modes are standard. Five pulse settings and a percent-of-range selector shape your waveform. Includes electric start Honda generator.

**Includes:** Generator, output cables, single foot switch with 15-foot cables, control box and instruction manual.

**Order Number ..... 04574**

### 9.0 GPP Electrofisher System

The 9.0 GPP has power capabilities for medium to extremely high conductivity water. Variable voltage pulsed DC output mode is standard. Five pulse settings and a percent-of-range selector shape your waveform. Includes electric start Vanguard generator.

**Includes:** Generator, cathode cable, anode cables(2), single foot switch with 15-foot cables, control box and instruction manual.

**Order Number ..... 03866**

SPECIFICATIONS				
	2.5 GPP	5.0 GPP	7.5 GPP	9.0 GPP
Conductivity Range	10 to 1,750 microsiemens/cm <sup>3</sup>	10 to 5,500 microsiemens/cm <sup>3</sup>	10 to 11,000 microsiemens/cm <sup>3</sup>	100 to 25,000 microsiemens/cm <sup>3</sup>
Rated Output Power	2,500W	5,000W	7,500W	9,000W
Rated Output Max. Current	8A	16A	62A	150A
12 VAC Auxiliary Power*	500W 42A	2 @ 500W 42A	2 @ 500W 42A	2 @ 500W 42A
Output Pulse Modes	Pulsed AC & DC	Pulsed AC & DC	Pulsed AC & DC	Pulsed DC
DC Output Peak	0 to 500V Low 0 to 1000V High	0 to 500V Low 0 to 1000V High	0 to 1000V in 4 steps	0 to 680V in 4 steps
AC Output RMS	0 to 350V Low 0 to 700V High	0 to 350V Low 0 to 700V High	0 to 700V in 4 steps	N/A
Output Pulse Frequency	7.5, 15, 30, 60 & 120Hz	7.5, 15, 30, 60 & 120Hz	7.5, 15, 30, 60 & 120Hz	7.5, 15, 30, 60 & 120Hz
Output Current Metering	AC & DC 0 to 8A	AC & DC 0 to 25A	AC & DC 0 to 199A	DC 0 to 199A
High Voltage Output Indicator	Panel Lamp & Audio Tone	Panel Lamp & Audio Tone	Panel Lamp & Audio Tone	Panel Lamp & Audio Tone
Output and Safety Control	Foot Switch & Panel Switch	Foot Switch & Panel Switch	Foot Switch & Panel Switch	Foot Switch & Panel Switch
Seconds Timer LCD Display	0 to 999,999 sec.	0 to 999,999 sec.	0 to 999,999 sec.	0 to 999,999 sec.
Cooling Method	Convection	Convection	Convection	Fan Cooled
Output Connectors	CPC with 15-ft. Cable	CPC with 15-ft. Cable	CPC with 15-ft. Cable	POS. CAM CONN. 15-ft. Cable
Pulsator Weight	23 lb.	20 lb.	30 lb.	35 lb.
Pulsator Dimensions	16 in. L x 7.25 in. W x 11 in. H	16 in. L x 7.25 in. W x 11 in. H	20 in. L x 15 in. W x 16 in. H	20 in. L x 15 in. W x 16 in. H
Generator Weight	101 lb.	210 lb.	228 lb.	238 lb.
Generator Dimensions	23 in. L x 15.625 in. W x 16.5" H	28 in. L x 21.5 in. W x 20 in. H	28 in. L x 21.5 in. W x 20 in. H	28 in. L x 21.5 in. W x 20 in. H
Generator Horsepower	5 HP	11 HP	16 HP	16 HP

\* Note: 12 VAC auxiliary power subtracts from Electrofisher power available. Specification subject to change without notice.

# ELECTROFISHERS

## USING CUSTOMER SUPPLIED GENERATOR

### Model 1.5KVA Electrofisher

The 1.5 KVA is an economically priced, medium powered electrofisher for use with your own generator. It is designed to handle moderately soft to relatively hard waters. Its light weight and small size make it ideal for both boat and shore-side operations.



This model outputs 1.7 kilowatts (kW) and can be powered by any 120 volt (V) AC generator rated at 2000 watt (W) or greater.

Voltage selection is by a heavy-duty rotary switch in 25 and 50 V steps. Input and output circuit protection is by circuit breakers.

The cabinet is constructed of heavy-duty aluminum with welded seams and a carry-handle.

**Includes:** Control box, 15-foot. anode cable with foot switch, 15-foot. cathode cable and instruction manual.

**Recommended Generator:** Honda EU2000i

**Order Number**.....04065

### Type VI-A Electrofisher

The Type VI-A is a heavy-duty 5 kilowatt (kW) electrofisher for use with your own generator. It is designed for use in large bodies of water or in low to medium-high conductivity waters.



This model can be powered by any 120 or 240 volt AC generator, and features transformer isolation for safety.

Input circuit protection is by a magnetic-hydraulic circuit breaker, and the output circuit protection is by a fast-acting fuse.

The AC output is a sine wave, and the DC output is fast rise, slow decay.

This electrofisher is supplied with a Foot and Hand Switch. For safety, both switches must be operated simultaneously to provide output.

The Type VI-A is housed in a rugged splash-proof aluminum case with a see-through top for closed-lid operation. Carrying handles are provided on both ends.

**Includes:** Control box, foot and hand switch with 15-foot cable, output cable, input cable, extra key and instruction manual.

**Recommended Generator:** Honda EG5000 or Honda EM5000S

**Order Number**.....03427

#### SPECIFICATIONS

Conductivity Range	20 to 1,500 microsiemens/cm <sup>3</sup>
Rated Output Power	1,700W
Output Pulse Modes	Pulsed AC & DC
DC Output Peak	0 to 560V
AC Output RMS	0 to 40 V
Output Frequency, AC	60Hz AC
Pulsed Frequency, DC	120 PPS
Output Current Metering	AC & DC 0 to 10A
High Voltage Output Indicator	Panel Lamp & Audio Tone
Output and Safety Control	Foot Switch & Panel Switch
Seconds Timer Display	0 to 999,999 sec.
Cooling Method	Convection
Output Connectors	MS Circular with 15-ft Cable
Input Voltage	120VAC 60Hz
Pulsator Weight	39 lb.
Pulsator Dimensions	16.75 in. L x 8.75 in. W x 10.5 in. H
Generator Requirements	1800W 60Hz 120VAC

Specification subject to change without notice.

#### SPECIFICATIONS

Conductivity Range	10 to 1,000 microsiemens/cm <sup>3</sup>
Rated Output Power	5,000W, AC & DC
Rated Output Max. Current	10A
Output Pulse Modes	Pulsed AC & DC
DC Output Peak	0 to 1,000V in 167V steps
AC Output RMS	0 to 707V in 117V steps
Output Frequency, AC	60Hz
Pulse Frequency, DC	60 or 120 PPS
Output Current Metering	AC & DC 0 to 10 A
High Voltage Output Indicator	Panel Lamp & Audio Tone
Output and Safety Control	Foot Switch & Panel Switch
Seconds Timer Display	0 to 999,999 sec
Cooling Method	Fans
Output Connectors	MS Circular with 15-ft. Cable
Input Voltage	120 or 240VAC 60Hz
Pulsator Weight	75 lb.
Pulsator Dimensions	20 in. L x 10.5 in. W x 15.5 in. H
Generator Requirements	3,500W minimum, 60 cycle, 240V output, single phase. Standard plug twist lock 4-pin plug designed for 220V 30A, NEMA # L14-30P.

Specification subject to change without notice.

# VVP-15B ELECTROFISHER

## GENERATOR POWERED ELECTROFISHER



The Variable Voltage Pulsator Electrofisher Model VVP-15B is a Smith-Root electrofisher that is based on the electrical output waveforms of the Coffelt VVP-15 and MK-22 units. Great care has been taken to improve upon the original designs of the VVP-15 and MK-22. This updated electrofisher provides almost identical control features and metering to allow consistency with previous samplings. Higher efficiency is an added benefit of our generation B, allowing increased samples with less wear and tear on equipment. Input and output connectors remain the same as the original Coffelt design to aid in implementation into existing boat and shore systems.

### Monitors

Meters are used to monitor input and output voltage and output current. Crystal controlled time bases are used to insure accuracy of selected output pulse frequencies, duty cycles and the output seconds timer.

### Safety

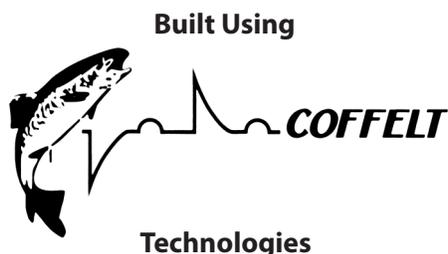
Red and green panel lamp show power output status. An automatic electronic circuit breaker will disconnect the output when the unit is overloaded, and automatically reset after a time delay. A toggle switch type circuit breaker provides input protection.

Requires a 5000 watt generator to reach full rated output. Generators with less output can be used but will not achieve full output potential.

**Includes:** Control box, foot switch, input & output connector, power cord and instruction manual.

**Recommended Generator:** Honda EM5000S, Honda EG5000, Honda EM3800S or Honda EG3500.

**Order Number** .....**07957**



### SPECIFICATIONS

Conductivity Range	50 to 4,000 microsiemens/cm <sup>3</sup>
Input Voltage	240VAC 60Hz Single Phase with Isolated Neutral
Output Voltages	Constant DC: 0 to 600V Pulsed DC: 0 to 600V Rectangular Pulse 5 to 120 PPS at 10% to 80% Duty Cycle CPS 3 Pulse: 0 to 600V Burst of 3 Pulses at 15, 30, 45, 60, 90 & 120 Per Second CPS 6 Pulse: 0 to 600V Burst of 6 Pulses at 15, 30, 45, 60, 90 & 120 Per Second AC: 0 to 240V 60Hz
Output Power	10,000W Peak, 4,500W Average
Indicators	Red and green pilot lights show power output status
Safety	Supplied with remote safety switch, which controls solid-state output switches and an output relay, which opens the output circuit.
Weight	28 lb.
Dimensions	18 in. L x 11 in. W x 11.125 in. H
Generator Requirement	5000W to reach maximum rated output. Generators of a lower power rating can be used, however maximum output power will be limited. Generator must have unbonded neutral. Standard plug twist lock 4-pin plug designed for 220V 30A, NEMA # L14-30P.
Output Connectors	MS Circular

Specification subject to change without notice.

# SR-6 TOTE BARGE

ELECTROFISH WHERE YOU WANT, WHEN YOU WANT



The SR-6 Tote Barge is a minimum draft, flat-bottomed barge designed to carry the 2.5 or 5.0 GPP, VVP-15B, Type VI-A or 1.5 KVA Electrofishers. Generator and frame are shock-mounted and secured in position with rubber straps. Removable fiberglass decking allows easy cleaning and provides a strong bottom to handle engine vibrations. Hull construction is fiberglass with a stainless steel bottom plate as cathode. An insulated push-handle is provided across the stern for maneuvering the barge. Electrofisher output power is automatically shut off when one or both handles are released. The flat-bottom design supports eighty pounds per inch of draft.

**SR-6 Tote Barge (Electrofisher sold separately) .....03414**

## STANDARD EQUIPMENT

### Plastic Holding Tank

Insulated and constructed of durable polypropylene. The hinged lid is removable for cleaning. Inside measurements are 12 inches wide x 12 inches high x 28 inches long. The tank provides approximately eighteen gallons capacity.

### Safety Push Handle

GPP output stops when one or both handles are released. Also fits older barges without safety push handles.

## OPTIONAL EQUIPMENT

### SR6-JB Junction Box

Connected by a short cable to the SR-6 cathode plate, controls electrofishing output. It also expands the electrofisher output by providing connectors for up to three Extension Cables. An "in use -or- off" switch for two of the three electrode connectors allows use of one, two, or three electrodes. All active electrode pole switches and push handle must be operated simultaneously to provide electrofisher output.

**SR6-JB for GPP Order Number .....06223**

**SR6-JB for VVP 15-B Order Number .....09379**



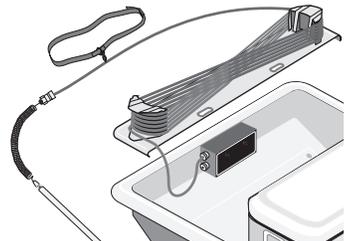
### Safety Push Handle (For older Tote Barges with RCB-6B Control Box)

GPP output stops when one or both handles are released. Also fits older barges without safety push handles.

**Order Number ..... 05660**

### Cable Holder

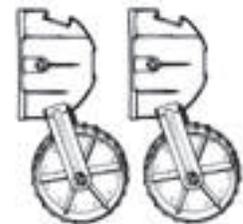
Will hold up to 300 feet of extension cable. The cable is stored in a figure-of-eight pattern to prevent cord from curling. Removable from the boat with carry-handles.



**Order Number ..... 04467**

### Pelican Dinghy Dolly

Designed for easy movement of small lightweight boats, inflatables, aluminum car toppers and duck boats up to 250 pounds. Made of Graphite filled Nylon resin. Contains two per set with all stainless steel fittings.



**Order Number ..... 06504**

# ACCESSORIES

## RCB-6B Junction Box

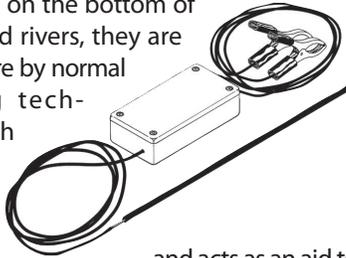
The RCB-6B Junction Box is used to increase the number of electrodes that can be used with a single electrofisher by providing connectors for up to three extension cables. A short cable is provided to connect to a cathode along with 15 inches of cable and plugs. A switch is provided for two of the three electrodes so that one, two or three electrodes may be employed. As a safety feature, the magnetic switches on all the active electrode poles must be operated simultaneously to activate electrofisher output.



- 2.5 and 5.0 GPP** ..... 05251
- Type VI-A** ..... 08747
- VVP-15B**..... 08749
- 1.5kVA** ..... 08748

## Catfish Zapper

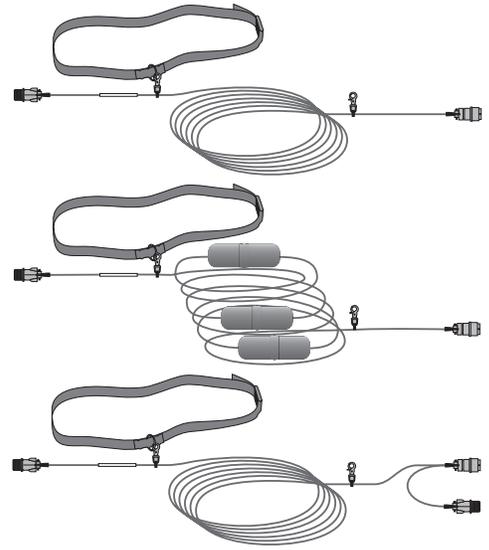
Since catfish live on the bottom of lakes, ponds, and rivers, they are difficult to capture by normal electrofishing techniques. The Catfish Zapper is used in conjunction with an electrofisher, and acts as an aid to capture. It works by inducing a weak electric field at the bottom, thereby causing the catfish to rise. Then they are subject to the normal electrofisher field and may be captured.



**Order Number** ..... 04532

## Extension Cables

Extension cables have connectors at each end, to interconnect between the SR-6JB and RCB-6B control boxes and an electrode pole. One end of the extension cable plugs directly into the junction box. At that point a sturdy strain relief is attached. The other end of the cable attaches to an adjustable nylon waist belt with a strong strain relief. The electrode pole plugs into a mating connector at the belt end of the cable. Floats prevent the cable from sinking; the cables are sold with and without floats. Additional floats may be purchased. Longer cable lengths are available in all models. One GPP can power three cables up to 100 feet long. Extension cables are not compatible with the LR-series electrofisher.



- Extension cable, 25 ft. with belt** .....03296
- Extension cable, 50 ft. with belt** .....03586
- Extension cable, 75 ft. with belt** .....03588
- Extension cable, 100 ft. with belt**.....03589
- Extension cable, 25 ft. with belt and 3 floats**.....04071
- Additional floats** .....04013
- Additional cable (per foot)**.....03102

## Foot Switches

Single Foot Switch with 15-foot cable and plug. Included with all GPP Systems.

**Order Number** .....03309

Dual Foot Switch with 15-foot cable and plug. Both switches must be depressed to activate electrofisher output.

**Order Number** .....03310

Foot and Hand Switch with 15-foot cable and plug. Included with Type VI-A.

**Order Number** .....03302



## Items For Older Electrofishers

- Model 15-D Electrofisher frame/suspension**.....07764
- Model 12-B Electrofisher frame/suspension** .....07765
- Ext. cable, "Y" config. for two poles, 25 ft. with belt**..04444
- Reset magnet for elapsed shocking time counter** ....02418
- Type VII battery, sealed, 24.8 lb, 12V/33Ah** .....01697
- Type VII battery, sealed, 12.2 lb, 12V/14Ah** .....04745
- LR-series Battery to Model 12 charger adapter** .....07459
- Model 12 Battery to LR-series charger adapter** .....07458



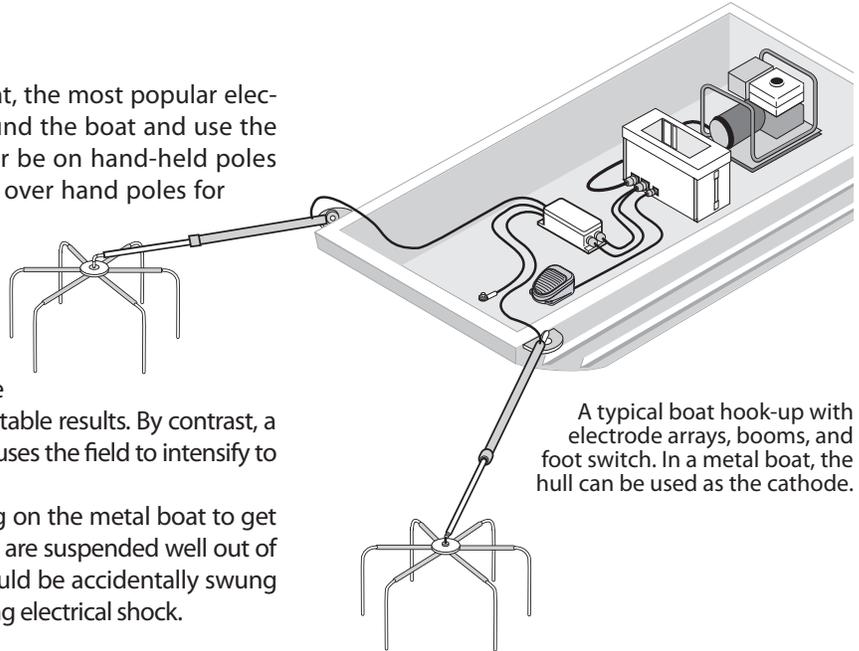
# ELECTRODE BOOMS

## FOR CUSTOMER BUILT BOATS

### ADVANTAGES OF BOOMS

When an Electrofisher System is installed in a boat, the most popular electrode set-up is to hang anodes in the water around the boat and use the boat hull as the cathode. Electrodes could either be on hand-held poles or suspended from booms. Booms are preferred over hand poles for three reasons:

1. A boom can support a much larger electrode array than a person could support on a pole. Larger diameter arrays provide a less intense field at each electrode that is less stressful to fish.
2. Booms keep the array at a fixed distance from the boat, so the field will remain constant, with predictable results. By contrast, a hand pole being used too close to the boat hull causes the field to intensify to a level that would damage fish in its vicinity.
3. With booms it is impossible for a person standing on the metal boat to get shocked by touching the array, because the arrays are suspended well out of reach. By contrast a hand-held electrode pole could be accidentally swung over the deck, touching a crew member and causing electrical shock.



A typical boat hook-up with electrode arrays, booms, and foot switch. In a metal boat, the hull can be used as the cathode.

### BOOM MODELS

There are two basic boom models; Standard and Hi-Current. The Standard Boom is approximately 8 feet long, made of 1½ inch and 1¾ inch diameter tubes. The High Current boom, used with 9.0 GPP's, is made with the same diameter tubes as the Standard boom but has larger diameter electrical conductors to accommodate the higher currents produced by 9.0 GPP's.

Also offered is light duty boom designed for use on small craft.

#### Standard & Hi-Current Boom Kits

Each Hi-Current and Standard Boom is sold individually and supplied with a GPP connector, Port or Starboard Boom clutch assembly, upper & lower boom support, quick release slug designed to attach electrode arrays, 6 feet of height adjustment chain, chain support plate, 10 feet of cable from boom end to the connectors, two quick links and mounting bolts. Booms are sold individually - specify Port or Starboard.



- Standard Boom Kit 2.5, 5.0 GPP, Type VI-A, VVP-15B (starboard) .....06629
- Standard Boom Kit 2.5, 5.0 GPP, Type VI-A, VVP-15B (port).....06630
- Above Kits Require Boom Interconnect Box**
- Standard Boom Kit 7.5 GPP (starboard) .....06631
- Standard Boom Kit 7.5 GPP (port).....06632
- Hi-Current Boom Kit 9.0 GPP (starboard) .....06633
- Hi-Current Boom Kit 9.0 GPP (port) .....06634

#### Boom Interconnect Box

Provides a safe connection between Electrofisher and Booms when used in a boat. Allows for various configurations of anode and cathode setup using electrode arrays and boat hull. This box is necessary to safely operate 2.5, 5.0 GPP, Type VI-A & VVP-15B Electrofishers.



Order Number..... 05591

#### Light Duty Boom Kits

Designed for use on small craft. Two 8-foot fiberglass boom poles with quick release slug designed to attach electrode arrays supplied with four plastic pole mounts and 10 feet of cable. 2.5, 5.0 GPP, VVP-15B and Type VI-A booms come with a Boom Interconnect Box. Does not require or include boom clutches or housing. Mounting arrangement will need to be improvised for individual craft, therefore booms remain stationary. Sold as pairs.

- L. Duty Boom Kit 2.5, 5.0 GPP, Type VI-A, VVP-15B..... 06248
- L. Duty Boom Kit 7.5 GPP ..... 06644
- L. Duty Boom Kit 9.0 GPP ..... 06645

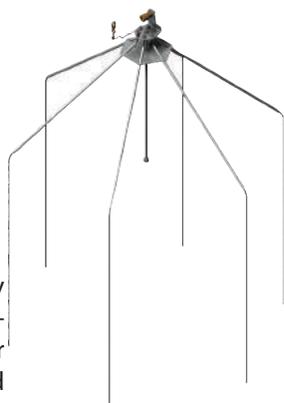
#### Replacement Boom Extension

This design utilizes the entire length of the Boom extension to act as the insulator and improves the reliability of the boom. Extensions are 8 feet and come with 10 feet of cable and an insulated boom slug. Replacement Boom extensions are sold individually and come with installation instructions.

- 2.5, 5.0, 7.5 GPP, Type VI-A, VVP-15B ..... 06242
- 9.0 GPP ..... 06243

# ELECTRODE ARRAYS

FOR USE WITH BOOMS



### SAA-6 Spider Adjustable Array

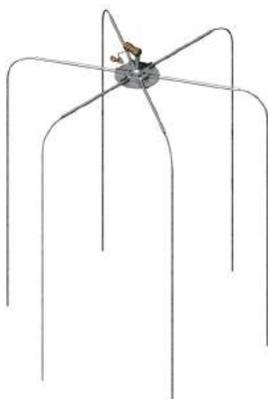
This medium-duty array features six stainless steel dropper cables that expand from 12 inches to 36 inches in diameter. The droppers are submersible to three feet of water and are complete with a brass quick connect fitting and safety line. Compatible with all Smith-Root Electrofishing Booms, including Hi-Current, Standard, and Light Duty models.

**Order Number..... 06759**

Replacement parts for the SAA-6 are available. Contact Smith-Root Sales for more information.

### LPA-6 Low Profile Array

This light-duty array is designed for use with our light duty booms only. This array is intended to operate in shallow waters with shallow draft boats. The array features six stainless steel dropper cables that open to 36 inches in diameter and fold into a compact package for easy storage and portability. The array is complete with a brass quick connect fitting and safety line. Only compatible with Smith-Root Light Duty Electrofishing Booms.



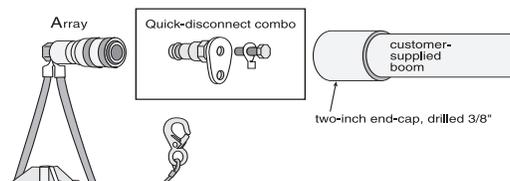
**Order Number..... 07395**

Replacement parts for the LPA-6 are available. Contact Smith-Root Sales for more information.

### Quick-Connect Adaptor

Customers who wish to use Smith-Root Arrays but already have their own booms can purchase this Quick-Connect Adaptor, which includes the quick-connect plug, and the safety line hook and eye. It is easily attached to any boom with a 2-inch end cap.

**Order..... 05409**



## ELECTRODE ARRAYS

All Smith-Root electrode booms are designed to use a pair of electrode arrays. These feature stainless-steel dropper cables, quick-connect fittings, and a safety line. The arrays fold into a compact package for storage.



### AUA-6 Adjustable Umbrella Array

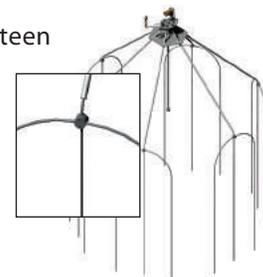
This heavy-duty array is designed for durability and long life. It features six stainless steel dropper cables that expand from 6 inches to 42 inches in diameter; also, the droppers are submersible in up to 3 feet of water. The array is complete with a brass quick connect fitting and safety line. Compatible with all Smith-Root Electrofishing Booms, including Hi-Current, Standard, and Light Duty models.

**Order Number..... 09473**

### Array Multiplier Kit

Converts an AUA-6, SAA-6 or LPA-6 into an eighteen dropper electrode array. Additional droppers provide better loading in low conductivity water and a less intense field at each electrode. The array multiplier kit converts a six dropper array into an eighteen dropper array.

**Order Number..... 05713**



### Array Dropper Expander

Attach to AUA-6, SAA-6 or LPA-6 arrays to extend your electrofishing capabilities. Size: 1½ inch diameter and 24 inches or 36 inches in length. Sold individually. Electrode array is sold separately.

**24 in. Order Number..... 04468**

**36 in. Order Number..... 05399**







SR-20EH shown.

# BOATS

*Smith-Root, Inc.'s line of reliable, field-proven electrofishing work boats are designed to provide safe and stable working conditions. Equipped with the latest electrofishing technology, they provide the fisheries researcher with the utmost in electrofishing efficiency and equipment reliability.*



# ELECTROFISHER BOATS

Smith-Root H and EH model boats are heavy-duty electrofishing work boats designed to provide the fisheries researcher with the utmost in electrofishing efficiency and equipment reliability.

H model boats feature a sled-style hull, available from 14 feet to 18 feet in length, perfect for shallow water fishing operations. For rough water conditions, our EH models offer our rugged modified "V" hull available in 18 feet to 21 feet lengths.

All models include the standard equipment listed here. Custom equipment is also available to meet individual needs.

## Hull And Transom

Hulls are constructed of rugged aluminum that gives superior impact strength and excellent resistance to water and weather corrosion. The fabrication features all-welded seams with hard machine-rivets at all critical rib support points. Seams are double welded at the bottom-to-gunwale sections and are overlaid with a formed chine.

H-models feature a minimal 6° "V" for shallow water work, while EH-models have a modest 20° "V". All models feature superior handling abilities at high running speeds. The bow is a modified "V" design, giving good lift and wave splitting action in rough water.

All Smith-Root boats come equipped with an extra heavy-duty transom built with a double H-frame-style reinforcing. This transom is highly resistant to damage that can happen on or off the trailer.

## GPP Electrofisher with Kohler Powered Generator

Kohler generator is custom-wound with insulated high voltage windings able to deliver maximum power into the water. Generator is cooled by water pumped in through a screened intake in the bottom of the boat hull. The water strainer screen is removable for easy cleaning. Additional heavy-duty windings provide 12 volt power for battery charging and auxiliary lighting. Engine features:

- Meets Coast Guard safety standards for electrical systems and gasoline fuel systems
- One side serviceability of fuel filter, cooling system and lubrication system
- Heat exchanger
- High water and high exhaust temperature cutouts
- Flywheel guard
- Disposable oil filter
- Oil drain valve
- Full-pressure lube
- Electronic fuel pump
- Anti-dieseling solenoid
- Solid-state ignition
- Attached overflow bottle
- Automatic choke
- Emission compliant



For more information about GPP Electrofisher specifications see catalog page 7.

## Generator Engine Housing

Housing is lined with heat reflective and sound deadening material. A large cooling fan circulates airflow through the housing. The top lid hinges back and a 12 volt night light is provided. When closed, the lid serves as a seat mount. The adjustable seat is swivel mounted and vinyl covered with a back-rest.

## Fish Holding Tank

Constructed of rugged aluminum with all welded seams. The sides have full length stiffeners and inside corners are angled for easy fish removal. Hinged lids fold down and lay flush along sides. The lids have formed bracing for sitting or walking on. Tank lights are provided at each corner for night operations. Tank is filled by a high volume pump. Fresh water is pumped in through a screened intake on the bottom of the boat hull and is constantly circulated through the holding tank. Additional aeration is provided by a secondary pump and water circulating system with an aerating dome. This feature allows transporting fish when the boat is out of water and can be used to add extra oxygen to the tank when high fish-density occurs.

## Steering & Control Console

GPP Electrofisher and boat operator controls are integrated into a center console. The console also contains a patch panel allowing complete selection of anode/cathode boom configurations. Console hinges forward to provide easy access to all steering controls, switches, circuit breakers, and wiring terminals for the entire electrical system. All wiring terminals are clearly labeled for easy identification and servicing. A schematic diagram is provided which shows all wiring and terminal designations for the entire boat.



## Automatic Bilge Pump

A console mounted switch allows manual operation of the pump. The pump is rated for an open flow of 1,500 gallons per hour.

# ELECTROFISHER BOATS

## Lights

Complete system of lights for navigation and safety.

Featuring:

- Halogen head lights
- Navigation lights
- Work lights
- Deck lights
- Stern flood lights

## Flotation

Full-length flotation along both sides, with ample flotation placed below the deck line. This extra flotation is provided so that a fully equipped electrofishing boat will float approximately level in the unlikely event of flooding.

## Work Deck

Provides a roomy and safe working area for electrofishing. The deck is below the gunwale top to give a low center of gravity and make it easier to reach fish. The work area is large enough for several people to work comfortably. The work surface is a dri-deck mat for stable footing. A sturdy 42-inch railing, with integrated net holders, surrounds the work deck on three sides. Foot switches used to control electrofisher output are built into the work deck. A two-position switch is provided at the steering and control console to select single or dual operation. An additional built-in foot switch is provided for the boat operator. A receptacle is provided for additional foot switches to accommodate extra crew. A large below work deck storage compartment with locking marine doors, provides a secure dry storage area (locking doors not available on SR-14H). Wiring at the work deck is contained in safe junction areas and all high voltage to the platform is in separate conduits. Meets all OSHA suggested safety guidelines.

## Cathode Array

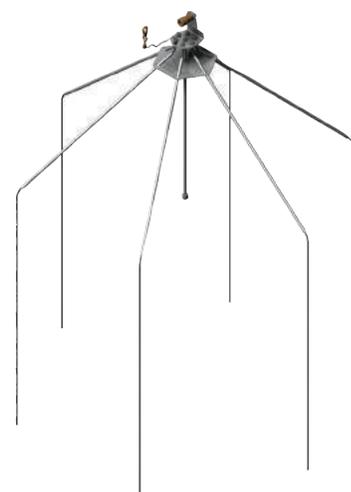
Provides better loading in low conductivity water and a less intense field at each electrode. Array is electrically isolated from boat hull on H-models. Consult the factory for array isolating options on EH-models.

## Electrofisher Booms

Standard Boat Booms are mounted at each corner of the bow on clutches. These clutches allow the booms to be swung from 0° to 180° for the most effective spread for the waterway being fished. The clutches also allow horizontal slippage in the event of impact. Booms are elevated by adjustable support chains attached to the safety railing.

## Electrode Arrays

All Smith-Root electrofishing boats include a pair of SAA-6 electrode arrays. These medium-duty arrays features six stainless steel dropper cables that expand from twelve inches to 36 inches in diameter. The droppers are submersible to 3 feet of water and are complete with a brass quick connect fitting and safety line. AUA-6 Adjustable Umbrella Arrays are also available as an upgrade.



## Battery Compartment and Charging System

Provides space for two Group-24 marine batteries. A 40 amp charging system is included which utilizes power from the GPP generator. Additional charging from the outboard motor is incorporated in the charging system. A battery isolator helps protect the system from damage. Storage space above batteries provide room for a fire extinguisher and other small items.

SR-18H shown.

## On-Board Fuel Tanks

Built-in tank provides gas for both the outboard and the GPP generator. The tank is foam-lined to minimize condensation. It also has a marine water separator/filter with a replaceable cartridge and shut-off valves. Fittings at the fuel filter facilitate using standard 6 gallon marine gas tanks to supplement the main fuel tanks.

# ELECTROFISHER BOATS

## H & EH MODEL COMPARISON

	SR-14H	SR-16H	SR-18H	SR-18EH	SR-20EH	SR-21EH
Hull Style	Heavy Duty	Heavy Duty	Heavy Duty	White Water, Extra Heavy Duty	White Water, Extra Heavy Duty	White Water, Extra Heavy Duty
Hull Material	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum	Aluminum
Hull Bottom Thickness	0.125 in.	0.125 in.	0.125 in.	0.187 in.	0.187 in.	0.187 in.
Hull Side Thickness	0.10 in.	0.10 in.	0.10 in.	0.125 in.	0.125 in.	0.125 in.
Hull Length	14 ft. - 6 in.	16 ft. - 8 in.	18 ft.	18 ft. - 10 in.	20 ft. - 10 in.	21 ft. - 10 in.
Bottom Width	80 in.	80 in.	80 in.	72 in.	72 in.	72 in.
Gunwale Width	79 in.	79 in.	79 in.	96 in.	96 in.	96 in.
Side Height	24 in.	24 in.	24 in.	30 in.	30 in.	30 in.
Standard Transom Height	20 in.	20 in.	20 in.	25 in.	25 in.	25 in.
Optional Transom Height	25 in. or 27 in.	25 in. or 27 in.	25 in. or 27 in.	N/A	N/A	N/A
Approx. Weight w/5.0 GPP	1,475 lb.	1,950 lb.	2,080 lb.	2,700 lb.	2,950 lb.	3,100 lb.
Displacement w/5.0 GPP	5 in. 401 lb./in.	5 in. 468 lb./in.	5 in. 506 lb./in.	10 in. 465 lb./in.	10 in. 520 lb./in.	10 in. 540 lb./in.
Payload Max. <sup>1</sup>	1,320 lb.	1,485 lb.	1,650 lb.	1,820 lb.	2,150 lb.	2,450 lb.
Fish Tank Capacity	47 gal.	63 gal.	74 gal.	63 gal.	74 gal.	90 gal.
Prop HP Max <sup>2</sup>	50 HP	75 HP	90 HP	150 HP	150 HP	150 HP
Jet HP Recommended	80 HP	100 HP	150 HP	200 HP	200 HP	200 HP
Twin Engine HP	25 HP	30 HP	40 HP	N/A	90 HP	90 HP
Fuel Capacity	20 gal.	20 gal.	20 gal.	50 gal.	50 gal.	50 gal.

1. Maximum payload (persons, motor, gear) includes 12-inch water depth in the fish holding tank.

2. Four stroke with remote controls.

It is recommended that motors above 30 HP have variable ratio oiler and power trim ad tilt. All motors require remote control. Customer supplied motor will incur an installation charge. Specifications subject to change without notice.

### Ordering Numbers

**SR-14H w/5.0 GPP ..... 05981**

**SR-14H w/7.5 GPP ..... 05984**

**SR-14H w/9.0 GPP ..... 05987**

**SR-16H w/5.0 GPP ..... 05982**

**SR-16H w/7.5 GPP ..... 05985**

**SR-16H w/9.0 GPP ..... 05988**

**SR-18H w/5.0 GPP ..... 05983**

**SR-18H w/7.5 GPP ..... 05986**

**SR-18H w/9.0 GPP ..... 05989**

**SR-18EH w/5.0 GPP ..... 05951**

**SR-18EH w/7.5 GPP ..... 05952**

**SR-18EH w/9.0 GPP ..... 05953**

**SR-20EH w/5.0 GPP ..... 05954**

**SR-20EH w/7.5 GPP ..... 05955**

**SR-20EH w/9.0 GPP ..... 05956**

**SR-21EH w/5.0 GPP ..... 05959**

**SR-21EH w/7.5 GPP ..... 05958**

**SR-21EH w/9.0 GPP ..... 05957**

### Standard Features Quick Reference

- GPP Electrofisher
- Kohler Powered Generator
- Aluminum Hull
- Forward Work Deck with:
  - Safety Railings
  - Built-in Foot Switches
  - Locking Front Storage
- Standard Boat Booms
- SAA-6 Electrode Arrays
- Cathode Array
- Light Package with:
  - Pre-aimed Work Lights
  - Adjustable Head Lights
  - Deck Lights
  - Navigation Lights
  - Stern Flood Lights
- Fish Holding Tank
- Dual Batteries
- Battery Charging System
- On-board Fuel Tank
- Steering & Control Console with:
  - Wheel Steering
  - Side Mounted Outboard Controls
  - Fuel Gauge
  - 12 VDC Acc. Power Plugs
  - Outboard Stall Indicator
  - Outboard Hour Meter
  - Generator Hour Meter
  - Dual Electric Horns
  - Shatterproof Windshield
  - Depth Finder
  - Voltmeter
  - Battery switch
  - Heavy-duty canvas console cover
- Automatic Bilge Pump
- Generator Engine Housing
- Fire Extinguisher

*Boat motor and trailer sold separately. Throttle and gearshift controls are supplied with the outboard motor. Motor and controls must be installed at the time of manufacture to allow under-deck routing of wiring harness, steering and motor control cables and to be able to test fully and guarantee the completed boat before shipment. Smith-Root supplied motors installed at no additional charge. Additional options and accessories listed on page 19.*

# ELECTROFISHER BOATS

## BOAT MOTORS AND TRAILERS

Correct trailer and motor selection are crucial to ensuring the long life and proper operation of your electrofishing boat. Smith-Root's experienced sales staff can help you select the right trailer and motor for your new boat.

We proudly offer trailers from King, EZ Loader and ShoreLand'r.



**ShoreLand'r**

**EZ LOADER**  
BOAT TRAILERS

For qualifying customers, factory direct government pricing is available for Johnson/Evinrude and Mercury motors. Government pricing for Yamaha, Honda and Suzuki is also available.

**EVINRUDE**  
*Johnson*

**HONDA**  
MARINE

 **YAMAHA**

 **SUZUKI**  
MARINE

**MERCURY**

Contact Smith-Root sales for trailer and motor pricing and specifications.

## OPTIONAL/REPLACEMENT EQUIPMENT

### Auxiliary Lighting Kit

6 inch diameter "headlight" type light mounted in a tough rubber housing. Comes with mounting hardware. Lights are 12 volt, can be used with either AC or DC power and are approximately 60 watts output.



**Headlight..... 06528**

**Floodlight..... 05845**

### Light Box

All Smith-Root electrofishing boats can be equipped with up to four of these lights. The high powered diffused lighting system is designed to be mounted on the bow and on the sides of your boat. Cathode droppers may be added to shield hull from effects of electrolysis. Each box has six high power lights. Bolts easily to most boats. Most boats will accept four light boxes, two on bow, one port, one starboard.



Standard dimensions are 35¼ inch L x 3¾ inch W x 4¼ inch H. Custom sizes are available for specific applications. All mounting hardware is included.

**Order Number (each)..... 05181**

### Hand-held Spot Light

Rugged design and corrosion-resistant construction make this 12 volt spotlight with 400,000 candle power ideal for marine environments. Eliminates reflective glare and protects against night blindness. 170 watt sealed bulb with intense beam can penetrate fog, snow, windshields, and water. Comes with 10 feet of coil cord which plugs into any 12 volt source.

**Order Number..... 03617**

### Extra High Transom Adapters

This adaptor is welded to the top of the transom to alter the transom to a 27 inch height for a jet drive engine. This adaptor can be removed later if you wish to go to a 20 inch shaft engine. Available for H Model boats only.

**Order Number..... 03318**

### Boat Cover

Provides complete weather protection for the complete boat hull during storage. The Sunbrella® material is lightweight, UV resistant and has reinforced abrasion points, elastic draw rope, and spaced eyelets.

**H Model Boats..... 03892**

**EH Model Boats..... 03319**

### Foot Switches

With 15 feet of neoprene cable. Fitted with a mating plug to match the connector at the console.

**Single Foot Switch ..... 03309**

**Dual Foot Switches ..... 03310**



### Cathode Arrays

Cathode array featuring thirty-two 38 inch droppers provides better loading in low conductivity water and a less intense field at each electrode. Can be added to any boat. Set of four (two on bow, one port, one starboard side) bolts easily to most boats.

**Order Number..... 05266**

### Replacement Droppers

38 inch replacement dropper cables for cathode arrays. Fits all non-isolated arrays. Sold individually.

**Order Number..... 05183**

### Locking Side Storage

Locking keyed doors installed in side compartments. Priced per compartment door. Available on EH Model boats only.

**Order Number..... 06012**

# ELECTRODE ARRAYS

## FOR USE WITH BOOMS

### ELECTRODE ARRAYS

All Smith-Root electrode booms are designed to use a pair of electrode arrays. These feature stainless-steel dropper cables, quick-connect fittings, and a safety line. The arrays fold into a compact package for storage.



#### AUA-6 Adjustable Umbrella Array

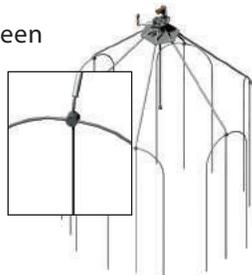
This heavy-duty array is designed for durability and long life. It features six stainless steel dropper cables that expand from 6 inches to 42 inches in diameter; also, the droppers are submersible to 3 feet of water. The array is complete with a brass quick connect fitting and safety line. Compatible with all Smith-Root Electrofishing Booms, including Hi-Current, Standard, and Light Duty models.

**Order Number**.....09473

#### Array Multiplier Kit

Converts an AUA-6, SAA-6 or LPA-6 into an eighteen dropper electrode array. Additional droppers provide better loading in low conductivity water and a less intense field at each electrode. The array multiplier kit converts a six dropper array into an eighteen dropper array.

**Order Number**..... 05713

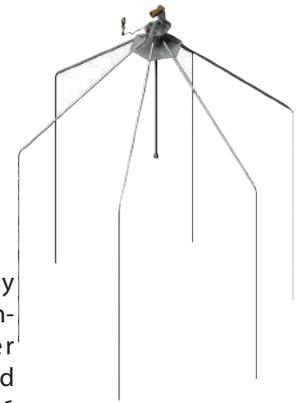


#### Array Dropper Expander

Attach to AUA-6, SAA-6 or LPA-6 arrays to extend your electrofishing capabilities. Size: 1½ inch diameter and 24 inches or 36 inches in length. Sold individually. Electrode array is sold separately.

**24 in. Order Number**..... 04468

**36 in. Order Number**..... 05399



#### SAA-6 Spider Adjustable Array

This medium-duty array features six stainless steel dropper cables that expand from 12 inches to 36 inches in diameter. The droppers are submersible to 3 feet of water and are complete with a brass quick connect fitting and safety line. Compatible with all Smith-Root Electrofishing Booms, including Hi-Current, Standard, and Light Duty models.

**Order Number**..... 06759

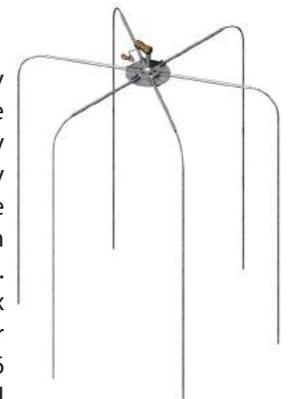
Replacement parts for the SAA-6 are available. Contact Smith-Root Sales for more information.

#### LPA-6 Low Profile Array

This light-duty array is designed for use with our light duty booms only. This array is intended to operate in shallow waters with shallow draft boats. The array features six stainless steel dropper cables that open to 36 inch diameter and fold into a compact package for easy storage and portability. The array is complete with a brass quick connect fitting and safety line. Only compatible with Smith-Root Light Duty Electrofishing Booms.

**Order Number**..... 07395

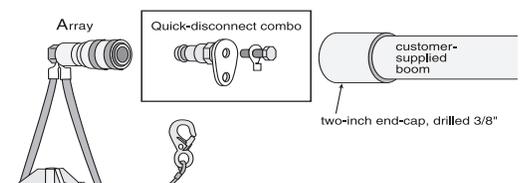
Replacement parts for the LPA-6 are available. Contact Smith-Root Sales for more information.



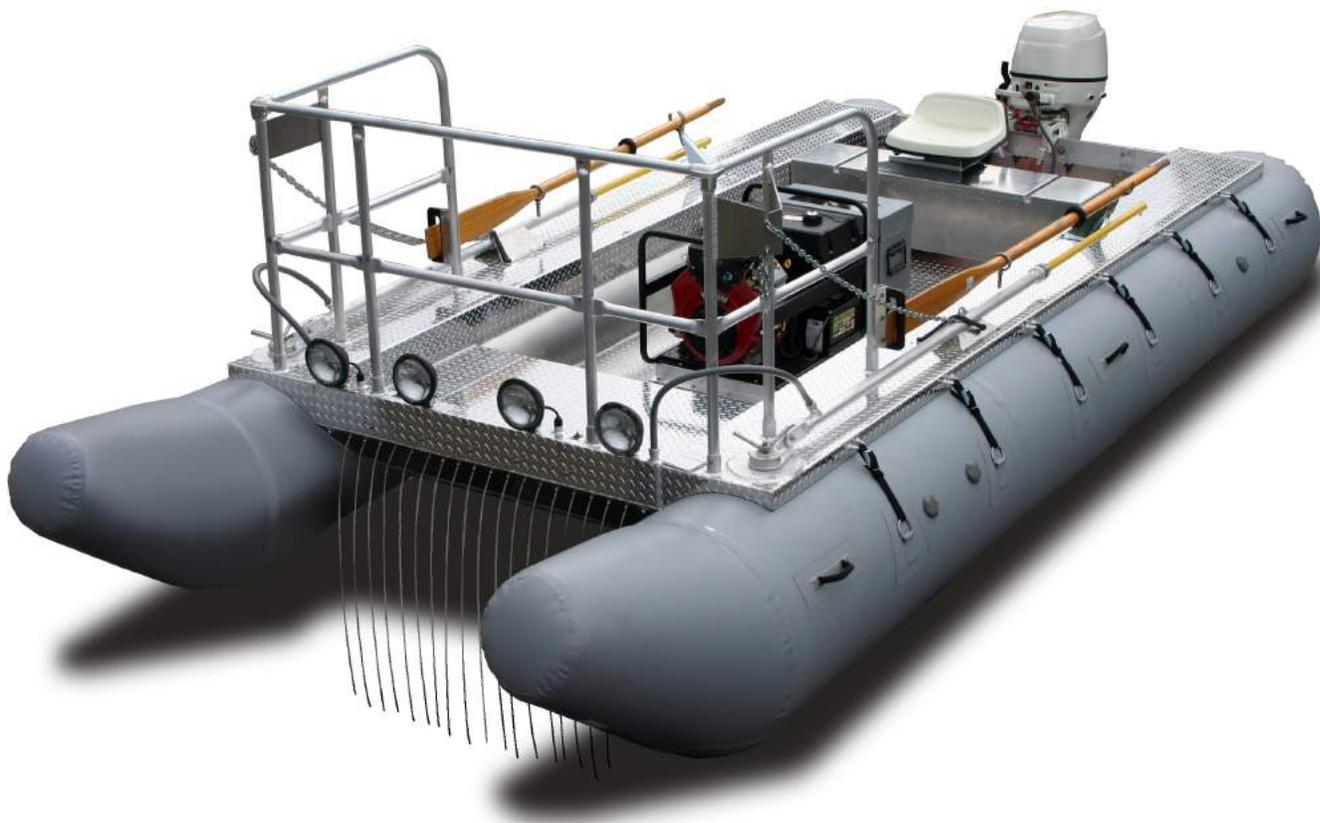
#### Quick-Connect Adaptor

Customers who wish to use Smith-Root Arrays but already have their own booms can purchase this Quick-Connect Adaptor which includes the quick-connect plug and the safety line hook and eye. It is easily attached to any boom with a 2-inch end cap.

**Order**..... 05409



# SR-17 CATARAFT



The CataRaft is an inflatable electrofishing craft designed for white water use. Its inflatable pontoons are ideal for shallow water work and maneuverability.

The CataRaft can handle tough white water conditions to get you where you need to go. Equipped with a 5.0 or 7.5 GPP electrofisher, the CataRaft is an ideal white water electrofishing package.

SR-17 CataRaft	
Electrofisher	5.0 or 7.5 GPP
Hull Material	Aluminum
Hull Length	13 ft.
Pontoon Length	18 ft.
Deck Bottom Width	45 in.
Approx. Weight w/out Motor	670 lb. (5.0 GPP) / 720 lb. (7.5 GPP)
Capacity	1,600 lb.
Payload	930 lb.
Recommended HP	25 HP
Max HP	35 HP

Specifications subject to change without notice.

**Standard Equipment Quick Reference**  
**3-Chamber Dupont Hypalon® Pontoons**  
**5.0 GPP Electrofisher System**  
**Electrofisher Booms**  
**Electrode Arrays**  
**Forward Work Area**  
**Safety Railings**  
**Built-in Foot Switches**  
**Cathode Array**  
**Adjustable Head Lights**  
**Adjustable Operators Seat**  
**Oars**  
**Hand Operated Air Pump**  
**Dry Storage**  
**Fire Extinguisher**

**Order Number**  
**SR-17 w/5.0 GPP..... 06005**

*Does not include motor or trailer.*





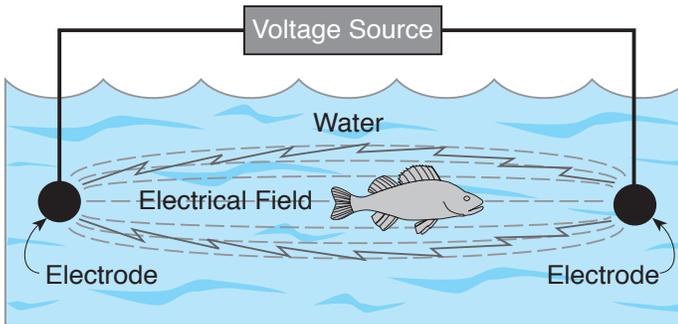
# FISH BARRIERS AND GUIDANCE



# BARRIER & GUIDANCE THEORY

## WHAT ARE ELECTRIC FISH BARRIER AND GUIDANCE SYSTEMS?

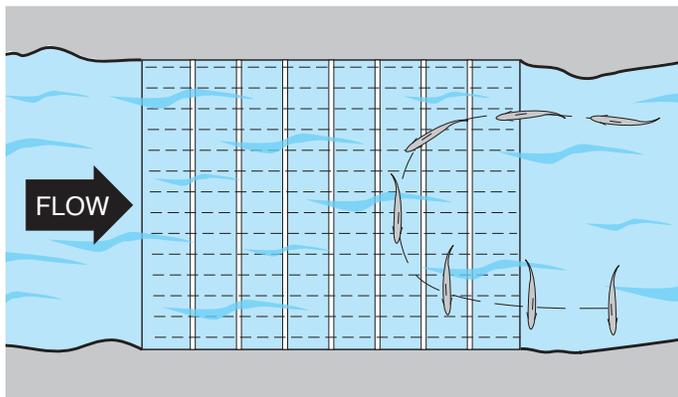
The electrical fish barrier can be thought of as an impassible barricade, and the fish guidance system as a repelling zone. Both consist of electrical current passing through water. The electrical circuit is made up of two or more metal electrodes submersed in water with a voltage applied between them. Electric current passing between the electrodes, via the water medium which produces an electric field. When fish are within the field, they become part of the electrical circuit with some of the current flowing through their body. The electric current passing through fish can evoke reactions ranging from a slight twitch to full paralysis, depending on the current level and shock duration they receive.



1. Basic Electric Field in Water

## TYPES OF CURRENT

In the past, both Alternating Currents (AC) and Direct Current (DC) have been used to energize fish barriers and guidance systems; however, AC is known to be much more stressful to fish. Therefore, Smith-Root electrical fish barriers and guidance systems employ DC pulses of very short duration.

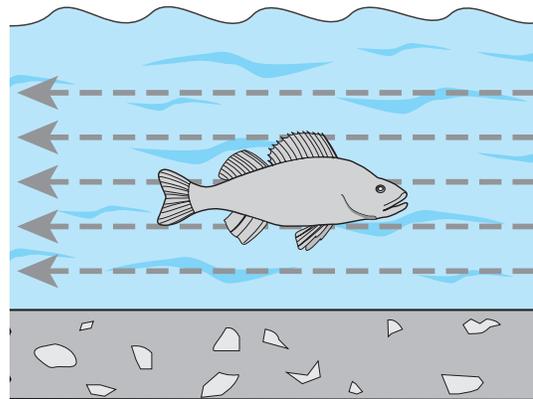


3. Typical fish path within a graduated field.

## ELECTRIC FIELD PATTERN

To produce the most efficient electric field pattern for blocking or guiding fish, it is desirable to produce a field with electric lines running head-to-tail along the fish. This orientation transfers the maximum power from water into the fish. In flowing water of 1.5 to 2 fish body lengths per second or greater, fish instinctively swim with their heads into the flow. Therefore, the most effective field pattern is one with the electric field lines running parallel to water flow. In sites with flowing water, Smith-Root electric fish barrier and guidance systems produce electric field lines which run parallel to water flow.

One of the most important advantages of the parallel field orientation is that when a fish is crosswise to the electric field it receives almost no electric shock. Fish learn very quickly that by turning sideways to the flow they can minimize the effects of the electric field. In this orientation, upstream migrating fish are swept clear of the field by water flow. The figure below shows the typical reaction of migrating fish challenging an oriented electric field. In slow or static water a high percentage of fish also learn to turn in relation to the field and swim away from the electric field.



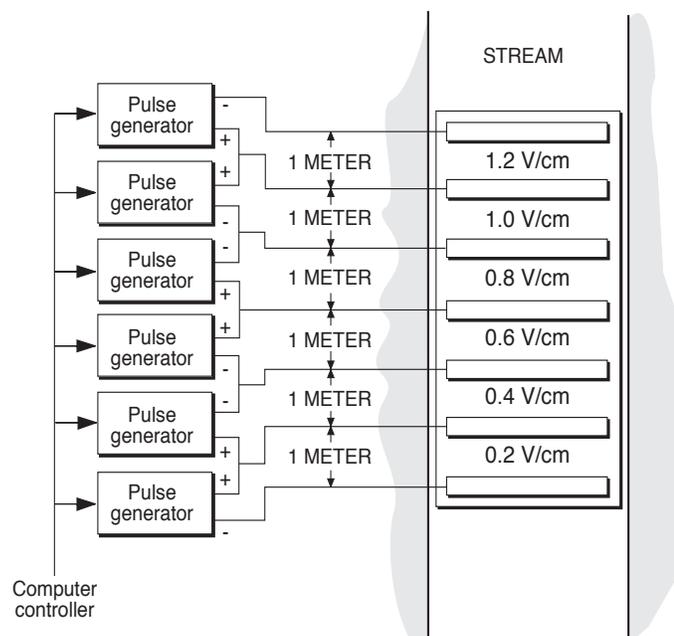
2. Electric field lines which run head-to-tail along the fish transfer the maximum power from water to fish.

# GRADUATED FIELDS

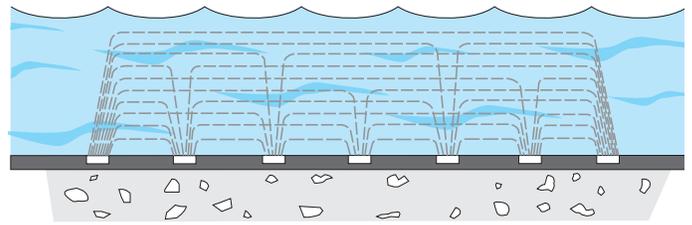
Another, important feature of the Smith-Root fish barrier design is the graduated electric field. As fish advance into a graduated field, they feel an increasingly unpleasant sensation. When the sensation is too intense, fish are unable to advance further and cannot keep their body orientated with the water flow. They turn perpendicular to the field, and are either swept clear by water flow or swim in the opposite direction from the increasing electric field.

## HOW IS THE GRADUATED FIELD PRODUCED?

Smith-Root barrier and guidance systems use from two to six pulse generators to provide ascending levels of field intensity. The pulsators (pulse generators) have their outputs connected to an array of evenly spaced electrodes placed across a stream bottom. Each pulsator can be adjusted to provide an increasing voltage between successive electrode pairs. This creates a gradually increasing electric field along the array. The pulsators are simultaneously triggered to cause the electric field lines to become additive and oriented with stream flow. Longer fish receive more head-to-tail voltage and are affected at an earlier stage, while smaller fish can penetrate the barrier further before being overcome or repelled.



4. Typical graduated electric field



5. An oriented electric field distributes evenly.

The figure above shows a cross section of an electric field generated along a serially connected bottom-mounted electrode array. The oriented electric field causes the pattern to be distributed from the stream bottom to the surface.

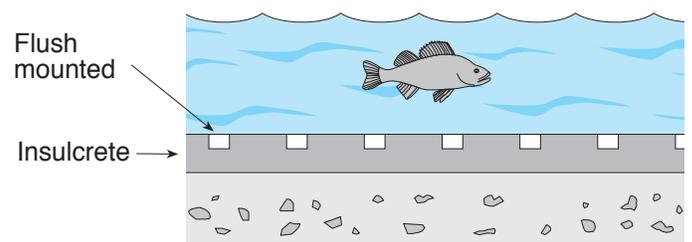
## FLUSH-MOUNTED ELECTRODES

Flush bottom-mounted electrode arrays do not alter normal water flow or catch debris. The electrodes are fixed into an insulating medium placed on the stream bottom. The insulating medium ensures that the electric current will flow through the water and not through the stream bottom.

For most permanent installations, the insulating medium is a special concrete mix called Insulcrete™. Site-specific designs include cast-in-place decks, precast flat panels, and precast culverts.

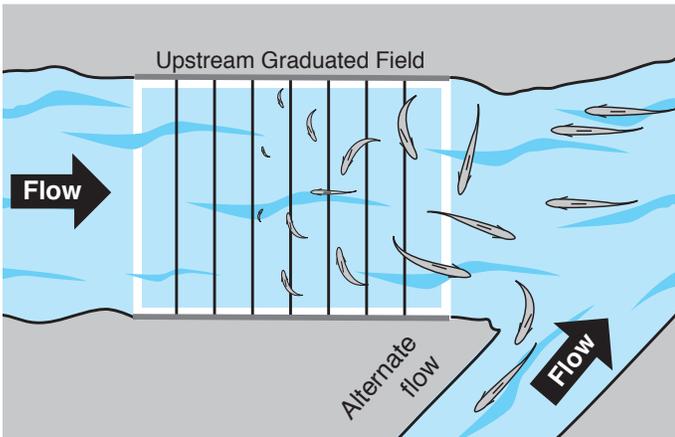
Plastic culverts are now also available. These provide the required insulation and allow flush-mounting of circular electrodes.

For site-evaluation we have portable canvas arrays that provide a temporary barrier system. The portable arrays are constructed of reinforced vinyl sheets with stainless steel cable electrodes attached to the top surface.

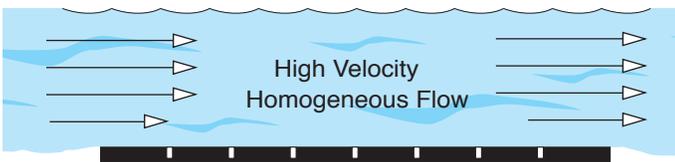


6. Flush-mounted electrodes do not trap debris.

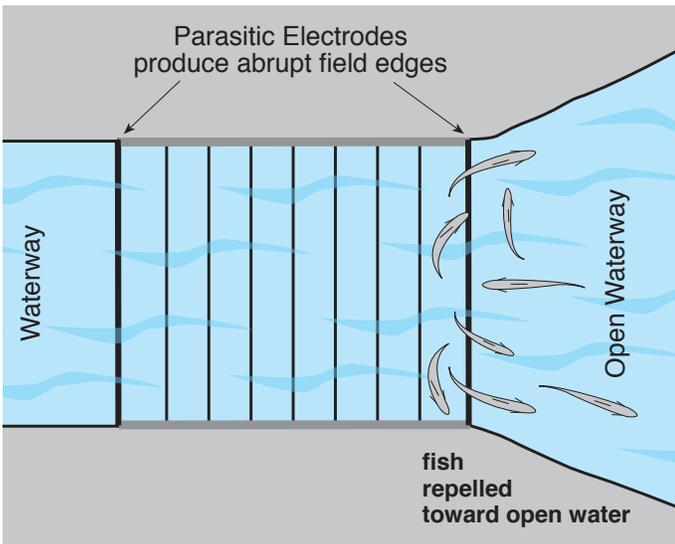
# UPSTREAM BARRIER SYSTEM



**7. Upstream Graduated Field barrier with an attraction flow immediately below the barrier.**



**8. For Upstream Barriers, the electrode array should be level and smooth.**



**9. Static Flow Barrier with open water return.**

## UPSTREAM BARRIERS

Smith-Root Upstream Fish Barrier systems are designed to block completely, the passage of all upstream migrating fish. The barriers use electric pulses designed to partially paralyze fish without causing physical injury. The pulsators are adjusted to produce an ascending electric field sufficient to gradually reduce the ability of fish to swim against the water flow. It is best to have upstream barriers located in areas of medium to high water velocity in order to sweep stunned fish clear of the electric field. Often an attraction flow is provided just below a barrier to lure fish into hatcheries, traps, fish ladders, etc.

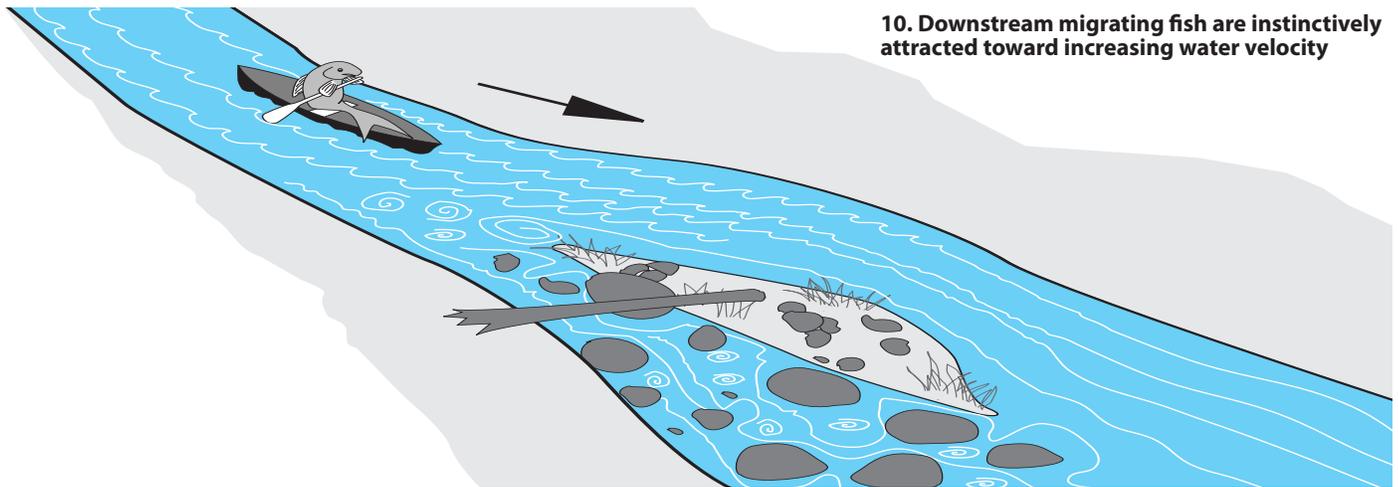
## UPSTREAM BARRIER HYDRAULICS

For optimum design, it is important to maintain a uniform velocity and water depth across the entire water column. To do this, the bottom must be level and the sides should be contained. The bottom should also be smooth so that a velocity is maintained near the bottom. With high velocity and homogeneous flow throughout the barrier, inhibited fish are quickly swept clear of the electrified zone. For upstream migrating adult salmon and steelhead, our upstream electrical fish barriers have proven to work well in velocities ranging from 2 to 10 ft/sec.

## STATIC FLOW BARRIERS

Smith-Root static flow barrier systems are designed to startle and repel the advancement of migrating fish. The pulsator intensities are adjusted to provide a constant field strength across the array. The outputs are set to produce very narrow pulses with a slow repeating pulse rate. The narrow pulses do not tetanize or reduce fishes' ability to swim. The electrode array arrangement is similar to upstream barriers except parasitic electrodes are placed at each end to produce an abrupt field edge. The abrupt field edge causes fish to be startled toward open water. Tests have shown repelling efficiencies of nearly 100% in static flows when an open body of water is available for fish to return.

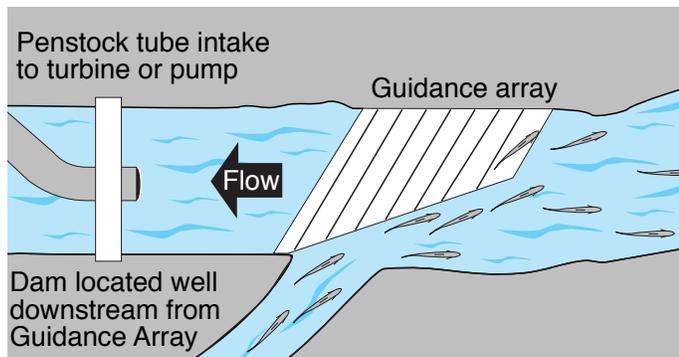
# DOWNSTREAM GUIDANCE AND REPELLING SYSTEM



10. Downstream migrating fish are instinctively attracted toward increasing water velocity

## DOWNSTREAM GUIDANCE AND REPELLING

Downstream migrating fish are instinctively attracted toward increasing water velocities, called attraction flows. The Smith-Root Downstream Guidance and Repelling systems are designed to guide downstream migrating fish away from dangerous attraction flows. Our design uses electrical pulses that do not tetanize fish or in any way reduce their swimming ability. Tetanized fish would be swept further into the electrified zone by water flow. To avoid the tetanizing effect, very short DC pulses are used which provide a sensation much like pins and needles. Repelled fish are guided towards an alternate waterway, with an attraction flow, or repelled toward open water, in the case of resident fish in a lake or reservoir.



11. Downstream Guidance System

## DOWNSTREAM GUIDANCE HYDRAULICS

Downstream guidance systems should be located in areas of moderate water velocity and positioned well upstream from turbine intakes, pumps, etc. For downstream anadromous migration, an alternative attraction flow or bypass is required as shown in Figure 10.

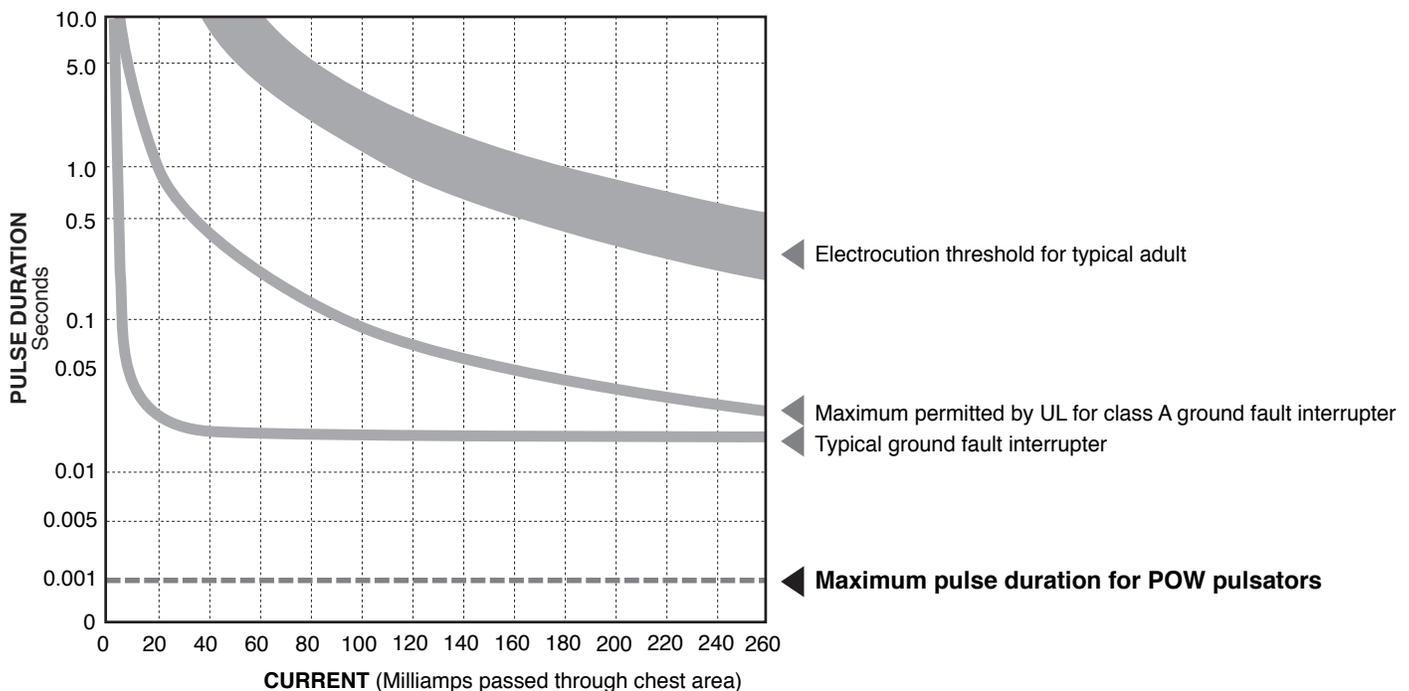
The best response is achieved when fish approach the electric field tail-first, as they typically will if the flow is at least 1 to 2 fish body length/sec. In addition, the electric field is designed to have an abrupt edge which increases the startle effect. The startle effect causes fish to dart ahead of the electrode array. To guide fish toward a bypass, the electrode array is often angled with relation to stream flow.

Once the fish have been guided into a bypass, it is essential to maintain a natural flow with uniform velocity well into the bypass so that fish will not reject it. Sudden increases in velocity within the bypass often spook downstream migrants, causing them to reject the bypass. For migrating Coho and Steelhead smolts, experimental tests indicate that velocities of 1 to 2 feet/sec work well. For Pinks, Chinook fry, and other small fish, somewhat lower velocities are desirable.

# SAFETY

The danger of receiving electric shock is increased when working around water. To receive an electrical shock, a person must be part of a closed circuit in which current can flow through them. Just how badly a person is affected by electric shock depends on the following:

1. The path the current takes through the body. The chest and head are the most vulnerable areas. All personnel should wear rubber lineman's gloves and a safety helmet.
2. The time spent in the circuit. The sooner the circuit is interrupted the better.
3. The person's age, size, and health. The greatest danger is to a person with a prior heart ailment.
4. The amount of current that flows through the body. When the body is submerged in water this becomes a complex situation involving many variables and very little data is available.
5. The type of current, AC or DC. Humans are three times more likely to be electrocuted by AC current than by DC. For this reason Smith-Root barrier and guidance systems use only DC current.
6. Whether the current flow is continuous or pulsed. UL Laboratories found that short pulses are much less likely to be lethal, see figure 12 below. Smith-Root barrier and guidance systems use a pulse of much shorter duration than that of a typical Ground Fault Interrupter Circuit.



**12. Effects of an electrical pulse on humans passed through the chest.**  
Adapted from the Handbook of Electronic Safety Procedures 1982 Edward A. Lacey.

# FISH BARRIER AND FBTCS MONITORING SYSTEM

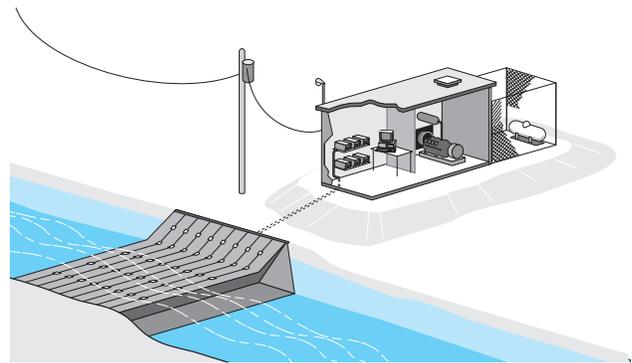
The figure at right shows a typical large stream electric fish barrier system. The system includes six Programmable Output Waveform (P.O.W.) pulsators. The pulsators are serially connected to a group of submerged electrodes. The system uses a BP-1.5-P.O.W., with an input power of 1.5 kilowatts. Energy is stored in a large capacitor bank and is quickly discharged through water, much like a camera flash. Pulse width is adjustable between 0.15 and 10.0 milliseconds. The repetition rate is adjustable from 0.1 to 10 pulses per second. Culvert barriers typically only require one or two pulsators. In the case of only one pulsator, the output can be split to energize up to three electrodes.

Each pulsator's waveform is controlled and monitored by the Fish Barrier Telemetry and Control System (FBTCS) via a fiber optic network. Pulsators are connected through a star concentrator so that should any pulsator in the system fail, the barrier will remain operational without disrupting communications with the remaining pulsators. A separate trigger loop keeps the pulsator's outputs synchronous as required by the system.

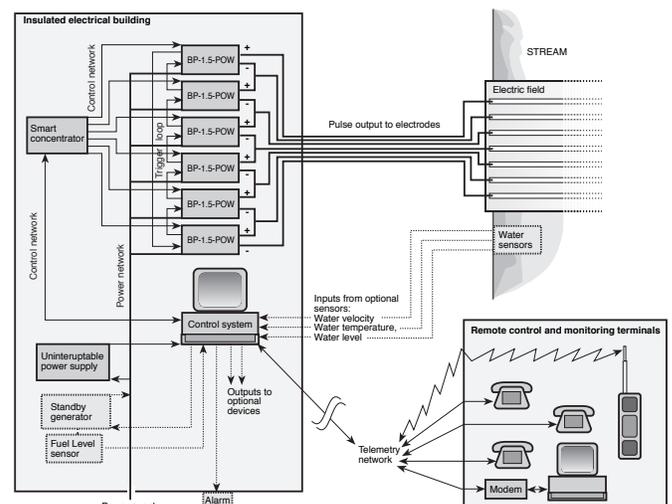
The FBTCS system also has relay contacts for controlling external devices. The system can be expanded to monitor and/or control up to 256 devices by adding a custom interface board. The control system reports to remote monitoring locations via telephone modem or radio telemetry. Up to four telephone numbers can be programmed for it to call in the event of a problem.

The FBTCS can also receive remote commands to reconfigure the pulsators' outputs via telephone or radio modem link. When connected by modem to a computer, the FBTCS system presents menus allowing remote control and monitoring. Passwords can be employed to prevent unauthorized tampering. The system software provides a status display, and a keystroke calls up the menus to give access to all functions. An event-history is maintained to record error conditions. The system can be interrogated at any time from a standard touch-tone phone, in which case the system will respond in clear spoken voice.

In the illustration at right the system monitors water velocity, temperature and level sensors which can automatically adjust pulse characteristics to respond to changes in water conditions. The system sends an alarm if preset water parameters go beyond set limits.



**13. Typical barrier installation. Six pulse generators mounted in an environmental equipment enclosure. Wiring connects underground cables to the electrode array. Auxiliary power is provided, fueled by propane for quick starting and reliability.**



**14. A typical barrier schematic. Optional extensions are shown in dashed lines.**

# THE BP-1.5-P.O.W. PULSATORS

Smith-Root Programmable Output Waveform pulse generators output up to 1.5 kilowatts. Pulsed waveforms and frequencies can be programmed for optimum fish blocking or repelling. They produce a wide range of DC pulse outputs to give more stopping power with less stress to fish.

Each P.O.W. pulsator includes a microprocessor to control width, frequency, and period of the output. A variety of waveforms can be generated: standard pulses, sweeping pulse widths, sweeping frequencies, and gated bursts. This allows generation of optimum waveforms that are effective with a wide range of species. The FBTCS telemetry and control system is required to setup, monitor, and control the pulsators.

**Standard Pulses:** A regular pattern of on/off times. The width and period of the pulses are selected to produce the most effective pattern.

**Gated Bursts:** A group of pulses followed by a longer off-time. This is often just as effective as standard pulses, but less stressful to the fish.

**Other Waveforms:** Sequences of pulses sweeping from wide-to-narrow width, or sequences sweeping from high-to-low frequency, can be implemented on special order.



16. BP-1.5-P.O.W.



15. Pulses can be created in a wide range of rates, widths, and periods.

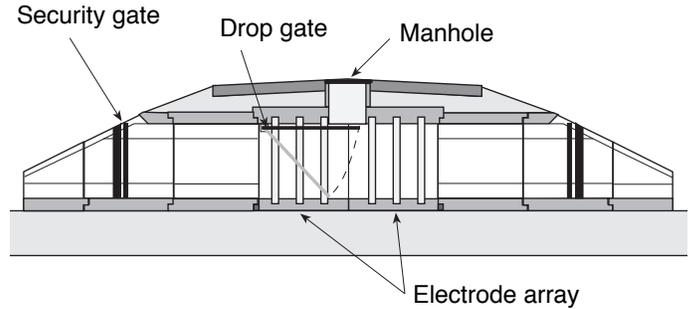
## SPECIFICATIONS

Input Voltage, standard	240V single phase AC
Input Voltage, special order	120V single phase AC
Output Voltage (Pulsed DC)	40, 80, 120, 160, 200 and 240 Volts
Maximum Input Power	1,500W
Maximum Output Energy	1,525J
Output Insulating Rating	5,000V
Maximum Output Current	1,200A
Pulse Width	0.15 to 10.0ms
Output Pulse Frequency	0.1 to 10.0Hz
Dimensions	15.5 in. W x 10.5 in. H x 21 in. D
Weight	100lb.
Operating Temperature	0 to 35° C (32 to 95° F)
Capacitor Bank	27,000 µfd

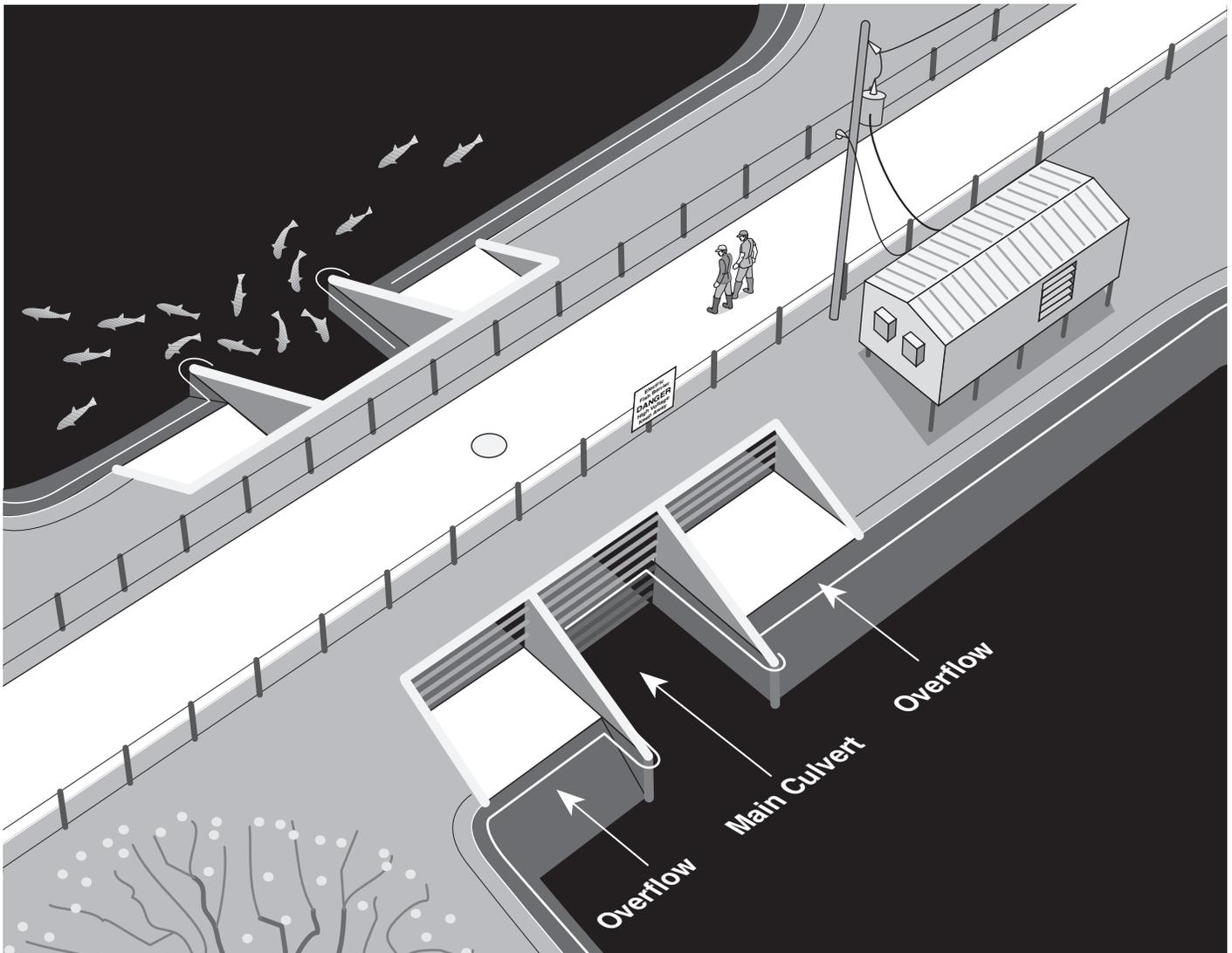
Specifications are subject to change without notice.

# CAST CULVERT BARRIER

For the control of fish in covered-over water channels, Smith-Root has developed the culvert barrier. This is a special culvert section with a cast-in-place electrode array. It is installed at the center of a culvert assembly, flanked by conventional culvert sections that make up the required length. The electrode array is powered by pulsators housed in the building nearby. Accidental human exposure to the electric field is prevented by fixed security gates at both ends of the culvert assembly. To ensure no fish ever pass through, a central fine-mesh drop gate swings down automatically in the event of a power failure.



18. Cast Culvert Barrier Cross Section



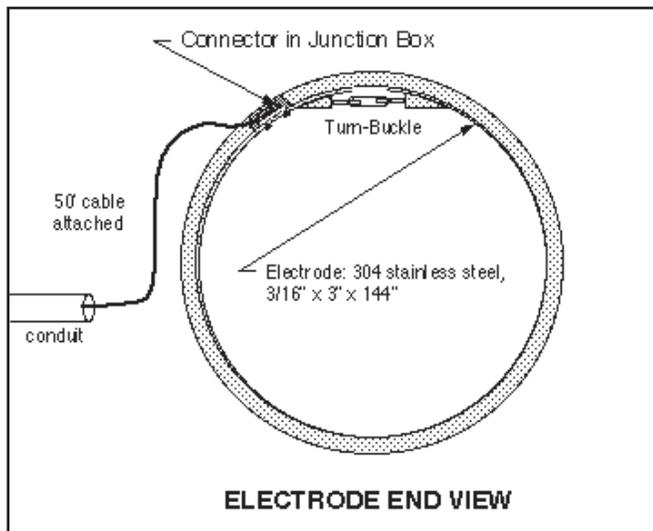
17. Culvert barrier

# PLASTIC CULVERT BARRIER

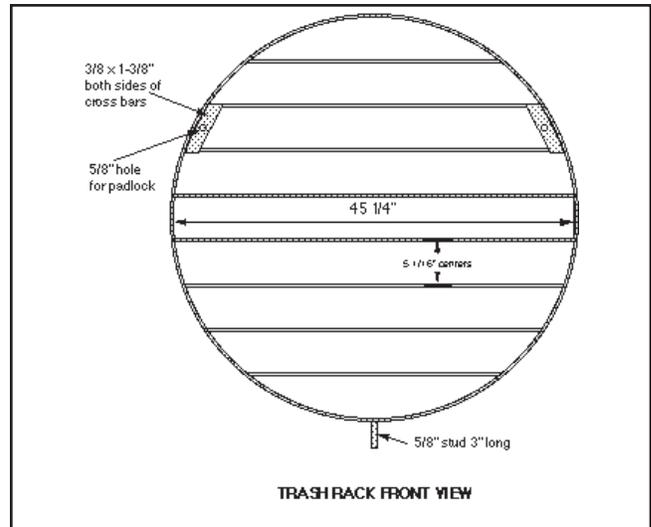
For the control of fish in covered-over water channels, Smith-Root has developed the plastic culvert barrier. The required length of Hi-Q pipe has an electrode array installed at its center. The electrode array is powered by pulsators housed in a building nearby. Accidental human exposure to the electric field is prevented by security gates at both ends of the culvert assembly.



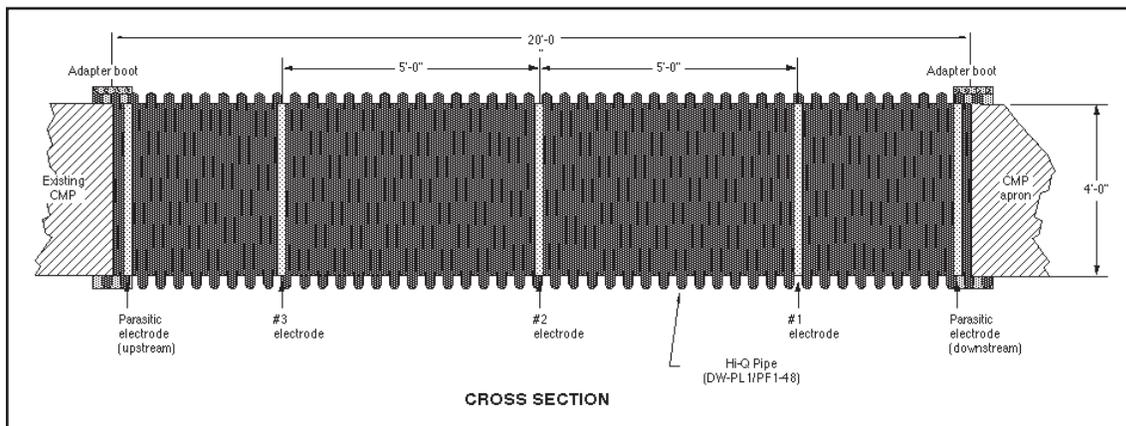
21. Plastic Culvert barrier



19. Three electrodes are placed in the optimum positions inside the culvert.



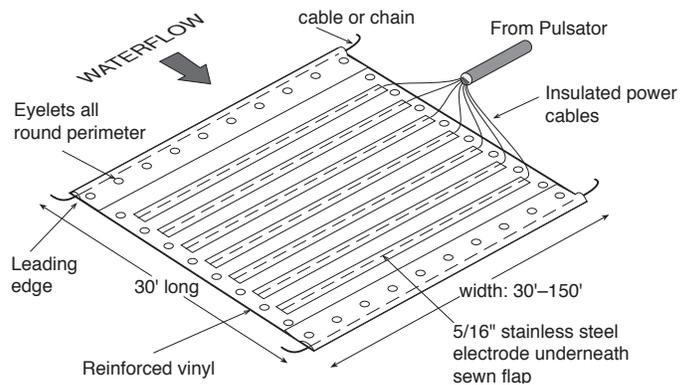
22. This trash-rack is fitted to both ends of culvert



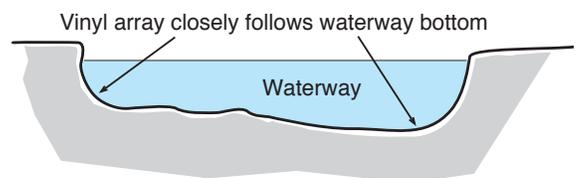
20. Plastic Culvert barrier longitudinal section

# PORTABLE ARRAY

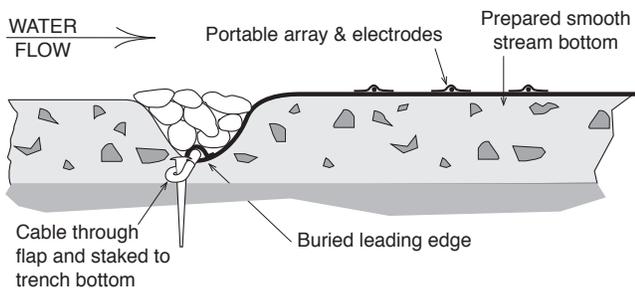
Shown below is the GFPA Portable Array. The array is used where a temporary barrier or guidance system is needed. They are often used for testing the feasibility of permanent array locations. The electrodes are stainless steel cables, held in place by sewn plastic netting. Each array is supplied with 50 feet of seven-conductor, #10 gauge, neoprene jacketed power cable. The array can accommodate irregular shapes as shown in Figure 24. Anchoring eyelets are provided along both sides. The standard length is 30 feet (parallel with the stream flow) which includes two 3-foot aprons for securing the leading and trailing edges. The leading edge has a sewn pocket to accommodate a cable or chain weight (not supplied). It is important to secure the leading edge in a way that prevents water from flowing under the vinyl. Whenever possible, it is best to secure the leading edge of the array.



23. Portable array construction.



24. Portable array cross section.



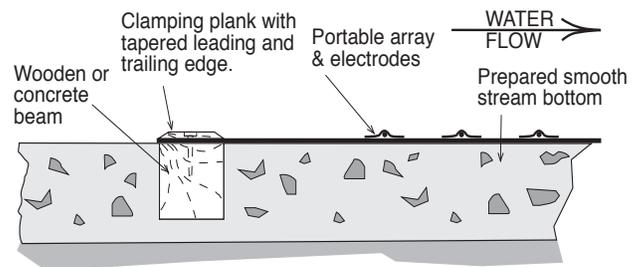
25. Buried leading edge example.

A typical portable array was installed at the confluence of the San Joaquin River and Merced River in central California.

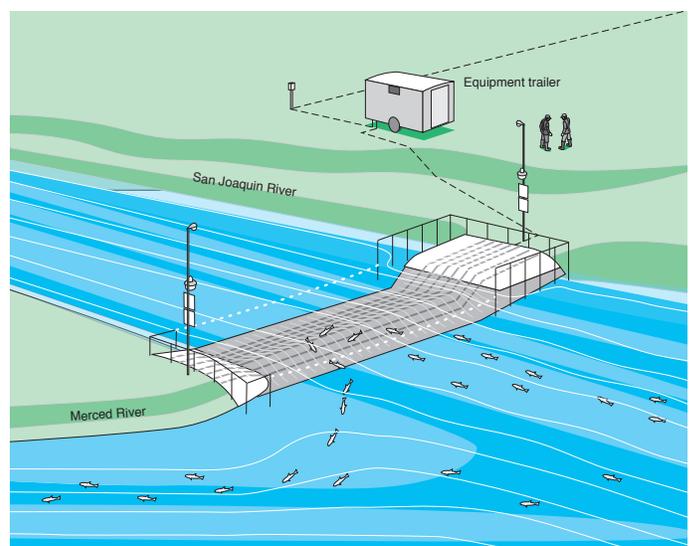
For many years adult salmon have migrated up the San Joaquin; however, due to intensive farming and slow moving water, the stream has become so polluted that salmon eggs are not able to hatch.

The Merced river, on the other hand, is a stream with much better water quality and higher velocities. Additionally, a fish hatchery is located a few miles upstream from the confluence.

This array prevents fish from swimming up the San Joaquin River, and the attraction flow from the Merced River guides them toward the cleaner stream.



26. Clamped leading edge example.



27. A typical application of a portable array.

# EQUIPMENT BUILDINGS

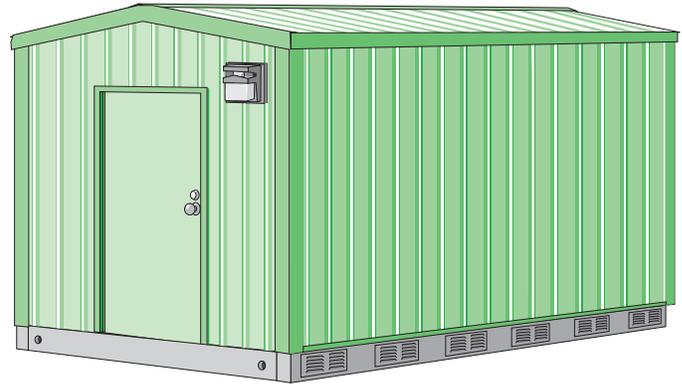
The buildings and trailers are designed to house a complete barrier system and assure efficient barrier control and monitoring. It will house up to ten P.O.W. pulsators, the transformer cooling system, and the FBTC monitoring system.

IEB buildings are 8 feet wide. The length is variable dependent on need. Removable sections facilitate installation servicing and venting of a backup generator as large as 100 kilovolt-amperes (kVA).

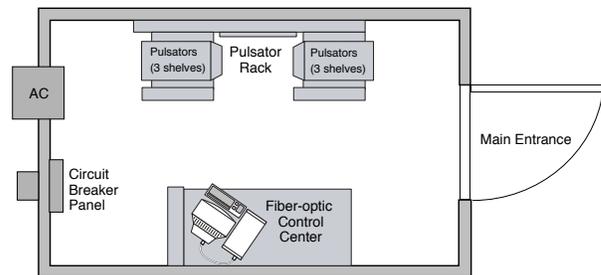
Installation requires a level site. Ideal for both temporary and permanent installations.

The buildings and trailers come pre-wired with all required connections. All interior electrical is surface-mounted to facilitate upgrades, with separate conduits for power and low voltage. Interior lighting is fluorescent.

To withstand very severe environmental conditions, buildings and trailers are well insulated. The built-in heater and air conditioner regulate temperature and optimize equipment operation.



**An Insulated Equipment Building.**



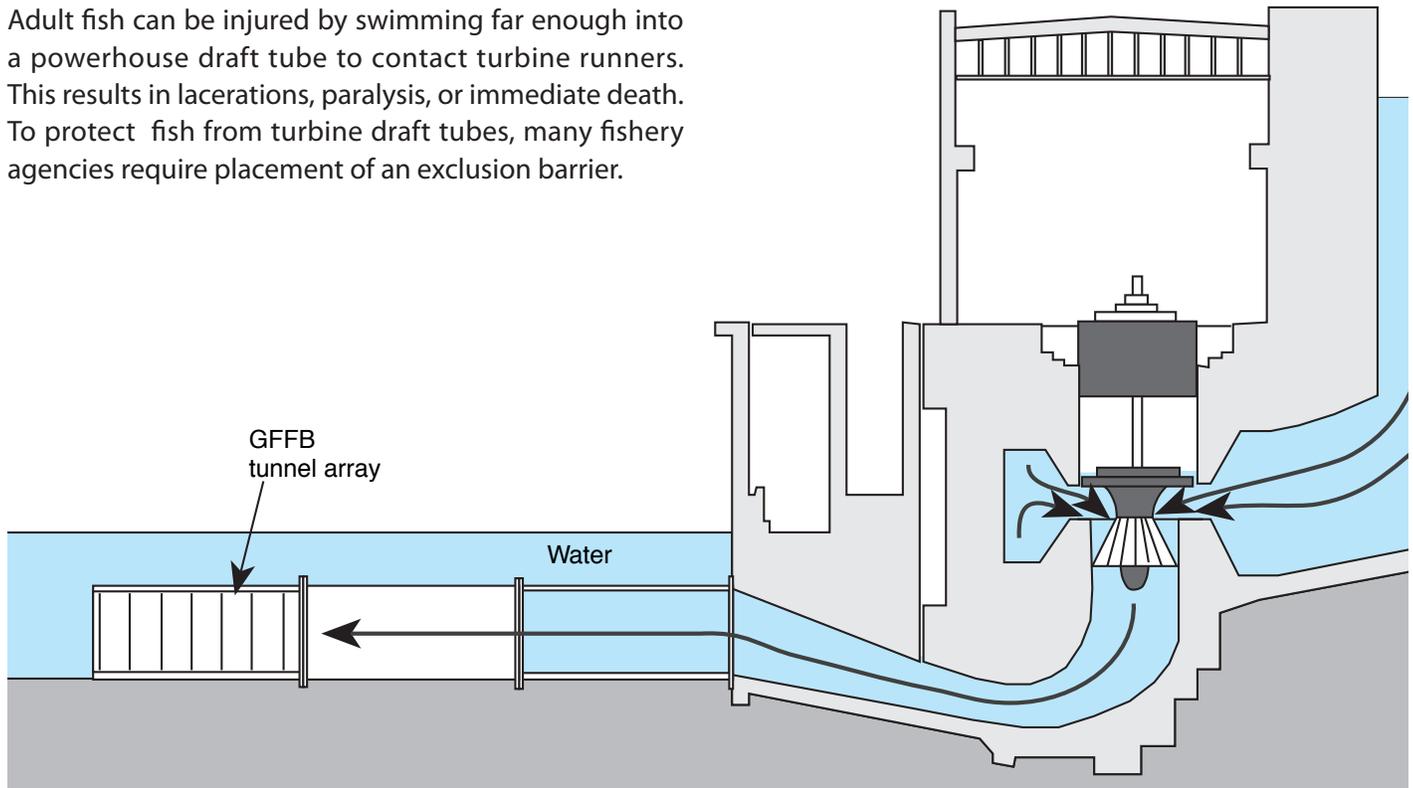
**A typical floor plan. This model is 8 feet wide x 20 feet long. A backup generator is optional.**



**A portable barrier equipment trailer.**

# TAILRACE BARRIER

Adult fish can be injured by swimming far enough into a powerhouse draft tube to contact turbine runners. This results in lacerations, paralysis, or immediate death. To protect fish from turbine draft tubes, many fishery agencies require placement of an exclusion barrier.



## 31. Tailrace Barrier Installation

Some turbine discharge tunnels allow fish to enter and hold. These fish may be exposed to potentially dangerous hydraulic conditions, even if velocities immediately downstream of turbine runners exceed the burst speeds of the fish to be protected. Often fish ascend draft tubes as turbines are being brought on-line or off-line, increasing the risk of contact with runners. At certain turbine loadings, jumping within tunnels may lead to debilitating injuries.

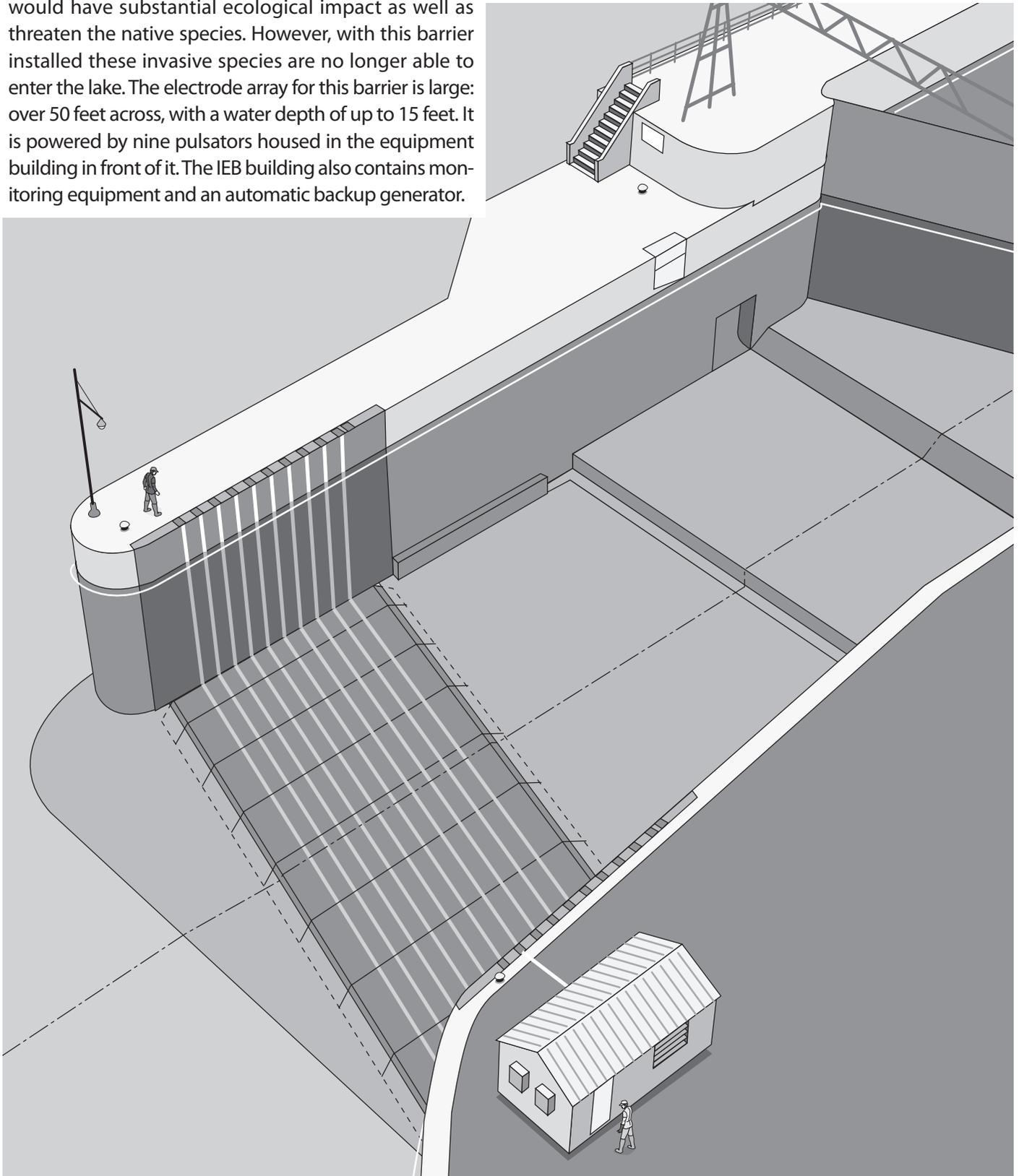
Since each site is unique, and relatively little is known, fishery agencies usually require adult exclusion devices to be fitted. The burden of proof is with the operator. A site-specific study, approved by the fishery agencies in advance, must show conclusively that all anadromous fish species present will be protected by the barrier.

The Smith-Root Tailrace Barrier is designed for efficiency. Flush mounted electrodes, which do not obstruct water flow, eliminate maintenance associated with debris. Back pressure is reduced with corresponding increased turbine efficiency. Draft tubes and out-falls provide ideal hydraulic conditions to position our electric field. Circular geometry and highly insulated electrodes provide an ideal electric field pattern. The turbine discharge provides high water velocity which very quickly sweeps stunned fish away.

Smith-Root Graduated Field Fish Barriers are an excellent method of keeping fish in the river channel where they will be attracted away by river-flows or fish ladders.

# CANAL BARRIER

The canal shown in the graphic below connects a river to a lake. Sea lampreys and alewives entering this lake would have substantial ecological impact as well as threaten the native species. However, with this barrier installed these invasive species are no longer able to enter the lake. The electrode array for this barrier is large: over 50 feet across, with a water depth of up to 15 feet. It is powered by nine pulsators housed in the equipment building in front of it. The IEB building also contains monitoring equipment and an automatic backup generator.



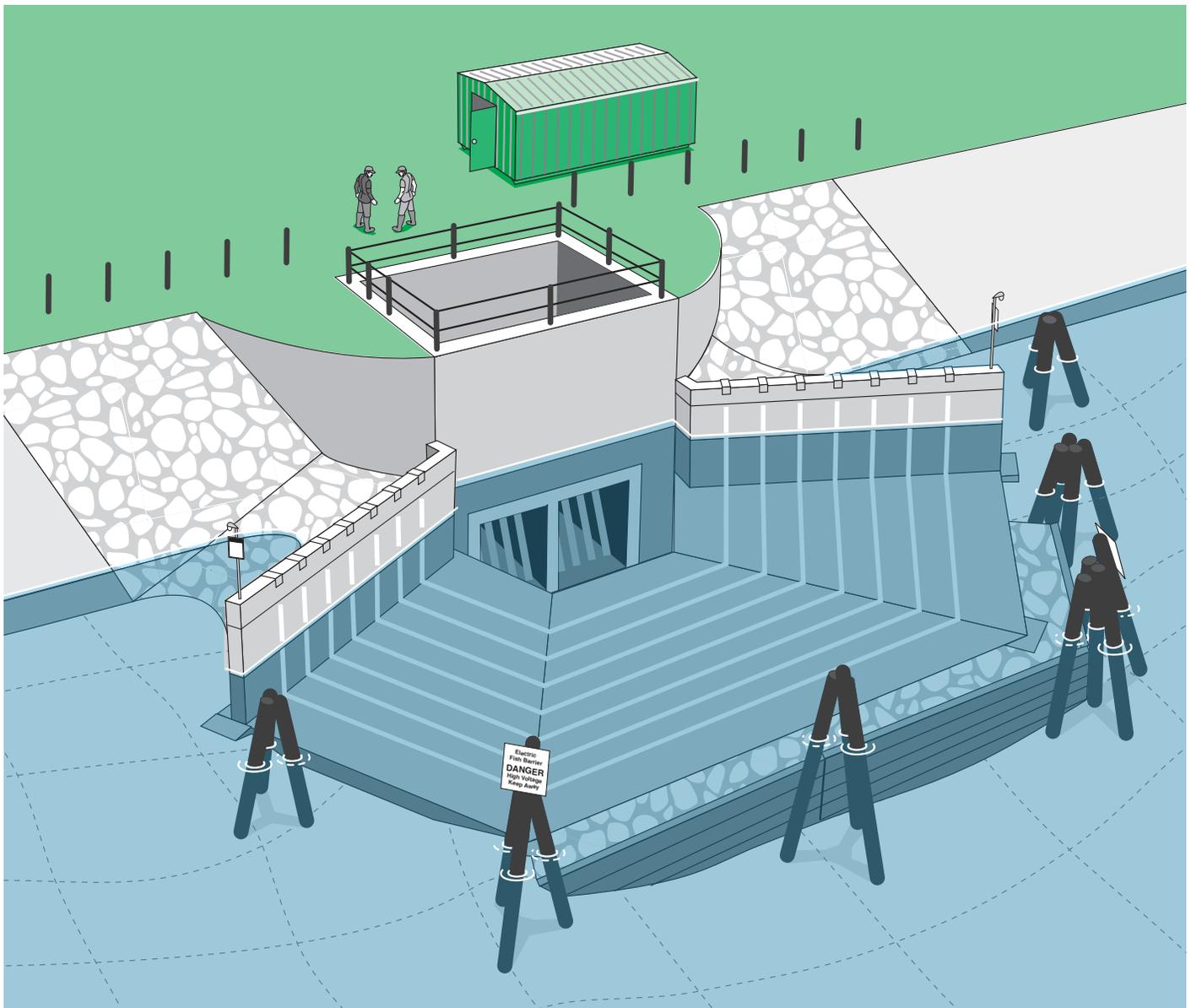
32. Canal Barrier

# INTAKE BARRIER

This fish barrier is designed to prevent fish being drawn into the cooling intake of a large steel mill. The old mechanical screens had to be cleaned regularly, and each cleaning required a costly plant shutdown. No cleaning is needed with the new Smith-Root electric fish barrier.

This barrier is powered by six pulsators housed in the IEB equipment building behind it. This building also contains FBTCS monitoring equipment.

In the river, pile-clusters are installed to protect the barrier from damage by passing ice-floes or ships.



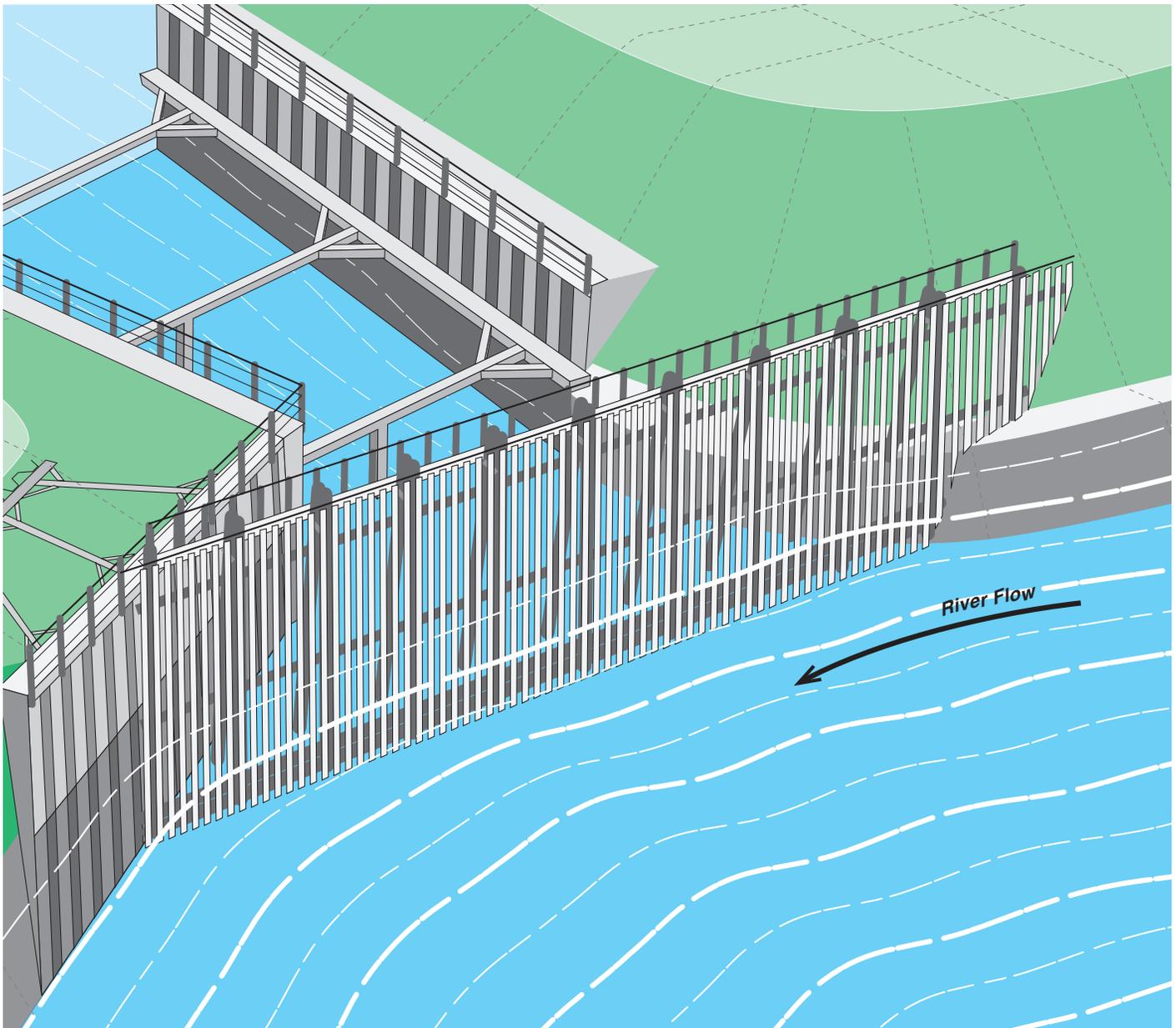
33. Pump intake barrier.

# LOUVERED INTAKE BARRIER

Our louvered barrier is designed for water intakes that have high-flows and big variations in water depth. Fish are thereby excluded from hydroelectric turbines or irrigation pumps.

Large increases in water depth do not reduce the effectiveness of this barrier because the electrodes are mounted vertically on the louvers.

High flows are made possible by spreading the flow over a large area. The electrodes are flush mounted to facilitate water flow between the louvers. (Patent Pending).



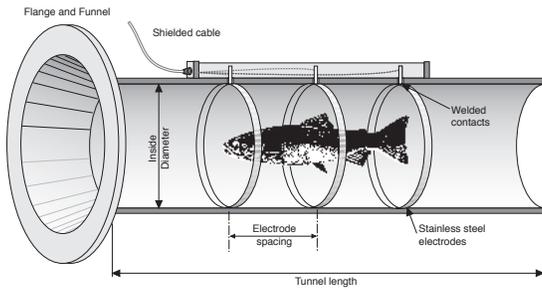
34. Louvered barrier for a large pump intake.



# AQUACULTURE



# FISH COUNTING SYSTEMS



**Organisms passing through a counting tunnel cause fluctuations in water conductivity that are tallied by an electronic counter. Banks of tunnels are used to count large quantities of fish. Small tunnels are used to count organisms as small as fish eggs, and large tunnels are used to count large fish. The tapered entrance prevents abrasive damage and tends to separate fish entering the tunnel.**

Smith-Root fish counting systems are used at hatcheries and major river systems throughout North America as well as many other locations around the world. Our many years of experience solving the complex variables involved in fish counting has enabled us to produce the most accurate and reliable fish counters available. Smith-Root fish counters include the following state-of-the-art features: auto-balance circuitry, stabilized amplification and detection systems; versatile power requirements using battery, AC or solar power operation, weather resistant cases, optional video recording and data logging equipment. Smith-Root fish counters give the versatility, accuracy and reliability needed by today's fisheries researcher.

For most fish counting operations our submerged counting tunnels, called potentiometric bridge tunnels, are used to sense the passage of fish and other aquatic animals. When fish or other aquatic animals pass through a potentiometric bridge, it causes fluctuations in water conductivity between the sensing elements. These fluctuations are amplified and tallied by an electronic counter. For out-of-water fish counting, photo-electric fish counting is utilized.

Two models of fish counters are available from Smith-Root:

### SR-1101 Fish Counter

The first type is the SR-1101 Fish Counter which utilizes a single counting tunnel with three electrodes, as shown in the illustration at left. The SR-1101 is a bidirectional counter which tallies both upstream and downstream fish passages. Learn more on page 42.

### SR-1601 Fish Counter

The second fish counter is the SR-1601 which is a passage fish counter able to count up to sixteen tunnels simultaneously. Using banks of small tunnels, SR-1601 is often used to count fish eggs, hatchery fry, migrating smolt, or emergent shrimp. Learn more on page 43.



Standard counting tunnel

## COUNTING TUNNELS

Counting tunnels can be used by both the SR-1101 and the SR-1601 Fish Counters. The SR-1101 counts with only one tunnel but is able to discriminate between upstream and downstream fish movements. Conversely, the SR-1601 counts up to sixteen tunnels but does not discriminate between upstream and downstream fish movements

### Standard Counting Tunnels

The standard SCT-1, 2, & 3 counting tunnels are 1", 2", and 3" diameter respectively. They all have a tapered entrance to prevent abrasive damage to fish. Counting tunnels are fabricated from PVC with stainless steel electrodes.

- SCT-1 Order Number .....00857
- SCT-2 Order Number .....03365
- SCT-3 Order Number .....03366

### Custom Counting Tunnels

Counting tunnels can be designed and custom made to accommodate fish of most any size. Counting tunnels are usually fabricated from PVC but can be made of transparent plastic upon special request.

# SR-1101 FISH COUNTER

The SR-1101 Fish Counter provides a state-of-the-art fish counting system. It is designed for counting operations requiring information about both upstream and downstream fish movements. The SR-1101 provides field reliability, simplicity of operation and ease of installation.

The SR-1101 uses a single counting tunnel with metal rings, flush-mounted, on the inner surface. The passage of fish through the counting tunnel causes water conductivity changes. Special logic in the SR-1101 allows it to discriminate between upstream and downstream fish passages. Two six-digit liquid crystal displays (LCD) tally completed fish passages. The displays are easy to read even in direct sunlight.

## Special Features

The SR-1101 employs an Auto-Balance system which compensates for changes in water conductivity, water temperature and marine growth. The Auto-Balance feature makes it possible to set it and forget it for unattended counting operations.

A wide-range Sensitivity Control determines the minimum size of fish that will be counted. Maximum sensitivity depends on the ratio of tunnel to fish dimensions. For best counting accuracy, tunnel diameter to fish length should not be more than one-to-one.

Output signals are provided which may be used to drive remote tally units, digital cameras or other devices. The system easily tallies five counts per second, giving 18,000 counts per hour.

## Water Conditions

The SR-1101 Fish Counter is designed to work in fresh water within a conductivity range of 20 to 500 microSiemens/cc. The submerged counting tunnel should be mounted in a location to produce a velocity through the tunnel sufficient to sweep through fishes desiring to rest within the tunnel, i.e., water velocity through the counting tunnel should be equal to, or greater than, the sustained swimming ability of the fish. With a correct tunnel-size to fish-size ratio, count accuracy is typically better than 95%.

## Power Requirements

The SR-1101 Fish Counter can be powered from either a 120 voltage alternating current (VAC) 60Hz source or from the optional 1101-RB internal rechargeable battery. The battery life varies from five to seven days, depending on water conductivity and tunnel size. A low-battery indicator will provide a warning several days before a battery change is required. When powered from 120VAC the battery is kept fully charged at all times. An internal stand-by battery is provided to preserve count data when the AC power is turned off or when the 1101-RB battery is being replaced.

## Construction

The SR-1101 Fish Counter features a rugged all-welded aluminum case. The case has a top cover with a see-through window which allows observation of count data while providing protection from rain and wet environment.

Order Number .....04953

SPECIFICATIONS	
Type Of Detection	Potentiometric bridge
Conductivity Range	20 to 500 microSiemens/cm <sup>3</sup>
Count Sensitivity	1% tunnel unbalance, minimum
Count Rate	5 per second
Count Capacity/Channel	999,999 six digit LCD
Counting Mode	Directional
Type Of Tunnel Required	Three element potentiometric
Auto Balance Range	5% tunnel unbalance
Tunnel Diameters	1 in. to 12 in. standard
Tunnel Length:Diameter	3:1 minimum
Smallest Fish Detected	Length equal to tunnel diameter
Data Output Signals	0 to 12V pulse for each count
Power Requirements	120VAC 60Hz or 12VDC
Battery Life	5 days minimum
Size	13.5in. W x 6.25 in. D x 6.75 in. H
Weight	4 lb. (17 lb. with battery)

Specifications are subject to change without notice.



The SR-1101 electronic fish counter keeps a separate tally of upstream and downstream movements.

## SR-1101 ACCESSORIES

### 1101-TS Tunnel Simulator

The 1101-TS simulates a dual potentiometric fish counting tunnel. Push-button switches cause an unbalance condition, simulating fish passage. A range switch provides 1% and 5% unbalance. This is very useful when setting up or trouble-shooting. The Tunnel Simulator operates on signals from the SR-1101 Fish Counter and requires no external power.

Order Number ..... 00940

### BC-1101 Battery Charger

The BC-1101 Battery Charger is designed to recharge fully the 1101-RB internal battery within four hours. It is powered from 120 VAC 60 Hz and can be left on continuously without damage to the battery.

Order Number ..... 06584

### 1101-RB Rechargeable Battery

Order Number ..... 03363

### 1101-EBA External Battery Adapter

This adapter's three foot cord with battery clips allows a battery of much larger capacity to power the SR-1101 for extended periods of time. External gell cell batteries and weatherproof cases are available up to 225 Amp-hour rating (8-D).

Order Number ..... 03364

# SR-1601 FISH COUNTER



**The SR-1601 electronic fish counter tallies up to sixteen channels at once.**

The SR-1601 Fish Counter is a 16-channel fish counter. This unit is designed for hatchery fry, migrating smolt, fish eggs, emergent shrimp, and other macro organisms. The SR-1601 simultaneously monitors all sixteen tunnels for fish movements, giving individual counts for each tunnel. In order to be counted, macro organisms pass through a counting tunnel and are tallied on a 16-digit display. The system easily tallies ten counts per second per channel, giving 576,000 counts per hour.

The SR-1601 uses multiple counting tunnels that are separate potentiometric bridges. The passage of fish or eggs through each tunnel causes corresponding water conductivity changes. With a proper tunnel-size to fish-size ratio, count accuracy is typically better than 98%. For best counting accuracy, tunnel diameters should not be more than one-half the length of the fish to be counted. These are counted by the SR-1601 and displayed on separate LCDs. Any number of tunnels from one to sixteen may be used at one time.

## Water Conditions

The SR-1601 is designed to work in fresh water within a conductivity range of 20 to 500 microSiemens/cc. The submerged counting tunnels are arranged to produce a velocity through the tunnels sufficient to overcome the fishes' swimming ability. The fish in the vicinity of the tunnel entrances are pulled through by the water flow. Water velocity should be equal to the burst swimming speed of the fish.

## Power Requirements

The SR-1601 can be powered from either a 120 voltage alternating current (VAC), 60 Hz power source, or from the optional internal rechargeable batteries. If the batteries are installed, the counter will continue to operate for up to four days when AC power is lost. If extended operation from battery power is necessary, an external battery connector is provided. A low-battery indicator is provided to give several hours advanced warning before a battery change is required. When the SR-1601 is powered from 120VAC, the battery is kept fully charged at all times. A secondary internal stand-by battery is provided to preserve count data on all channels when the AC power is turned off or when the internal battery is being replaced.

## Construction

The SR-1601 Fish Counter features a rugged all-welded painted aluminum case. The case is weather resistant and has a top cover with a see-through window which allows observation of count data while maintaining water resistance.

**Order Number .....04952**

**Optional Internal Battery (requires 2) .....04961**

SPECIFICATIONS	
Type Of Detection	Potentiometric bridge
Conductivity Range	20 to 500 microSiemens/cm <sup>3</sup>
Count Sensitivity	1% tunnel unbalance, minimum
Count Rate	10 per second/channel
Count Capacity/Channel	999,999 six digit LCD
Counting Mode	16 discrete channels
Tunnel Length:Diameter	3:1 minimum
Smallest Fish Detected	Length equal to tunnel diameter
Power Requirements	120VAC, 60Hz
Battery Life	4 days minimum
Size	21.5 in. W x 9.5 in. D x 9.2 in. H
Weight	16.5 lb. (35 lb. with battery)

Specifications are subject to change without notice.

## SR-1601 ACCESSORIES

### Tunnel Mounting Plate

Individual tunnels can be mounted as a group with the TMP-16 Tunnel Mounting Plate. The plate can hold from one to sixteen standard counting tunnels. Each Mounting Plate is custom designed to fit into your raceway or other mounting locations. Please specify desired number of tunnels, center-to-center spacing, and mounting plate dimensions when ordering.

**Order Number ..... 03359**

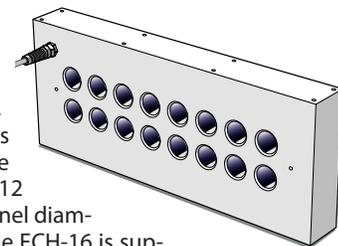
### 1601-EBA External Battery Adapter

The 1601-EBA consists of a 3-foot cord with battery clips at one end and a plug on the other end which attaches onto the fish counter external power connector. This allows a much larger external battery to power the SR-1601 Fish Counter for extended periods of time. External gell cell batteries and weatherproof cases are available up to 225 Amp-hour rating (8-D).

**Order Number ..... 04948**

### Fry Counting Head

The FCH-16 Fry Counting Head is a single unit containing sixteen small counting tunnels. The tunnels are arranged in two rows of eight, spaced according to tunnel size. Each tunnel has a smooth-tapered entrance to prevent abrasive damage to fish. The FCH-16 is 3 inch high by 12 inch wide for ¼ inch tunnels. Size varies with tunnel diameters which are available from 0.125" to 0.75". The FCH-16 is supplied with fifteen feet of cable and a connector for SR-1601 Counter.



**Order Number .....03357**

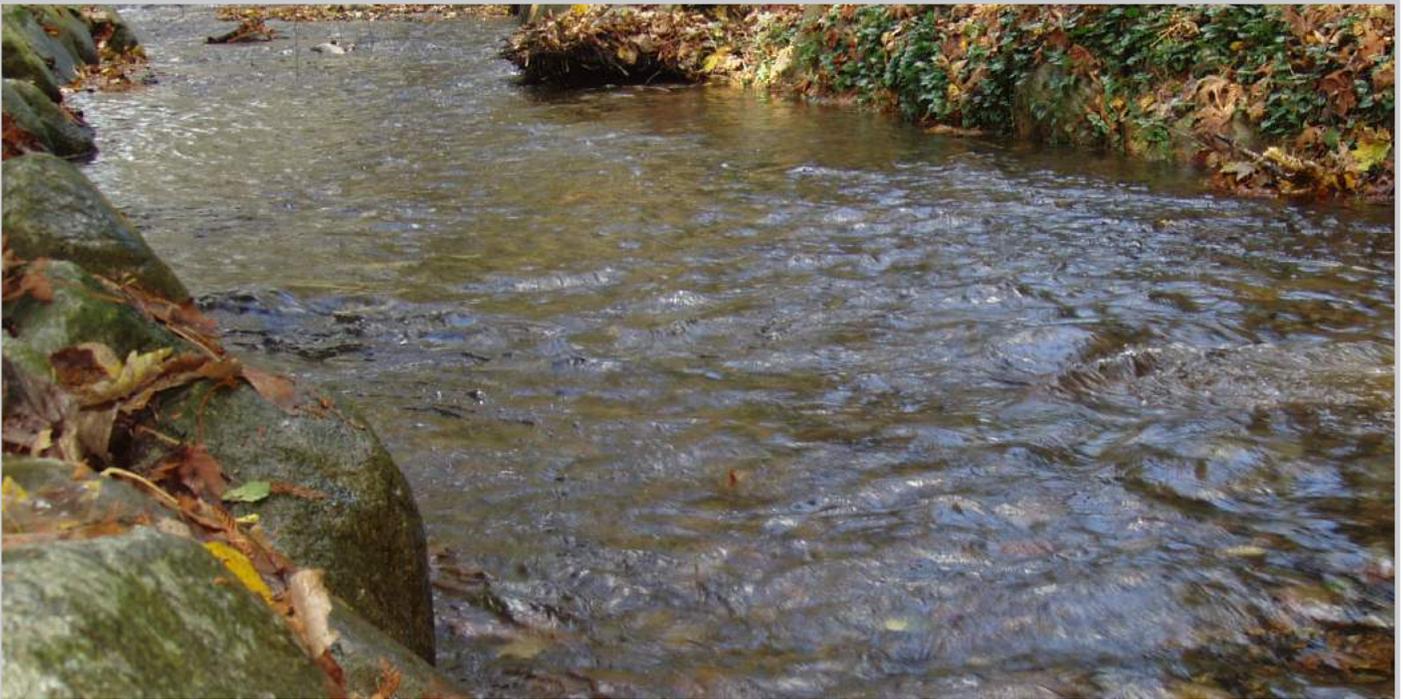
### Tunnel Junction Box

The tunnel junction box simplifies the process of adding or changing the configuration of fish tunnels connected to the 1601 fish counter. New tunnels may be added in the field by connecting to the terminal strips in the TJB-16, eliminating the necessity of soldered connections to the SR-1601 input connector.



**Order Number ..... 03360**





# **FIELD ACCESSORIES**



# LOKI DIP NETS AND HANDLES

Loki Dip Nets feature 100% nylon netting made in the USA under strict quality control conditions. The knotless netting reduces abrasion to the fish, is more durable and also absorbs preservative treatment better than knotted imitations. Netting is protected by Loki's Monorail mesh-guard system. Monorail prevents netting abrasion from livewells, rocks and sand. The net is encased in the bow, creating a natural guard and attractive appearance.

Dip net handles are reinforced fiberglass with foam grip. Available in fixed lengths or in telescoping models.

**Handles for all nets must be purchased separately. Contact our sales department to order replacement net bags.**

## DIP NETS



### Livewell Dip Net

Monorail aluminum hoop: 9 inches x 6 inches with 1/8 inch mesh Ace nylon net 4 inch deep with sewn in bottom-fitted to CB-1 connector using stainless steel screws, no handle  
**Order Number .....08309**

### Stream Dip Net

Monorail aluminum hoop: 11 inches wide x 15 inches long with 1/8 inch mesh Ace nylon net 8 inch deep with sewn in bottom-fitted to CB-1 connector using stainless steel screws, no handle  
**Order Number .....08317**

### Stream Dip Net

Monorail aluminum hoop: 16 inches x 16 inches with 1/8 inch mesh Ace nylon net 7 inches deep with sewn in bottom-fitted to CB-1 connector using stainless steel screws, no handle  
**Order Number .....08336**

### Boat Dip Net

5/8 inch aluminum hoop: 21-1/2 feet X 24 inches with 1/2inch mesh #189 nylon netting 24 inches deep. Made to fit CB-3 connector w/ bolts, no handle  
**Order Number .....08288**

### Trapezoid Dip Net

Monorail aluminum hoop. Front 4 inch wide back 14 inches wide x 17 inches long with 1/4 inch mesh 8 inches deep with sewn in bottom-fitted to CB-1 connector using stainless steel screws, no handle.  
**Order Number .....09396**



08317



08336



08288

## HANDLES

### 24 inch Livewell Dip Net Handle

Single piece 1 inch x 24 inch yellow fiberglass handle complete with the black 1 inch end cap, the black 5 inch foam grip, one hole and the one stainless steel spring. Made to fit CB-1 connector.  
**Order Number .....08360**



### 6 foot Telescoping Net Handle

Two piece telescoping yellow fiberglass handle complete with black 1 inch end cap, black, 1-1/4 inch OD x 5 inch foam grip, holes for stops at 4-1/2 feet, 5 feet, 6 feet and 7 feet. Made to fit CB-1 connector.  
**Order Number .....08344**

### 9 foot Telescoping Net Handle

Two piece telescoping yellow fiberglass handle complete with black 1-1/4 inch end cap, black 1 inch x 5 inch foam grip on 1 inch tubing, 1-hole for stops 5-1/2 feet and 9 feet. Made to fit CB-3 connector.  
**Order Number .....08301**





# HONDA GENERATORS

## EU1000I

This super quiet generator is extremely portable as well as fuel efficient. This easy starting generator produces only 59 decibel (dB) of sound at 7 meters running at full load, which is less than common speech. The Honda Inverter Technology makes this generator ideally suited for use with sensitive electronics (e.g., computer, printer, and other sensitive electronic equipment) because the generator produces a clean sine wave of energy that prevents surging. To prevent any possible damage to the unit, the Oil Alert will shut the unit off when the oil drops below a safe operating level. The unit also has a DC terminal for use when charging 12-volt automotive type batteries.

**Order Number** .....04356



## EU2000I

The EU2000i utilizes Honda's "state of the art" inverter technology to provide 2000 watts of lightweight, quiet and efficient power. This generator will run up to 15 hours on a single tank of gas when used with the Eco-Throttle feature. This easy starting generator produces only 59 decibel (dB) of sound at 7 meters with a full load. The Honda Inverter Technology makes this generator ideally suited for use with sensitive electronics because the generator produces a clean sine wave of energy that prevents surging. To prevent any possible damage to the unit, the Oil Alert will shut the unit off when the oil drops below a safe operating level. The unit also has a DC terminal for use when charging 12-volt automotive type batteries.

**Order Number** .....06537



## EU3000IS

The EU3000is maintains the impressive rating of 48 to 58 decibel (less than that of common speech even at rated load), and it will run for up to 20 hours on a single tank of gas when used with the Eco-Throttle feature. This impressive generator provides 3000 watts of power and weighs only 134 lb. The Honda Inverter Technology makes this generator ideally suited for use with sensitive electronics (e.g., computer, fax, printer, telephone, stereo) because the generator produces a clean sine wave of energy that results in no surging. To prevent any possible damage to the unit, the Oil Alert will shut the unit off when the oil drops below a safe operating level.

**Order Number** .....06293



Model	Engine	Displacement	AC Output	DC Output	Starting System	Fuel Capacity	Run Time per Tankful	Dimensions (LxWxH)	Noise Level	Dry Weight
EU1000I	1.8 HP overhead valve	50cc	120V 1000W max. (8.3A) 900W rated (7.5A)	12V, 96W (8A)	Recoil	0.6 gal.	3.8 hrs. @ rated load, 8.3 hrs. @ 1/4 load	17.7 in. x 9.4 in. x 15 in.	59 dB @ rated load, 53 dB @ 1/4 load	29 lb.
EU2000I	3.5 HP overhead cam	98.5cc	120V 2000W max. (16.7A) 1600W rated (13.3A)	12V, 96W (8A)	Recoil	1.1 gal.	4 hrs. @ rated load, 15 hrs. @ 1/4 load	20.1 in. x 11.4 in. x 16.7 in.	59 db @ rated load, 53 dB @ 1/4 load	46.3 lb.
EU3000IS	6.5 HP overhead valve	196cc	120V 3000W max. (25A) 2800W rated (23.3A)	12V, 144W (12A)	Recoil, electric	3.4 gal.	7.2 hrs @ rated load, 20 hrs @ 1/4 load	25.8 in. x 18.9 in. x 22.4 in.	58 dB @ rated load, 49 dB @ 1/4 load	134 lb.

We are a full line Honda authorized dealer. If you need a generator that is not listed please call.

**HONDA**  
**Power**  
**Equipment**



**EB3000**

This compact and lightweight (68.4 lb.) generator provides 3000 watts of commercial power due to Honda's Cyclo Converter Technology. This generator comes standard with a G.F.C.I. receptacle, DC charging, fuel gauge and oil alert. It is also both EPA and CARB compliant.

**Order Number** .....06292



**EM3800S**

This generator comes standard with a 2-wheel kit for easy transport. It also has the option of electric start for further convenience. Thanks to the Honda OHV commercial grade engine, this generator can produce a maximum of 3800 watts of power and features automatic voltage regulator, auto idle, automatic choke and fuel cut solenoid for operation with the optional remote start kit. In addition this generator has a full frame for protection and 120/240 volt operation.

The voltage selection switch allows for total generator output to be available through each of the 120 volt outlet for powering electric motors with large starting requirements (Output is limited to the rating of each receptacle).

**Order Number** .....04494



**EM5000S**

This generator comes standard with a wheel kit for easy use. It also has the option of electric start for further convenience. Thanks to the Honda OHV commercial grade engine, this generator can produce a maximum of 5000 watts of power and features automatic voltage regulator, auto idle, automatic choke and fuel cut solenoid for operation with the optional remote start kit. In addition, this generator has an full frame for protection and 120/240 (V) operation.

The voltage selection switch allows for total generator output to be available through each of the 120 volt outlet for powering electric motors with large starting requirements (Output is limited to the rating of each receptacle).

**Order Number** .....04732

Model	Engine	Displacement	AC Output	DC Output	Starting System	Fuel Capacity	Run Time per Tankful	Dimensions (LxWxH)	Noise Level	Dry Weight
EB3000	6.5 HP overhead valve	196cc	120V 3000W max. (25.0A) 2600W rated (21.7A)	N/A	Recoil	2.7 gal.	6 hrs. @ rated load, 9.39 hrs. @ 1/2 load	17.3 in. x 15.7 in. x 18.9 in.	68 dB @ rated load	68.4 lb.
EM3800S	8 HP overhead valve	242cc	120/240V 3800W max. (31.6/15.8A) 3300W rated (27.5/13.7A)	12V, 100W (8.3A)	Recoil, Electric	6.6 gal.	10.4 hrs. @ rated load, 15.6 hrs. @ 1/2 load	41.9 in. x 27.2 in. x 29.2 in.	71 dB @ rated load	192 lb.
EM5000S	11 HP overhead valve	337cc	120/240V 5000W max. (41.7/20.8A) 4500W rated (37.5/18.8A)	12V, 100W (8.3A)	Recoil, Electric	4.5 gal.	5.7 hrs. @ rated load, 8.5 hrs. @ 1/2 load	41.9 in. x 27.2 in. x 29.2 in.	72 dB @ rated load	193 lb.

We are a full line Honda authorized dealer. If you need a generator that is not listed please call.

# WARNING SIGNS



## INTERNATIONAL DANGER SIGN

This weatherproof sign is vinyl on .080 inch aluminum plate. Background color is white with red and black lettering. 12 x 18 inches.

Order Number..... 07823



## ELECTROFISHING DANGER SIGN

This adhesive, flexible & weatherproof sign is made to be put on boats, buoys and other non-porous surfaces. Size approx. 10.5 x 12.5 inches.

Order Number..... 04042

# ELECTRICAL INSULATING GLOVES

## ELECTRICIAN'S GLOVES

Our insulating gloves are made from the highest quality natural gum rubber available and manufactured with the best rubber-to-filler mixtures in the industry. Especially contoured to fit the hand, all gloves are flexible, comfortable to wear and will not cramp or fatigue the muscles of the hand. Two-toned construction aids in detection of cuts, abrasions and other damage.



Salisbury rubber insulating gloves have earned the reputation for superior performance - meeting and exceeding the requirements for current ASTM D120 specifications. Our gloves are tested following ASTM D120/IEC903 specifications.

5 kilovolt (kV) gloves are Class 0 (1kV rated, tested to 5kV). 10kV gloves are Class 1 (7.5kV rated, tested to 10kV).

5kV Sizes: 9, 9.5, 10, 10.5, 11, 11.5, 12

10kV Sizes: 8, 9, 9.5, 10, 10.5, 11, 11.5, 12

Colors: Vary



Measure the circumference around the palm

### Sizing Guide

Hold tape in center of palm measure around back of hand (excluding thumb), the measurement in inches is your glove size.

### 5kV Gloves

Order Number.....03131

### 10kV Gloves

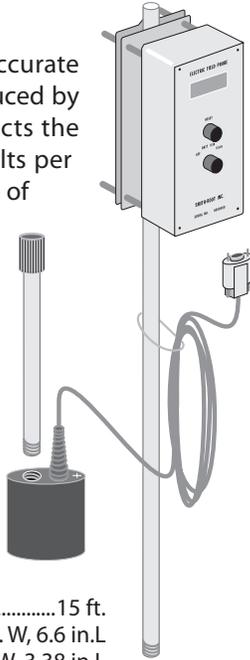
Order Number.....03106

# ELECTRIC FIELD PROBE

The EFP-2 Electric Field Probe allows fast, easy, accurate measurements of the electric fields in water produced by electrofishers. A front panel function switch selects the units of measurement, either volts per inch or volts per centimeter. The readings drop with time at a rate of approximately 1 millivolt per second. Pressing the reset switch clears the old reading and prepares the unit to make a new reading. The probe is polarity-sensitive. It will measure only positive fields. If a negative field needs to be measured, simply turn the probe 180 degrees.

- Field strength.....5V/in. or 1.97V/cm max. measurable
- Frequency.....13kHz max.
- Pulse width.....75 microseconds max.
- Reading decay.....rate <1 millivolt per second
- Accuracy.....+/- 5%
- Display.....3-digit 0.5" high LCD
- Battery/Battery life.....9V alkaline/10 hours continuous
- Cable length.....15 ft.
- Size display box.....2.25 in. H, 3.2 in. W, 6.6 in.L
- Size probe head.....3.2 in. H, 1.38 in. W, 3.38 in.L
- Weight: display box/probe head.....9 oz. /1 lb.

Order Number..... 04443



**Notes:**



GLOBAL SALES AND SERVICE

SMITH-ROOT, INC.  
14014 NE Salmon Creek Ave.  
Vancouver, WA 98686 USA  
360.573.0202 Voice  
360.573.2064 FAX  
<http://www.smith-root.com>  
[info@smith-root.com](mailto:info@smith-root.com)

AUTHORIZED RESELLERS:

Hoskin - Vancouver 3735  
Myrtle Street Burnaby, BC  
V5C 4E7  
P: (604) 872-7894

Hoskin - Oakville Unit  
5-3280 South Service Rd, W  
Oakville, ON L6L 0B1  
P: (905) 333-5510

Hoskin - Montreal  
300 Rue Stinson  
St-Laurent, QC H4N 2E7 P:  
(514) 735-5267

[www.hoskin.ca](http://www.hoskin.ca)



[WWW.SMITH-ROOT.COM](http://WWW.SMITH-ROOT.COM)

