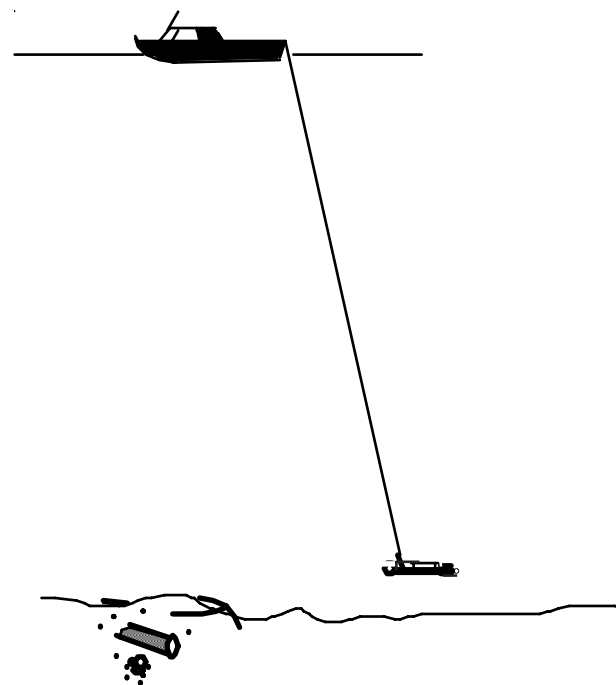


PULSE 12

BOAT TOWED PULSE DETECTOR

OPERATION MANUAL



JW FISHERS MFG INC
1953 COUNTY ST.
E. TAUNTON, MA 02718 USA

(508) 822-7330; (800) 822-4744; FAX (508) 880-8949
Email: info@jwfishers.com WEB: www.jwfishers.com

SPECIFICATIONS

SENSITIVITY (see page 3 for details):

Sensitivity (in water): Sample Pulse Delay	Fresh	Salt	
	0	0	5
• Piece of eight	17 in	9 in. ...	4 in.
• 25 lb. lead ingot	40 in	32 in. .	31 in.
• One gallon can	6 ft	4 ft.	4 ft.
• Automobile	13 ft	12 ft. ..	12 ft.
• Ship (max. range)	16 ft	14 ft. ..	14 ft.

PERFORMANCE/DESCRIPTION:

- Detection area 14 ft deep, 21 ft wide
- Tow speed 1-6 mph
- Input voltage 24 vdc
- Power consumption 7 w
- Readout Meter and Audio

DIMENSIONS/WEIGHT:

- Coil 24"Wx36"L 10 lbs
- Fish 4' Lx6"Dia 20 lbs
- Control Box 13"Lx13"Wx6"H 5 lbs
- Cable75"Dx150'/300' 30/60 lbs
- Shipping Boxes -fish 53"Lx15"Dx13"H 50 lbs
- coil,cable,CB 28"Wx10"Dx41"L 75 lbs

MATERIALS/COLOR:

- Fish High impact PVC, stainless/yellow
- Control Box High impact Pelican case, PVC/black
- Cable 8 conductor in polypropylene/yellow
- Coil High impact PVC, epoxy/black

OPTIONS

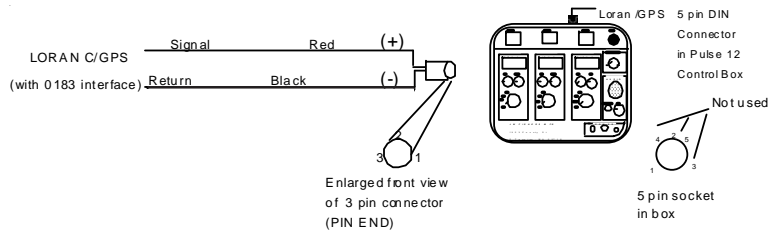
- Additional Search Coils • RS232 computer interface
- 300 ft cable
- Altimeter

LIMITED WARRANTY

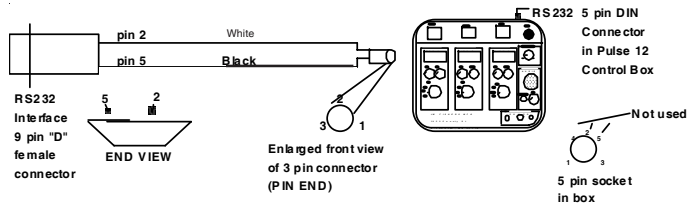
Your unit underwent constant inspection during assembly to insure many years of trouble free performance. The PULSE 12 is warranted for TWO FULL YEARS from the date of purchase. During this period, your unit will be repaired free of charge should a failure occur due to materials or workmanship. The Warranty does not cover broken cables or coils, or damage due to droppage or general misuse.

Should service be required, write/phone us explaining the nature of the problem, and we will supply shipping instructions. All repairs are made at our factory. Repairs by unauthorized persons may void the Warranty.

LORAN C / GPS WIRING



RS232 WIRING

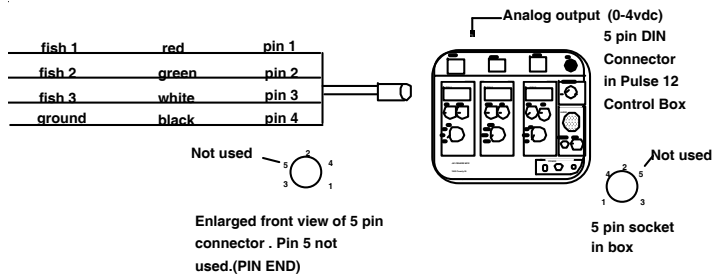


ANALOG OUTPUT OPTION

The analog output option allows the Pulse 12 to be connected to an external device such as a strip chart recorder or data logger. The analog output consist of 3 channels (one for each towfish) who's output is 0 to +4.00vdc. The voltage is a representation of the detection signal strength.

The analog output uses 4 wires and is wired to a 5 pin DIN connector on the Pulse 12 as Follows:

ANALOG OUTPUT WIRING

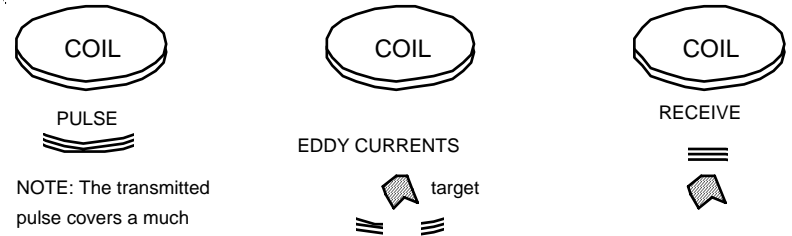


INTRODUCTION

The PULSE 12 is a boat-towed pulse induction metal detector. Though it was primarily designed to locate large metal objects, it will detect small targets though not at great distances. Pulse detectors have been around since the mid 1970's and have had a major impact on the search and salvage business. Their major claim to fame is that they are very sensitive and do not generally detect minerals (extreme concentrations of iron ore may give a modest reading). This lack to mineral detection is an answered prayer for salt water divers who have to contend with heavy mineralized deposits on the ocean floor which produce large false readings on conventional detectors. Pulse detectors, with small and medium size coils, ignore these mineral deposits and respond only to metal targets (ferrous and non-ferrous metal). The Pulse 12, with its very large coil, has a Sample Pulse Delay Knob which enables the operator to "tune out" most minerals. Pulse detectors work well on land and in fresh or salt water.

HOW PULSE DETECTORS WORK

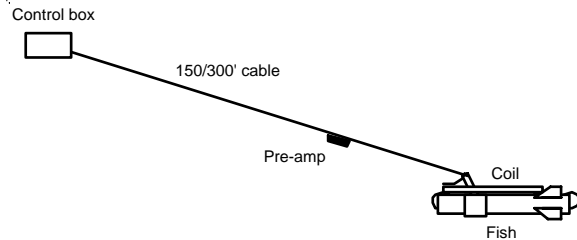
Pulse detectors operate by transmitting a continuous stream of high energy magnetic pulses (one hundred per second), from the Coil. After each pulse is transmitted, the unit then "listens" using the Coil as the receiving antenna.



When a transmitted pulse hits a metal object, a magnetic field is induced in the object. This causes eddy currents to flow in the metal, which in turn generates a second magnetic field. This field is picked up by the Coil, amplified, and then displayed by the meter and heard in the speaker/earphone.

PULSE 12 DESCRIPTION

The PULSE 12 is a boat-towed pulse detector consisting of an 24" by 36" Coil, a towable Fish (removable for land use), a Pre-amp, a 150/300' Cable, and a Control Box. The Control Box can support one, two, or three Fish; all being towed at the same time. If you purchased a single Fish, you can add additional Fish at any time.



For underwater use, the Coil is mounted on the Fish and is towed at any depth down to 150/300 ft. The Fish sails through the water at a depth determined by the speed of the boat and the amount of cable let out. The dynamics of the Fish is that it tows very flat and directly below the boat (see Figure 3a). As more cable is let out, or the speed of the boat increases, the Fish tows further behind the boat. An increase in boat speed results in reduced fish depth. If towing in deep water, a downrigger (25# of lead) can be added to the line to insure maximum depth for the Fish (see Figure 8b).

For pinpointing, or for very small search areas, the coil can be disconnected from the fish and suspended over the side of the boat. A simple three point harness, made out of rope, insures that the coil remains flat (see Figure 3b).

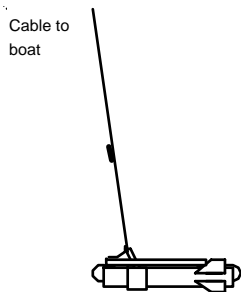


Figure 3a

2

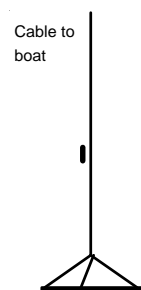


Figure 3b

If only one towfish is being used, the readings for Fish 2 and Fish 3 will be approximately 150mv.

If a GPS or Loran C is not being used, or if the GPS or Loran C message is not being properly received by the Pulse 12 the message will be as follows:

@ NO POSITION AVAILABLE, Fish 1=,3270,Fish 2=,1650,
Fish 3=,350<cr><lf>

When using the Pulse 12 with a Loran C or GPS receiver the following connection and power-up sequence must be followed for proper operation.

1. Cable up entire system including GPS/Loran C to Pulse 12, Pulse 12 to the computer (RS232 interface), and Pulse 12 towfish to Pulse 12 control box. Also connect all components to their proper power sources.
2. Power-up GPS/Loran C and obtain current position fix.
3. Power-up computer.
4. Power-up Pulse 12
5. Initiate data collection program on computer.

If the Pulse 12 is powered up before the GPS has obtained the current position or the GPS interface cable is disconnected, the RS232 interface will default to the "No Position Available" message s shown above.

If the GPS/Loran C loses its position fix during operation, the Pulse 12 will default to the "No Position Available" message".

If either of these conditions occur correct the fault (re-initialize the GPS, check connections, check battery condition). Once the GPS/ Loran C is again functioning properly, power down the Pulse 12, wait five seconds and power up the Pulse 12. The position information should now be present.

BATTERY SELECTION

The PULSE 12 draws approximately .3 amp at 24v. Two car type batteries will last several days of continuous use. For good portability, two motorcycle type batteries can be used, with a minimum of 8 hours between charges. Battery status can be checked at any time by pressing the Batt Ck switch upward and observing the Fish 1 meter for a reading of .7 to 1.

MAINTENANCE

Please write/phone the factory at (508) 822-7330 if any problems.

RS232 /GPS/ANALOG OPTION

With the RS232 option the Pulse 12 can be connected to any computer or data recorder equipped with an RS232 input. The specification of the interface is as follows: 8 bit, 4800 baud rate, 1 stop bit, and no parity bit.

The GPS/Loran C interface allows the ships position information to be input into the Pulse 12. The Pulse 12 then reformats the information, combines it with the signal strength readings from the towfish, and sends it to an external computer via the RS232 interface.

Any GPS or Loran C receiver equipped with a NMEA 0183 output can be used with the Pulse 12. If you are not sure if your receiver has NMEA 0183 output, check its manual or call the manufacturer. You may find that you have to tell your GPS receiver to send out the 0183 information (refer to your GPS manual). If given a choice, select 0183A or 0183C format. Both versions include the latitude/longitude message format called GLL. The Pulse 12 can also receive the message format called GGA, if the message GLL is not available. The Pulse 12 automatically checks for the presence of either message on power-up.

The sample message sent on the RS232 interface is as follows:

```
@Position,4151.745353,N,07102.394576,W,
Fish 1=,3270,Fish 2=,1650,Fish 3=,350<cr><lf>
```

Where the position is the latitude and longitude coordinates from the GPS or Loran C receiver and "Fish 1", "Fish 2", and "Fish 3" are the detection signal strengths expressed from 0 to 5,000 millivolts (0 to 5.000 volts). The complete message is repeated once per second.

PULSE 12 SENSITIVITY

The sensitivity of the Pulse 12 is switch selectable and is dependent on whether it is operating in fresh or salt water. If operating in fresh water (or on land) you can expect detection ranges as indicated under **Fresh** in the chart below. When operating in salt water, you can expect detection ranges as indicated under **Salt** in the chart below. When operating in salt water, a second switch **Sample Pulse Delay** is used to "adjust out" the salt water impact on the large Pulse 12 coil. The Sample Pulse Delay setting does impact the detection range on smaller targets, but has little impact on larger targets. You can expect these detection ranges whether the target is buried under mud, coral, sand, or rocks.

Sensitivity (in water):	Fresh	Salt
	Sample Pulse Delay 0	0 5
• Piece of eight	17 in	9 in. ... 4 in.
• 25 lb. lead ingot	40 in	32 in. . 31 in.
• One gallon can	6 ft	4 ft. 4 ft.
• Automobile	13 ft	12 ft. .. 12 ft.
• Ship (max. range)	16 ft	14 ft. .. 14 ft.

PULSE 12 DETECTION ENVELOPE

The detection envelope for the PULSE 12 is very large - much larger than the coil width/length. Figures 4a,b shows the fresh and salt water detection envelopes for a one gallon can and for the maximum detection envelope (a very large object). Though it is not shown, the envelopes exist above the coil as well as below.

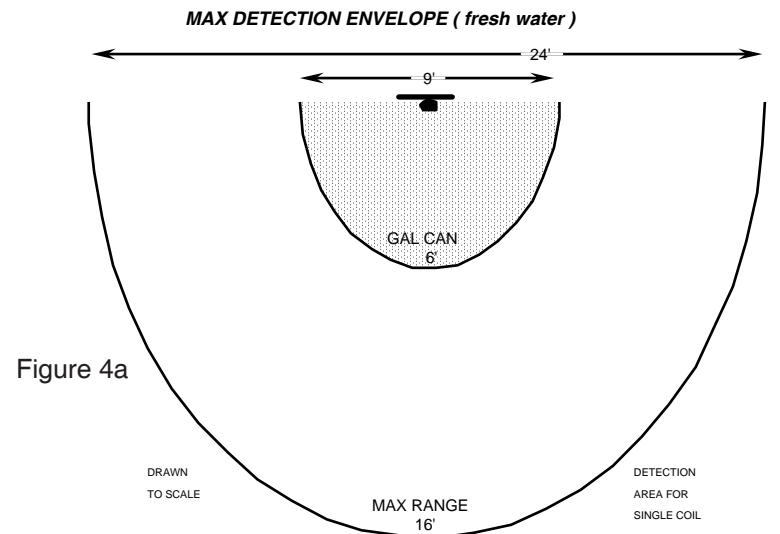


Figure 4a

The salt water detection envelope is somewhat smaller than the fresh water detection envelope. This was necessary to reduce the impact (meter movement) of salt water on such a large search coil.

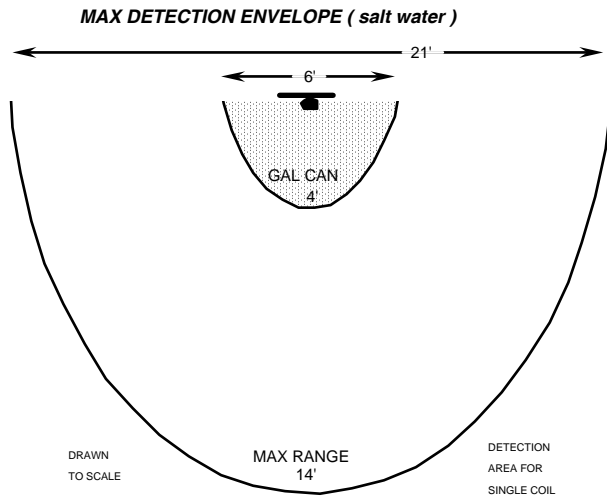


Figure 4b

PULSE 12 ASSEMBLY (coil and fish)

Note: All hardware must be of stainless steel. Stainless is not detectable by almost all kinds of metal detectors.

1. The Tow Arm is bolted to the Fish using two 1/4 - 20x1" stainless steel bolts, washers, and nuts. Tighten securely, be sure lock washers are under nuts and tow arm points forward.
2. The Coil mounts to the Fish with four 2" ID X 1/8" O-ring. Be sure to mount Coil so that the cable is close to the Tow Arm (front of fish). Stretch the O-rings over the coil and hook them around the head of the screws protruding out of the front and rear of the coil supports.
3. Connect the Tow Cable/ rope to the shackle at the top of the Tow Arm.

Altimeters attach to the bottom of a Fish and measure the distance to the bottom. If you did not purchase the Altimeter, then the tow rope should be marked every five ft and used in conjunction with your boat depth finder to control Fish depth.

Shallow water (2 to 6 ft) searching is accomplished by tying a float to the fish (see Figure 8a) so that it can be towed behind the boat without the Fish running into the bottom.

Deepwater searches (over 75 ft) require a downrigger (see Figure 8b) to insure maximum depth of the Fish. The downrigger can be of any weight - a 25 pound ingot of lead does a good job at low speed (2-4 MPH). The faster or deeper you tow, the heavier the weight must be for the Fish to stay directly below the boat to enable accurate depth control.

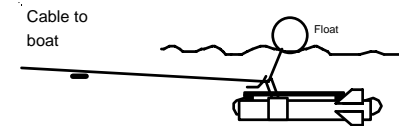
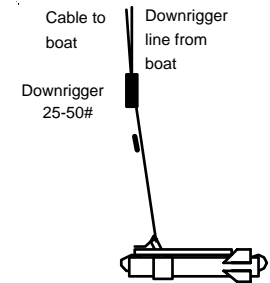


Figure 8a



If your target is small (small anchor, motor, etc.), a slow tow speed is recommended. If the target passes too quickly below the Coil, you may get a weak reading on the meter. Experiment by passing a one gallon can past the Coil while on land. It is recommended that you use a 1/4" rope between the boat and the downrigger. The downrigger should be connected to the boat on its own line, so not to put excessive strain on the Cable. The cable is taped, or wire wrap tied, to the rope every foot or so. When towing more than one Fish, a separate downrigger is used for each Fish.

When towing in a highly mineralized area, it will be necessary to operate in the Salt mode, with the Sample Pulse Delay at four or five. In this position the effect of minerals is held to a minimum. This control effects sensitivity for smaller objects - see chart on page 3. If the control is not set high enough in mineralized areas, then the meter will move around more than necessary. The meter movement is caused by the constantly changing distance between the bottom and the coil as it is being towed close to the bottom.

- Turn the Selection Switch for all unused Fish to the Off position.
- Push the Batt. Ck. momentary toggle switch upward, and note that the Fish 1 meter reads .7 to 1 which indicates Batts are ok.
- Set the Sample Pulse Delay knob to 0 for fresh water, or to 4 for salt water use.
- Turn the Selection Switch for Fish 1 to Cal. and adjust the Cal. Adjust knob until meter reads approximately .3.
- Turn the Selection Switch for Fish 1 to Salt or Fresh position (depending where you will be using the detector).
- Adjust the Zero Adjust knob for a meter reading of approximately .1. The actual needle position is not important as long as it is above zero. Some meter movement, especially while towing, can be expected.
- Fish 1 is ready to go. Periodic adjustment of the Zero Adjust knob may be necessary. Each time you turn on the Control Box, the Cal should be rechecked for a reading of approximately .3. The above procedure is repeated for each Fish.
- Before proceeding to connect up the remaining Fish (if you have them), run some tests with a metal target (gal can is fine) to get the feel of the Pulse 12. There is no need to move the coil, simply move the target around, above or below the Coil.

DETECTING METAL

As metal passes near the Coil, the needle swings up. At about a .2 meter reading the audio sounds off and increases in pitch (frequency) as the needle swings higher. Maximum meter swings occur when the target is directly below the center of the Coil. As you go past the target, the needle returns to zero and the audio stops.

TOWING

The Fish tows flat and directly below the boat. When searching in water 6 to 75 ft deep this works quite well. The objective is to get the coil as close to the bottom as possible so the target will not be missed. The ideal tool to do this with is an Altimeter.

- If you have purchased the optional Altimeter, bolt it to the bottom of the Fish. See the UA-2 operation manual for it's connection and use.

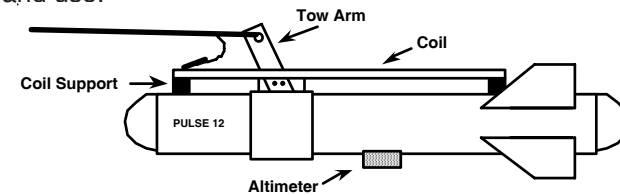


Figure 5

PULSE 12 CONTROL BOX

The heart of the system is the Control Box (see Figure 6) which contains all controls and indicators for the system. The Control Box can handle up to three Fish. The Fish are interchangeable and can be plugged into any Fish connector on the control Box. Each Fish has its own controls (Selection switch, Zero Adjust knob, and Cal knob), and meter which indicates a target has been detected by that Fish.

Control Box

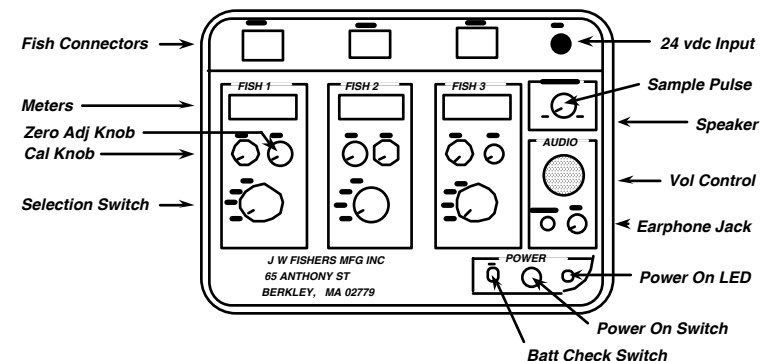


Figure 6

- 24 vdc Input Connect this cable to 24 vdc (see Figure 7). Supplies power to the complete system.
- Power On Switch Turns power on to the complete system.
- Power On LED Lights when power has been turned on.

- **Batt Check Switch** When depressed upward, displays condition of batts on meter number 3. If batts are ok, meter will indicate .7 to 1.
- **Fish Connectors** One, two, or three Fish cables can plug into the Control Box. Power should be off when plugging in cables. When the Fish is plugged into a Connector, it is controlled by the controls directly below that connector.
- **Meters** Each Fish has its own meter. When a metal target is detected, the meter swings up. At a given distance, a small target will produce a smaller swing on the meter than a large target.
- **Selection Switch** A four position switch which selects the mode of operation for each Fish.

OFF - When in this mode the Fish and all controls have no effect on the system. All unused Fish connectors must have Selection switch in the Off position.

CAL - When a Fish is plugged into a connector it must be calibrated before being used.

SALT - This position is used for searching in salt water.

FRESH - This position is used for searching on land or in fresh water. This position gives the search coil the maximum sensitivity available.
- **Cal Knob** When the Selection switch is in Cal position this knob is used to adjust the meter to approx .3 on the scale. The Fish is now calibrated and ready for searching in the Salt or Fresh position.

- **Zero Adjust Knob** When the Selection switch is in Search mode, the Zero Adjust is used to set the meter to approx .1 on the scale. The Fish is now ready for searching.
- **Sample Pulse Delay** Used to reduce the effect (meter movement) of highly mineralized salt water bottoms. Set to zero for land and fresh water, four or five for salt water. Effects sensitivity for small targets - see chart on page 3.
- **Speaker** When a target is detected by any Coil, the meter swings up from the .1 position. As it goes past .2 the speaker sounds off. The higher the meter goes, the higher the pitch (frequency) out of the speaker.
- **Vol Control** Adjusts the volume out of the speaker.
- **Earphone Jack** Accepts a standard 1/4" earphone plug (stereo or mono). Speaker output stops when earphones are plugged in.

OPERATION/CHECKOUT

- Position the coil outside and 5-6' away from any metal.
- Plug the cable from the coil into the Fish 1 connector on the control box.
- Connect the power cord to 24 vdc (two 12v car/motorcycle batteries in series) and observe polarity.

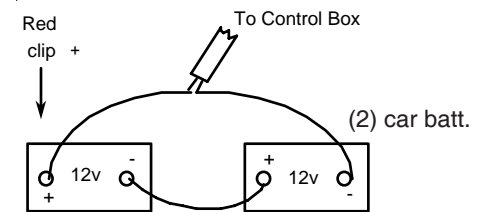


Figure 7

- Turn the Power Switch on and note that the LED is illuminated.