

FAQs, Tipps and Hints for Scooter Pilots

<http://www.farallonusa.com/tips.html>

- Part 1 - Diver Propulsion Vehicles
- Part 2 - Equipment Considerations
- Part 3 - Riding Hints & Equipment Configuration Tips
- Part 4 - Boat Diving with a DPV

Diver Propulsion Vehicles

Along with recent technological advances in scuba, came a growing interest in underwater transportation. This has brought several companies into a rapidly expanding market that was previously only for military and commercial divers.

There are basically two types of underwater transportation systems for recreational and technical divers - The Diver Propulsion Vehicle (DPV) and the underwater Scooter. The difference between a DPV and a Scooter is simple: a DPV is a vehicle with an integral saddle that a diver physically rides. A scooter is a unit that tows the diver along by the arms. As a general rule, Scooters tend to have smaller battery capacity than DPVs. For the purposes of this article, 'DPV' will refer to both systems except where distinctions need to be made.

DPVs have been available in various configurations for nearly three decades, but until recently, were used primarily by military and commercial divers. More DPVs have entered the market in the last ten years than ever before, and interest among recreational and technical divers continues to grow. Education on the subject of DPVs is increasing dramatically. Several agencies now offer specialty certification. This article answers some of the most frequently asked questions (FAQs) about DPVs.

What are the advantages of diving with a DPV?

A DPV allows for extended diving horizons. Trying to fin three to five miles on a dive is not practical to the average diver; however, with a DPV the average diver can cover this distance on a single dive. Because a diver usually uses less energy, it may be possible to conserve breathing gas and thus, extend the time of the dive (always adhering to safe diving practices and prescribed bottom times). The DPV allows the diver to cover more territory and see more of the underwater world with increased comfort and maneuverability.

Some divers use the DPV to get down to a specific sight, such as a wreck, where they tie off the DPV, continue their dive and pick up the DPV for the ride back to their origination point. Some wrecks are large with open spaces that can safely accommodate a diver riding a DPV. For the wreck diver, range and comfort are very important. Thus, a DPV with a long range and a saddle for comfort is very desirable.

How deep can a diver go on a DPV?

One of the factors determining the DPVs depth rating is the type of material used to produce the unit. Materials used in the manufacturing of a DPVs hull or body range from plastic and fiberglass to different grades of aluminum. The thickness of the hull along with the type of material is important in determining the depth rating for a DPV.

For example, Farallon DPVs are made from aluminum and have been safely operated below 400 feet of sea water. Other light weight plastic vehicles may be rated to 100 to 150 feet.

How is a DPV powered?

Generally, DPVs are powered by two to four, 12 volt batteries. Depending upon the configuration, they are wired in series or series parallel. The batteries used today are rechargeable sealed lead acid which have increased the overall safety of DPVs. Silver zinc batteries are available and can increase range by as much as a factor of five, but at a cost increase of considerably more than a factor of five.

How are the batteries recharged?

Battery manufacturers prefer their batteries to be charged to a specific criteria. The charge cycles maximizing the useful life of the battery will only be obtained by adhering to specific charge and discharge parameters. The chargers used will charge a battery pack in 6 hours (less if discharge is not 100%). Most manufacturers of DPVs provide a specific battery charger for their unit.

What are the sizes and weights of DPVs?

The smaller scooters average 30 inches in length while the largest DPVs measure 60 inches and beyond. DPVs range in weight from approximately 35 pounds to over 100 pounds.

How is speed controlled on a DPV?

Units of any description must have a motor enable switch or a 'dead man switch' which, when released, stops power to the motor thereby preventing powered movement of the DPV without a rider. Some of today's units have only an On/Off device which, when in the ON mode, puts the DPV at full speed. Other units incorporate a variable pitch propeller. The propeller can be set to as many as nine different positions at the discretion of the operator. The speed of the vehicle will vary related to the propeller pitch setting. In the larger units, a variable speed control is available which may vary in form from a somewhat simple 'volume control' to the sophisticated digital electronic fingertip control found on the Farallon DPVs.

What are the speed and range capabilities of current DPVs?

Zero to three plus mph appears to be the standard speed range offered by most manufacturers, but be aware that the diver's physical size, equipment configuration, environmental conditions, the state of the charge remaining in the battery and the propeller pitch affect individual results. Range capability varies by model but will generally run from 1 to 5 miles.

What do DPVs cost?

Most of today's diver propulsion vehicles range from approximately \$1000 to \$7000 depending upon how elaborate a system you choose and what options are selected.

What should I look for when purchasing a DPV?

You must first look at your particular needs and wants. This will determine the features and functions needed in your DPV. There are however, some basic questions that should be asked by anyone interested in purchasing a DPV.

- What is the range, speed and depth of the unit?
- Is it reliable and rugged?
- What is the warranty?
- Are spare parts readily available?
- Is it easy to use?
- Are the controls accessible and logical?
- Does it pull me along by the arms or can I ride the unit? -Which is more comfortable or less tiring?
- How do I steer it?
- Is it easy to charge the battery?
- How long does it take to charge the battery?
- Do I need a spare battery?
- Is there an indicator to tell me how much battery is left?
- How heavy is the DPV Does it stop if I let go?
- Will it sink or go to the surface if I let go?
- Where do I find information on DPVs?

The best place to start is the World Wide Web. Nearly every manufacturer has a website. Most dive retailers, charter boat operators and many resort operators are familiar with DPVs and scooters. They can usually steer you in the right direction to get information or they can get information for you.

Where can I receive DPV Training?

The first place to look for DPV training is your local dive shop. Many certifying agencies offer DPV specialties. If the shop does not offer a specialty class for this discipline, call the agency from which you received your certification. Most certification agencies have a list of instructors that are certified and qualified in DPV operation and training.

What about DPV safety?

Using a DPV allows you to go faster and further but, like all diving, it requires you to be a responsible diver. Remember, the DPV itself has received no Scuba training. The operator of the DPV, on the other hand, is the certified diver; the DPV is simply the mode of transportation. Safe diving rules apply with or without a DPV or Scooter; don't break the rules. Diving on the conservative side is always best and will assure the diver of a lifetime of pleasure.

Owning vs. Renting

There are thousands of divers who want the thrill of riding a DPV. Although dive operators have been a little slow to get the message, more and more of them are offering DPVs for rent. In many cases, divers can choose to go on a guided dive using a DPV right from the shore. Of course, those divers who are fortunate enough to get to dive frequently have discovered the usefulness and fun of owning a DPV. If you want to take a ride on a DPV, ask your operator if he/she rents them. If your dive operator doesn't have DPVs for rent, tell them they're missing out on a great opportunity.

The author, Peter Vickers, is a former military diver with the Royal Navy. He has extensive experience in the commercial, technical (full cave certified), and recreational diving industries. Peter is a Master Instructor for PADI, has owned a dive retail store for ten years, and currently is President of a scuba equipment manufacturing company.

Equipment Considerations

We are, as responsible divers, accustomed to conducting a pre-dive safety check of own and our buddy's scuba equipment. Preparing a Diver Propulsion Vehicle (DPV) for a dive is an additional step in the pre-dive safety check process. Finding out during the dive that the unit is flooded or that the battery was not properly charged is a problem related to what I like to refer to as 'check neglect'. We have all seen the diver who throws down a piece of equipment, enraged by its inability to function correctly, only to find out it has never been serviced or maintained.

The loss or impairment of a DPV or scooter due to neglect can be a high price to pay for not reading the instructions and following them. It is imperative that the specifications provided in the manufacturer's guidelines for operating and maintaining a Diver Propulsion Vehicle or a Scooter be strictly followed. So, read the instructions first!!!

There are a number of generic pre-dive tasks that should be conducted on your vehicle regardless of what type of vehicle is being used. There are also a number of specific checks that will relate only to certain models of propulsion vehicles or scooters.

The battery is the 'power supply' for your vehicle. Most of the batteries currently used in DPVs and Scooters are 12 Volt, which can be linked as multiple batteries depending upon the supply voltage required for the vehicle you are using. The battery should be properly stored, kept clean, inspected regularly and charged fully after each use. The batteries used today are sealed lead acid cells which are a lot more manageable than the previously used wet cells used on early models of DPV's. By not dealing with liquid acid, the possibility of acid burns or equipment damage resulting from spills has been eliminated.

CAUTION: All batteries under certain conditions will emit hydrogen gas including 'sealed cells'. It was initially thought that the use of sealed batteries would eliminate the need for a 'catalyst;' however, in certain conditions (i.e. during charging), even sealed batteries will emit a minimal amount of gas. Hydrogen gas is volatile and, under some conditions, can cause an explosion. The 'catalyst' which looks like a small hockey puck or a spinning top, will absorb the hydrogen gas and reduce it to water, eliminating the dangers associated with battery 'off-gassing'. A DPV operator should never smoke or have an open flame in the vicinity of a battery being charged.

The battery terminals should be kept clean to prevent oxidation, which creates a higher resistance at the terminal and a bad connection. An operator should ensure that the battery terminals are connected properly and that the battery itself is secure in the housing. Batteries should be fully charged after each use and stored in a warm dry place. Batteries should NEVER be charged in a confined or unventilated space, (i.e. inside the DPV or Scooter) unless specifically advised to do so by the vehicle manufacturer.

Some manufacturers provide a battery charger with the DPV. If one is not provided, be sure that the battery charger you purchase corresponds with the charging requirements specified by the manufacturer.

A disadvantage associated with many battery chargers is the time it takes to charge the battery - normally 4 hours to charge to 90% capacity and 24 hours to charge to 100%. You may want to consider buying multiple battery packs or live with the fact that you can only do one dive with your vehicle per 24 hours. Look for a battery charger to be available soon that will have the capacity to charge two 24 volt battery packs in six hours.

A simple little article requiring a huge amount of attention is the 'O' ring. An 'O' ring looks like a black rubber band and is generally used to seal two surfaces in strategic places to

maintain the water tight integrity of the vehicle. 'O' rings require constant but simple care: they need to be cleaned, smeared lightly with silicone grease, and should not be stretched. Always carry a spare!!! Remember - 'Murphy is a Diver.'

'O' rings come in many materials, Buna 'O' rings being one of the most popular for DPV's and Scooters. The grooves that the 'O' rings sit in should be kept free of all debris. They should be inspected and cleaned every time the vehicle is opened. Sand and grit particles tend to find a way to infiltrate the 'O' ring seat and, over time, can cause a defective 'O' ring and/or a leak. When inspecting 'O' rings check very carefully for small burrs or cuts. Discard any 'O' rings at the first sign of degradation in quality and do not keep it for a 'spare.' When assembling your vehicle for a dive, check that the 'O' ring is correctly seated and has not been pinched during the assembly process. CAUTION: Use only the 'O' ring specified by the manufacturer - off size substitutes could cause a leak.

Always check the body of the vehicle after each use. Running into or deflecting off of objects during operation may result in more than a tiny bump. Though the density of water acts as a shock absorber to a diver, it may not protect the DPV. Check the body latches for function and be sure that the safety latch prevents any accidental unlatching of the body clip when it is in the secured position. Scrutinize the body for cracks, scrapes or dings. Check the security of the propeller and the function of the variable pitch if that is a feature of the propeller. Inspect the area between the propeller and the body to ensure nothing is wrapped around any visible part of the propeller shaft.

The propeller area should always be thoroughly rinsed with fresh water after a dive to ensure no grit, mud or sand remains in that area. Inspect the mechanical function of all user on/off devices and any other user controls. Check the security of the saddle and/or the towing harness if applicable. Check the integrity of the propeller guard if it is an integral part of the vehicle or check the security of the propeller guard if it is removable. You are advised not to ride a vehicle without a propeller guard in place.

Following the appropriate assembly instructions as written in the user manual supplied by the manufacturer, conduct all the pre-operational dive checks. It is strongly advised to perform a 'bubble check' first. If you find that the unit is not water tight, other operational checks become meaningless. If the unit is secure (i.e. 'no bubbles'), check that all indicators are giving you correct information and that the controls are properly conducting their functions.

When conducting a rotational check of the propeller, do so quickly in that shaft seals can be damaged by continuous rotation in a 'dry' environment. A quick spin should indicate function, and a visual check of direction of rotation can be made. The motors are direct current (DC), meaning that reverse connections will cause the propeller to turn in the wrong direction. Most manufacturers already know that 'Murphy' is a diver and the configuration of the battery connections should be very obvious. It is often impossible to connect the battery if it is installed incorrectly.

Do not attempt repairs to your DPV - leave it to the experts. Your local dive store can advise you where to find service. Voiding warranties or installing other than the correct parts can be an expensive exercise.

Riding Hints and Equipment Configuration Tips

If you are purchasing a Diver Propulsion Vehicle (DPV) or Scooter for the first time and do not have any experience with these vehicles, it is imperative to seek professional training in this discipline. Visit your local dive store for information and training. Initial training should be

conducted in a confined water environment. Learning to ride a vehicle is a scuba skill that needs to be perfected prior to use in open water.

Riding a DPV for the first time is like taking that first breath underwater - it is exciting and addictive. You will discover that the ability to cover large areas of a diving environment during a single tank dive is an awesome experience. At the end of the dive you will feel relaxed, comfortable, and not experience the fatigue normally associated with long, exploratory dives. It is the only way to go.

What you wear and how you wear it is an important consideration for DPV or Scooter diving. Being streamlined is something you should have been taught in basic open water courses. If this is something you have ignored until now, change your habits. Loose and dangling equipment are no no's for riding a vehicle. There are a multitude of clips and fasteners available at your local dive store to properly secure your equipment. The primary concern is to prevent damage to equipment, free flows from your regulators, and maintain the availability of the equipment for monitoring or use. All hoses except for your primary regulator should be secured properly to your BCD and in such a manner as they are still readily available for any function they may have to perform.

The BCD should fit properly and snug to the diver to preclude ballooning and drag as a result of water flow between the diver and the BCD. Proper weighting will eliminate the need for an abundance of air in the BCD to create neutral buoyancy - an inflated BCD creates significant drag and increases air consumption.

Wear your snorkel away from the side of your face or it will become bothersome when you turn your head. At higher speeds be careful not to look up too quickly - your mask could be removed involuntarily by the increased water flow.

Carry a small lift bag (streamlined of course) in that your chances of finding treasures increases greatly because of the vast area you are covering with the use of a vehicle. In the unlikely event that you flood your vehicle, the lift bag will provide proper support for recovering it. This is a better alternative to jeopardizing your own personal buoyancy.

The riding position on a DPV is very much like a motorcycle, the higher you sit the more drag you create. The more drag you create, the more battery you use. The more battery you use, the shorter your run time will be. Riding trimmed down (smaller target - less drag) at a medium speed will give you the best of comfort and duration. You can enjoy hours of run time over several dives by watching trim and speed.

Loose clothing of any description should never be worn. Water flow through the propeller guard is significant and creates an 'octopus effect' with loose clothing or soft items that can be sucked through the small openings in the propeller guard. If you are diving without a wet suit, wear a bathing suit that is form fitting rather than loose - you will be glad you did.

Do not be tempted to distribute your personal weights onto the DPV rather than wearing them on your body. If you become separated from the DPV, you have jeopardized your ability to achieve neutral buoyancy due to a lack of a weight system.

A properly secured BCD cumberband and/or waist buckle is important. The increase in water flow created by your increase in speed can lift the buckles and/or Velcro fasteners on both a BCD and a weight belt. This can be solved easily for buckles by adding a rubber band loop to secure the loose end of the webbing or by rotating the buckle off the centerline of your body.

Steering a DPV is accomplished mainly by positioning your fins for direction and rocking the DPV for small depth changes for descent and ascent. You will find that even the larger

units are extremely maneuverable. The standard rates for ascent and descent while using a vehicle are the same as those used when diving without one. Remember, on the descent we are also having to equalize and at the same time control the vehicle. Sometimes it is easier to make a standard descent without the use of the vehicle, then at our planned depth continue on with the vehicle. Ascents are preferably made with the vehicle inoperative, which allows you to concentrate 100% on your ascent rather than having to deal with controlling a vehicle and ascending at the same time.

Riding a Scooter takes a great deal more effort and affords you far less flexibility than riding a DPV. Some experts ride the Scooters with the unit oriented on its side with one hand, a skill that requires practice and training. The best performance from a Scooter is achieved with the unit held down below the body and positioning the body parallel with and above the Scooter. The down side to this is that the arms tire very quickly. Scooters that have the propeller housed below the battery compartment may alleviate this problem.

Because of the increased area that can be covered with the use of a vehicle, dive planning should include the observance of an air rule that would allow you to swim back, towing the vehicle if necessary, from the most distant point of the dive. Basic protocol dictates that you begin your dive into the current with or without a vehicle. This is of particular importance should you be placed in a situation requiring you to tow the vehicle. Towing into a current is not only fatiguing, but potentially dangerous.

If you and your buddy are using two different vehicles, be aware that not all vehicles have the same performance characteristics. If you are planning a dive with a buddy that has a slower vehicle, plan to run no faster than the slower machine. If you have two similar machines, and one diver of the buddy pair is much larger than the other, adjust the speed and/or pitch settings accordingly. Being a good Buddy, period, is still important.

Your conduct while operating a DPV is very important. Do not engage in and stay away from 'stunt divers' - clowns performing circus acts. This is dangerous and can be life-threatening. Bumping into other divers or objects while riding a vehicle could cause considerable harm, so dive responsibly and give consideration to others around you. Maintain the same good habits and common sense you use in scuba diving when using DPV's and scooters. Plan your dive, dive your plan, and enjoy the additional benefits of using a DPV - being relaxed, comfortable, and covering more area per dive. Have Fun and Be Safe!

The author, Peter Vickers, is a former military diver with the Royal Navy. He has extensive experience in the commercial, technical (full cave certified), and recreational diving industries. Peter is a Master Instructor for PADI, has owned a retail dive store for ten years, and currently is President of a scuba equipment manufacturer.

Boat Diving With A DPV

Boat diving with a DPV is a unique and pleasant experience. You will cover more area than ever before enhancing the value of your dive beyond your wildest dreams.

Following are a number of tips to help DPV users with DPV boat diving.

Prior to booking a boat dive, check with the boat operator to ensure that space is available for your DPV. Some '6-Pack' operators have very small vessels with very limited deck space.

Prior to boarding the vessel, ask the captain where he would like you to stow your DPV during transit. A practical place for DPV's to be stowed on smaller vessels is in the 'V berth'

in the bow. DPV's should not be left out on the deck unless properly secured, and then only with the Captain's approval. On larger boats, it may be possible to stow the DPV in the main cabin. All pre-dive checks should be completed prior to boarding the dive vessel, including the 'bubble check'.

On arrival at the dive site, secure the DPV to the dive vessel and lower it into the water, checking for 'bubbles' as it submerges.

To tether the vehicle securely, a 25 foot length of quarter inch rope with a clip on each end can be used.

Assuming that five feet from the boat rail to the water and twenty feet further will be the perfect parking space for your DPV, plus it is coincident with the depth for your safety stop at the end of the dive.

Always check with the boat captain and see his or her approval prior to parking your DPV. The best location on the boat to tether your DPV is either of the aft corners of the rear deck. In conditions with no current, the DPV will hang vertically and is not in the way of the anchor line, the swim line, the current line or the exit ladders. In the event of a surface current, the DPV will stream with the current and should be ascertained not to be interfering with any of the safety lines.

After mounting the DPV and prior to releasing the tether line, ensure your buoyancy is established. Conduct an all around sweep to ensure you will not interfere with other divers when you power up the DPV to start your dive. Standard descent and ascent rates should be observed at all times as should depth and range from the dive boat.

Following the dive, the DPV can be parked back on the tether line which may be a good place to do a safety stop. The DPV is now ready for your second dive. DO NOT ride the DPV to the exit ladder or platform except in an emergency situation as this will interfere with entries and exits of other divers.

On completion of diving, remove your DPV from the water and stow it away as appropriate. It is not advisable to open your DPV on the boat. Apart from the possibility of getting water inside the DPV, it will probably inconvenience other divers.

The author, Peter Vickers, is a former military diver with the Royal Navy. He has extensive experience in the commercial, technical (full cave certified), and recreational diving industries. Peter is a YMCA and a Master PADI Instructor, has owned a retail dive store for ten years, and currently is President of a scuba equipment manufacturer