FORCE

By Richard Sorokin

As mariners we are dealing with forces all the time. But what is a force and where do they come from? A force is simply a push or pull. In our universe there are just a few natural forces but they control us completely. Let's start with the smallest but the most powerful force; the force that holds atoms together, *the atomic force*. In the atom's nucleus neutrons and positrons adhere to each other. Flying around the nucleus are the electrons. The electrons carry a negative charge and the positrons carry a positive charge, therefore they attract each other and stay together. This is the atomic forces that create all the matter we come in contact with daily.

The next force is *magnetic*. In some earth materials the atoms can move and line up their charges to form magnetic forces. Iron is the best example. Atomic forces are seldom observed outside of the atom but the magnetic force is strong at close distances.

The last natural force is *gravity*. It is the weakest force of all yet it effect is the widest, universal. Every object exerts a gravitational force. The bigger it is the greater the force. This force can span huge distances and does affect the entire universe. It's the force that keeps us on the earth and gives us weight. It's the force that keeps the sun and the planets in their place. It's the force the keeps our galaxy and all the others in their place.

Sir Isaac Newton discovered three simple laws that cover how things move.

1. Things in motion will stay in motion and in the same direction and things at rest will stay at rest unless a force is acted upon them. This explains inertia.

2. Forces make objects change their speed. The bigger the force or the smaller the object, the greater the speed changes.

3. Every action has an equal and opposite reaction. When you swim, you push backwards to go forwards. Your car tires, your boat propeller, your shoes, etc., all push backwards so you can go forward.

There are many other forces on our earth, like wind force, water currents, friction etc but they all derive from the few natural forces above.