WRECK LOCATION WITH THE AQUA SCAN MC5
PROTON MAGNETOMETER

INTRODUCTION

Marine magnetometers have been used in professional applications with great success for many years.However the high cost of these units have restricted their use for general wreck location.Recent advances in electronic technology have however enabled much cheaper magnetometers to be produced without sacrificing any of the features of these professional models.In fact the use of microcomputers has enabled costly features on previous designs to be implimented quite cheaply.

For wreck location sounder, is its enable the search buried in sand difficult with an

the magnetometers great advantage over an echo ability to detect a wreck at a distance and then vessel to home onto it.lt can also detect wrecks etc, or lying on rocky ground;both of which are very echo sounder.

The AQUAS CAN MCS is a proton magnetometer which is used to measure the earth's magnetic field strength and can detect variations in this field caused by the presence of ferrous objects.The earth's field is normally uniform, but will be disturbed by local concentrations of magnetic material such as a steel wreck.These variations can extend up to several hundred metres from a wreck site with the maximum occurring over the wreck itself.It is however, difficult to give accurate performance figures for the detection of various objects as much depends on the size,attitude and permability of the object disturbing the field.

A major feature of the MCS is simple operation.This has been achieved ,- by using a microcomputer to control the operation of the magnetometer.

PRINCIPLE OF OPERATION

The principle of operation of a proton magnetometer is unlike that of conventional hand held metal detectors.These detectors produce their own dynamic magnetic field and detect disturbances in the field caused by metal objects.This time varying magnetic field only extends about 2 metres from the search coil,so consequently the maximum detection range for large metal objects is still only about 2 metres.Their main advantage over a proton magnetometer is that by generating a time varying magnetic field non ferrous metals can be detected.The physical principles on which these detectors work is outside the scope of this article.

A proton magnetometer for wreck location measures the strength of the earth's magnetic field and for this it is extremly sensitive.The earth's field is a static field and because many non ferrous metals do not effect a static magnetic field then they cannot be detected by a proton magnetometer.A good rule of thumb to determine if a material will be detected by a magnetometer is if it is attracted to a bar magnet the it can be dete~ted.Thc proton precession magnetometer is so named because it utilises the procession of spinning protons in a sample of hydrocarbon fluid to measure the strength of any magnetic field through the fluid.In practice the sensor consists of a bottle of hydrocarbon fluid (i.e.kerosene) around which is wound a coil of wire.

To measure the earth's field, the fluid must first be polarised for a few seconds.The polarise state consists of connecting the coil to a battery which produces a strong magnetic field through the fluid. The protons behave as small spinning magnets and temporarily align themselves with this strong field,as shown in (FIG l).When the battery
is disconnected the magnetic field collapses and the spin of the protons causes them to precess about the direction of the earth's magnetic field. The precessing protons generate a small signal of approximately one microvolt in the coil, and the frequency of this signal is directly proportional to the strength of the earth's magnetic field. The precise relationship between the frequency of the signal and the magnetic field strength is known as the gyromagnetic ratio.