

### TUNING PROCEDURE

The magnetometer can only be used to search for ferrous materials or compounds, and for this purpose it is extremely sensitive and has considerable range. This high sensitivity to field variations means that the magnetometer may only be used remote from known earth field disturbers, such as power lines or buildings. Before attempting to set up the magnetometer ensure that it is positioned at least 50 metres (160ft) from the nearest power line or building, additionally ensure that any vehicles are at least 10 metres (30ft) away.

Assuming the initial setting up is carried out on land the TOWFISH should be positioned at least 3 metres (10 ft) from the electronics unit and battery. The towfish should be set up horizontally at least 1.25 metres (4 ft) off the ground using some form of totally non magnetic support - NOT EVEN CONTAINING SMALL NAILS, SCREWS OR EVEN STAPLES. Elevation of the sensor is very important unless carrying out the "land tuning" on totally magnetically clean ground such as the sand of a beach. Note. Additionally, if the magnetometer is provided with the Solenoid type towfish rather than the Omni-directional Toroid version then position it so that it is aligned in approximately an east-west direction to maximise the response. If the initial tuning is being done at sea then it should be carried out with the TOWFISH cable fully extended - if carried out in very shallow water it is advisable to use a float such as a tubular boat fender as a support for the sensor.

#### Control Unit Settings:

1. Set the POLARISE control to 3 sec, the range to X1 and the alarm to 10nT.
2. Set the AREA TUNE control to the centre of its tune range i.e. position 'J'.
3. Connect the power cable to the battery (red to positive), the MC5 is now ready to be switched on.
4. After switch-on observe that the small (signal) meter needle deflects across the scale every 3 seconds.
5. Adjust the AREA TUNE control one step at the time to find the setting that maximises this deflection.
6. Note this optimum setting for subsequent usage, the magnetometer is now set up for your area.
7. If you now switch off, then on again the magnetometer will now set itself up with the benefit of maximum signal level.

NOTE. If the initial set-up is carried out on land then the procedure should be repeated at sea as this may vary by one or two steps due to distortion of the natural field value by buildings or underground features. When the magnetometer is switched on there is a short delay period before an initial bleep is heard, then two measurements are made to determine the reference value of the magnetic field. Once the reference measurement has been completed it calibrates the

magnetometer to the measured field strength and sets the large meter to centre scale. The field strength measured at calibration is stored in the microcomputer memory and all subsequent measurements are compared with this value to determine the magnitude of any field disturbances. After each subsequent measurement the audible alarm will provide a short reassurance bleep if a valid measurement is made. This bleep indicates that the magnetometer is working correctly. If the magnetometer fails to bleep when the alarm control is on then something is wrong i.e. low battery voltage or electrical interference etc. Once the system is taking regular measurements a ferrous object gradually brought near to the probe will cause the alarm to sound immediately the change in magnetic field strength exceeds the alarm setting.

Based on the above you should now have a working understanding of the setting up procedure. It is not necessary to repeat the setting up procedure each subsequent time you "switch on", provided you operate within 20 miles of your original setting up point and maintain your chosen AREA TUNE selection. Just switch on and the magnetometer will automatically calibrate itself. The following two sections describe how to use the POLARISE and RANGE controls to optimise the survey.

### TROUBLESHOOTING GUIDE

Symptom: **Display wont power up**

Check the following: -

1. Check that the supply battery has a sufficient charge: -
  - If not, place battery on charge and then re-test or replace battery. N.B. The demand on the battery alternates between a few hundred mA and a current in excess of an amp during the Polarise phase.
2. Check the internal 3.15A fuse inside the MC5 Display case.
3. Check the 3A fuse in the external power lead
4. Check the integrity of the wiring on the POWER connector on the back of the display and on the Power lead itself.

Symptom: **Signal Level Constantly Low**

Check the following: -

1. Check that the supply battery has a sufficient charge: -
  - If not, place battery on charge and then re-test or replace battery. N.B. The demand on the battery alternates between a few hundred mA and a current in excess of an amp during the Polarise phase.
2. Check the condition of the Phono insert of the Towfish Connector and the mating insert on the rear of the MC5 Display.
  - If one or both of the connectors is badly corroded or loose fitting then they should both be replaced - the system is supplied with a spares kit containing these inserts.

**N.B. AN AUTHORISED AQUASCAN SERVICE AGENT OR A SUITABLY QUALIFIED PERSON SHOULD CARRY OUT THIS WORK. PLEASE CONTACT YOUR NEAREST SERVICE AGENT OR THE AQUASCAN SUPPORT DEPARTMENT BEFORE ANY WORK IS CARRIED OUT.**

3. Check the resistance across the Towfish Phono Connector: -
  - Connect a good quality multi-meter across the core (inner pin) and metal outer contact (screen) on the Phono plug and check the resistance, You should see a reading of about 9 to 15Ω depending on the actual sensor fitted and the cable length.

**NB. IT IS GOOD POLICY TO FIRSTLY CHECK THE MULTI-METER'S READING WITH THE LEADS SHORTED TOGETHER - THIS PROVIDES A MEASURE OF WHAT RESIDUAL READING TO TAKE INTO ACCOUNT.**

4. Place a good quality multi-meter in series with the power lead and the supply battery to check the current drawn by the system. Typical current readings are shown below.

Without Towfish connected and 12V Supply:-

Before and after Polarisation – Approx. 74mA (135mA)

During Polarisation – Approx. 88mA (150mA)

With Towfish connected and 12V Supply:-

Before and after Polarisation – Approx. 75mA (135mA)

During Polarisation – Approx. 1330mA (1370mA)

**NOTE: THE VALUES SHOWN ABOVE CAN VARY IN DIFFERENT CONFIGURATIONS OF MC5 BUT THEY CAN BE USED AS A GUIDE TO HIGHLIGHT OBVIOUS HIGH OR LOW READINGS. IN SOME CASES, THE VALUES WILL MATCH THOSE SHOWN ABOVE IN BRACKETS, THIS IS DUE TO A DIFFERENT TYPE OF I.C. BEING FITTED IN SOME MC5 DISPLAYS.**

Symptom: **Signal Level Constantly High - irrespective of Area tune selection**

Check the following:-

1. Check to see if excessive noise is affecting the signal: -

- Under conditions described in section 5.1 for setting up the Area Tuning, place a ferrous metal object on top of the towfish and check to see if the signal level drops. Under normal conditions putting a piece of ferrous metal in close proximity will dramatically reduce the signal level. If the signal level remains high then background noise may be causing the problem.

### **Potential Noise Sources & recommendations for elimination**

a) Generator or other electrical noise on the power source - It is highly recommended that you use a totally independent & fully isolated battery. An additional improvement can very often be obtained by use of a Sea Earth, this is a direct connection between the ground (-ve) battery terminal and the seawater. A piece of stainless steel or bronze inserted into the water and coupled to the battery with a copper or stainless wire will suffice - the metal contact can be hull mounted or can even be loosely coupled to the towfish cable behind the vessel.

b) Electrical noise coupled into the cable - The Towfish cable routing can be a critical issue for obtaining an optimum magnetometer performance. Ensure that the cable does not run parallel to any other cables that carry high level noise - such as generator or echo sounder cables. Ensure

that the cable does not pass close to an outboard engine. Ensure that any excess cable that is not paid out over the stern is coiled in a "figure of eight" pattern - this ensures a high level of noise cancellation. Experiment with various cable routing options and note the

2. Check the integrity of the cable insulation.

- Feed the entire length of the cable into the sea and measure the resistance between the screen contact of the Towfish connector and a probe placed into the sea. If you measure less than  $1M\Omega$ , the cable insulation may have been damaged. The cable should be laid out and carefully checked for physical damage.

If none of the above checks help cure or identify your problem then please contact your nearest service agent or the support department at Aquascan International Ltd.