MARAN ULTRA
INSTALLATION MANUAL

MARAN ULTRA USER INSTALLATION AND SERVICE MANUAL v2.1 26/10/98.

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INTRODUCTION

The aim of the MARAN Ultra User Installation and Service Manual is to describe the basic processes involved in installing and servicing MARAN Ultra instruments. This manual contains information for installation engineers and users who wish to perform basic servicing, such as changing fuses and cleaning air filters.

The MARAN Ultra User Installation and Service Manual does not attempt to:

i) Educate the non expert user in the basic theory of low resolution NMR. For information of NMR theory, the non expert user should refer to the document - 'NMR Theory for Non Expert Users'.

ii) Provide information regarding MARAN Ultra software. Information on the MARAN Ultra software may be found in the RI NMR, RI MultiQuant and RI Analysis manuals.

iii) Provide information regarding supplementary equipment supplied with the MARAN Ultra instrument. For information regarding VT controllers, gradients, T1 RHO units, special data processing, batch programming and imaging the user should refer to the MARAN Ultra Supplementary Equipment Manual.

1. UN-PACKING AND OVERVIEW

1.1 Introduction

All MARAN Ultra instruments are composed of three main units. These are the magnet box, power supply and computer (PC).

1.2 Environmental Requirements

The MARAN Ultra instrument is designed to be operated indoors in normal laboratory conditions. The instrument should be sited in a vibration-free area away from draughts and out of direct sunlight on a non-metallic bench capable of supporting a weight of up to 120 kg. A bench of area 2 m by 1 m is required.

The average surrounding air temperature should be between 20 and 30°C and should not vary by more than ±3°C during any 24 hour period. Ideally the instrument should be sited in an air-conditioned room.

1.3 Electrical Requirements

The MARAN Ultra is designed to operate from a voltage supply of between 95V and 240 V. The instrument has a current rating of 6.3A and the power supply should be connected to an electrical outlet meeting this requirement with an earth connection.

1.4 Positioning of Units

Open all the shipping crates, check for transit damage and identify the contents of each crate. Lift the magnet box onto the bench.

WARNING!! THE MARAN ULTRA MAGNET BOX IS VERY HEAVY (UP TO 70 KG). USE MECHANICAL LIFTING GEAR IF AVAILABLE AND OBSERVE LOCAL HEALTH AND SAFETY GUIDELINES FOR LIFTING HEAVY OBJECTS.

WARNING!! ALL FERROMAGNETIC OBJECTS MUST BE KEPT AT A SAFE DISTANCE AWAY FROM THE MAGNET BOX.

The power supply can be positioned anywhere within 2 m of the magnet box in a well ventilated location.

Unpack the PC (if supplied). Connect the VGA cable, monitor power lead and keyboard into the main PC unit as described in the computer's installation instructions.

1.5 The Magnet Box

WARNING!! FERROMAGNETIC OBJECTS MUST NEVER BE PLACED IN THE MAGNET SAMPLE ACCESS HOLE OR BETWEEN THE MAGNET POLE PIECES.

WARNING!! THE MARAN ULTRA MAGNET GENERATES A STRONG BUT LOCALISED MAGNETIC FIELD. DO NOT PLACE MAGNETIC MEDIA IN CLOSE PROXIMITY TO THE MAGNET BOX.

The MARAN Ultra magnet box contains the permanent magnet, the RF coil and amplifier and associated electronics for performing NMR experiments. The magnet box may weigh up to 70 kg and should be sited on a sturdy non metallic bench away from strong drafts, direct sunlight and vibrations.

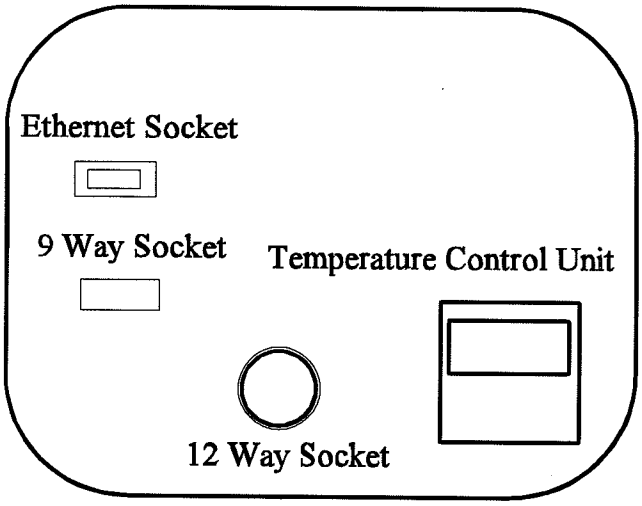


Figure 1.1

The rear panel of the magnet box showing the ethernet connector, the 9 way D type connector, the twelve way power supply socket and the temperature control unit.

The magnet box should be connected to the PC's ethernet port via the supplied ethernet lead.

Users should note that two ethernet cables are supplied, one crossover cable, which is used to connect the MARAN Ultra directly to a PC and a straight through cable which can be used to connect the MARAN Ultra to a network port (enabling the MARAN Ultra to be operated remotely over the ethernet). Users should ensure that the correct ethernet cable is used to connect the MARAN Ultra to the PC/network port.

WARNING!! THE MARAN ULTRA WILL NOT FUNCTION CORRECTLY UNLESS THE CORRECT ETHERNET CABLE IS USED.

Finally, connect the power supply to the magnet box via the twelve way power supply lead and the 9 way D type connector to a spare 9 way D type connector on the PC.

NOTE : THE 9 WAY D TYPE LEAD IS SUPPLIED FOR DIAGNOSTIC PURPOSES ONLY AND DOES NOT NEED TO BE CONNECTED.

The magnet box should be left for approximately 12 hours after being switched on to allow the magnet box temperature to stabilise.

WARNING!! IF THE MAGNET BOX IS SWITCHED OFF DURING A POWER CUT (POWER OUTAGE), ELECTRICAL SAFETY TEST OR DURING MAINTENANCE IT MUST BE ALLOWED TO RE-STABILISE BEFORE NEW MEASUREMENTS CAN TAKE PLACE.

The magnet box has a temperature control unit located on the rear of the magnet box (Figure 1.2). The temperature control unit is automatically activated when the magnet box is switched on. More information on setting the magnet box temperature may be found in Chapter 2.

Operators should ensure that no metallic objects are placed in close proximity to the magnet box. Computer disks, videotapes and other magnetic media should kept at least 30 cm away from the magnet box.

The magnet box contains no user serviceable parts or air filters.

WARNING!! UNDER NO CIRCUMSTANCES SHOULD THE MAGNET BOX COVER BE REMOVED WITHOUT FIRST CONTACTING RESONANCE INSTRUMENTS FOR ADVICE.

1.6 The Power Supply

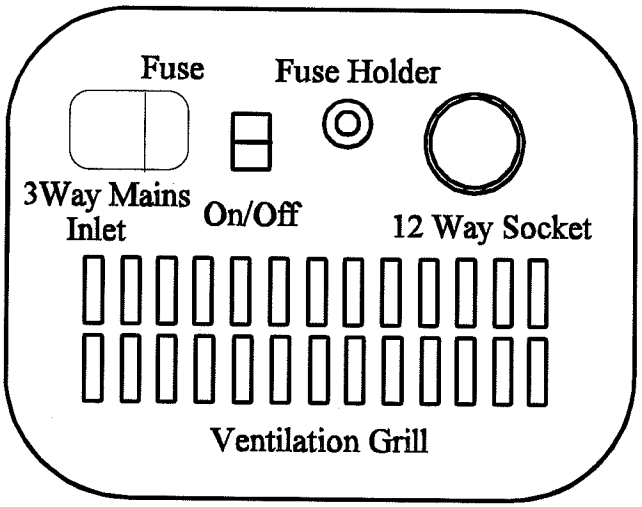


Figure 1.2

The rear panel of the power supply, showing the fuse holder, three way IEC mains inlet connector (fused) and twelve way magnet power supply socket.

The power supply transforms the local power supply into a format compatible with the MARAN Ultra. The power supply weighs approximately 3 kg and should be sited in a well

ventilated area, within 2 m of the magnet box.

A diagram of the rear panel of the power supply may be found in Figure 1.2.

The power supply is connected to the mains via the supplied three way IEC mains lead. The power cable is factory fitted with a 13 A fuse (UK only). The three way mains inlet connector is also fused with a 6.3 A antisurge fuse (RI part no. FU1011).

WARNING!! DURING OPERATION THE POWER SUPPLY MUST BE EARTHED VIA THE THREE WAY IEC MAINS LEAD AT ALL TIMES.

The twelve way magnet power supply lead (the lead has gold twelve way connectors) should be connected from the rear panel of the power supply (Figure 1.1) to the rear of the magnet box (Figure 1.2). The power supply is turned on via the switch located next to the three way IEC mains inlet connector.

The power supply has a single filter for the cooling fan mounted on the front panel. The filter must be cleaned periodically (once every six months) or sooner if it becomes clogged. The cleaning procedure is particularly important when the MARAN Ultra is being operated in harsh environmental conditions. The filter may be snapped off by hand and cleaned with a soft wire brush.

The power supply should be tested periodically (to observe local standards) for electrical safety using a portable appliance tester. The fuse holder (Figure 1.1) contains an 3.15A fast blow fuse (RI part no. FU1010).

The power supply contains no user serviceable parts.

WARNING!! UNDER NO CIRCUMSTANCES SHOULD THE POWER SUPPLY COVER BE REMOVED. IF IN DOUBT PLEASE CONTACT RESONANCE INSTRUMENTS FOR ADVICE.

1.7 The MARAN Ultra PC

The PC supplied with the MARAN Ultra instrument is already loaded with the necessary software. Resonance Instruments strongly recommends that the PC is regarded as an integral part of the MARAN Ultra instrument and not as a normal laboratory PC available for other tasks.

1.8 MARAN Ultra's Supplied Without a PC

The MARAN Ultra may be supplied for use with an existing PC. In this case it is necessary to install an ethernet card in the PC (one is supplied with the MARAN Ultra instrument if a PC is not included). Please refer to the RI NMR users manual for more information on installing ethernet cards and configuring Windows 95 for use with the MARAN Ultra.

2. SWITCHING ON THE INSTRUMENT

2.1 Introduction

Once the instrument has been connected according to the instructions provided in Chapter 2, the MARAN Ultra and PC may be switched on. Once the magnet box has been switched on, the temperature controller display on the rear of the magnet box will illuminate, displaying the current temperature of the magnet box. If this display fails to illuminate, check that the power leads are connected correctly. If the problem persists contact Resonance Instruments for advice.

2.2 Magnet Box Temperature Control

The magnet box temperature is controlled by a temperature controller mounted on the magnet box rear panel. The current magnet box temperature is displayed in green figures. Magnets are normally factory set to an operating temperature of 40 °C.

To view the set temperature, press either the up or down arrow key once. The set temperature is displayed for a few seconds before the display reverts back to the current magnet box temperature.

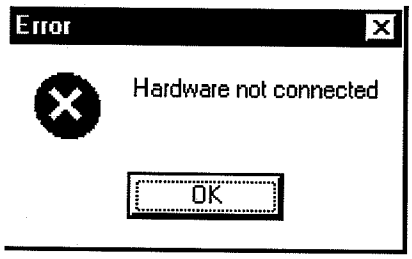
To change the value of the set temperature, press and hold either the up or down arrow key The current set temperature will be displayed and will begin to increase/decrease. Using the up and down arrow keys set the required operating temperature. After a few moments the display will revert back to displaying the current operating temperature, which will gradually increase/decrease to match the new set point. Note that although the operating temperature may reach the new set value quickly, the temperature sensor reads the temperature of the air inside the magnet box, not the temperature of the magnet itself. The magnet contains a large mass of metal which has a considerable thermal inertia and will take up to 24 hours to reach its new operating temperature.

WARNING!! DO NOT PRESS ANY OTHER KEYS ON THE TEMPERATURE CONTROLLER OR THE CONTROLLER MAY NOT FUNCTION CORRECTLY.

WARNING!! THERE MUST BE AT LEAST 5 DEGREES DIFFERENCE BETWEEN THE SET TEMPERATURE AND THE OUTSIDE AIR TEMPERATURE FOR THE TEMPERATURE CONTROLLER TO FUNCTION CORRECTLY.

2.3 Checking for PC-MARAN Ultra Communications

To check that the PC is communicating with the MARAN Ultra electronics, run RI NMR from the Windows 95 Start Menu. If the message box



appears, the MARAN Ultra electronics are not communicating correctly with the PC. Please check the connections, particularly the ethernet connection between the rear of the magnet box and the PC. If the problem persists, contact Resonance Instruments for advice.

WARNING!! USERS CONFIGURING THEIR OWN PC'S FOR USE WITH THE MARAN ULTRA ELECTRONICS SHOULD REFER TO THE RI NMR USERS MANUAL, WHERE ADDITIONAL INFORMATION ON INSTALLING ETHERNET CARDS FOR USE WITH THE MARAN ULTRA MAY BE FOUND.

3. SAFETY AND USER MAINTENANCE

3.1 Introduction

This chapter provides information regarding basic user safety testing and maintenance of the MARAN Ultra instrument. Users should be aware that MARAN Ultra instruments contain no user serviceable parts inside. If in doubt about any aspect of user servicing, users should contact Resonance Instruments or the local distributor for advice. A copy of user warranty terms and conditions is available on request. Extended warranty contracts may be arranged by contacting the local distributor or Resonance Instruments.

3.2 Fuses

The MARAN Ultra has two fuses located on the power supply (a full description of the location of these fuses may be found in section 1 :

Power Supply 3 way IEC mains inlet connector 6.3 A - RI part no. FU 1011.
Power Supply Fuse Holder 3.15 A - RI part no. FU 1010.

3.3 Other Safety Points

The instrument must not be exposed to rain, moisture, excessive dust or high temperature as these may cause risk of shock or fire. High voltages are present inside the units. The instrument must be switched off and disconnected from the mains before any of the covers are removed and it must never be operated with any of the covers off. Please contact Resonance Instruments for advice before removing the magnet box cover.

In normal use of the MARAN Ultra instrument, the sample is subjected to short, intense pulses of radiofrequency electromagnetic radiation. Samples which may be damaged by this process, or which may cause sparking or other electrical effects, should not be placed in the instrument. This includes metallic or magnetic samples. Volatile or flammable samples should also not be placed in the instrument.

If any of the following occurs, the instrument should be switched off and disconnected from the mains supply and Resonance Instruments should be contacted:

- liquid is spilled on or into any part of the instrument
- any part of the instrument is dropped
- small metal objects fall into the sample access hole
- fuses continually blow out
- any of the mains leads are damaged or frayed
- the instrument exhibits any marked change in performance which might indicate the need for servicing

3.4 Cleaning

The exterior panels of the instrument may be wiped if necessary with a damp (not wet) cloth.

3.5 Regular Maintenance

There are no user serviceable parts inside the MARAN Ultra instrument. Once per year, the electrical safety of the instrument should be checked according to local guidelines.

The filter on the rear of the power supply should be cleaned periodically in accordance with the instructions provided in section 1.5.

4. APPENDIX

4.1 MARAN Ultra Specifications

Mass (Magnet Box) 70 kg (for 20 MHz MARAN Ultra).
Length (Magnet Box) approx 45 cm.
Width approx 40 cm.
Height approx. 30 cm.
Operating Temperature (nominal) 40°C.
Power Supply 95 V - 230 V (1*13 amp sockets for magnet box + power supply).

Note that these specifications do not include the PC which may vary in size, power requirement and configuration from instrument to instrument.

4.2 MARAN Ultra Fuses and Additional Parts

1*20 mm 6.3 A type T fuse - RI part no. FU 1011.
1*20 mm 3.15 A type T fuse - RI part no. FU 1010.
Air Filter for Power Supply (pack of 5).
Fan / Heater Assembley.
'Sample In' Microswitch Assembley.
Ethernet Crossover Cable (MARAN Ultra to PC).
9-Way D Type cable.
Ethernet Straight Through Cable (MARAN Ultra to Network).

4.3 Additional Information

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