

**OPERATORS' HANDBOOK**

**FOR THE**

**FAT DEPTH METER**

**FOR BEEF CATTLE**

**B-10**

**Advanced Measurement and Control Pty Ltd  
87A Beardy Street  
ARMIDALE. N.S.W. 2350  
AUSTRALIA**

**ABN 14 054 088 836  
Phone: 02 67 71 2266  
Fax: 02 67 71 2268  
Email: [amacpl@ozemail.com.au](mailto:amacpl@ozemail.com.au)**

# Operators' Handbook for the ULTRAMAC

<i>FOREWORD</i> .....	
<i>INTRODUCTION</i> .....	
<b>FAT DEPTH METER ULTRAMAC</b> .....	1
<i>PARTS OF THE INSTRUMENT</i> .....	2
<i>RECHARGING THE INTERNAL BATTERIES AND ALTERNATIVE ENERGY SOURCES</i> .....	4
<i>TRIAL OPERATION WITH TEST BLOCK</i> .....	5
<i>MEASURING FAT THICKNESS ON THE ANIMAL</i> .....	7
<i>SITES:</i> .....	7
<i>OBTAINING A MEASUREMENT</i> .....	7
<i>OIL</i> .....	7
<i>TRANSDUCER CONNECTION</i> .....	7
<i>TRANSDUCER ORIENTATION</i> .....	7
<i>TRANSDUCER PRESSURE</i> .....	7
<i>MEASUREMENT</i> .....	8
<i>DISPLAY</i> .....	8
<i>TROUBLE-SHOOTING</i> .....	9
<i>NO DISPLAY</i> .....	9
<i>INTERMITTENT DISPLAY OF NUMBER</i> .....	9
<i>NO READING ON TEST BLOCK</i> .....	9
<i>NO STABLE READING ON THE ANIMAL</i> .....	10
<i>SPECIAL PROCEDURES FOR 'DIFFICULT' ANIMALS</i> .....	10
<i>GENERAL COMMENTS</i> .....	11
<i>WARRANTY</i> .....	12
<i>SERVICING</i> .....	12
<i>APPENDIX</i> .....	13

## ***FOREWORD***

The specifications, illustrations and information contained in this manual were in effect at the time the manual was approved for printing; however, Advanced Measurement And Control Pty Ltd reserves the right, subject to the laws of Australia or any applicable State or Territory thereof which may apply at the time, at its discretion and without notice to change the specifications and prices of the **ULTRAMAC**, options, parts and accessories referred to herein at any time and without incurring any liability whatsoever to any purchaser thereof in respect of any such change.

Your thorough understanding of the contents of this manual will assist you in obtaining the maximum benefits from your **ULTRAMAC**.

## ***FAT DEPTH METER ULTRAMAC***

The **ULTRAMAC** measures the fat depth on live beef cattle.

The **ULTRAMAC** uses high frequency sound waves to probe the hide, fat, and muscle layers. It uses the echoes from these sound waves to measure the fat depth between hide and muscle. A digital display instantly shows the result of this measurement to the nearest mm.

Although the handling of the instrument does not require special skills, a description and explanation of the features and workings as outlined in the following pages will assist in the most efficient operation of the instrument.

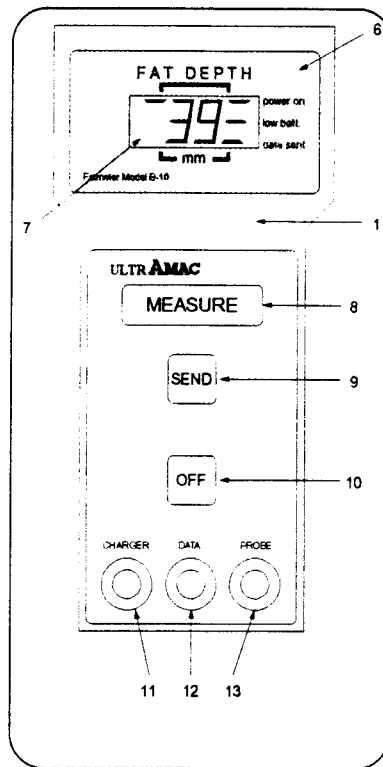
## ***PARTS OF THE INSTRUMENT***

Supplied as parts of the total instrument set are (see Photo and Diagram for reference)

- ◆ **ULTRAMAC Model B-10**, with protective pouch (1)  
Size: 21cm x 10cm x 5cm  
Weight: 0.8kg including batteries
- ◆ Transducer AMAC P/N 207-010 (2)
- ◆ Cable between the transducer and the main unit (3)
- ◆ Mains battery charger (4)
- ◆ Test block (5)

Optional extras available:

- ◆ Carry case
- ◆ Cable between Fat Depth Meter and external 12V battery
- ◆ Cable between Fat Depth Meter and car cigarette lighter
- ◆ Data Logger
- ◆ Printer
- ◆ Cable to Data Logger, Printer, or Computer



***Following is a brief description of the most important parts of the ULTRAMAC:***

The entire electronic circuitry and the batteries are contained in an ABS housing, the 'main unit' (1). The main unit is enclosed in a protective cover. It is recommended that the main unit remains in this protective cover.

The transducer will be connected with the main unit via the cable (3) at the port marked "PROBE" (13).

In the display area (6) within the window (7) the fat depth and other signals will be shown. The actual fat depth will be displayed above the text "mm". To the right of the number displayed, bars will show you when the power is on, the battery is low, or the data displayed has been sent, each as indicated by the text written in the window outside the display area. To the left of the number displayed, a bar will show you when the 'MEASURE' button (8) is pressed. On activating the 'SEND' button (9), the displayed data is transmitted to an external device through the "DATA" port (12). The instrument will switch itself off after 6 minutes in standby mode, but you can switch it off by pressing the 'OFF' button (10) at any time. The mains charger or any 12V power supply as described later will be plugged into the port marked "CHARGER" (11).

**AVOID HITTING THE TRANSDUCER AGAINST HARD SURFACES.** The transducer face contains a very sensitive element which can be damaged if it suffers a direct impact from a hard object. Due care should be taken to avoid dropping the transducer or hitting it against railings or other hard surfaces.

## ***RECHARGING THE INTERNAL BATTERIES AND ALTERNATIVE ENERGY SOURCES***

The internal batteries will not be charged when the instrument is first delivered to you.

To recharge the batteries, connect the main unit with the charger provided to a mains supply using the "CHARGE" port on the main unit. To fully charge empty batteries from the mains supply will take 14 hours.

Fully charged batteries will give you 500 measurements at 10 seconds each with an extra 8 hours of standby time (see chapter on 'OPERATION' for explanation of 'measurement' and 'standby').

As an indicator for low batteries, one bar in the right of the display window will appear next to the text 'low batt.'. This is a warning signal and will first appear when you press the 'MEASURE' button. You will still have time to do some short measurements, but the display will soon start to blank out completely when you try to do a measurement. Finally, the display will go completely blank. At this point, fully recharge the batteries to maintain the full battery capacity.

As a backup, the instrument can be operated from an external 12V battery such as a car battery by using the port marked "CHARGE" on the instrument as you use for 240V supplies. If you are running the instrument directly from a car battery, check carefully that you are using a 12V negative earth system to prevent accidental short circuiting. Cables for running the instrument either from battery terminals or a cigarette lighter can be supplied by AMAC on request. On the cable you will find clearly marked, which side has to be connected to the positive and to the negative terminal. Fuses are built into the cables to protect the instrument from accidental short circuiting.

The instrument can also be operated by permanent connection to mains power through the charging unit supplied.

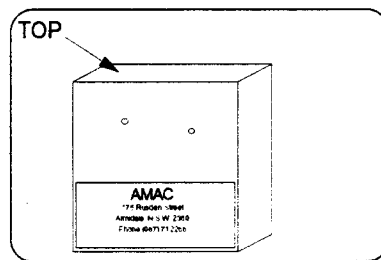
If you have any special recharging requirements, please contact AMAC. In most cases we will be able to provide you with the cables or connectors you need for your application as well as recommendations how to solve special problems.

## ***TRIAL OPERATION WITH TEST BLOCK***

Note:

Ultrasound gets absorbed very quickly in air; a coupling medium is required between the face of the transducer and the surface you want to measure from at all times. Vegetable oil is recommended as it is inexpensive and provides excellent coupling.

- 1) Connect the transducer cable to socket marked 'PROBE'.
- 2) Apply oil to top face (see diagram) of test block.



- 3) Place transducer down on top face of test block.
- 4) Press 'MEASURE' button.

When you press the 'MEASURE' button, the **ULTRAMAC** will actively take measurements. A bar appearing in the top left corner of the display area will show you that the instrument is in measuring mode.

Slowly moving the transducer from side to side will cause various numbers to appear in the display area. If you release the measuring button while a number is displayed, the bar in the top left corner of the display area will disappear and the number will be held on display. The instrument now is in standby mode. It will switch itself off after about 6 minutes.

While the instrument is in standby mode and the display shows a number, the result of your measurement can be sent to an external recording device (if connected) via the 'DATA' port by pressing the 'SEND' button. When the data has been sent, a bar next to the text 'data sent' will appear in the display area. To avoid accidental sending of the same measurement more than once, this value cannot be sent again. For further information about data connections see Appendix 'SERIAL INTERFACE'.

On closer examination of the test block and the display, a correlation will be found between the position of the transducer relative to two fine holes in the test block and the numbers displayed. When the centre of the transducer is directly above one of the holes, one number will be displayed, when the transducer is above the other hole, the other number will appear.



The display area will remain blank when the transducer is between holes or at the edge of the block.

Note:

The **ULTRAMAC** will only display a number if it has good reason to believe that the value it displays is an actual fat depth. To achieve that the **ULTRAMAC** sends out an ultrasound signal which partly penetrates the hide, fat, and muscle, and partly gets reflected from interfaces between those layers. From the reflected part of the signal, the instrument first determines the position of the hide/fat interface relative to the transducer, and then the position of the fat/muscle interface. The distance between the top of the test block and a hole represents the hide, and the distance between a hole and the bottom of the test block represents the fat layer. From the relative positions of these interfaces, the instrument then determines the thickness of the fat. When the instrument does not find a suitable first hide/fat interface, it does not accept the reading as valid and does not display any number.

If the transducer is taken away from the surface, a number may appear on the display, especially if the coupling fluid remains on its face. The value displayed in this case depends on the actual transducer being used and has no significance. It is caused by multiple reflections of the sound at the surface of the transducer and disappears when the transducer is in proper contact with another surface.

Please do not force any connectors onto the **ULTRAMAC**. If force is required, an incorrect cable may be being used, or the connectors may have become damaged or dirty.

If a longer or shorter cable is required, please contact the manufacturers and cable to suit your application will be supplied.

## ***MEASURING FAT THICKNESS ON THE ANIMAL***

The instrument will measure the thickness of the fat layer between the hide and the first layer of muscle or bone anywhere on beef cattle. There are, however, two standard sites at which fat depth measurements are conventionally taken.

### ***SITES<sup>1</sup>:***

***The P8 site*** is located on the rump of the animal at the intersection of two lines. One line extends down the side of the animal from the 'HIGHBONE' (sacral vertebra) and the other line extends *parallel* to the backbone along the side of the animal starting from the pin bone. The fat depth for the P8 site should be taken within an area around the intersection of these lines.

***The 12/13 rib site*** is located by feeling for the gap between the last and second last rib. Follow the gap up to the backbone. The site is on the side of the animal, 3/4 of the distance across the eye muscle from the backbone.

## ***OBTAINING A MEASUREMENT***

### ***OIL***

A fluid has to be applied to the measurement area as an acoustic coupling agent. Vegetable oil has proven to be a very successful and inexpensive material. The purpose of this fluid is to exclude air between the transducer face and the hide. So, depending on how much hair grows in the area you want to measure and the amount of dirt trapped in the hair, more or less oil may be needed. If the animal is extremely dirty, it might be necessary to brush the area where you want to measure. To make sure most air is expelled, some rubbing in of the oil is probably needed. Moving the transducer around *slowly* within the area to be measured while maintaining contact between the transducer and the animal will also help to create a good contact between hide and transducer. Some practice will help you to judge the correct amount of oil for different situations. If you have difficulties obtaining good readings, more oil will resolve your problems in most cases.

### ***TRANSDUCER CONNECTION***

Connect the transducer cable to socket marked 'PROBE'.

### ***TRANSDUCER ORIENTATION***

The transducer should be placed as nearly as possible perpendicular to the hide. The transducer emits an ultrasound signal and receives the echoes created by interfaces between layers of different densities like fat and muscle. If the transducer is placed onto the hide at an angle the beam will not be reflected back correctly and it will generally miss the transducer altogether.

### ***TRANSDUCER PRESSURE***

Don't press the transducer hard down onto the hide. Good contact is needed, but the fat layer should not be squashed and distorted. Light pressure is all that is required, although firm pressure can be used while searching for a good measurement location.

---

<sup>1</sup> See Appendix: INFORMATION FROM THE DEPARTMENT OF AGRICULTURE OF NSW, THE P 8 RUMP FAT MEASURING SITE

## ***MEASUREMENT***

Press the 'MEASURE' button.

When you press the 'MEASURE' button, the **ULTRAMAC** will actively take measurements. A bar appearing in the top left corner of the display area will show you that the instrument is in measuring mode.

Note:

It is best to apply transducer to measurement area before pressing MEASURE button.

## ***DISPLAY***

The electronics makes quite complicated decisions before a result is displayed as a valid number. However, the display should be instantaneous. If you do not obtain a display, first make sure the 'MEASURE' button is being pressed. If there is still no number, move the transducer *slowly* within the measurement area while maintaining contact.

## ***TROUBLE-SHOOTING***

### ***NO DISPLAY***

First check:

- Battery charged?

To check whether a discharged battery is at fault, connect the instrument with the charger provided to mains power and try again.

Second check:

- Bar next to 'power on' displayed after 'MEASURE' button pressed?

Press the 'MEASURE' button. The bar in the top left hand corner should appear. It might take a little practice to find the correct pressure required to activate this button, but force is not necessary! The bar in the top left hand corner will disappear after you release the 'MEASURE' button, but the bar in the top right hand corner will stay as long as the instrument is in standby mode. The easiest way to operate the instrument is to hold it in one hand and to press the 'MEASURE' button with your thumb of the same hand. You will soon find out whether it is easier for you to hold the instrument in your right hand or your left hand. Both bars will appear whether a transducer is connected or not.

If there is still no display, contact the manufacturers or suppliers.

### ***INTERMITTENT DISPLAY OF NUMBER***

Check:

- 1) - Transducer connected correctly to main unit?
- 2) - Any obvious damage to either transducer or connectors?
- 3) - Verify on the test block that the instrument is working correctly!

If the answer is yes to all three checks and still no display of numbers, contact the manufacturers or suppliers.

### ***NO READING ON TEST BLOCK***

Check that the holes in the test block are not filled up with oil or other material.

### ***NO STABLE READING ON THE ANIMAL***

- ◆ Try first to apply more coupling oil, rub it in and try again.
- ◆ Don't hold the transducer rigidly, move it around *slowly* in the area you want to measure and alter the angle slightly.
- ◆ Make sure you are not trying to measure through a brand. It is almost impossible to create good contact over an area large enough to get a good signal through a brand.
- ◆ Make sure you are not trying to measure through paint.
- ◆ Try the other side of the animal.
- ◆ Keep an eye on the bar in the top left hand corner; it will disappear when the 'MEASURE' button is not pressed.
- ◆ Verify on the test block that the instrument is working properly.

### ***SPECIAL PROCEDURES FOR 'DIFFICULT' ANIMALS***

- ◆ By far the main reason for an unstable reading is insufficient contact between the transducer and the animal. More oil will eliminate the problem in most cases.
- ◆ On rare occasions the skin can be very rough and uneven and more pressure might be required to achieve the contact. Care has to be taken that any compression of the fat is taken into account when determining the fat depth of this animal.

## GENERAL COMMENTS

- Do not force connectors. All connectors fit easily and smoothly.
- **BE CAREFUL** The face of the transducer is fragile. Transducers and cables are not included in any warranty; they can be bought as spare parts or replacements from the manufacturers.
- Assist in the maintenance of the **ULTRAMAC** by keeping it clean. Wipe off any oil and dirt before storage.
- If you have any questions that need clarification, please do not hesitate to contact the manufacturers at the following address:
- Advanced Measurement and Control Pty Ltd  
ACN 054 088 836  
209 Beardy Street  
Armidale NSW 2350  
Phone: 067 712266  
Fax: 067 712268  
Email: [amacpl@ozemail.com.au](mailto:amacpl@ozemail.com.au)

## **WARRANTY**

The instrument is warranted for 6 months from date of purchase against failure due to any defect in materials or workmanship provided the instrument has been treated, in the opinion of the manufacturer, with reasonable care.

Any instrument must be returned to the manufacturer for repair. Freight charges will be the responsibility of the owner.

If, in case of a warranty claim, the instrument cannot be repaired within one working day, **AMAC** will provide a replacement at its own expenses free of charge until the repaired unit can be returned to its owner.

## **SERVICING**

This instrument is designed to provide years of trouble free operation. If a fault should occur it is recommended that the unit be returned to **AMAC** for repair as our technicians are able to provide the most comprehensive servicing of this product.

## **APPENDIX**



## ***SERIAL INTERFACE***

A DATA output socket is provided on the ULTRAMAC B-10 so that the fat depth values may be recorded by a data logger, sent to a computer or printed out.

The FAT DEPTH appearing on the display is output when the SEND key is pressed. The DATA SENT indicator comes on the ULTRAMAC B-10 display showing that the value has been output. The DATA SENT indicator is then cleared when the next measurement is made. If no reading is on the display, pressing SEND has no effect.

### ***DATA LOGGER***

To record the FAT DEPTH values with a data logger, connect the DATA output on the ULTRAMAC B-10 to the serial port on the data logger. Refer to your data logger manual for instructions on how to setup the data logger.

### ***COMPUTER***

To record the FAT DEPTH values with a computer, connect the DATA output on the ULTRAMAC B-10 to the serial port on the computer. Serial ports are often labelled COM1, COM2 etc. Refer to your computer manual for instructions on how to setup your computer. Software is available for IBM compatible computers to setup your computer and record the FAT DEPTH values. Contact AMAC or your supplier.

### ***PRINTER***

The FAT DEPTH may be printed out directly by connecting the DATA output on the ULTRAMAC B-10 to the serial input on a printer. Refer to your printer manual for instructions on how to setup your printer.

### ***CABLES***

Accessory cables are available for various computers, data loggers and printers. Contact AMAC or your supplier for accessory cables to suit your special application.

## *SPECIFICATION SERIAL INTERFACE*

Type	Serial
Baud Rate	300 baud, internally preset.
Format	8 bits 1 stop bit no parity
Data	ASCII fat depth in mm: <tens digit> <units digit> <linefeed> A leading zero is output for values up to 9mm.
Connector	
pin 3	data
pin 2	not used
pin 1	ground

**SPECIFICATIONS**

**ULTRAMAC  
FAT DEPTH METER  
Model B-10**

---

Ultrasound Fat Depth Grading for Beef Cattle

---

SPECIFICATIONS			
Fat range	2 - 40 mm	Power	Internal rechargeable batteries with mains adapter
Display	Fat depth Signal Indicator Battery Indicator		
- resolution	1 mm (rounded)	- internal battery capacity	500 measurements
- type	liquid crystal		
- update rate	5 per second	- recharge time	14 hours
Data Output	Serial data interface	Power Options	*Additional internal battery *External battery pack *External 240V adaptor *External 12V adapter
Size	210 x 100 x 50 mm		
Overall Weight	850g		

APPENDIX  
SPECIFICATIONS



## THE P8 RUMP FAT MEASURING SITE FOR CATTLE

March 1987

Brian Sundstrom  
Cattle Marketing Specialist  
Armidale.

In NSW the standard fat measuring site has been at the 12/13th rib. While it gives a good description of fatness and is relatively easy to assess in cattle, there are problems measuring rib fat on carcasses.

To improve the reliability of carcass fat measuring, a site on the rump - the P8 - has recently been adopted. It is used in the Ausmeat National stock and carcass languages and is recommended for all other situations requiring a single fat measurement.

Compared to the RIB site, the RUMP has:

- \* Firmer fat,
- \* Less hide puller damage,
- \* More definite site location.

These add up to:

**More reliable carcass measurements.**

### P8 SITE LOCATION

The intersection of a line from the 'pin' bone (parallel to back bone) with a line at right angles from the 'highbone' (3rd sacral vertebra).

