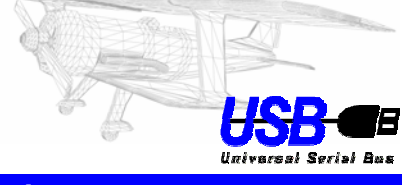
medusa research Inc.

Engineered Products for the RC Enthusiast

ORACLE DATA RECORDER

Operation Manual

Models: MR-DR-60100-D
MR-DR-60100-W



www.MedusaProducts.com

I FORWARD

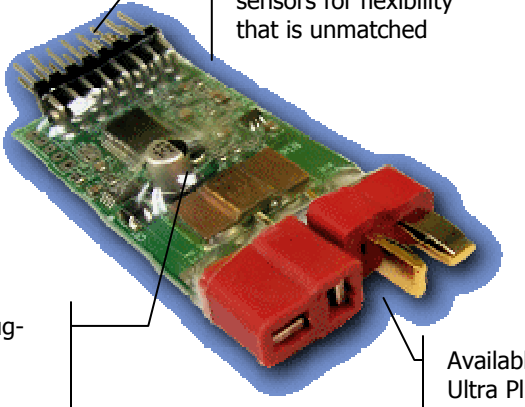
Congratulations on your purchase of the best in electric model monitoring and data recording, the Medusa Research Oracle Data Recorder.

Medusa Research Inc., renowned in the R/C circles for producing highest accuracy, most complete power meter the Power Analyzer PRO and the feature rich, ultra flexible PC software, PowerPROview, is pleased to present our latest product. The Oracle raises the bar for flexibility in on-board data recording, providing all of the sensor inputs of the Power Analyzer PRO, in an ultra-light (less than 20 grams) package with over 20 minutes of on-board data recording capability. Use the Oracle to record voltage, current, amp-hours, watt-hours, watts, 2 temperatures, a custom analog channel, RPM, and throttle position in your model. The Oracle also uses the same feature rich PowerPROview package our Power Analyzer PRO uses.

Oracle connects to the PC using our POWERLink data bus, through our USB to POWERLink adapter, or through the Power Analyzer PRO.

PRELIMINARY RELEASE NOTE

The February 2007 release of the Oracle allows you, our customer, to experience many of the great features the Oracle has. Thanks to our in-field upgradeability, we will be including many new and exciting features in the near future, so check our website www.medusaproducts.com frequently for the latest software, firmware and user manual updates.



Sensor inputs for Temperature, Throttle, RPM, and custom user sensors for flexibility that is unmatched

High quality and rugged surface mount construction.

Engineered in the USA, made in the USA

Available with Deans Ultra Plug connectors, or with wire leads. Both versions are less than 20 grams

CONTENTS

1 SAFETY FIRST

CAUTION CURRENT HANDLING LIMITATIONS

The Oracle is designed and built for safe use in systems carrying currents up to 100 Amps. Exceeding 100 Amps could result in damage to the equipment and possible personal injury.

CAUTION INPUT VOLTAGE LIMITATIONS

The Oracle is designed and built for safe use in systems with less than 60 Volts. Exceeding 60V will permanently damage the Oracle.

CAUTION **HARDWARE AND CONNECTIONS**

Follow proper assembly and ratings for wires and connectors. The user is responsible for attaching connectors rated to handle the voltage and current that will be applied in the user's application. Ensure that all wiring and connections are rated to handle the input or output current, and are assembled appropriately for each application. High current connections should be made by those experienced to do so.

CAUTION **APPLYING POWER**

Before connecting a battery to the Oracle, make certain there are no exposed wires or connectors that may short circuit. Connectors with exposed male conductors should never be used on batteries, use female connectors for batteries. Both the "SOURCE" and "LOAD" leads of the Oracle are hot when a battery is connected to either side. A shorted Oracle connected to a battery can supply massive amounts of current, causing fire, explosions, personal injury, and damage to the equipment.

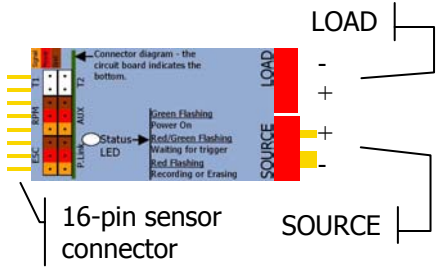
3 DIAGRAMS

The Oracle Data Recorder comes in with one of two connector options, shown to the right. For both models, the SOURCE connection is intended to be attached to the power source, such as a battery or power supply. The LOAD connection is attached to the device drawing power such as a motor speed control.

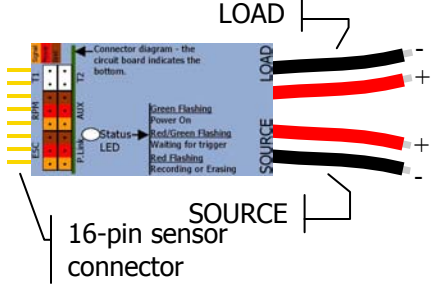
MR-DR-60100-D comes with a mated pair of Deans Ultra Plug® connectors. Polarity follows the standard Deans convention as shown.

MR-DR-60100-W comes with pre-tinned 12 gauge wires. This allows the user to attached their prefered connector type.

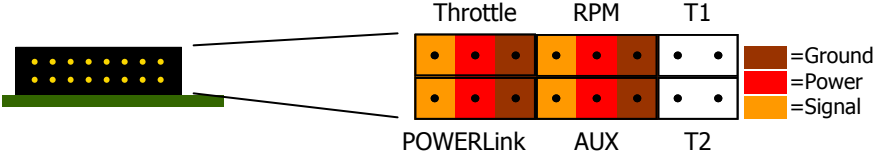
Oracle with Deans



Oracle with wire leads



Connector Diagram



The diagram above shows the 16-pin connector with the flat, label side of the Oracle facing down. The polarity of each 3-pin connector is shown wire colors of the sensors that plug into them. The 2-pin thermistor inputs, T1 and T2, are not polarized.

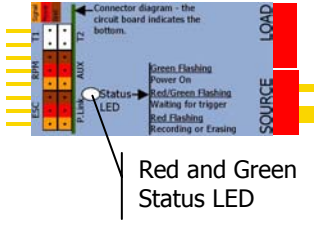
- Throttle: This input connects to the throttle channel of the receiver, and allows the Oracle to record throttle position as the model is running.
- RPM: This input connects to the RPM sensor.
- T1 and T2: Each input connects to one of two thermistor probes.
- POWERLink: This connects to the POWERLink USB adapter, or the ESC/ POWERLink port of the Power Analyzer PRO and allows the user to configure the Oracle and download data through the computer.
- AUX: This analog input allow the user of a custom analog sensor.

5 DIAGRAMS

The flat backside of the Oracle has a red/ green LED that indicates the current activity of the Oracle.

- Flashing Green: Power On
- Alternating Red/Green: Waiting for trigger
- Flashing Red: Recording or Erasing

Bottom view

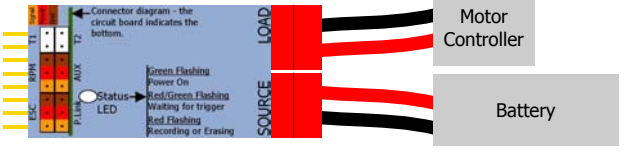


USING THE ORACLE TO MEASURE VOLTAGE AND AMPERAGE

One of the primary functions of the Oracle is to measure the voltage and amperage of the model while it is being operated in a real-world situation. To connect the Oracle, the main battery should be connected to the SOURCE side, and the motor controller is connected to the LOAD side. In addition to measuring voltage and current, the power (watts), capacity (amp-hours), and work (watt-hours) are also calculated.

The Oracle will power up once the battery is connected to the SOUCE side, and, using the factory configuration, it will be in *waiting for trigger* mode. In this mode, the Oracle will wait until the amp draw exceeds the set threshold, and then start a recording. Recording will continue until the Oracle is powered off by removing the power from the SOURCE side.

The Oracle supports multiple recordings, so the user may re-connect the SOURCE to the battery ,and then re-trigger the Oracle to start another recording without having to download the data to a computer.

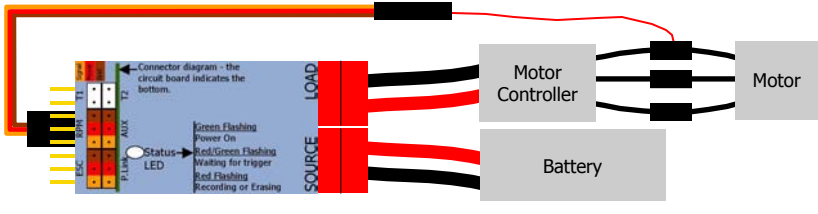


BRUSHLESS MOTOR RPM PHASE SENSOR

The Oracle can monitor RPM with the addition of the MR-RPM-002 RPM sensor. This device measures motor RPM by monitoring the voltage in one phase of the model's brushless motor.

Connect the sensor to the *RPM* input of the Oracle, observing the polarity marked on the label. Then, connect the 3.5mm connector tap in to one of the brushless motor leads coming out of the motor controller. If your system uses connectors other than this type, cut off the tap-in and splice the single red lead into your preferred type of connector.

Use the PowerPROview software to enable RPM recording and to setup the correct number of motor poles for the motor that is being monitored.



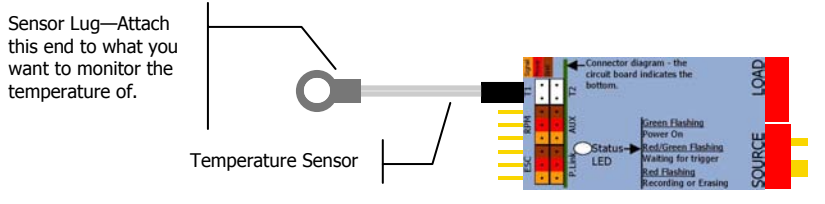
TEMPERATURE SENSORS

The Oracle supports two separate temperature channels, allowing the temperature of two devices can be monitored simultaneously.

Connect one or two sensors to T1 or T2, there is no polarity for the temperature input.

The sensor end has a lug that can be bolted to the device, or secured with adhesive, tape or strapping. Items in the model that the user would want to monitor temperature on include, but are not limited to, the motor, motor controller, and batteries.

Use PowerPROview to enable temperature recording and to configure the temperature recording in degrees Fahrenheit or Celsius.

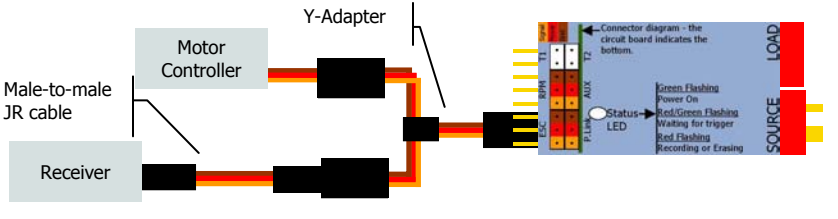


THROTTLE POSITION INPUT

The Oracle can measure the position of the throttle channel (typically channel 3 for most airplane radios) coming out of the receiver. This feature is useful in that it allows the user to correlate throttle position with data from the other channels. In addition, it can be useful for detecting radio glitches that may occur in flight and finding what conditions are causing the radio glitches.

To use this input, it is necessary to tap into the ESC to Receiver connection. A *Y-adapter* and *male to male* JR cable can be used to connect the throttle channel to the motor controller and receiver. These harnesses are available on our website (see the *Support*) section, or from most hobby stores.

The throttle input can measure receiver signals with 10µs resolution up to 2.55ms. Use PowerPROview to enable/disable throttle recording.

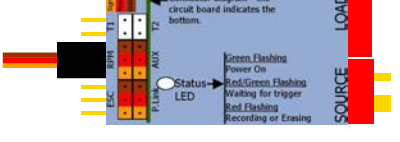


AUXILLARY SENSOR INPUT

The Aux port can be configured as a generic analog input with a linear input range of 0.1V to 2.6V. Using PowerPROview software, the user can configure gain and offset factors to apply to the data recorded to memory, as well as enable/disable the recoding of the AUX channel.

The polarity of the 3 pins used for the AUX port is shown on the label. If you are connecting a custom analog sensor, use the *Signal* (orange) and *Ground* (brown) pins, but **do not connect any signals to the Power (red) pin.** The AUX input should also not share a common ground with the LOAD side ground, doing so may results in current reading errors.

THE MAXIMUM INPUT RANGE IS –0.1V to 5.0V. VOLTAGE OUTSIDE OF THE MAXIMUM RANGE WILL CAUSE ERRONEOUS READINGS ON OTHER CHANNELS AND POSSIBLE DAMAGE TO THE ORACLE!

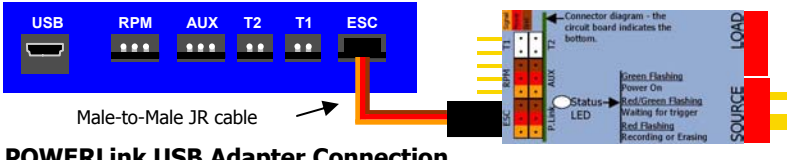


POWERLINK CONNECTION

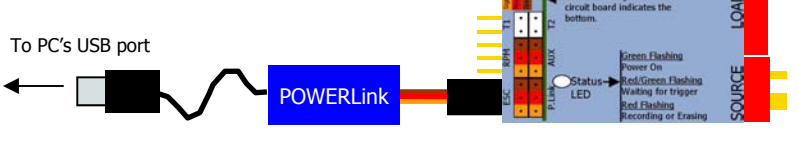
The Oracle uses a POWERLink connection to connect to the PC. Use a POWERLink USB adapter, or the ESC/POWERLink port of a Power Analyzer PRO to connect the Oracle to a PC. The included PowerPROview PC software will allow the user to upload recorded data and change the Oracle's configuration settings.

Check our website for the *latest* PowerPROview updates, Oracle, and Power Analyzer PRO firmware before connecting to the PC.

Power Analyzer PRO POWERLink Connection



POWERLink USB Adapter Connection



The Oracle is compatible with Medusa Research's PowerPROview software. Before connecting the Oracle to the PC, install the latest version of PowerPROview either from CD or downloaded from our website.

Also, make sure your computer meets or exceeds these minimum requirements:

- 400MHz Pentium II or equivalent
- Windows 98SE, 2000, XP, Vista
- 128Mb RAM or the minimum requirement for your operating system, whichever is greater.
- 50Mb free disc space
- 800x600 minimum graphics resolution
- USB v1.1 compatible port

After installation of PowerPROview, run PowerPROview. Then, connect the Oracle to a POWERLink port (see page 9) The PowerPROview software will automatically detect that the Oracle has been attached. Follow the PowerPROview prompts and toolbars to upload data and change configuration settings.

FIRMWARE UPGRADABILITY

PowerPROview can also be used to update the firmware inside the Oracle when new features are developed. We will be adding many exciting features in the near future, so check our website frequently to get the latest software and user manual updates.

13 SPECIFICATIONS

Specification	Value
Input Voltage	0 to 60 Volts
Current	-30 to 100 Amps
Power	9999 watts
Amp-Hours	+/- 999.999 Ah
Watt-Hours	+/- 9999.9 Wh
Temperature (T1 and T2)	0ºC to 130ºC (32ºF to 266ºF)
RPM	60,000 RPM(2 to 14 motor poles w/ MR-RPM-002)
Throttle input	10us to 2.55ms
AUX analog mode	0.1V—2.6V
Voltage Resolution	0.005V
Current Resolution	0.010A
RPM Resolution	100, 50, or 25 RPM, (user selectable)
Throttle Resolution	10us

Specification	Value
AUX Resolution	160uV
Sample Rate	4.4 samples/second to 1 sample/min
Offset accuracy (all channels)	+/- 1 count
Voltage accuracy	+/- 0.1% of reading +/- 1 count
Current	+/- 0.1% of reading +/- 1 count
RPM	+/- 0.1% of reading +/- 1 count
Throttle	+/- 0.1% of reading +/- 1 count
Dimensions (H x L x W)	9.5mm x 66.5mm x 28mm
Weight w/ Deans	14g
Weight w/ Wires	18g

SUPPORT

If you are still having difficulties, or have questions that aren't covered in this manual, you can contact Medusa Research for support.
Our contact information is:

World Wide Web
http://www.medusaproducts.com

E-Mail
support@medusaproducts.com

Telephone Support
Hours: Monday-Friday 10am to 5pm eastern time, excluding business holidays
Phone Number: 508.675.0200 (in Fall River, Massachusetts)

LIMITED WARRANTY

Medusa Research Incorporated warrants all Oracle Data Recorders to be free of manufacturing defects in material and workmanship for a period of 12 months from the original date of purchase. Should any defects covered by this warranty be found, the Oracle Data Recorder shall be repaired or replaced with a unit of equal performance by Medusa Research Incorporated.
In the event of a product defect during the warranty period, see the directions in the "Returns and Return Authorization" section.

LIMITS AND EXCLUSIONS:

This warranty may be enforced only by the original purchaser, who uses the Oracle in strict accordance with the information provided in this operation guide.

This Warranty does not apply to:
1. Damage resulting from failure to follow instructions provided in this operations guide-line
2. Damage resulting from misuse, reverse polarity on input or output wires, abuse or neglect.
3. Damage occurring as a result of poor solder joints, connector incompatibility, or me-chanical failure of user installed input and output connections.
4. Damage resulting from any repair or alteration performed by someone other than Medusa Research Inc.

LIMITATION OF LIABILITY

(i) UNDER NO CIRCUMSTANCES WILL MEDUSA RESEARCH, INC. BE LIABLE FOR ANY INDIRECT, THIRD PARTY, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY EXPENSES, COSTS, LIABILITY, LOSS, OR DAMAGE WHATSOEVER IN ANY CONNECTION WITH THE USE OR MISUSE OF, OR INABILITY TO USE THIS PRODUCT;
(ii) that Medusa Research, Inc. shall not be liable for any harm, loss, damages, expenses, costs, suit, claim or demand whatsoever against the user of this product;
(iii) that neither Medusa Research, Inc., nor any of its representatives, employees, officers, directors, agents, distributors, affiliated corporations or any other person, shall be responsible for nor shall incur, any liability, damages, loss, obligations or responsibility whatsoever (whether in equity, contract, tort or otherwise) for any harm, loss, reliance, or damages, whatsoever, that may arise in any connection with or result from any promise, advice, arrangement, agreement, statement, technical support or maintenance, representation, warranty, or information whatsoever, that may have been made to by Medusa Research, Inc.;

RETURNS AND RETURN AUTHORIZATION:

For warranty and repair returns, please download a *returns form* from our website.
Instructions for packaging and shipping returns are also on our website.
If you do not have access to the internet, please call or fax us at the number below.

Medusa Research Inc.
288 Plymouth Avenue
Fall River, Massachusetts
02721-4226

Phone: 508.675.0200
Fax: 508.675.0202
Email: support@medusaproducts.com
Website: www.medusaproducts.com

Medusa Research, Inc.
288 Plymouth Ave.
Fall River, MA 02721
Phone: (508)675-0200
Fax: (508)675-0202
Email: info@medusaproducts.com

Document P/N 821A00019 Rev 2
Apr 2007