Bell Mega BM-510

User Manual

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Technical Support Contact Information
Tel: +61 7 3821 5151
Email: support@mrd.com.au

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1. DESCRIPTION

1.1 INTRODUCTION

The BellMega simultaneously tests point-to-point wire Continuity and Isolation Resistance of the wiring under test. Test results are output as Audible Tones.

- Isolation Resistance- Low Tone, Latched
- Continuity- High Tone, Momentary

During test, the "LIVE" LED confirms voltage detection.

The BellMega detects Isolation Resistance within 200ms @ 110MΩ, and 20ms @ 10MΩ. Isolation Resistance detection occurs faster than Continuity detection.

If Isolation Resistance <110MΩ is detected a Low tone will be heard. The cause of the alarm must be resolved before a successful continuity test result can be completed.

The Isolation Resistance threshold is detected using the voltage divider principal. A regulated high voltage is applied to two known HV metal film resistors, and a variable resistor is used to calibrate the threshold of detection as a function of Time and Leakage Resistance.

The regulated, high voltage, DC source provides a stable reference for insulation breakdown resistance detection.

Any Leakage Resistance less than 110MΩ will trip the unit; the high voltage drop – 371V @ 0.909MΩ is not relevant. The detection of the Leakage Resistance is a function of the regulated high-voltage supply (1%) and the calibrated internal resistance.

The BellMega contains an internal fuse, to protect it from excessive current fault. This fuse is not user serviceable. The unit can be tested to verify that the unit is operating within specifications. See Section 2.2

The BellMega uses an internal battery or external power. Battery condition is advised by LEDs on the front panel. LEDs also advise if external power is connected. See Section 4.

1.2 KIT CONTENTS

The BellMega Standard kit contains one each of the following items:

#	Name
1	BellMega unit
2	Black Test Probe
3	Red Test Probe
4	Green Alligator Clip
5	Green Test Lead 4m long
6	Black Test Lead 4m long
7	Red Test Lead 4m long
8	Battery Charger
9	Carry Bag

1.3 ACCESSORIES AND REPLACEMENT PARTS

Contact MRD to obtain the following items:

Accessory	MRD Part Number
Bag	BM-510-Bag
Lead Set	BM-510-LS
Battery Charger	BM-510-BC

2. OPERATION

2.1 CHECK CALIBRATION DATE.

If Calibration is past due DO NOT use the BellMega. Arrange for the unit to be calibrated immediately (see Section 5).

2.2 SELF TEST

2.2.1 Tools required

#	Description
1	10MΩ Multimeter e.g. Fluke 87
2	Jumper lead with Banana Plug ends

2.2.2 Procedure

Step	Action		Response	Comment
1	Turn BellMega ON		BATTERY LED should be Green 500v LED should illuminate Audible Alarm may activate	Connect Charger if required
2	Press RESET to cancel alarm if required		Alarm de-activates	
3	BellMega Pre-operational tests			• Failure of any test indicates that the unit requires service or calibration • Press RESET to cancel latched tones
3.1	Test Constant Current Source. Measure current between Black & Red terminals		10mA	
3.2	Test High Voltage Reference. Measure Voltage between Black and Green terminals		500V +10V -5V	
3.3	Use a Jumper Cable to connect the BLACK Terminal to those at right	RED	High tone	
		GRN	Low tone, latched	
		8R	High tone	
		12R	Silence	
		80M	Low tone, latched	
		100M	Low tone, latched	
		150M	Silence	
3.4	Use a Jumper Cable to connect the RED Terminal to those at right	GRN	Low tone, latched	
		8R	Silence	
		12R	Silence	
		80M	Low tone, latched	
		100M	Low tone, latched	
		150M	Silence	

2.3 TESTING EQUIPMENT

Step	Action	Response	Comment
1	Turn BellMega ON	• BATTERY LED should be Green • 500V LED should illuminate RED • Audible Alarm may activate	• Connect Charger if required • Continuity alarm is deactivated if battery voltage falls below 5.8V
2	Press RESET to cancel alarm if required	Alarm de-activates	
3	Complete BellMega Self-Test if required		
4	Plug the Green Test Lead into the Green Alligator Clip		
5	Connect Red Test Probe to Red Test Lead		
6	Connect Red Test Probe to Red Test Lead		
7	Plug Red, Green and Black Test leads into the matching coloured sockets on the BellMega		
8	Connect BellMega Earth Lead to Earth Point on Equipment-under-test (EUT)		
9	Ensure all EUT Earths are terminated		
10	Touch Red and Black Probes to End terminals of EUT circuit under test. Make observations.	"LIVE" LED activates	If Voltage is >23V
		Low tone	• Isolation Resistance detected (less than 110mΩ) • Press RESET to cancel tone. • Investigate cause of alarm
		High tone	• Circuit continuity confirmed • Isolation Resistance is greater than 110mΩ
		Silence	• Open Circuit or, • BellMega Faulty or, • Battery flat, or • Poor technique

2.4 TROUBLESHOOTING

During extreme humidity environment and low air circulation, the Isolation Resistance Alarm may activate incorrectly. There are two common causes.

Cause	Remedy
Old test leads	Replace test leads with new 1kV PVC 24/.020 wire. Silicone test leads are usually not suitable due to lower mechanical strength
Surface resistivity on EUT	Improve air circulation. Use a fan to reduce surface condensation

The BellMega may be calibrated to suit special requirements. Special Calibrations must be clearly marked on the unit.

3. SAFETY

3.1 RISK OF ELECTRIC SHOCK

The BellMega is a 500V HIGH VOLTAGE power supply and there is a risk of non-lethal shock. This can be avoided by careful usage and handling. The product design reduces the chance of shock.

- Internally, the Green Earth Terminal is connected to the Enclosure and Handle
- The Enclosure is powdercoated to provide electrical insulation
- The Red High Voltage Terminal has approximately 200k Ohms series resistance between Earth terminal/Enclosure/Handle and probes.

To avoid electric shock occurring:

- Do not turn unit ON whilst two test leads are touching
- Do not touch leads to the metal handle.

3.2 CAUTIONS

- Take the precautions above to avoid electric shock
- Do not use the BellMega if it is wet
- Disconnect all electronic equipment from wiring before Bell testing
- Ensure no flammable gases or other flammable substances are present when Bell testing.
- Do not open the Enclosure. The BellMega contains no user serviceable parts.

4. CHARGING

4.1 OVERVIEW

The BellMega has an internal 1.3AHr 6v Sealed Lead Acid (SLA) Battery. The unit's circuitry protects the battery from overcharging or excessive discharge.

The BellMega is charged using a plug-in power supply. If the battery is discharged, the BellMega can be operated using the plug-in power supply.

The charger in the BellMega is a constant voltage and current limited type, and requires a suitable plug pack power supply.

4.2 BATTERY/CHARGING CONDITION

Two LEDs provide battery and charging status information. There is no indicator for Fully Charged.

LED	Response	Status	Action Required
BATTERY	Green	OK	None
	Red	Low Battery <5.8V	Connect charger now
	RED Flashing	Critically Low <5.5V Continuity tone disabled Battery isolated to prevent excessive discharge	Connect charger now
	OFF	Battery isolated to prevent excessive discharge	Connect charger to operate unit
DC IN	GREEN	External power connected- Battery is charging	None
	OFF	No external power	Connect if required

4.3 OPERATING THE BELLMEGA WHILE CHARGING

The unit can be operated while being charged, if:

- Supply is isolated from the mains earth
- Fully insulated power leads are used.

4.4 BATTERY CARE

- Recharge the battery as soon as possible after use. The battery does not need to be fully discharged before recharging
- For best results the unit should be charged for 3 - 4 hours
- Charge the battery fully if no immediate usage is planned, or if the unit is to be stored. Recharge again before use
- Turn the power switch OFF before storage
- The battery capacity will reduce if unused for more than six months. Normal capacity will be restored after two or three charge & discharge cycles.

5. CALIBRATION, SERVICE AND REPAIRS

500V DC is present within the BellMega enclosure and may deliver a non-lethal shock.

The BellMega contains no user serviceable parts. Only Authorised Persons may open the enclosure. Unauthorised access will void existing Calibration and Warranty.

Calibration is due every 12 months.

An Authorised Person or an Approved Calibration Laboratory must perform Calibration, Service and Repairs. Calibrated, traceable test equipment must be used in accordance with ISO/IEC 17025. Contact MRD for the name of your nearest agent.

MRD Rail Technologies Pty Ltd
235 South Street, Cleveland QLD Australia 4163
Tel: +61 7 3821 5151
Email: sales@mrd.com.au

6. SPECIFICATIONS

Specification	REV C
Insulation leakage trip	110M ohm
Insulation leakage trip response time	250 ms @ 100M / 100pf
Insulation voltage	500V dc +10/-5% @ 10MΩ
High voltage supply	500V dc regulated 1%
Insulation short circuit current	1.5mA max
High voltage drop at terminals	490V @ 5MΩ 371V @ 0.909MΩ
Continuity threshold	10Ω
Continuity constant current	10mA +/- 1mA
Continuity applied voltage	5V dc+/- 2v (red = +)
Continuity response time	400ms +/- 100ms
Live circuit tolerance	250V ac/dc (350v peak)
Live circuit LED operates at	25V ac/dc
Operating supply range (battery)	5.8 to 7.2V
Low battery warning LED at	5.8V +/- 0.2V
Low battery disable	5.5V
Operating current (battery)	75mA
Operation time (fully charged battery)	~8 hours
Operation time (using plug pack)	Indefinite
Plug pack type	9-24V ac/dc @ 600mA (min) EARTH ISOLATED
Battery	Sealed Lead Acid HT6V1.3 6V 1.3AH/20hr
Charge time	3 hours minimum
Insulation sound frequency lo	1.7 kHz +/- 100Hz
Continuity sound frequency hi	2.2 kHz +/- 100Hz
Switch mode cycle frequency	40~70 kHz (factory set)

Physical characteristics	
Dimensions (Main unit)	184 x 116 x 90mm
Dimensions (Entire Kit in Bag)	250 x 150 x 250mm
Mass (Entire Kit)	2.3kg

End of Manual