



GEISMAR®

Geismar (UK) Limited

Owner's Manual

Laser System for Track



Model: - Opal-*mini*

PADs No. 0057/047570

Issue 03 – February 2015

Contacting Us:

Geismar (UK) Limited

Salthouse Road
Brackmills Industrial Estate
Northampton
NN4 7EX
England

General / Sales Enquiries:

Telephone +44-(0)1604-769191
Facsimile +44-(0)1604-763154
E-Mail uk@geismar.com

Technical / After Sales Support:

Telephone +44-(0)1604-432901
Facsimile +44-(0)1604-763154

Spare parts:

Telephone +44-(0)1604-432907
Facsimile +44-(0)1604-763154

TABLE OF CONTENTS

Section	Description	Page No.
	ADMENDMENTS	4
	CONFIDENTIALLY NOTICE	5
	CE DECLARATION OF CONFORMITY	6
1	INTRODUCTION	7
1.1	PACKING LIST	7
1.2	INITIAL INSTRUCTIONS	7
2	SYSTEM OPERATION	8
2.1	SYSTEM SET UP	8
2.2	OPERATION	9
2.3	TRACK SQUARE FEATURE	11
2.4	VERSINE MEASURING	12
3	POWER SOURCES	13
4	ACCESSORIES (OPTIONAL)	14
4.1	VERSINE CALCULATOR AND DATA STORAGE	14
4.2	SET UP	15
4.3	USER INTERFACE	15
4.4	CHANGING THE LANGUAGE	18
4.5	WIDE TARGET PLATES FOR CURVES	18
4.6	CAR CHARGER	18
5	MAINTENANCE	19
6	SPECIFICATION	20
7	SPARE PARTS	21

The information, drawings and any other descriptive matter set out in this publication are the confidential and copyright property of Geismar (U.K.) Limited and must not be disclosed, loaned, copied or used for any manufacturing, tendering or for any other purpose without their written permission.

The data and information contained in this publication are not binding and the manufacturer reserves the right to make modifications at any time, for technical or commercial reasons or in order to adapt to the legal requirements in the various countries.

AMENDMENTS

Change Number	Page(s) Amended	Date	Authorised By
1	First Issue	September 2013	B Bentley
2	Para 2.3 revised and picture selection revised to show red feet marking. IP rating corrected to IP64. Revised Declaration of Conformity added.	November 2014	A. Leyland
3	Revised Declaration of Conformity Rev c added. Para 2.3 modified	February 2015	A.Leyland

CONFIDENTIALITY NOTICE

The data and information in this publication are not binding and the manufacturer therefore reserves the right to make modifications at any time, for technical or commercial reasons or in order to adapt to the legal requirements in the various countries. Reproduction of any or this entire document is strictly forbidden without the prior written approval of GEISMAR. The manual is an essential part of the Garnet digital track gauge and should be kept for the lifetime of the system. Any amendments or modifications to the manual provided by Geismar must be kept with it and/or included in the manual itself.

DESCRIPTIVE MATTER AND ILLUSTRATIONS

Descriptive matter, illustrations, dimensions and weights issued by the company are typical and shall not be held as binding. The company reserves the right to alter patterns and designs without notice.

TRADEMARKS

All trademarks mentioned herein are the property of their respective owners.

LICENCE AND WARRANTY

The software/firmware, which accompanies this license, (the Software) is the property of Geismar or its licensors and is protected by copyright law. While Geismar continues to own the Software, you will have certain rights to use the software after your acceptance of the License. Your rights and obligations with respect to the use of this Software are as follows:

You may:

- (i) Use one copy of the Software on a single gauge; if the Software is provided in more than one language version of the Media then you are licensed for one language version per Software title contained on the media (you may not make copies of different language versions) and you may not transfer such other versions to another person or allow another person to use such other versions;
- (ii) After written notice to Geismar, transfer the Software on a permanent basis to another person or entity, provided that you retain no copies of the Software and the transferee agrees to the terms of this Agreement.

You may not:

- (i) Copy the documentation that accompanies the Software
- (ii) Sublicense, rent or lease any portion of the Software
- (iii) Reverse engineer, decompile, disassemble, modify, translate, make any attempt to discover the source code of the Software, or create derivative works from the Software; or
- (iv) Use a previous version or copy of the Software after you have received a disk replacement set or an upgraded version as a replacement of the prior version. All copies of the prior version must be destroyed.

Limited Warranty:

Geismar warrant that the media on which the Software is distributed is free from defects for a period of sixty (60) days from the date of delivery of the Software to you. Your sole remedy in the event of a breach of this warranty will be that Geismar will, at its option, replace any defective media returned within the warranty period. Geismar does not warrant that the Software will meet your requirements or that the operation of the Software will be uninterrupted or that the Software will be error free.

THE ABOVE WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT.

Disclaimer of Damages:

REGARDLESS OF WHETHER ANY REMEDY SET FORTH HEREIN FAILS OF ITS ESSENTIAL PURPOSE, IN NO EVENT WILL GEISMAR BE LIABLE TO YOU FOR ANY SPECIAL, CONSEQUENTIAL, INDIRECT OR SIMILAR DAMAGES, INCLUDING ANY LOST PROFITS OR LOST DATA ARISING OUT OF THE USE OR INABILITY TO USE THE SOFTWARE EVEN IF GEISMAR HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

SOME STATES DO NOT ALLOW THE LIMITATION OR EXCLUSION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

IN NO CASE SHALL GEISMARS' LIABILITY EXCEED THE PURCHASE PRICE FOR THE SOFTWARE OR THE INSTRUMENT ON WHICH THE SOFTWARE OPERATES WHICHEVER IS THE HIGHER AMOUNT.

The disclaimers and limitations set forth above will apply regardless of whether you accept the software.

General:

This Agreement will be governed by the laws of England. This Agreement may only be modified by a license addendum, which accompanies this license, or by a written document, which has been signed by you and by Geismar. Should you have any questions concerning this Agreement, please contact the sales agent through whom you purchased the gauge.

EC Declaration of Conformity

In accordance with EN ISO 17050-1:2004

We : **Geismar (UK) Limited**
 Of : **Salthouse Road**
Brackmills Industrial Estate
Northampton NN4 7EX
England

In accordance with the following Directives

<i>EN Directive 2006/42/CE</i>	<i>Machinery Directive</i>
<i>EN Directive 2014/35/EU</i>	<i>Low Voltage Directorate</i>
<i>EN Directive 2014/30/EU</i>	<i>Electromagnetic Compatibility</i>

Hereby declare that:

Equipment Type : **Opal-mini and Opal-Mini MSP**Serial Numbers : **14-001 and above**

Are in conformity with the applicable requirements of the following documents

Ref. No	Title	Edition/Date
BS EN 50121-1	Railway Applications – Electromagnetic compatibility. General Requirements	2006
BS EN 50121-4	Railway Applications – Electromagnetic compatibility. Emission and immunity of the signalling and telecommunications apparatus	2006
BS EN 13977	Railway Applications. Track. Safety requirements for portable machines and trolleys for construction and maintenance	2011
BS EN 60825-1	Safety of laser products. Equipment classification and requirements	2007



M. D. Clarke
 UK Technical Manager
 On: 5th January 2015

Attention: This declaration of conformity is issued under the sole responsibility of the manufacturer.
 Any modification of this machine without prior written agreement of the manufacturer will invalidate this certificate

ANY ALTERATIONS OR MODIFICATIONS TO THIS EQUIPMENT OR THE USE OF AFTER-MARKET SPARE PARTS, WITHOUT THE EXPRESS WRITTEN AGREEMENT OF GEISMAR (UK) LIMITED, MAY INVALIDATE THE WARRANTY AND NETWORK RAIL PRODUCT ACCEPTANCE AND ADDITIONALLY MAY INVALIDATE THE CE CERTIFICATION TOO

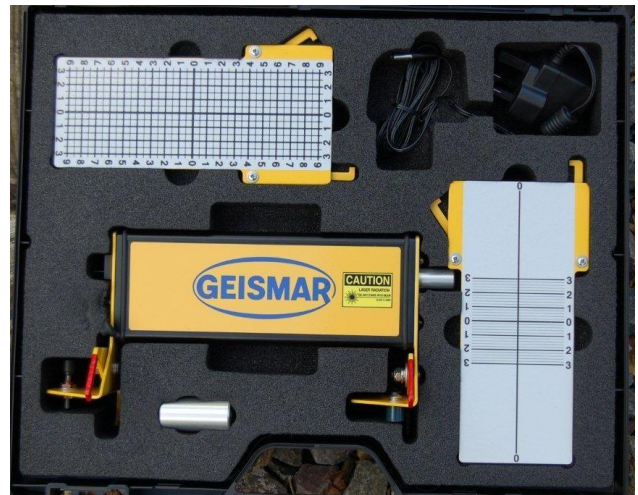
1. Introduction

The Opal-mini is a modern laser alternative to sighting boards enabling night time working. It is a portable instrument for measuring horizontal straightness over a variable base (levelling) for traditional packing (hand tamping) and MSP work. Additional features such as versine measuring and squaring are also achievable. Over a distance up to 30metres the Laser and Linear Target provide a level against which an intermediate target can be inserted to establish any change in level and alignment. A magnetic base on all components means that they are free standing and especially in packing work the intermediate Target can be left in position whilst any jacking and packing is in progress so saving time.

1.1. Packing List

The Opal-mini kit is supplied with the following components. If any of these items are missing then contact your local Geismar representative.

- 1 off Intermediate Graduated target plate (Levelling and Packing)
- 1 off MSP Linear Target plate (MSP Measuring)
- 1 off laser source
- 1 off battery charger
- 1 off Operator Manual
- 1 off 90° Prism (Switch Blades and Crossing Noses)
- 1 off Heavy Duty Storage Case



1.2. Initial Instructions

The Opal-mini laser source uses a rechargeable NiMH battery. Before the instrument is first used, the battery must be fully charged using the procedure outlined in Chapter 3 of this manual.

WARNING

The Opal-mini uses a 1mW Class 2 laser this may damage the eye if the operator stares directly into the beam.

UNDER NO CIRCUMSTANCES SHOULD THE OPERATOR EVER LOOK DIRECTLY AT THE BEAM AND NEVER DIRECT THE BEAM INTO ANY PERSONS EYES.

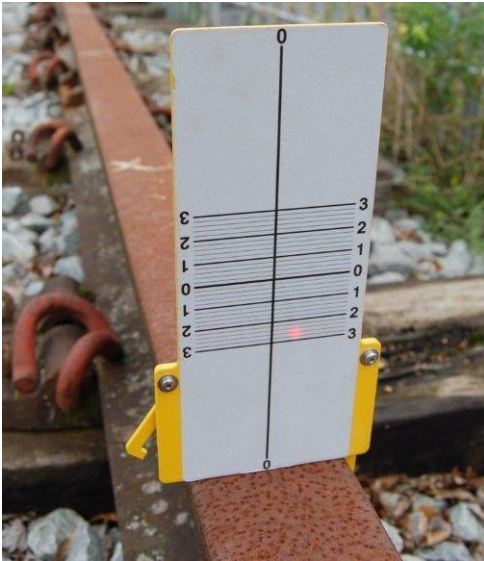
SWITCH OFF WHEN NOT IN USE.

2. System Operation

The Opal-mini is extremely simple to operate and can be operated by one person.

2.1. System Set Up

On opening the transport case, the MSP Linear Target plate (MSP Measuring) should be removed first and then the Intermediate Graduated target plate (Levelling and Packing).



MSP Linear Target plate (MSP Measuring)



**Intermediate Graduated target plate
(Levelling and Packing)**

The laser source should then be removed from the transport case



Laser source

2.1.1 Setting Swivel Feet

The laser and targets are each fitted with swivel feet and magnets for secure location on the railhead. The swivel feet allow the equipment to use either the running edge or field side of the rail head as a reference. The swivel feature also allows the units to be transferred between running rails or turned 180° on the rail head with minimum adjustment i.e. by simply adjustment of the swivel feet to maintain the same reference edge.

It is imperative that when setting the position of the swivel feet that they are adjusted firmly to their respective position on the laser and against the rail head.

Swivel Feet



2.2. Operation

2.2.1 Having identified the area for measurement/levelling, place the Laser and the Linear Target Plate on the extreme ends of this area facing each other up to 30metres apart. Ensure these positions are outside any track irregularities and that the swivel feet are in contact with the relevant side of the rail head – usually field face.

Ensure that all magnets are in contact with the rail head.



2.2.2 Turn the laser on using the green ON/OFF switch



Switch OFF



Switch Mid Position



Switch ON

If the green ON/OFF switch illuminates when it is in the Mid Position, this indicates that the laser battery is between 80% and 100% charged.

2.2.3 Adjust the position of the laser spot using the adjusting screw at the rear of the laser until the laser is centred on the zero position of the Linear Target Plate.

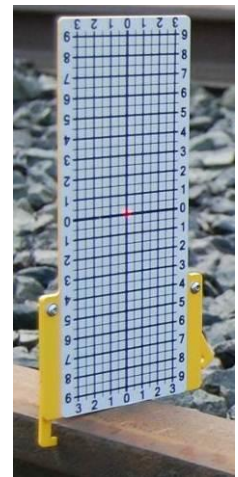
NB In actual fact the above procedure could be done over a nominal distance of say 1.5 metres so that when set up over the eventual working distance, minimal (if any) adjustment will be necessary.

Adjusting screw



2.2.4 Place the Intermediate Graduated Target Plate on the rail head immediately above the first sleeper within the length being measured. Ensure that the magnets and the swivel feet are in contact with the rail head. The centre of the laser dot will now indicate how low the rail is and how much packing/lift is required. The sleeper can now be jacked up to a level position such that the centre of the laser dot is in line with the centre of the target.

As shown, the sleeper can be jacked and packed with the target still in position.



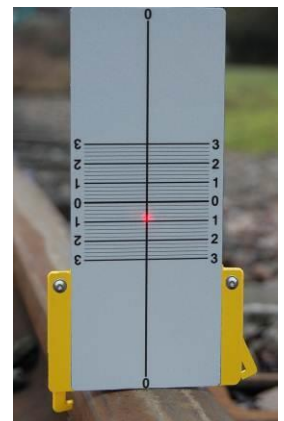
2.2.5 Remove the Intermediate Graduated Target and check that the centre of the laser dot on the Linear Target Plate is still central and so indicating that there has been no disturbance to the level.

2.2.6 Repeat the above procedure for all sleepers between the laser and the Linear Target plate.

2.2.7 Alternatively for MSP work the Intermediate Graduated Target Plate need not be used. In this case proceed as follows:-

2.2.8 Set up as paragraph 2.2.1

2.2.9 For MSP work where the procedure is to note the value of displacement, continue by placing the Linear Target Plate over each sleeper in sequence. Ensure that the magnets and swivel feet are in contact with the rail head. The amount of displacement can be viewed in the centre of the laser dot and noted. The Linear Target Plate is calibrated in 2mm sections each corresponding to 1 x canister of chippings.



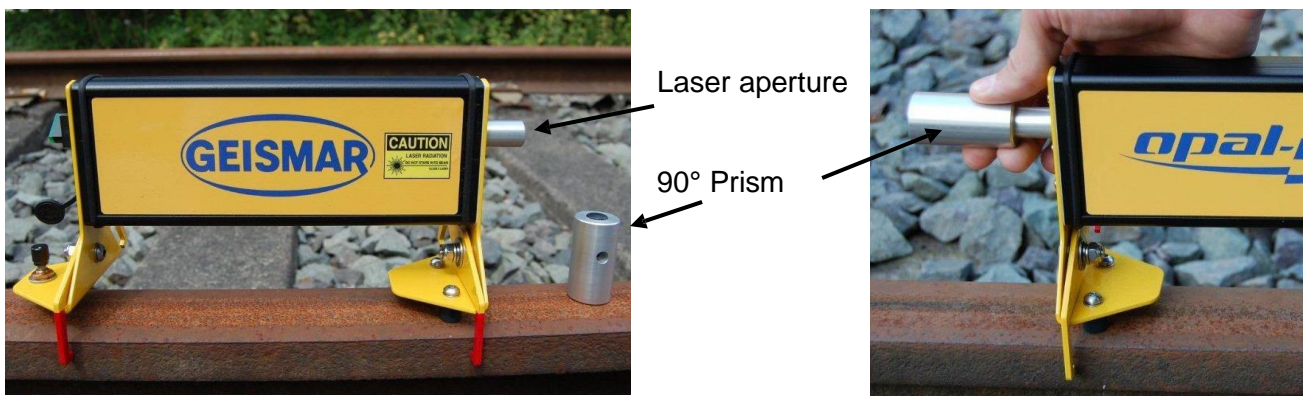
2.3. Track Square Feature

A track square feature for providing a 90° measurement is available by means of a detachable prism. Ideal for applications such as Setting Up Switches and Alignment of Crossing Noses for removal and installation work.

IMPORTANT – To use this feature the unit **MUST** lie parallel along the length of the rail head with the red portion only of the swivel feet in **full** contact with the outside edge (field side) of the rail head.

To ensure that the unit is parallel with the rail head set it up with any of the targets approx 1.5 metres distance away on straight rail. Adjust the laser beam until it is positioned on the horizontal centre of the target. If the beam does not naturally locate with the vertical centre it means that either the swivel feet are not fully located or the rail edge is irregular. If the rail edge is an issue, a solution is to raise the rear swivel feet (the ones near the adjusting screw) so that they cannot come in contact with the rail head. and adjust the rear of the unit until the laser is in the correct position. Take care not to disturb the rear of the unit when fitting and rotating the prism.

2.3.1 Insert the 90° Prism into the laser aperture (push fit) and locate on railhead as described above.



2.3.3 Switch laser on and holding the laser unit lightly in position, rotate the Prism until the laser dot is located on the rail head in line with or to establish a reference position and release. Adjust the lateral position of the unit as necessary. Now swivel the Prism until the laser dot is located on the opposite rail face or crossing to establish a right angle position and release. **DO NOT** keep hold of the prism once rotation has been completed. Typical example below.



2.4. Versine Measuring

Using only the Laser and Intermediate Graduated Target the Opal-mini can be used for measuring versine with just two personnel.

2.4.1 If several measurements are to be taken in sequence the direction of movement will be such that the target follows the Laser i.e. the Laser is moved backwards.

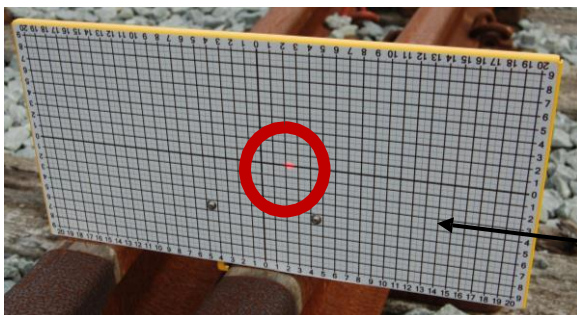
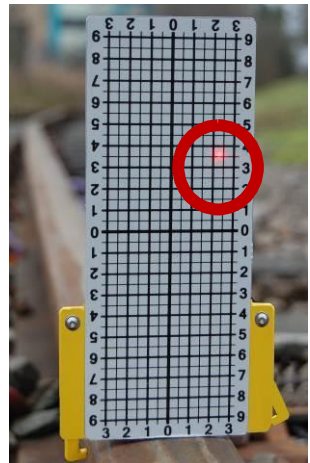
2.4.2 Mark out the maximum chord length (up to 30m) and corresponding mid-point. Place the Laser and Intermediate Graduated Target at either end of this length facing each other and in the correct operational sequence. Set up as previously described.

2.4.3 Switch on the Laser and adjust so that the centre of laser dot is positioned in the centre of the Graduated Target. If any lateral adjustment is required this can be done by releasing the rear swivel foot and moving the rear of the Laser manually whilst the magnets are still touching the railhead and the front foot is in contact with the rail edge.



2.4.4 Move the Intermediate Graduated Target to the mid chord point. The centre of the laser dot on the target will indicate any displacement (versine) vertically or laterally.

NB Some users find it easier and more consistent to use the edge of the laser dot rather than its centre as a reference.



Optional wider target

2.4.5 If further measurements are required, move the laser backwards to re-establish the chord length between the Intermediate Graduated Target. Repeat procedure.

(Optional software is available for the storage of collected measurements including automatic calculation and storage of the calculated radii).

3. Power Supplies

The Opal-mini has a battery pack in the laser module.

To charge the batteries connect the external charging unit to the socket of the laser box and connect to a suitable mains supply. The charging units are 220-240VAC 48/60 Hz and so can be plugged into any standard socket without harm. The charging unit will automatically start to charge the batteries when plugged in.

Battery charger connection



The lifetime of a single charge will be approximately 40 hours continuous use; therefore, a single charge will last a considerable time with light usage.

When not in use the unit should NOT be left on charge, but after a significant period of use the batteries should be recharged overnight.

Under normal operating conditions there should be no need for a monthly discharge of the Opal-mini batteries however if the lifetime of the instrument is becoming much shorter, then a complete discharge cycle may restore the battery life. Leaving the laser switched on will eventually discharge the battery. When fully discharged, charge for 24 hours.

4. Accessories (optional)

4.1. Wide target plates for curves

1 off Wide MSP Linear Target plate for use on curves

1 off Wide Intermediate Graduated Target plate for use on curves



4.2. Car Charger

Picture not available.

5. Maintenance of the Equipment

There are no user maintainable parts to the standard system. Provided the Opal-mini is handled with care and the basic operating instructions are adhered to, only minimum maintenance is required.

ALWAYS REMEMBER THAT THE Opal-mini IS AN ACCURATE MEASURING INSTRUMENT AND NOT A PIECE OF RAILWAY RUNNING EQUIPMENT. AS WITH ANY INSTRUMENT INTENDED FOR USE ON RAILWAYS, IT IS DESIGNED TO OPERATE IN THE RAILWAY ENVIRONMENT BUT MUST AT ALL TIMES BE HANDLED WITH CARE.

After use clean all rail contacts of grease or dirt.

Check the target plate for tears in the target or dirt on the plate, these should be kept clean, and can be washed with a light detergent if necessary.

Calibration of this equipment is not necessary BUT operators should test at regular intervals for the accuracy of the 90⁰ Prism. This can be done by checking against a known right angle. If there is any major discrepancy and/or if the swivel feet are damaged or distorted this feature should not be used and the complete Opal-mini unit returned to GEISMAR for repair.

6. Specification

Measurements

Intermediate Graduated Target plate:	-	-90 to +90mm Vertical -30 to +30mm Horizontal Measurement accuracy +/-1mm
MSP Linear Target Plate	: -	-30 to +30mm Measurement accuracy +/-1mm

(Optional wider targets) -200 to +200mm - accuracy +/- 1mm)

Batteries

	Integral rechargeable NiMH
Charging	Via external universal input charging unit
Charging Time	24 hours for complete charge

Weight

Source	0.90 Kg
Target	0.25 Kg. each

Weather proofing

IP64

Shipping case

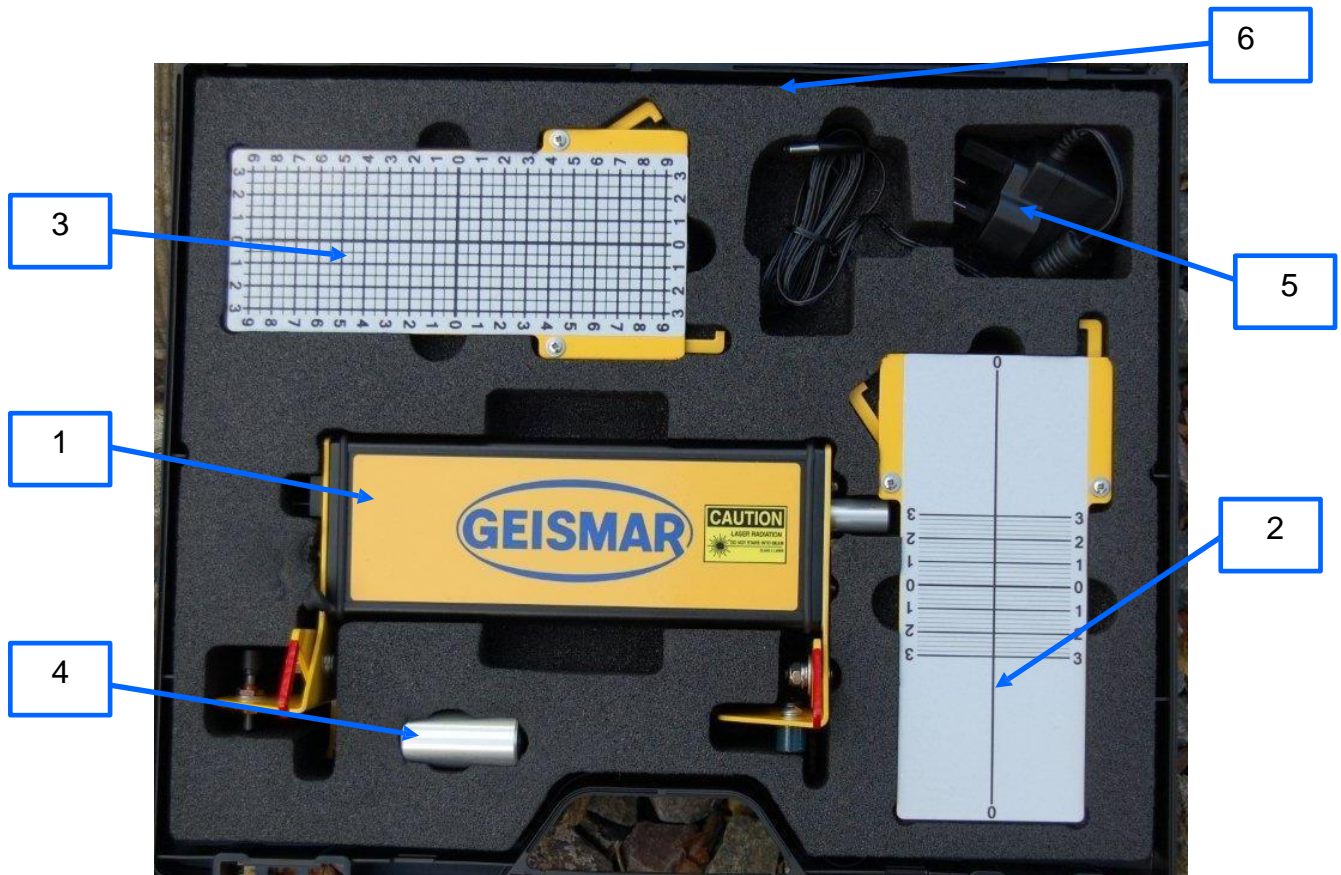
Size	460mm long x 390mm high x 180mm wide
Weight	3.15 Kg

7. Spare Parts

INDEX

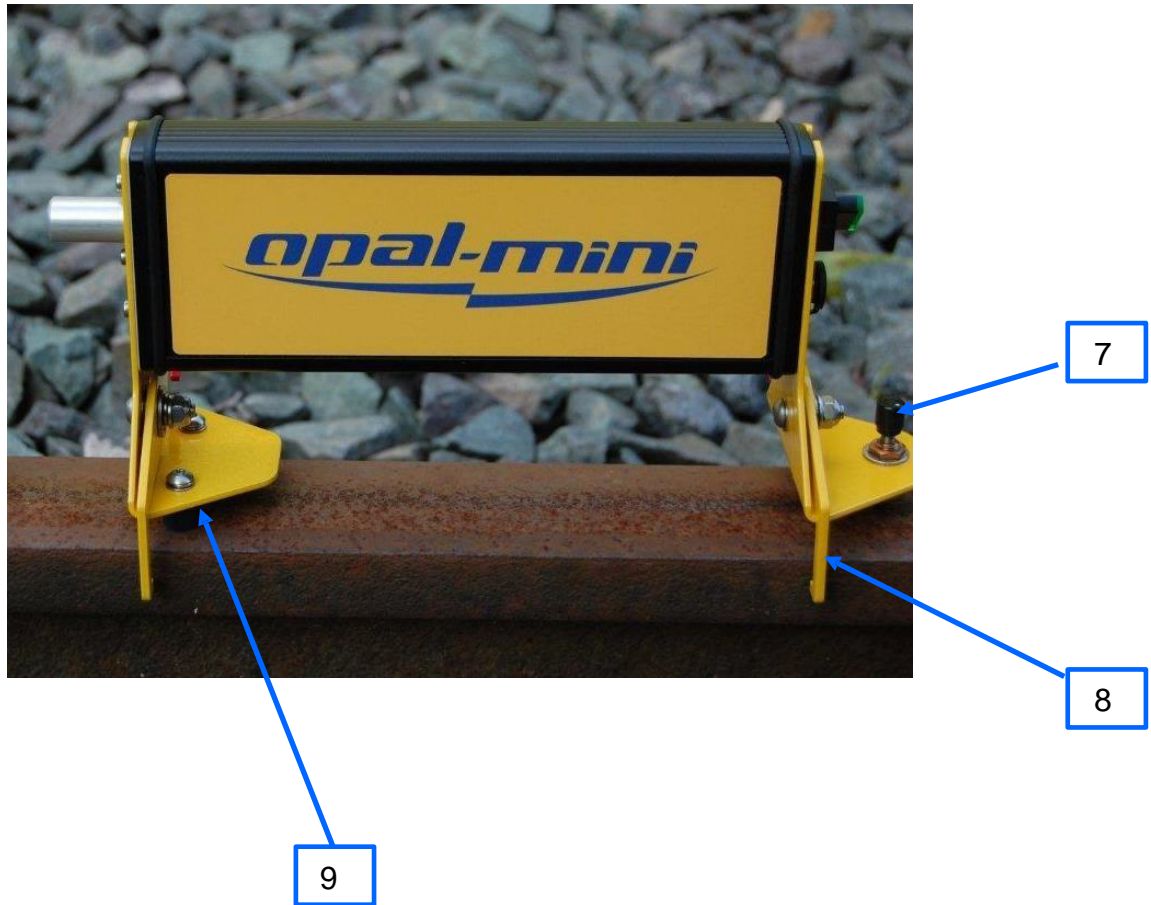
Section	Description	Page Number
7.1	ASSEMBLY	22
7.2	LASER UNIT	23
7.3	FINE ADJUSTER	24
7.4	RAIL GUIDE and MAGNETS	25
7.5	INTERMEDIATE GRADUATED TARGET PLATE	26
7.6	MSP LINEAR TARGET PLATE	27
7.7	OPTIONAL EXTRAS	28

7.1 ASSEMBLY



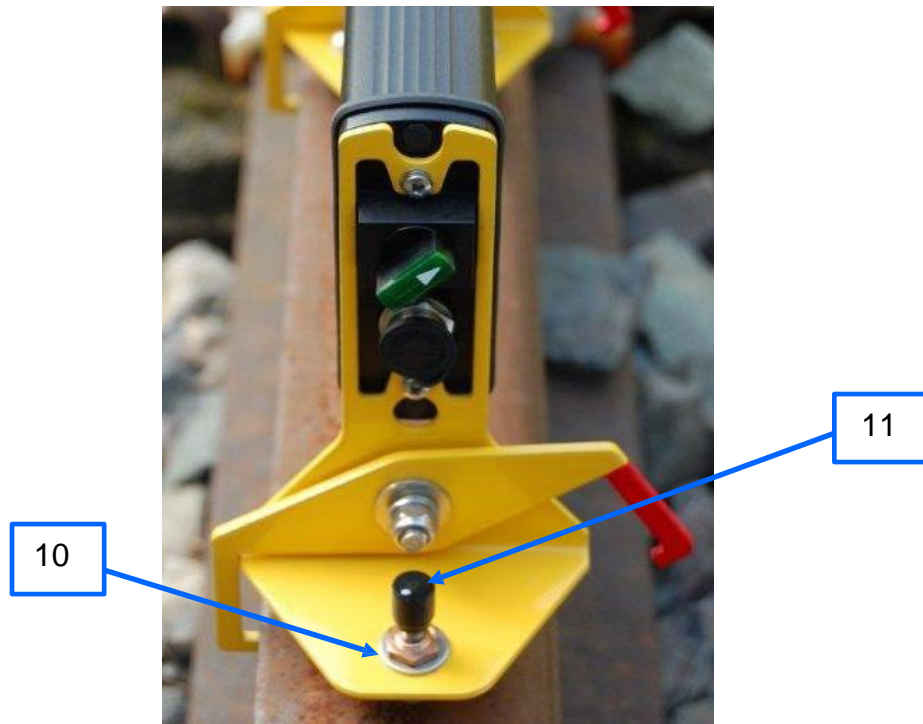
Item No	Qty per Unit	Description	GUK Part No.
1	1	Laser Unit	UKM00415
2	1	MSP Linear Target Plate	UKM00417
3	1	Intermediate Graduated Target Plate	UKM00411
4	1	90° Prism	UKM00439
5	1	Battery Charger	UKM00440
6	1	Heavy Duty Storage Case	UKM00434

7.2 LASER UNIT



Item No	Qty per Unit	Description	Page No.
1	1	Laser Unit	
7	1	Fine adjuster assembly	24
8	2	Rail guide	25
9	2	Magnet Bi pole 12.7 o/d x 11.6 long	25

7.3 FINE ADJUSTER



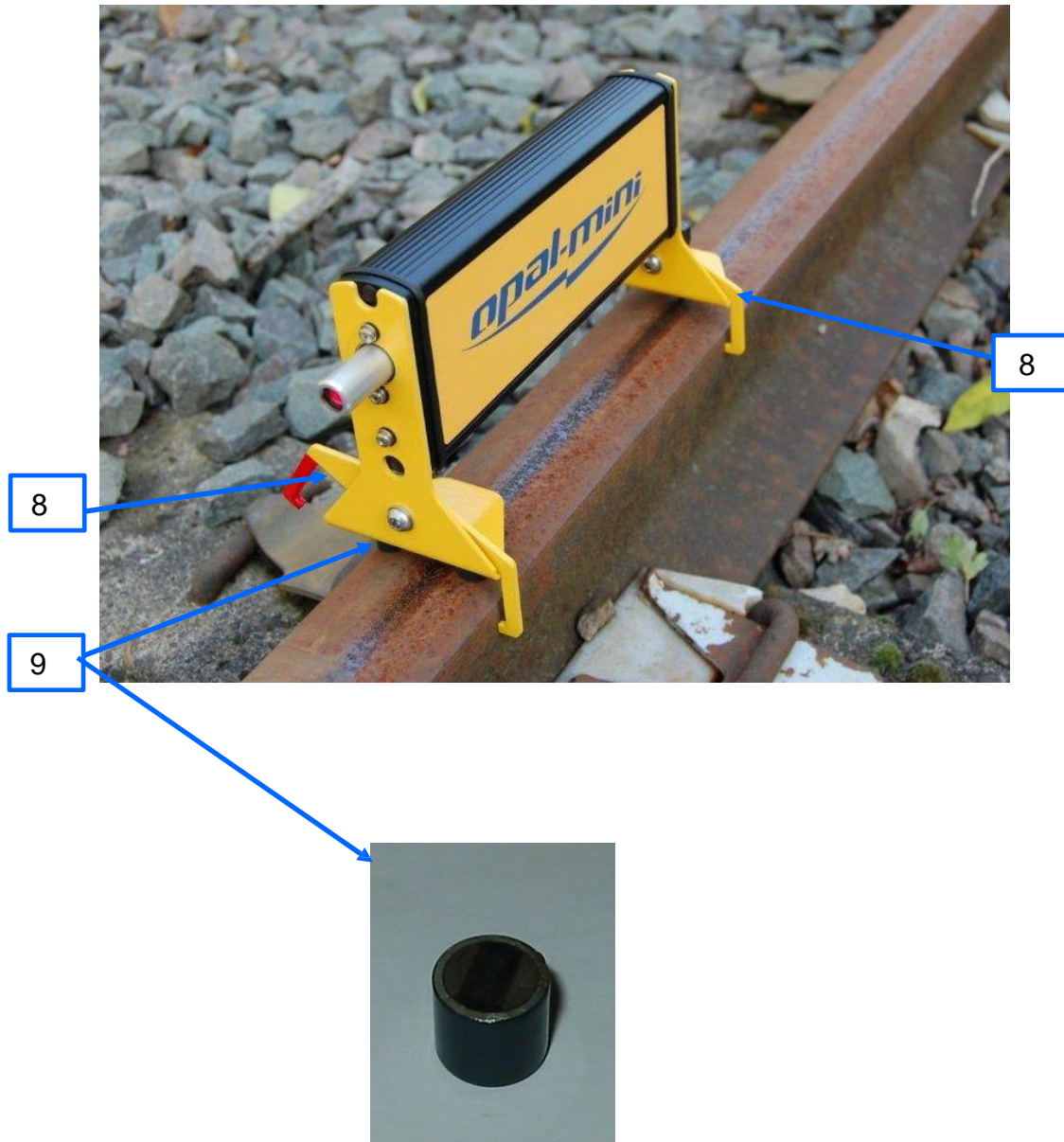
Item No. 10



Item No. 11

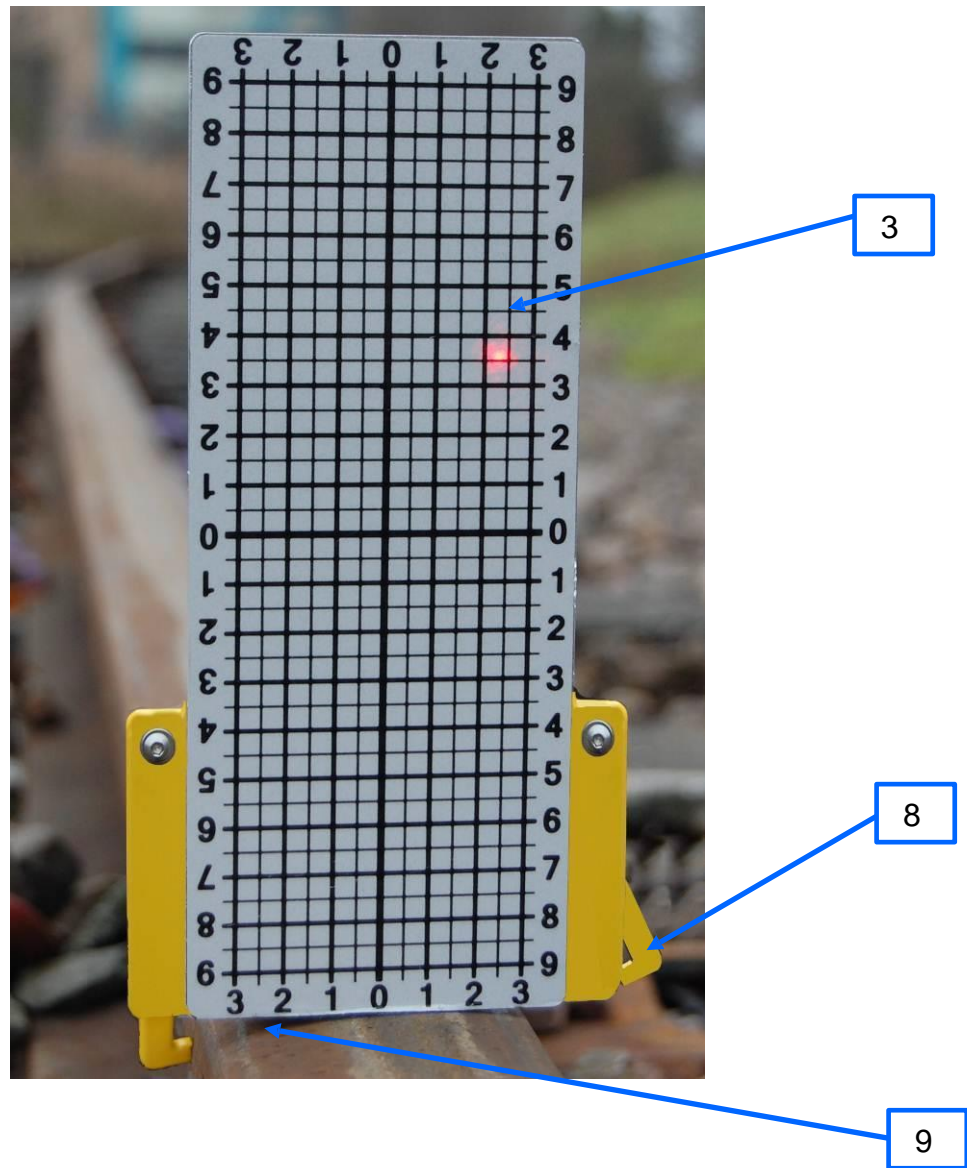
Item No	Qty per Unit	Description	GUK Part No.
10	1	Fine adjuster nut	UKM00437
11	1	Fine adjuster with knob	UKM00436

7.4 RAIL GUIDE AND MAGNETS



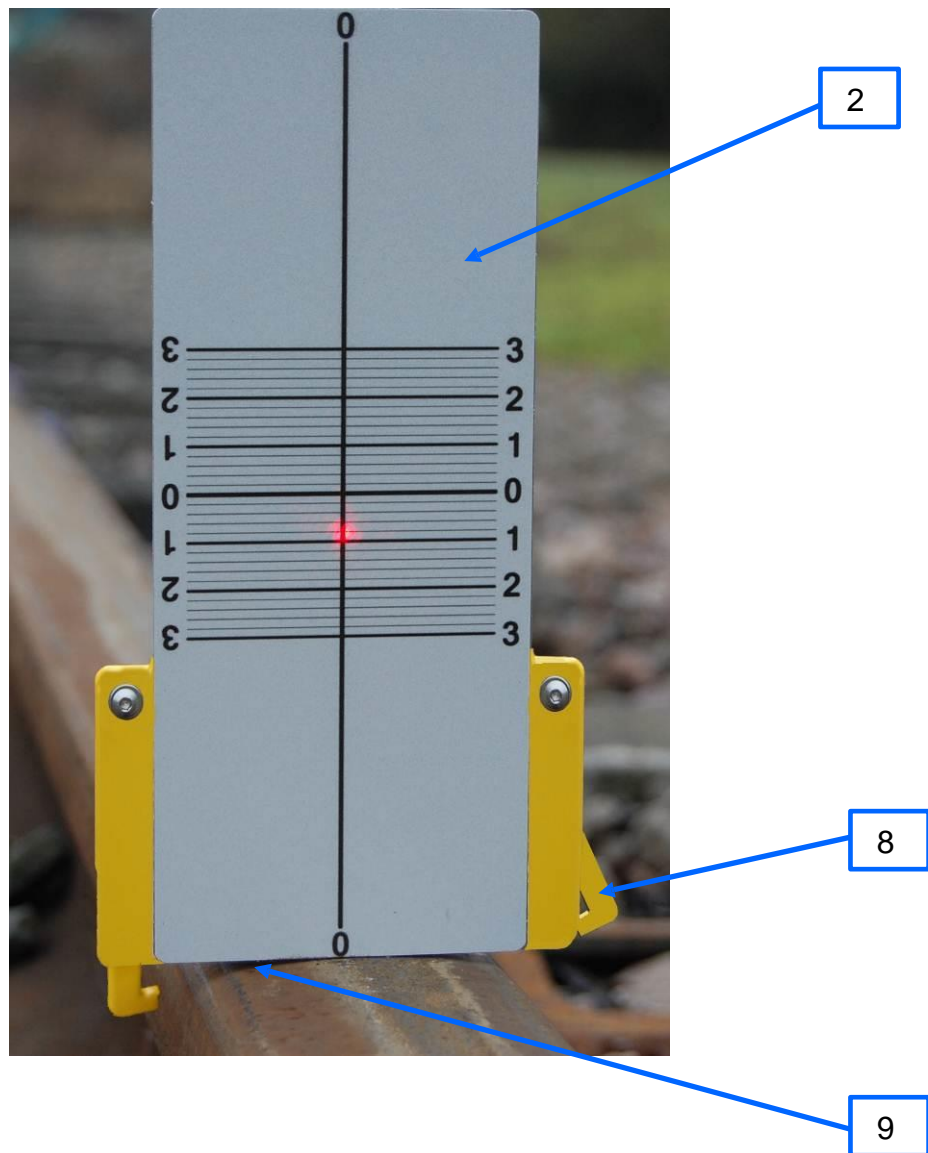
Item No	Qty per Unit	Description	GUK Part No.
8	2	Rail Guide	UKM00438
9	2	Magnet Bi pole 12.7 o/d x 11.6 long	UKM00435

7.5 INTERMEDIATE GRADUATED TARGET PLATE



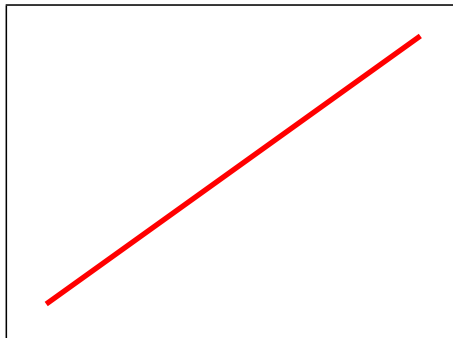
Item No	Qty per Unit	Description	GUK Part No.
3	1	Intermediate Graduated Target Plate Assembly	UKM00411
8	1	Rail Guide	UKM00438
9	3	Magnet Bi pole 12.7 o/d x 11.6 long	UKM00435

7.6 MSP LINEAR TARGET PLATE

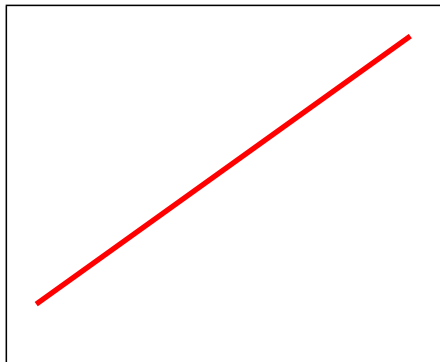


Item No	Qty per Unit	Description	GUK Part No.
2	1	MSP Linear Target Plate Assembly	UKM00417
8	1	Rail Guide	UKM00438
9	3	Magnet Bi pole 12.7 o/d x 11.6 long	UKM00435

7.7 OPTIONAL EXTRAS



Item 12 (picture not available)



Item 13 (picture not available)

Item No	Qty per Unit	Description	GUK Part No.
12	1	Car Charger	UKM00441
13	1	PDA (Versine calculator + data storage)	UKM00442