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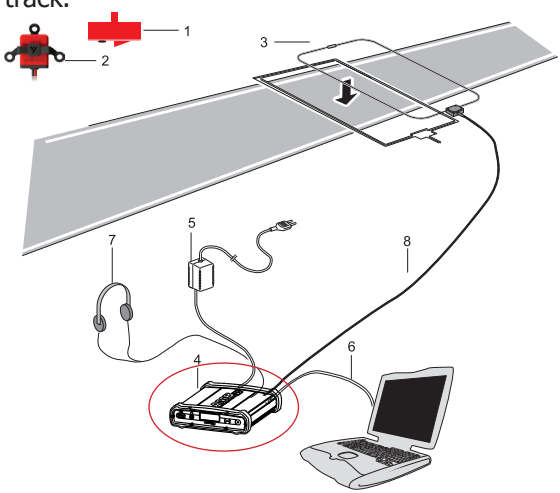
1. Introduction

The MYLAPS RC Timing System, previously the AMBrc System, is designed for the timing and scoring of RC model car races. The (magnetic) signal of each car carrying a MYLAPS RC transponder is picked up by the detection loop installed in the track surface. This loop is connected to the MYLAPS RC decoder. The decoder timestamps the received transponder signals and sends this data to a connected computer. Two types of transponders are available: a rechargeable battery powered transponder and a Direct (externally) Powered transponder. Each transponder has a unique number, which enables you to identify and time/score each RC car on the track.



1. MYLAPS RC rechargeable transponder
2. MYLAPS RC4 Direct Powered transponder
3. Detection loop
4. MYLAPS RC decoder
5. 12 VDC adapter for MYLAPS decoder
6. Connection cable RS232/ TCP/IP network cable
7. Headphones for decoder
8. Coax cable and connection box

Not in picture: charger rack

Figure 1.1 System overview

2. Installation of the system

To install the MYLAPS RC Timing System, one needs to install a detection loop, connect the decoder and mount the MYLAPS RC transponders to the cars. For optimal results, please follow the instructions in the following paragraphs carefully.

2.1 Installation of the detection loop

All wiring of the detection loop must be installed according to the drawing below in order to avoid a serious degradation in the performance of the system.

Positioning the detection loop

1. The detection loop must be positioned in such a way that the transponder is above the center of the detection loop when the front of the car is above the finish line. Make sure vehicles cannot pass outside the detection loop. Extend the detection loop outside the track if necessary.
2. The detection loop can be used for a track width of a maximum 10m (33ft).
3. Cut the slots in the track a maximum of 2cm (3/4inch) deep and 30cm (1ft) apart.

Installation of the detection loop wires and cabling

1. Make sure the slots are clean and dry. This will ensure a perfect seal when the silicone is applied after installation of the wiring. Put the wires of the detection loop in the slots and cut the excess length of the detection loop wires.
2. When all wires are installed, put the heat shrinkage sleeve over a detection loop wire end. Then solder the loop wire end to the short wire end of the connection box. When soldering the wires together, the solder should flow through the entire connection and not only around it. Now put the shrinkage sleeve over the soldered connection and hold it over a heat source to shrink the sleeve (also see

the drawingon the next page). Repeat this procedure for the second wire end of the detection loop.

3. Fill the slot with silicone. Make sure not to overfill the slots and that the silicone is fully under the surface of the track, otherwise tires may pull out the silicone. If any silicone spills out of the slot, remove the excess silicone by scraping the top with a small piece of cardboard. This also ensures that the silicone is pressed into the slot and into the sides of the slot to ensure a perfect seal.
4. In the case of an OFF-ROAD track, cover the loop with carpet or something similar. The carpet can then be covered with sand. Please be aware of the max. distance of 15cm (6inch) between the transponder and the detection loop.
5. The detection loop is sensitive to interference, sometimes emitted by nearby cables. When possible, keep other cables 5m (15ft) away. Also make sure cars on other parts of the track will not get closer than 5m (15ft) to the detection loop, to avoid false inputs.

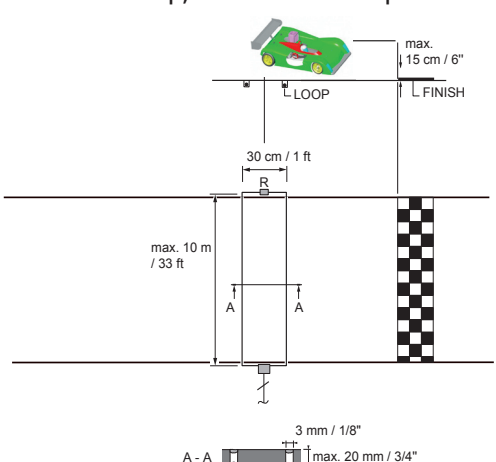


Figure 2.1 Detection loop installation overview

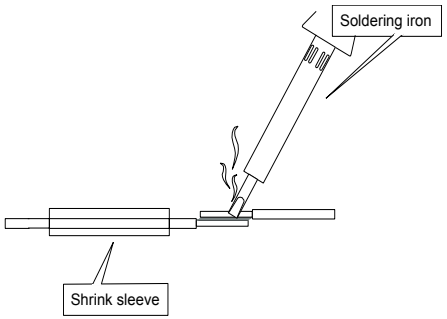


Figure 2.2 Solder the loop wire end

LEARNED BY EXPERIENCE

If you wish, you may pad the slots with a backing rod or nylon cord before sealing the slot with silicone. This helps to prevent the excessive use of silicone and is also useful when pulling out the silicone if the detection loop has to be replaced.

Silicone

There are a wide variety of silicone types available in hardware stores; it is important that the right type is used. Silicone that can withstand different temperatures as well as both wet and dry conditions since weather situations can vary should be used. If you are unsure, check the specifications of the silicone. The following types of silicone have been shown to yield lasting results and are recommended by MYLAPS:

- Dow Corning 890SL is a self-leveling silicone kit. It is applied as a liquid and fills the slot completely.
- Purflex is a polyurethane-based silicone that retains its elasticity under a wide range of temperatures.

Testing the detection loop installation

Once the loop has been installed, it should be tested to ensure that it is functioning correctly. We also recommend repeating the same procedure at the start of each race event. You can determine if your loop is functioning correctly by doing the following tests:

1. Connect the detection loop to the decoder and computer running MYLAPS timing software (also see the separate decoder manual). Check the background noise, which is updated every 5 seconds in the MYLAPS timing software. The background noise level should be between 0 and 40 points. A higher value may indicate a bad loop installation or interference by other electrical equipment in the area. Try switching off any suspected equipment or removing nearby objects and check for improvements. Short-wave radio transmitters may cause an increased background noise, especially at night.
2. Check the signal strengths of the transponders as they are picked up by the system during a test (also see paragraph 2.2 Installation of the Transponder). A good loop will yield consistent transponder signal strengths of at least 100 points with a hit rate of at least 20 points. The hit rate may vary depending on the speed of the transponder passings (slower passings yield higher hit counts), but the signal strength should be consistent for the same car.

Loop installation for temporary tracks

If slots for the loop can not be made in the track, the loop can be fitted overhead on a bridge. Do not make this bridge of any type of metal or carbon fiber, this will weaken the signal severely.

1. Construct a bridge (wood, PVC) with max clearance 45cm (1.5ft)(lower is better). Do not make the bridge longer than necessary. Make sure no cars can pass outside the bridge

2. Wires of the loop must be 45cm(1.5ft) apart and fixed underneath the bridge. Put the connection box on top of the bridge. Solder all connections and insulate well.

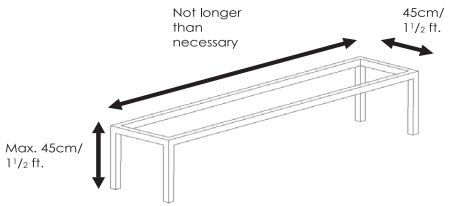


Figure 2.3 Bridge for temporary tracks

Please keep in mind that since a bridge has a larger distance between detection loop and passing transponder, this results in a weaker signal for the decoder. At dawn and at night, the interference from short-wave radio signals intensifies strongly and may occasionally cause the transponder signals to get overwhelmed by the interference. To avoid this, keep the loop on the bridge as short (less than 3m (10ft)) and low as possible (less than 45cm (1.5ft)).

2.2 Installation of the transponder

The MYLAPS RC transponder is available in a battery-powered and a Direct Powered version. The battery-powered transponder can be charged in the MYLAPS RC charger rack.

Installation of the Direct Powered transponder

The MYLAPS RC Direct Powered transponder is powered by the RC car's receiver and does not need to be charged.

1. The transponder must be mounted horizontally (flat). The position of the transponder must be identical in all RC model cars competing in the race for best finish accuracy.
2. Transponders must be positioned no higher than 15cm (6inch) (lower is better), with no metal or carbon fiber between the transponder and detection loop.
3. Fix the transponder to the car with the help of double-

sided adhesive tape or nuts and bolt. Make sure the transponder can not get detached during a race.

4. Connect the power plug to a free servo channel or use a Y-splitter.
5. Check for an orange LED on the transponder when radio receiver is on.

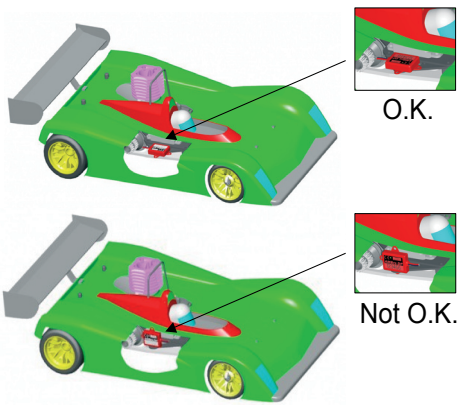


Figure 2.4 Mounting the MYLAPS RC DP transponder

Carbon fiber or metal chassis

If the MYLAPS RC transponder is fitted directly onto a carbon fibre or metal chassis, the signal from the transponder is weakened severely, which shows as low hits and strength readings from the MYLAPS RC decoder. Try to find a position for the transponder free from the chassis, for instance on the front bumper and check for better readings from the decoder. Hits should be no less than 20 (at speed) and strength not lower than 100 points.

If no good horizontal position can be found, as a last resort the transponder may be placed vertically, with the wiring facing the left- or right side of the car. In that case the signal from the transponder exits over the front and back of the car.

Power and polarity

When no free channel is available use a Y-splitter servo wire, obtainable via your local hobby store. If the polarity of the servo plug does not match the polarity of your radio receiver, it must be reversed (red wire is +). Carefully lift the plastic lugs of the plug and pull the connectors out. Re-insert the connectors into the plug according to the polarity of the radio receiver. The connectors may not be rotated before re-insertion, otherwise the lugs will not keep the connectors in place. Make sure the connectors are fully seated into the plug and then push the plastic lugs very carefully back into the servo plug.

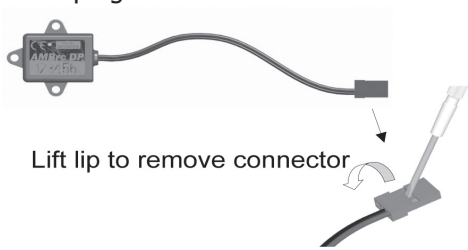


Figure 2.5 Installation of the MYLAPS RC DP transponder

When a power voltage of more than 8 VDC is to be used, a resistor of 100 ohms per volt over 8 VDC must be connected in series with the red wire. So 10 VDC means 200 ohms in series with the red wire. Power of the resistor should be/ is 0.1 watt per volt, so 0.2 watt or more in case of 10 VDC.

Interference

RC model cars can suffer from self generated interference, resulting in poor range of the radio. This is usually caused by incorrect lay-out of the wiring.The MYLAPS RC DP transponder does not use frequencies used by the RC model cars. However adding some wiring (power to the MYLAPS RC DP transponder) does not help in case of the problem mentioned above. To check if the signal from the transponder is causing trouble, disconnect the transponder power plug from the

receiver and check the performance of the car. To check if the wiring causes problems, disconnect one lead from the power connector (keep the other lead connected) and check the performance of the car. With one lead disconnected, the transponder is, of course, not working.

Installation of the rechargeable transponder

1. The transponder must be mounted horizontally (see drawing), preferably inside the car against the side, withthe fixing pin pointing upwards or downwards. The position of the transponder must be identical on all RC model cars competing in the race for best finish accuracy.
2. Transponders must be fitted no higher than 15cm (6inch) (lower is better), with no metal or carbon fiber between the transponder and detection loop.
3. Put a washer around the fixing pin and fix the transponder with a fixing clip.
4. Make sure the transponder can not get detached during a race.
5. Check before each race to see if the green LED on the transponder blinks.

Figure 2.6 Installation of the MYLAPS RC rechargeable transponder

For OFF-ROAD RC model cars, the transponder may be fixed underneath the rear wing.

Charging the transponder
Charging must be done in the MYLAPS charger rack, which is powered by a standard MYLAPS 12VDC adapter. Input voltage for the rack is 10-15VDC (4 pin power plug type). The charger rack converts the input voltage to a regulated voltage of 3.3V as is needed by the MYLAPS RC transponders.

Charging is done at room temperature. When charging, the red LED in each transponder indicates it is charging. One hour charge gives a minimum of 1 hour use, so the relation between charge/use time is one to one or better. Charge time for an empty transponder is 18 hours to reach full charge. After about 18 hours the red charge led will change over to a steady green led, indicating trickle charge. Transponders may be trickle charged for weeks, but please let the transponders fully discharge once every two months.

When transponders have not been used for a couple of months, the first re-charge will not be fully effective. To ensure maximum capacity, give the transponders a full charge and discharge cycle before use. Use the full charge/discharge cycle to check if transponders have sufficient operating time. When not in use give the transponders a full charge/discharge cycle once every 2 months.

Operating time
Operating time is 18 hours minimum after a full charge.When the transponder is removed from the charger rack the LED will blink green (when sufficiently charged) indicating the transponder is working. A low battery voltage is indicated by a blinking red LED. The amount of time the transponder blinks red (when nearly empty) depends of the amount of charge the battery has received previously. When charged until full, the LED will blink upto 30 minutes.

Appendix A: Useful tool/parts/ equipment

Useful Tools

- Resistance meter (Range at least: 1 Ohm - 1 Mega Ohm)
- Wire cutter / stripper
- BNC Crimper
- (Butane) Soldering gun
- Blade knife
- Coax stripper
- Screw driver (normal and Phillips)

Useful Spare Parts

- BNC couplers (3 pieces)
- Thick BNC connectors 5 mm 75 Ohm
- Thin BNC connectors 3 mm 75 Ohm
- Shrink sleeves
- Spare loop (for tracks up to 20 m (65 ft) wide)
- Electrical tape

Additional Tool for new loop installations

- Chalk line to get a straight line on the track surface
- Caulk gun to apply silicone.

Please contact MYLAPS Sports Timing if you would like to receive detailed specifications on any of the above items. You can find our contact details on page 2 of this manual.

Appendix B: Technical Specifications

MYLAPS RC Rechargeable Transponder

Dimensions	: 35 x 31 x 12 mm approx. 1.4"x1.2"x 0.5"
Weight	: 22 g
Humidity	: max. 90% relative
Max. speed	: 120 km/h / 75 mph
Temperature range	: 0-50 C / 32-122 F
Operating time	: min. 18 hrs
Charge time	: 16 hrs for full charge
Charge indicator	: LED indicator green / red
Signal transfer	: magnetic induction
Resolution timebase	: 3 ms
Transponder position	: max. height 15 cm / 6"
Charging voltage	: 3.3 VDC

MYLAPS RC Transponder Charger

Transponder Charger	: 380 x 117 x 65 mm approx. 15"x5"x3"
Capacity	: 20 transponders
Power supply	: 10 to 16VDC / 0.4 A via 115/230 VAC adapter

MYLAPS RC Direct Powered Transponder

Dimensions	: 22x28x7 mm approx. 0.9"x1.1"x 0.3"
Weight	: 8 g. complete
Humidity	: max. 90% relative
Max. speed	: 120 km/h / 75 mph.
Temperature range	: 0-50 C / 32-122 F
Operating time	: Unlimited
Signal transfer	: magnetic induction
Resolution timebase	: 3 ms
Transponder position	: max. height 15 cm / 6"

Power	: Power feed from a free receiver channel (ch3 or batt)
Connection Plug	: Connect using a standard servo plug
Power consumption	: 15mA @ 5VDC
Operating voltage	: 4 –8 VDC

Detection Loop

Track width	: max. 10m/33ft
Coax to decoder	: 75 Ohms, double shield, max.length 100m/330ft

Specifications are subject to change without notice.

Appendix C: CE and FCC Regulations

CE information:
This device complies with the EMC directive 89/336/EEC. A copy of the declaration of conformity can be obtained at:

MYLAPS Sports Timing
Zuiderhoutlaan 4
2012 PJ Haarlem
The Netherlands

FCC information:
This equipment complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This equipment may not cause harmful interference, and (2) this equipment must accept any interference received, including interference that may cause undesired operation.

Guarantees & Warranties

MYLAPS, formerly AMB, warrants that, for a period of three (3) years from the date of shipping the decoders and the MYLAPS MX Rechargeable Power (AMBmx), MYLAPS RC DP (AMBrc DP), MYLAPS KART DP (TranX160 DP), MYLAPS Kart Rechargeable Power (TranX160), MYLAPS Car/Bike DP (TranX260 DP), MYLAPS Car/Bike Rechargeable Power (TranX260), MYLAPS Car/Bike Pro (TranX Pro) transponders covered by this warranty with defects, as determined solely by MYLAPS, caused by faulty materials, workmanship or design will be repaired or replaced, unless such defects were the result of any of the following: shipping; improper installation, maintenance or use; abnormal conditions of operation; attempted modification or repair by the customer or any third party; use of the goods in combination with other items; or an act of God. If repair or replacement of the goods is not possible or economical for MYLAPS, MYLAPS may, at its option, refund the purchase price of the goods or deliver replacement goods at its sole discretion. MYLAPS's liability shall be strictly limited to replacing, repairing or issuing credits at its option.

MYLAPS warrants that, for a period of two (2) years from the date of shipping the ProChip, MYLAPS Kart Fixed Power (TranX140) and the MYLAPS RC Rechargeable Power (AMBrc) transponders covered by this warranty with defects, as determined solely by MYLAPS, caused by faulty materials, workmanship or design will be repaired or replaced, unless such defects were the result of any of the following: shipping; improper installation, maintenance or use; abnormal conditions of operation; attempted modification or repair by the customer or any third party; use of the goods in combination with other items; or an act of God. If repair or replacement of the goods is not possible or economical for MYLAPS, MYLAPS may, at its option, refund the purchase price of the goods or deliver replacement goods at its sole discretion. MYLAPS's liability shall be strictly limited to replacing, repairing or issuing credits at its option.

MYLAPS warrants that, for a period of one (1) year from the date of shipping the MYLAPS Onboard Display kit (TnetX Display Kit) covered by this warranty with defects, as determined solely by MYLAPS, caused by faulty materials, workmanship or design will be repaired or replaced, unless such defects were the result of any of the following: shipping; improper installation, maintenance or use; abnormal conditions of operation; attempted modification or repair by the customer or any third party; use of the goods in combination with other items; or an act of God. If repair or replacement of the goods is not possible or economical for MYLAPS, MYLAPS may, at its option, refund the purchase price of the goods or deliver replacement goods at its sole discretion. MYLAPS's liability shall be strictly limited to replacing, repairing or issuing credits at its option.

MYLAPS warrants that, for a period of one (1) year from the date of shipping, all other goods covered by this warranty with defects, as determined solely by MYLAPS, caused by faulty materials, workmanship or design will be repaired or replaced, unless such defects were the result of any of the following: shipping; improper installation, maintenance or use; abnormal conditions of operation; attempted modification or repair by the customer or any third party; use of the goods in combination with other items; or an act of God. If repair or replacement of the goods is not possible or economical for MYLAPS, MYLAPS may, at its option, refund the purchase price of the goods or deliver replacement goods at its sole discretion. MYLAPS's liability shall be strictly limited to replacing, repairing or issuing credits at its option.

If the requirements set forth above and described under Remedies and Damages are not complied with, our warranty/guarantee shall not apply and we shall be discharged from all liability arising from the supply of defective goods.

EXCEPT AS EXPRESSLY PROVIDED IN THIS SECTION, MYLAPS MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, NATURE OR DESCRIPTION, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OR MERCHANTABILITY, FITNESS OF THE GOODS FOR ANY PARTICULAR PURPOSE, OR NONINFRINGEMENT, AND MYLAPS HEREBY DISCLAIMS THE SAME.

Remedies and Damages

1. MYLAPS shall not incur any liability under the above warranty unless:
   i) MYLAPS is promptly notified in writing upon discovery by the customer that such goods do not conform to the warranty, and the appropriate invoice number and date of purchase information is supplied;
   ii) The alleged defective goods are returned to MYLAPS carriage pre-paid;
   iii) Examination by MYLAPS of goods shall confirm that the alleged defect exists and has not been caused by unauthorized use (including, without limitation, the use of an AMB decoder with non-MYLAPS hardware) misuse, neglect, method of storage, faulty installation, handling, or by alteration or accident; and
   iv) With respect to MYLAPS decoders, customer has upgraded the firmware in its decoder within one month after MYLAPS has offered to provide customer with such upgraded firmware.
2. The customer acknowledges that the goods may include certain firmware imbedded therein. MYLAPS hereby grants a license to customer to use the imbedded firmware in an MYLAPS decoder, but only to the extent the decoder is used in connection with MYLAPS hardware. MYLAPS shall have the right to terminate the license immediately upon written notice to customer in case MYLAPS has a reasonable belief that customer at any time has used the MYLAPS decoder in connection with non-AMB hardware. Further, customer may not copy, compile, reverse compile, disassemble, translate, analyze, reverse engineer or attempt to reverse engineer the firmware, except as permitted by applicable law.
3. In addition, customer grants MYLAPS the option to repurchase any MYLAPS decoder if MYLAPS has a reasonable belief that customer has used the MYLAPS decoder in connection with non-MYLAPS hardware. The repurchase price shall be the fair market value on the date MYLAPS provides notice to customer that it intends to repurchase the decoder.

The above mentioned warranty/guarantee is irrespective of any rights granted to the buyer of MYLAPS equipment manufactured or sold by MYLAPS based on the laws of the Netherlands. Any correspondence regarding the above mentioned guarantee must be addressed to MYLAPS:

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