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1: Introduction

The AMBmx system is designed to time and score motocross events. The signal sent by an AMBmx transponder is picked up by the detection loop, installed in the track surface. The transponder itself is mounted on the motorcycle behind the number shield. The detection loop is connected to the AMBmx decoder. The decoder timestamps the received transponder signals and sends this data to a connected computer.

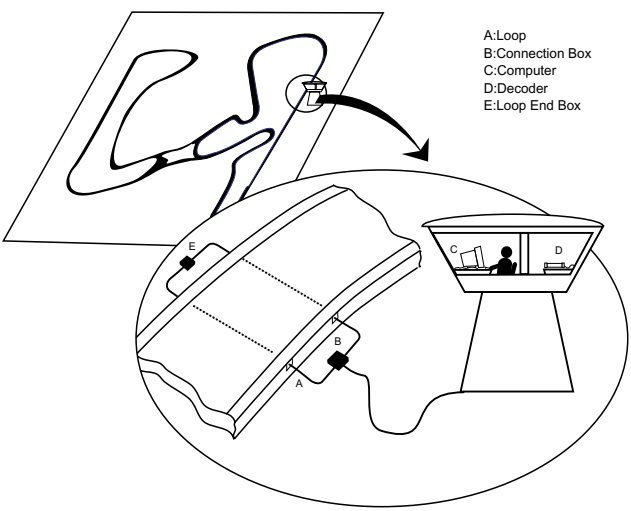

Figure 1.1 System overview

2: Installation of the detection loop

To install the AMBmx system, one needs to install the detection loop, connect the decoder and mount the AMBmx transponder to the motorcycle. For optimal results, please follow the instructions as described carefully. Appendix B contains a list of useful tools for installing the detection loop.

2.1 Positioning 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.

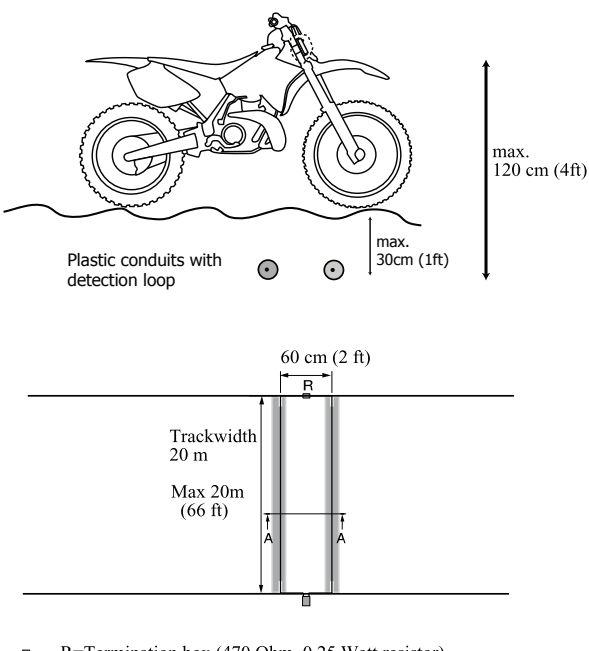

Figure 2.1 Detection loop installation overview

Positioning the detection loop

a) 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 motorcycle crosses the finish line. Make sure motorcycles cannot pass outside the detection loop. Extend the detection loop outside the track if necessary.

b) The detection loop can be used for a track width of a maximum 20 m (66 ft).

c) The maximum depth should be chosen in a way that the motorcycles cannot dig out the detection loop. However, please respect the maximum distance between loop and transponder, which is 120 cm (4 ft). Put the loop wires in the plastic conduits in the track 60 cm (2ft) apart.

d) The detection loop is sensitive to interference sometimes emitted by nearby cables. When possible, keep other cables 5 m (15 ft) away. Also make sure motorcycles on other parts of the track will not get closer than 5 m (15 ft) to the detection loop, to avoid false inputs.

LEARNED BY EXPERIENCE

When pulling the detection loop wire through the plastic conduit, it is a good idea to pull another non-metal wire through. This wire then can be used to install a new loop wire in case it gets damaged.

2.2 Installation of the detection loop

a) Put the wires of the detection loop through the plastic conduits and cut the excess length of the detection loop wires.

b) When all wires are installed, place 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 drawing below). Repeat this procedure for the second wire end of the detection loop.

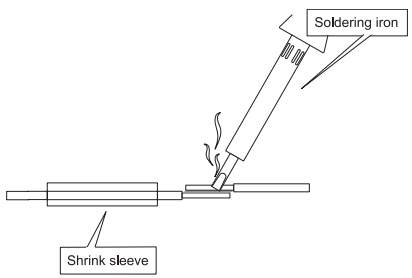

Figure 2.2 Solder the loop wire end

c) Fill the trench with the plastic conduits with sand. Before doing this, please test the loop as described in the next section. Make sure that the motorcycles cannot dig out the plastic conduits with the loop.

2.3 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:

a) Connect the detection loop to the decoder and computer running AMB i.t. timing software (also see the seperate decoder manual).
Check the background noise, which is updated every

five seconds in the AMB i.t. timing software. The background noise level should be between 0 and 40 points. A higher value may indicate interference by other electrical equipment in the area or a bad loop installation.
Try switching off any suspected equipment or removing nearby objects and check for improvements. Especially at night, short-wave radio transmitters may cause an increased background noise.

b) If a detection loop has been correctly installed, a transponder should be picked up at the same distance along the entire detection loop. To test this, stand at one end of the detection loop about 8 m (25 ft) away and hold a transponder approximately 120 cm (4 ft) off the ground. Walk slowly towards the detection loop. You will hear a beep in the headphones attached to the decoder when the transponder is detected. Mark the spot where the transponder was detected. Repeat the process for the middle and other end of the detection loop and do the same coming from the other direction. The detection distance from the loop should be approximately the same for all positions (< 20% variation).

c) Check the signal strengths of the transponders as they are picked up by the system during a test with motorcycles (also see paragraph 3.1 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 10 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 (< 10 points variation).

3.Transponder Installation/ Operation

3.1 Installation of the transponder

The AMBmx transponder is battery-powered and can be recharged in a 34-position charger case or single charger.

Positioning the transponder

The position of the transponder must be identical on all motorcycles competing in the race. Fix the transponder (or holder) vertically, with a maximum distance of 120 cm (4 ft) above the loop. Make sure that the transponder has a clear opening to the track with no metal or carbon fiber beneath it. Maximum operating temperature should not exceed 50 °C (122 °F)

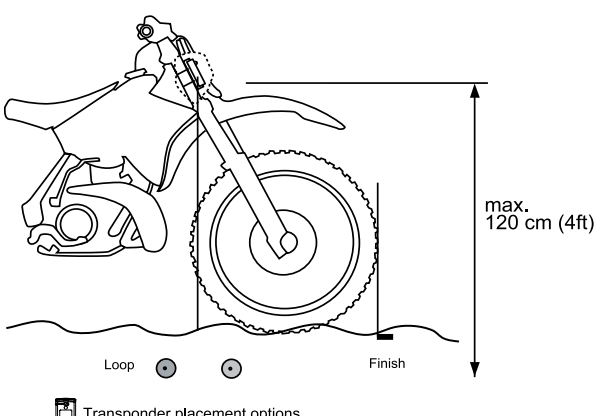

Figure 3.1 Transponder placement

Installation of the transponder

Fix the holder on the motorcycle, as shown on the holder, on top by using tie-wraps or screws. Fasten the transponder in the holder using the supplied fixing pin.

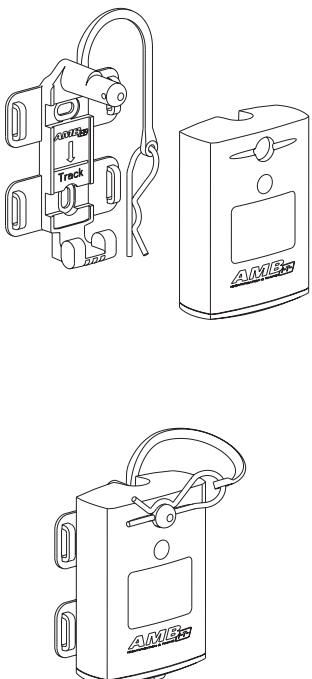

Figure 3.2 Fastening the transponder in the holder

WARNING

A detached transponder can be very dangerous!
Make sure the transponder cannot get detached.
Use additional tie-wraps to secure the pin.

3.2 Charging instructions

Transponders can be charged in an individual charger or in a charger case.

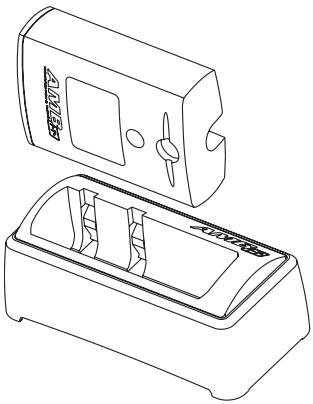

Figure 3.3 : Charging cradle

- Plug the power adapter into an electrical outlet and place the transponder on the charging unit.

- The transponder's Led will flash red indicating that the transponder is charging.

- After about 16 hours a steady green Led indicates that the transponder is fully charged.

A full charge yields a minimum of 4 days use. The Led flashing color and pattern indicates the remaining working days of the transponder. See the next paragraph for the complete information.

3.3 Led indication

The Led on the transponder provides the information of the transponder status

LED Flashing color/pattern	Description
Flashing …times green	Minimum … days left before the battery is empty
Flashing red (not in the charger)	Less than 1 day of functioning left
Continuously red	The transponder stops working at any moment, charging is required
No Light	Transponder is discharged
Flashing red (in the charger)	Transponder is charging
Continuous green (in the charger)	Transponder fully charged
No Light (in unplugged charger)	Transponder is in sleep mode

Figure 3.4: Led indication

3.4 Sleep mode

The sleep mode is designed to turn off the transponder's signal and save battery life. It is necessary to use the Sleep mode when travelling by airplane to adhere to airline regulations. While in Sleep mode, the transponder's charge-discharge cycle will last up to 3 times longer.

Switching a transponder into sleep mode
A charged/functioning transponder can be put into a sleep mode by placing it in an unpowered charging cradle or charger case.

Switching the transponder back to normal mode
Normal functioning resumes when the transponder is removed from the cradle or charger case.

3.5 Cleaning instructions

Over the course of time, transponders can become soiled in various ways. Normal dirt can be removed from the transponder with a soft brush and warm clean water up to 50°C. Cleaning electrical contacts: We recommend to spray Isopropyl alcohol on the contacts of the transponder and on the charger. Rub the contacts with ear sticks to clean them on a regular basis.

Caution

MAKE SURE THE TRANSPONDER IS DRY BEFORE CHARGING.

CHARGE YOUR TRANSPONDER ONCE EVERY 3 MONTHS.

DO NOT LEAVE THE TRANSPONDER IN A POWERED CHARGING CRADLE OR CHARGING RACK MORE THAN 24 HOURS.

DO NOT CLEAN TRANSPONDERS WITH AUTOMOTIVE CLEANING PRODUCTS OR OTHER DETERGENTS.

DO NOT USE HIGH PRESSURE WATERGUNS OR OTHER (DISH)WASHING MACHINES TO CLEAN OR RINSE THE TRANSPONDERS.

Appendix A: Useful tool/parts/ equipment

Useful Tools

- Multi meter (Range at least: 1 Ohm - 1 Mega Ohm)
- Wire cutter / stripper
- BNC Crimp tool for RG 58 & RG 59
- (Butane) Soldering gun
- Blade knife
- Coax stripper
- Screw driver (normal and Phillips)

Useful Spare Parts

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

Please contact AMB i.t. 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

AMBmx Transponder

Numbers available	: unlimited
Dimensions	: 73x50x22 mm (approx. 2.9x2x0.9”)
Weight	: 90 g
Housing	: Water- and shockproof
Max. speed	: 120 km/h (75 mph)
Timing resolution	: 0,006 sec
Temperature range	: 0 - 50 °C (32 - 122 °F)
Operating time	: min. 4 days after full charge
Charge time	: min. 16 hours for full charge
Charge indicator	: LED indicates remaining operating time in days
Signal transfer	: magnetic induction
Transponder position	: max. height 120 cm (4 ft)

AMB Detection Loop

Track width	: max. 20 m (66 ft)
Coax to decoder	: max. 100 m (330 ft)

AMB Transponder Chargers

Individual charger	: 12 VDC / 0,05 A
34 position charger case	: 12 VDC / 2,5 A

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:

AMB i.t. BV
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

AMB i.t. guarantees that, for a period of twenty four months from the date of dispatch, decoders manufactured or sold by AMB i.t. with defects caused by faulty materials and/or workmanship and/or design, will be repaired. If repair is not possible or economical for AMB i.t., AMB i.t. has the choice to refund the purchase price of these goods or to deliver new goods. AMB i.t.'s liability shall be strictly limited to replacing, repairing or issuing credits at its option for any goods returned within twenty four months from the date of dispatch. AMB i.t. shall not be liable for incidental or consequential damages including, but not limited to costs of removal and reinstallation of goods, loss of goodwill, loss of profits or use. If the requirements set forth above and described below are not complied with, the AMB i.t. warranty/guarantee shall not apply and AMB i.t. shall be discharged from all liability arising from the supply of defective goods.

EXCEPT AS EXPRESSLY PROVIDED IN THIS SECTION, AMB i.t. 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 AMB i.t. HEREBY DISCLAIMS THE SAME.

Please see the AMB standard Terms and Conditions of Sale for the additional terms in connection with the sale of goods and services covered by this manual.

Remedies and damages

AMB i.t. shall not incur any liability under the above warranty unless:

a) AMB i.t. 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;

b) The alleged defective goods are returned to AMB i.t. carriage pre-paid;

c) Examination by AMB i.t. of goods shall confirm the alleged defect exists and has not been caused by misuse, neglect, method of storage, faulty installation, handling, or by alteration or accident.