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This publication is to be used for the standard model of the product of the type given on the cover page.

AMB i.t.

Manual:TranX160/Rev.10-06

1: Introduction

The TranX160 system is designed to time and score competition karts. The signal sent by a TranX160 transponder is picked up by the detection loop installed in the track surface. The transponder itself is mounted in a transponder holder that is installed permanently on a kart. The detection loop is connected to the TranX decoder. The decoder timestamps the received transponder signals and sends this data to a connected computer.

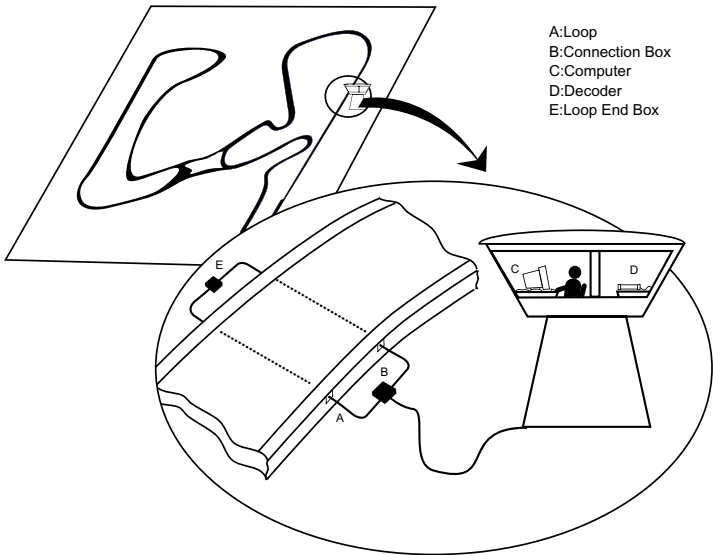


Figure 1.1 System overview

2: Installation of the detection loop

To install the TranX160 system, one needs to install the detection loop, connect the decoder and mount the TranX160 transponders to the karts. 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

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.

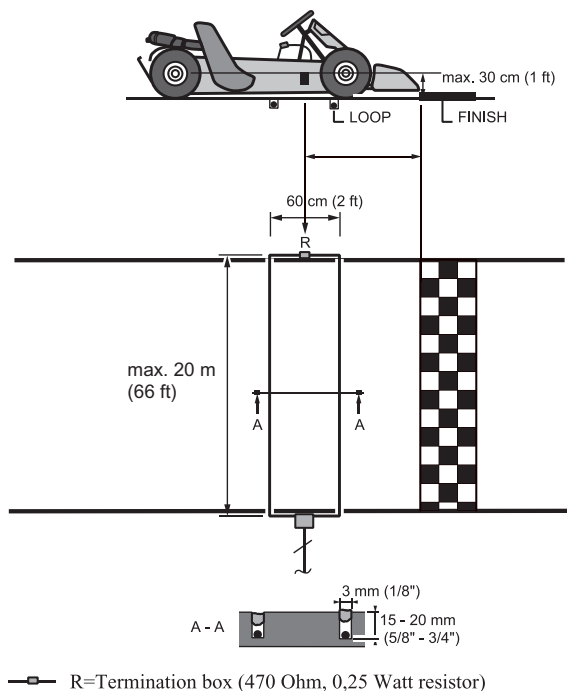


Figure 2.1 Detection loop installation overview

- 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 kart crosses the finish line. Make sure karts 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 detection loop is sensitive to interference, sometimes emitted by cables. When possible, keep other cables 5 m (15 ft) away. Also, make sure karts on other parts of the track will not get closer than 5 m (15 ft) to the detection loop, to avoid false inputs.

2.2 Installation of the detection loop

- a) Cut the slots in the track a maximum of 2 cm (3/4") deep and 60 cm (2 ft) apart. Make sure the slots are clean and dry. This will ensure a perfect seal when the silicon is applied after the installation of the wiring. Put the wires of the detection loop in the slots and cut the excess length of the detection loop wires.
- b) Widen the slot with a chisel where the small connection box of the loop is to be installed. Place the connection box vertically. Before sealing the loop with silicone, please test the loop as described in section 2.3.
- c) When all wires are installed, put the heat shrinkage sleeve over a detection loop wire end. Then solder the loop wire 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). Repeat this procedure for the second wire of the detection loop.

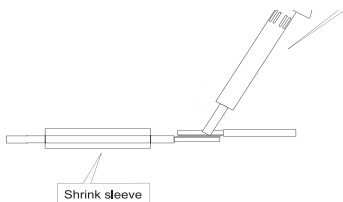


Figure 2.2 Solder the loop wire end

- d) Fill the slot with silicone. Note: before doing this, please test the loop as described in the section 2.3. Be 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 for a perfect seal.

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 is 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 AMB:

- 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.

2.3 Testing 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 section 4.1 Installation of the TranX decoder). Check the background noise, which is updated every 5 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. Short-wave radio transmitters may cause an increased background noise, especially at night.
- b) If a detection loop has been correctly installed, a transponder should be picked up at the same distance from the detection loop at all positions along the detection loop. To test this, stand at one end of the detection loop about 8 m (25 ft) away and hold a transponder approximately 80 cm (2,6 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 (also see the chapter about Installation and charging 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 (<10 points variation).

3: Transponder Installation/ Charging

3.1 Installation of the transponder

The TranX160 transponder is battery-powered and can be recharged in a single charger or 32-position charger case.

Positioning the transponder

The position of the transponder must be identical on all karts competing in the race. Fix the transponder holder, at a maximum of 30 cm (1 ft), above the track. Make sure that the transponder has a clear view to the track with no metal or carbon fiber beneath it. Maximum operating temperature should not exceed 122F/50°C.

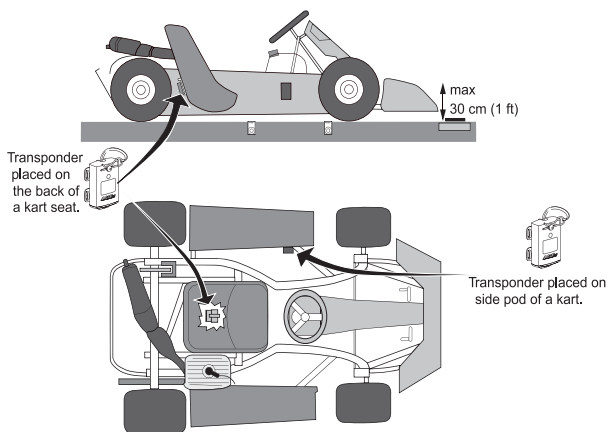


Figure 3.1 Transponder placement

Installation of the rechargeable transponder

Fix the holder on the kart with the fixing rod on top by using tie-wraps or screws. Fasten the transponder in the holder using the supplied fixing pin.

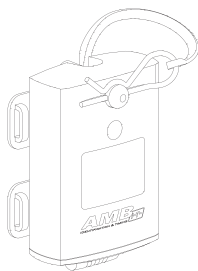
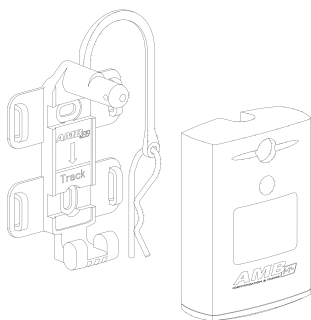


Figure 3.2 Fastening the transponder in the holder

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

The following paragraphs will describe how to charge your TranX160 rechargeable transponder.

Transponders can be charged by using an individual transponder charging cradle or by means of the 32-position transponder charger case.

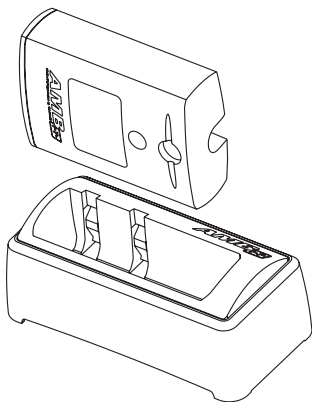


Figure 3.3: Charging cradle

Connect the adapter to the cradle or charger case, place the transponder inside and connect it to the appropriate power source.

When charging, the transponder's LED will flash red indicating the transponder is charging. A steady green LED indicates that the transponder is fully charged after approx. 14 hours.

Usage

A full charge yields a minimum of 4 days use. The number of green blinks of the LED is the MINIMUM number of days before the battery is empty. When the LED blinks red, the transponder will work less than 24 hours. A steady red light means the transponder can stop working at any moment.

Sleep mode

A charged/functioning transponder can be put into a sleep mode by placing it in an unplugged charging cradle or charger case. Normal functioning resumes when it is removed from the cradle. While in Sleep mode, the transponder will last up to 3 times longer during a single charge-discharge cycle. The sleep mode is designed to turn off the transponder's signal output and save battery life. It is necessary to use the Sleep mode when travelling by airplane to adhere to airline regulations.

Advice

Charge the transponder once every 3 months. Do not charge longer than necessary as this will reduce the life time of the battery.

Appendix A: Useful tools/parts/ equipment

- Multi meter (Range at least: 1 Ohm - 1 Mega Ohm)
- Wire cutter / stripper
- BNC Crimp tool for RG58 & RG 59
- (Butane) Soldering gun
- Blade knife
- Coax stripper
- Ice pick
- Screw driver (normal and Philips)

Useful Spare Parts

- BNC couplers (3 pieces)
- Thick BNC connectors 5 mm 75 Ohm
- Thin BNC connectors 5mm 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 AMB i.t. if you would like to receive detailed specifications on any of the above items.

Appendix B: Technical Specifications

TranX160 Transponder

Numbers available	: unlimited
Dimensions	: 73x50x22 mm (approx. 2.9x2x0.9")
Weight	: 95 g
Housing	: Water- and shockproof
Support	: 90x44 mm (approx. 3 1/2x3 3/4")
Max. speed	: 160 km/h (100 mph)
Timing Resolution	: 0,003 sec
Temperature range	: 0 - 50 °C (32 - 122 °F)
Operating time	: min. 4 days after full charge
Charge time	: min. 14 hours for full charge
Charge indicator	: LED indicates remaining operating time in days
Signal transfer	: magnetic induction
Transponder position	: max. height 30 cm (1 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
32 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.

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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.