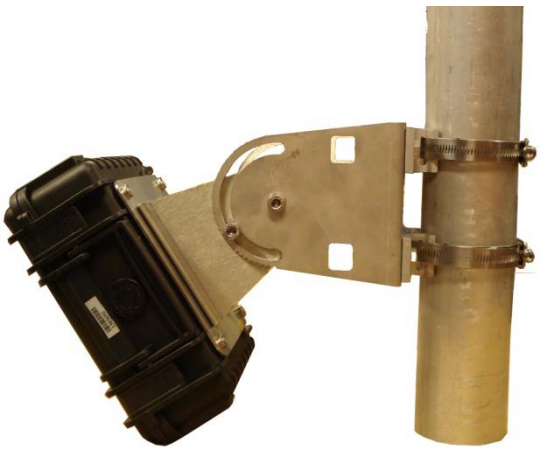
TMS-NET V10.0
user's manual

Permanent radar traffic counter



Manual version: TMS-NET_Man_**V04.06**_En

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Introduction

About the manual

On the following pages you will learn how to install and operate the radar in an appropriate & safer way. We attach great importance to the safe, appropriate and effective handling of this detector.
It is therefore important to read this manual thoroughly before using the device. In the manual you will find important instructions helping you to avoid danger and to prolong the reliability and durability of the device and the accessories.
For your own safety you should **read the safety instructions**.
Follow the instructions closely in order to avoid danger for yourself and others or damage to the device.

If you have any questions about the TMS-NET, which are not answered in this manual, or if you have problems understanding the descriptions, please contact the company that provided you with our reliable solution for portable traffic data collection.

Usage according to regulations

The TMS-NET is solely suited for traffic data collection (detection of vehicles for counting, classification and speed measurement). Any further usage is not appropriate. Do not use the TMS-NET for any other purpose.

Label

The microwave detector TMS-NET is provided with a serial number. You will need this serial number for any communication when talking with the customer service.

Safety instructions

Read the following safety instructions thoroughly and observe them carefully. They are stated to ensure your own safety and the safety of others and to avoid damage to the device or accessories.

Danger of electricity!
Make sure that no liquid may get inside the device.

If you notice any damage, e.g. broken or crushed cables, damaged plugs, enclosures etc., turn off the device at once and contact your TMS-NET provider.

The device may only be installed, brought into service and repaired by an electro-technical expert (Very ESD sensitive!!!). Inappropriate operation, improper maintenance or not observing the instructions in this manual can lead to danger.

Any malfunction of the device which may limit the safety of its users or others must be removed immediately. All warning and safety labels on the device must be observed and kept complete and legible.

The appropriate usage must be observed by all means. For damage resulting from inappropriate usage the manufacturer will not undertake any liability.

The device must not be used as a safety component in the sense of the European Directive 98/37/EC ("Machinery Directive"). In systems with high risk additional safety measures are necessary.

The operator of the device must ensure that the chosen means of operation will not cause damage to material or danger to people and that all security and safety installations are present and functioning.

Before installation and first operation please observe the instructions in the manual.

The manual must be available at the site of usage at any time. It must be read thoroughly and applied appropriately by the person responsible for the operation, maintenance and service of the device.

Our products are in a constant process of improvement and advancement. Because of this, read the current manual thoroughly before installation and first operation.

Without prior consent of the manufacturer, no modifications, neither mechanical nor electrical, may be done. Only parts that have the consent of the manufacturer may be used for backfitting or as accessories. Any violations will lead to the termination of conformity and the manufacturer's warranty. The user will subsequently bear the risk.

During the installation, be really cautious while using a ladder to fix either the bracket on the pole, either the radar on the bracket. Ensure you that the ground is perfectly stable for the ladder (or any material used to reach the installation height of the radar bracket). You need also to take all the safety precautions while climbing and fixing the material.

We also strongly advise the use of a padlock to secure the radar to its bracket.

Concept

The TMS-NET is a compact traffic analyser.

- It can be installed either at the roadside or "overhead" ;
- It is discreet ;
- It does not come directly in contact with the vehicles ;
- It is weather-proof ;
- It is silent ;
- It can be connected with integration to a network ;
- It can be equipped with wireless communication.

Features

- Counting, speed measurement and classification of vehicles into 2 length classes, with time-stamping (showing the date and time when each vehicle was detected).

Technology

- Microwave Doppler radar. Speed enforcement radars basically use the same technology.
- Vehicle-by-vehicle data collection.

Precautions

This unit contains electronic components. Precautions must be taken when transporting and installing it. Please follow the recommendations below:

- Avoid impacts when transporting and handling the unit.
- Use only the cables, power supplies, chargers and other accessc supplied with the unit.
- When storing the unit do not place anything on top of it.

Warranty

The warranty, which is for a period of 2 (two) years from the date of delivery, covers any manufacturing defects and faulty parts provided that the unit is used normally. It does not cover the scratches or other damage caused by normal use of the unit. To retain your right to the warranty, please follow the instructions given in this user manual carefully.
The warranty will be void, if the radar is not ship in its original packaging (confer hereunder).

Packaging

Please keep this box in case of return shipment to the manufacturer. If the radar is not shipped in this box, the warranty will not apply.
If the radar is shipped in a equivalent packaging, a new one will be provided once the radar is ready to be shipped. The packaging value will be invoiced: 20,00 EUR.

Radar unit

Physical description

Black plastic case containing:

- Plate fixed to the rear of the radar unit with 4 threaded rods for mounting
- Antenna and radar unit
- LED
- Connector for power supply
- Wire for telecom interface (RS-232/ RS-422/RS-485) and power supply.

Accessories:

- Adjustable bracket
- Key to open casing
- User manual

Case dimensions:

- Width: 182 mm
- Height: 228 mm
- Thickness: 92 mm,
- Total weight without bracket: approx. 2 kg

Mechanical data:

- Rear plate

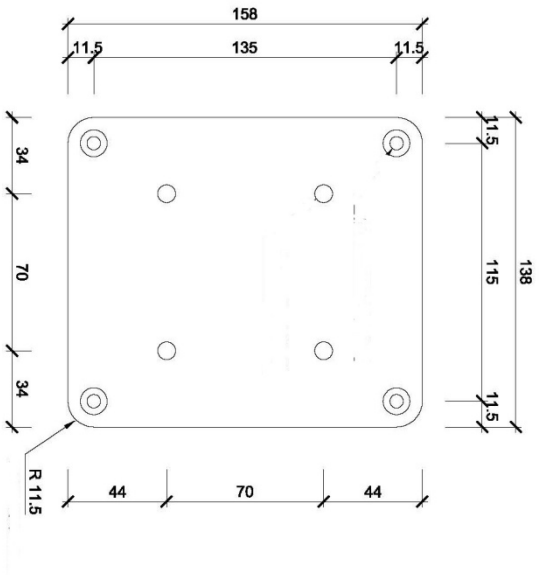


Figure 1 : Rear plate

Specifications

- Power supply
  - o • Power supply : 10-60 VDC
  - o • Power consumption : 90 mA @ 12V, 45 mA under 24 V (1.5 W max.)

- User output
  - o Standard RS-232 9600 to 115000 Bps 1 start, 1stop no parity
  - o Optional RS-422/485 point to point 9600 to 115000 Bps 1 start, 1stop no parity
  - o Visible led on bottom

- Operating temperature

The system can operate within a temperature range of from -40°C to 70°C

- Sealing

The system is waterproof (IP67). The case is protected by a door fitted with a seal. It may only be opened in a dry place by an approved technician or your distributor. To keep the unit properly sealed, please make sure that the case screws are fastened and the power/communication cable is properly connected.

- Direction of detection

By default, the radar unit measures the speed of vehicles travelling towards it (approaching vehicles – installation advised by Icoms). Under certain conditions, vehicles can be measured as they drive away (receding vehicles) or in both directions.

!! Note however very heavy rainfall (sudden shower or flurry, combined with gusts of wind during a storm for example) can create false detections (parasitic measurements) in the receding direction (measurement of vehicles moving away) !!

- Measurement accuracy

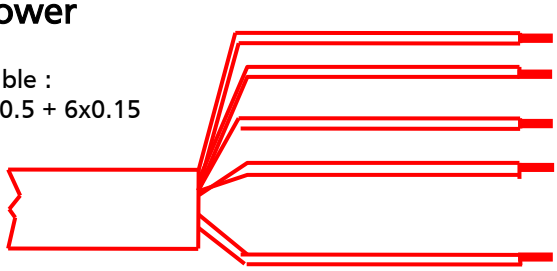
Laboratory speed measurement is over 97% accurate. Counting accuracy is approximately 98% (When inter-lane is processed). Vehicle classification is approximately 90% accurate. These values are achieved under optimum installation conditions (see below), on a single traffic lane.

The radar unit can measure speeds of from 10 to 255 km/h.

- RS-232 interface

Power

Cable :
2x0.5 + 6x0.15



BLUE: Power "–"
BROWN: Power "+"

YELLOW/GREEN: TX PC (DB9 n°3)

YELLOW: RX PC (DB9 n°2)

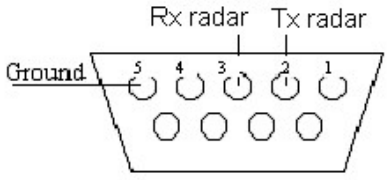
WHITE: RS232 ground

Figure 2 :RS-232

Communication

The communication between radar and PC is RS-232. The figure hereunder is a back view of a female DB9 to PC connector. Note that RX is radar side and must be interpreted as TX from PC (DB9 pin 3), while TX is RX on PC side (DB9 pin 2).

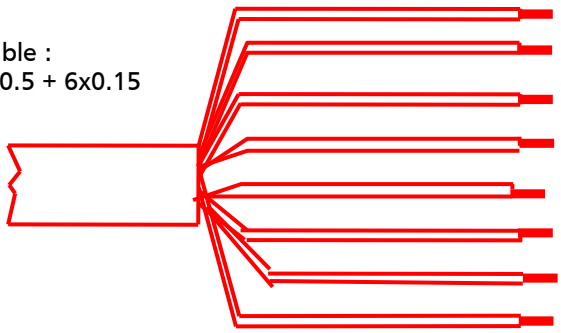
Cable layout DB9		
GND	White	5
RX PC or TX Radar	Yellow	2
TX PC or RX Radar	Green	3



- RS422 interface (optional)

Power

Cable :
2x0.5 + 6x0.15



BLUE: Power "–"
BROWN: Power "+"
YELLOW/GREEN: RX-
YELLOW: TX+
WHITE: RX+
GREY: COM ground
PURPLE: TX-

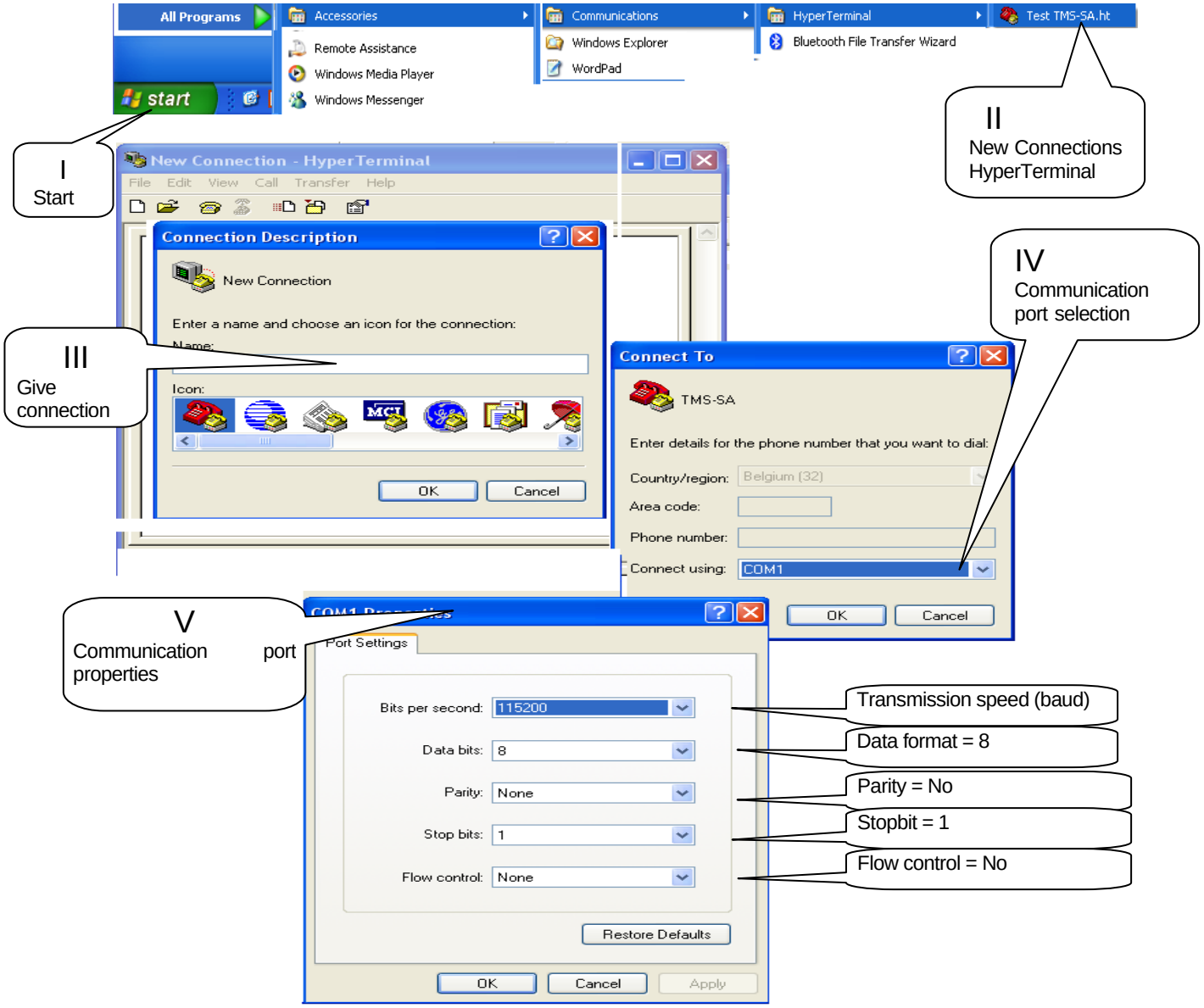
Figure 3 : RS422

- RS485 Point-to-point (optional)

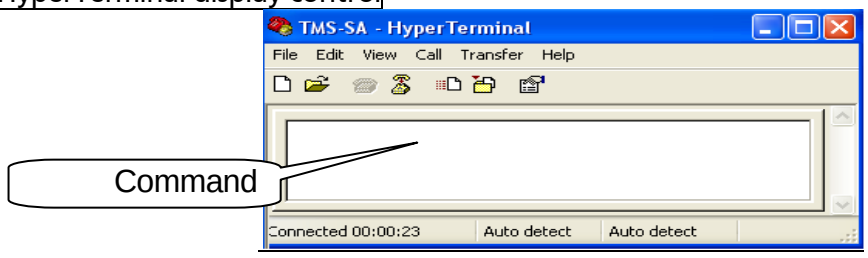
See add-on for RS485 protocol and wiring (TMS-NET_Man_MultipointsProtocol_V1.3_En).

Hyperterminal communication (RS-232)

Start Hyperterminal and configure the connection as below.



VI HyperTerminal display control



I. Start menu
II. New Connection
III. Give connection name : TMS-NET 1
IV. Port selection (the one the radar is connected to)
V. Define the parameters (115Kbps, 8 bits data, no parity,1 stop bit, no flow control)
VI. When the radar is turned on, a message is displayed with radar's header message.

Installation

The precision of the installation is really important and can influence the accuracy of the data. Please have a look on the following diagram, which explains the error margin in speed measurement depending on the installation angle error:

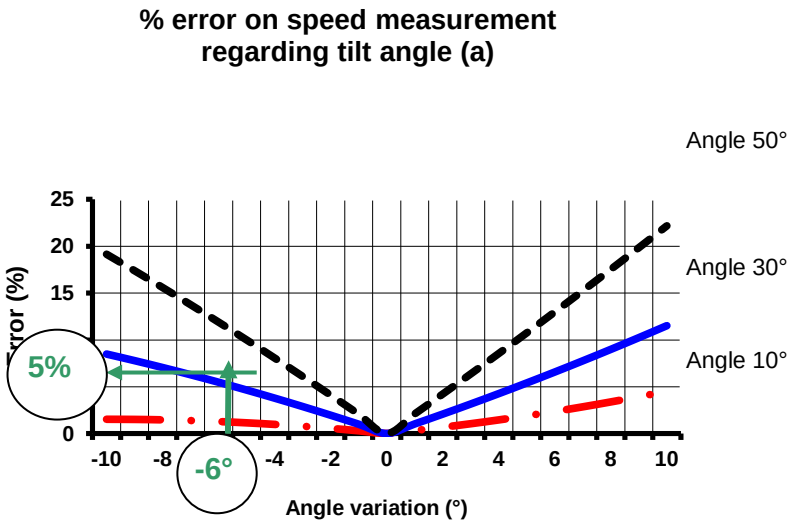


Diagram 1 : % error on speed measurement depending on vertical angle (tilt angle)

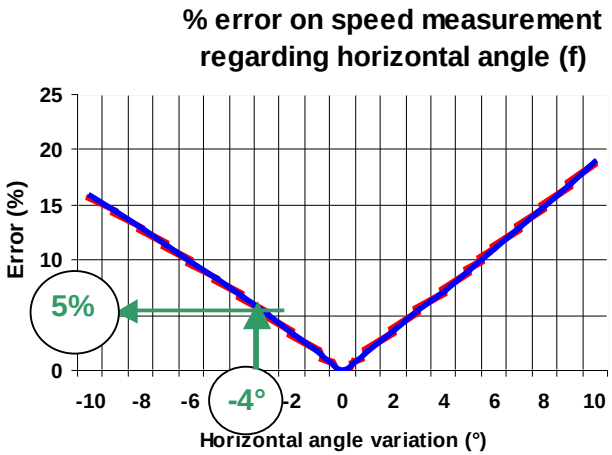


Diagram 2 : % error on speed measurement depending on horizontal angle

To get the best results, the counting has to be done on a single traffic lane.

You also need to measure on a site where the cars should not brake or accelerate too much (avoid to measure close to an intersection, etc..).
Places where you have a lot of traffic jam can also influence the results.

Physically installing the unit

Be VERY careful during the installation to secure all elements on the gantry to avoid risk of losing elements on the road.

- The bracket can be installed separately from the unit on a gantry support (universal clamps for band are advised). Care must be taken to ensure that the bracket plate is installed above the middle the road. This part of the installation is **very important** and can influence the precision of the data recorded.

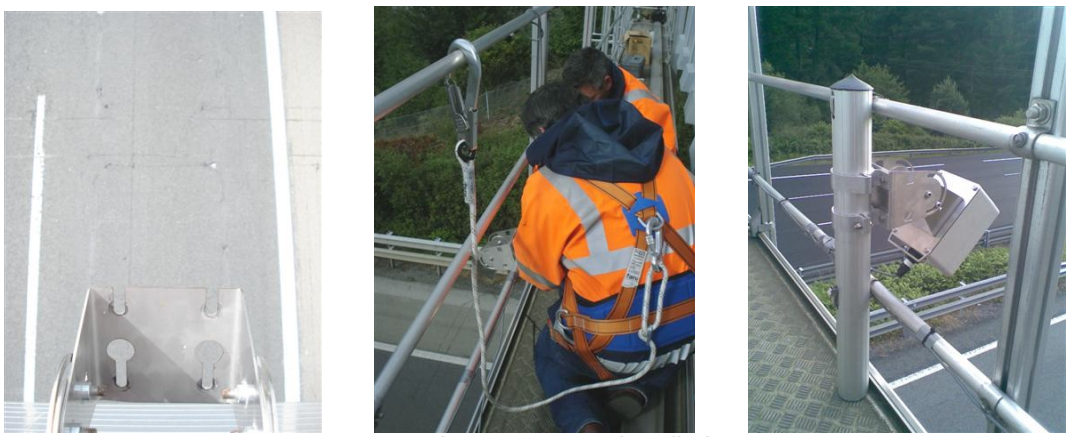


Figure 4 : Gantry installation

When the bracket is fixed, check again if the alignment is still correct as the bracket might have moved while fixing it.

The radar can be installed on a pole on the side of the road or on a gantry / bridge above the lane. The two types are described hereunder. **Gantry with approaching detection is the most recommended for length/speed precision.** In side view installation, the characteristics (a.o. distance to road) of the installation must be sent to the radar.

Detection direction (commands B, I and O)
The unit can measure vehicles approaching OR driving away from the radar unit. It can also be set for bidirectional measurements. The command B toggles between uni- and bidirectional detection. In bidirectional mode, the commands I and O applies to the nearest lane to the radar. The "I" or "O" are mandatory in side view installation for internal parameter topology (angle auto corrections)

Gantry installation

- Angles (command J)

  The advised vertical angle (_) value is 45°

Pay attention to the angle of installation: the 45° angle is compared to the road and not the horizontal. Example: if the road is inclined (-2° compared to the horizontal angle), the tilt angle will be in this case 47°.

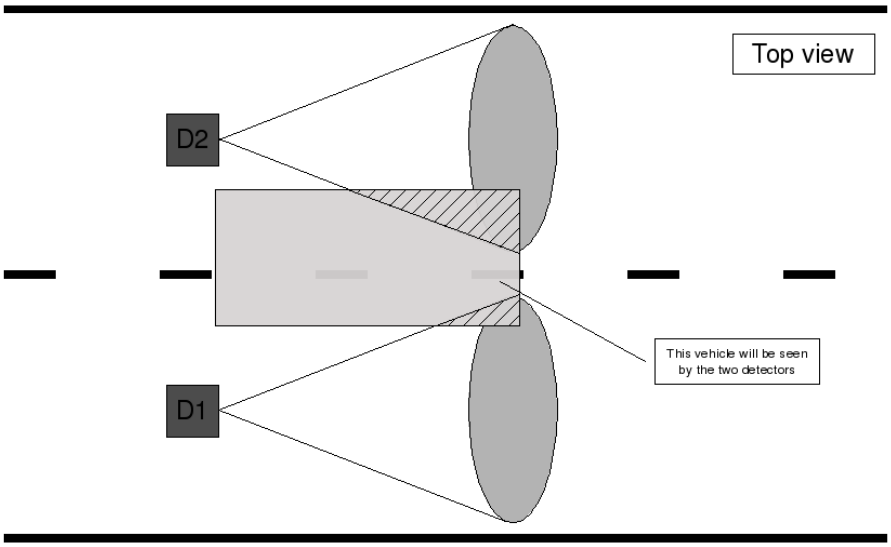
- Height of installation (command H)

  Recommended height of installation:
  - type GA1: 5-6m
  - type GA2: 7-8m

  Height setting can be parameter with the command "H".

Interlane

For installations where several lanes are monitored (one TMS-NET by lane), it is important to understand that vehicles driving between two lanes can be detected by two TMS-NET simultaneously (as seen in figure TO DO)
To achieve the best counting precision, it is necessary to take these "inter-lanes" cases into account at the node collecting the data of the detectors.



It is possible to tune the importance of this phenomenon by adjusting the installation to change the detection zone width: installing the TMS-NET higher or with a tilt angle closer to the horizontal will widen the detection zone width and inversely lowering the installation height or setting the tilt angle closer to the vertical will reduce the detection zone width.
These adjustments must be done carefully: if the detection zones widths are too narrow, small vehicles driving just between two zones could pass undetected.

Side installation

This installation type is not advised by Icoms as you cannot separate accurately different traffic lanes.

- Distance (command D)

Distance between installation pole and the vehicles movement axis, for uni-directional detection.

- Height of installation (command H)

  Recommended height of installation:
  • Type GA1: 5-6m
  • Type GA2: 7-8m

  Height setting can be parameter with the command "H".

- Angles

  Two angles determine the installation and the accuracy of the measurements (see Fig. 2: installation diagram).
  The horizontal angle (β), in relation to the vehicles' axis of movement) is ALWAYS 45°.
  The vertical angle (ϕ) is determined by the software in function of the installation height (H) and the distance (D).
  To know it, send the installation distance and height to the radar (commands D and H), then ask for the radar status with the « ? » command. The angle will be displayed on screen.

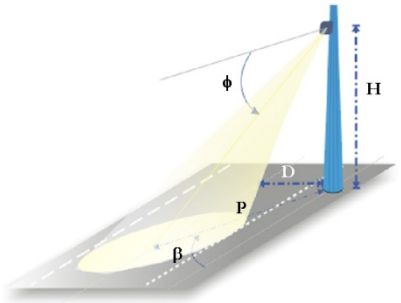


Figure 5: Installation diagram

Chapter 4

Parameters description

This section presents the different parameters of the detector. Those parameters can be set either interactively with the interactive console (as described in section "Interactive console", p23) or via encoded messages (as described in section "Encoded mode", p24). Once they have been set, those parameters are written in the internal memory of the detector and are kept throughout detector's resets and power cycles.

 IMPORTANT:

For **machine to machine development**, you are strongly advised to use the "Encoded mode" instead of the "Interactive mode". The main reason is that the "encoded mode" in future versions of the TMS-NET will be backward compatible, which won't be the case for the "Interactive mode".

General parameters

Baud rate

This parameter fixes the serial port baud rate of the detector. See section "Serial interface, p22" for more information on the serial port characteristics.

Type	unsigned int (1byte)
Range	[0,4]
Default	4
Description	0 : 9600 bauds 1 : 19200 bauds 2 : 38400 bauds 3 : 57600 bauds 4 : 115200 bauds
Notes	The new baud rate is applied after the next detector reset. If an out-of-range value is given, the default baud rate of 9600 bauds is used.

TX&Dir bitmap

This bitmap contains the following parameters (Please look at those parameters definition for more details):

Position	Parameter	Signification if 0	Signification if 1	Default
Bit 7 (MSB)	TX measures	Measures transmission OFF.	Measures transmission ON.	1
Bit 6	Reserved			
Bit 5	Reserved			
Bit 4	Direction mode	Unidirectional	Bidirectional	0
Bit 3	Direction selection	Incoming	Outgoing	0

Bit 2	Reserved			
Bit 1	Reserved			
Bit 0 (LSB)	TX mode	Send measures in encoded format.	Send measures in ASCII format.	0

Detector mode bitmap

This bitmap contains the following parameters (Please look at those parameters definition for more details) :

Position	Parameter	Signification if 0	Signification if 1	Default
Bit 7 (MSB)	Reserved			
Bit 6	Reserved			
Bit 5	Reserved			
Bit 4	Reserved			
Bit 3	Reserved			
Bit 2	Timestamp format	OUT timestamp	IN & OUT timstamp	0
Bit 1	Road type	Normal width road	Narrow road	0
Bit 0 (LSB)	Installation type	Side installation	Gantry installation	1

Measures parameters

TX measures (bit in TX&Dir bitmap)

This parameter controls the activation/deactivation of the measures transmission as vehicles are passing by the detector.
Measures that are not sent are discarded, but the vehicle counter is updated (see section "Encoded format", p38).

Type	Bit 7 in TX in TX & Dir bitmap
Range	[0,1]
Default	1
Description	0 : No measures are sent. 1 : Measures are sent with the format specified by other parameters.

TX mode (bit in TX&Dir bitmap)

The measures can be sent in two different formats: As a human readable ASCII line or as an encoded message (see section "Measures format", p38).
The ASCII format is intended for interactive use. It is strongly advised to use the encoded messages format for non-interactive use.

Type	Bit 0 in TX & Dir bitmap
Range	[0,1]
Default	1
Description	0 : Measures are sent as encoded messages (see p38). 1 : Measures are sent as human readable ASCII lines (see p38).

Timestamp format (bit in Detector mode bitmap)

Each measure can be associated with one or two timestamps: you therefore have two possibilities:

- each measure is associated to the timestamp OUT
- each measure is associated to the timestamps IN & OUT.

We advise to follow the first solution (only one timestamp) which is more accurate in terms of measure.

Type	Bit in Detector mode bitmap
Range	[0,1]
Default	0
Description	0 : OUT Timestamp 1 : IN and OUT Timestamps

Speed unit for Interactive mode

This parameter set the unit used for speed measurement. The two available units are kilometers per hour (km/h) and miles per hour (mi/h). Please note that speed measurements sent in encoded mode are always in km/h.

Type	unsigned int (1byte)
Range	[0,1]
Default	0
Description	0 : km/h 1 : mi/h

Installation parameters

Installation type (bit in Detector mode bitmap)

This parameter specifies the type of installation of the detector. (See section "Installation", p13).

Type	Bit in Detector mode bitmap
Range	[0,1]
Default	1
Description	0 : Side installation 1 : Gantry installation

Gantry angle

In gantry installations, the gantry angle is the angle (in degrees) between the horizontal and the main direction of the antenna lobe (see section "Installation", p13).
In side mode this parameter is ignored.

Type	unsigned int (1byte)
Range	[30, 60]
Default	45
Description	Angle in degrees in gantry mode with respect to the horizontal.

Installation height

The installation height is the vertical distance (in dm) separating the detector from the road level.

Type	unsigned int (1byte)
Range	[10, 120]
Default	64
Description	Detector height in dm.

Installation offset

In side installation: (see section "Installation", p13)

> In unidirectional mode and bidirectional mode with narrow road configuration, the installation offset is the shortest distance (in dm) between the vertical projection of the radar on the road level and the centre of the lane covered by the detector.
> In bidirectional mode with normal road configuration, the installation offset is the shorter distance (in dm) between the vertical projection of the radar on the road level and de middle of the two lanes watched by the detector.

In gantry installation, this parameter is ignored.

Type	unsigned int (1byte)
Range	[10, 120]
Default	40
Description	Detector offset in dm.

Road type (bit in Detector mode bitmap)

In bidirectional side installation, this parameter adapts the detector coefficients to the width of the road. Use the "normal road" value for situation where the vehicles with opposite direction drive on separate lanes. Use the "narrow road" value for situation where the vehicles with opposite direction drive on the same lane.
In the other installations (unidirectional or gantry), this parameter is ignored.

Type	Bit in Detector mode bitmap
Range	[0,1]
Default	0
Description	0 : Normal width road 1 : Narrow road

Direction mode (bit in TX&Dir bitmap)

The direction mode parameter configures the detector to detect vehicles either in one specific direction (incoming or outgoing traffic) or in both of them. See section "Installation", p13 for more details.

Type	Bit 4 in TX&Dir bitmap
Range	[0,1]
Default	0
Description	0 : Unidirectional 1 : Bidirectional

Direction selection (bit in TX&Dir bitmap)

In unidirectional mode, the direction selection parameter selects the direction watched by the detector.
In bidirectional side mode, the direction selection parameter selects the direction of the nearest lane to the detector.
In bidirectional gantry mode, this parameter is ignored.

Type	Bit 3 in TX&Dir bitmap
Range	[0,1]
Default	0
Description	0 : Incoming traffic 1 : Outgoing traffic

On-site tuning parameters

Those parameters are intended to fine-tune the detector for a specific installation. The corrections are added to the measured speed and length of each vehicle detected. The speed corrections are in a tenth of percent and the length corrections are in dm.
In bidirectional mode, different corrections can be applied to each direction. The parameter "direction selection" associates a direction with a lane. In unidirectional mode the "far lane" corrections are ignored.

Speed fine-tuning (near lane)

Type	unsigned int (1byte) (encoded messages) signed int (1byte) (interactive console)
Range	[28, 228] (encoded messages) [-100, 100] (interactive console)
Default	128 meaning 0 (encoded messages) 0 (interactive console)
Description	Speed fine-tuning in 0,1 % added to the measured speed (for the near lane in bidirectional mode).

Speed fine-tuning (far lane)

Type	unsigned int (1byte) (encoded messages) signed int (1byte) (interactive console)
Range	[28, 228] (encoded messages) [-100, 100] (interactive console)
Default	128 meaning 0 (encoded messages) 0 (interactive console)
Description	Speed fine-tuning in 0,1 % added to the measured speed for the far lane in bidirectional mode.

Length fine-tuning (near lane)

Type	unsigned int (1byte) (encoded messages) signed int (1byte) (interactive console)
Range	[28, 228] (encoded messages) [-100, 100] (interactive console)
Default	128 meaning 0 (encoded messages) 0 (interactive console)
Description	Length correction in dm, added to the measured length (for the near lane in bidirectional mode).

Length fine-tuning (far lane)

Type	unsigned int (1byte) (encoded messages) signed int (1byte) (interactive console)
Range	[28, 228] (encoded messages) [-100, 100] (interactive console)
Default	128 meaning 0 (encoded messages) 0 (interactive console)
Description	Length correction in dm, added to the measured length for the far lane in bidirectional mode.

Communication

The TMS-NET is designed to be directly connected to its controlling device through a serial interface (See section "Radar unit", p10).

The communication with the TMS-NET can be done through two different types of interfaces:

- An interactive console allowing the user to issue simple commands via a serial terminal (an example is given in "Chapter 2" for Hyperterminal under Microsoft Windows TM).
- An encoded protocol consisting in the exchange of fixed length messages between the detector and the controlling device.

Those interfaces are simultaneously available.

Serial interface

The communication is done via serial binary link with the following characteristics:

- 1 start bit
- 8 data bits
- 1 stop bit
- No flow control
- Baud rate configurable from 9600 to 115200 bauds.

The TMS-NET comes with:

- 3-wires RS-232 (standard)

- RS422 (in option)
  Note: The RX line is terminated by 100 ohms and neither line is biased.

- RS485 point-to-point (in option)
  Note: The line is terminated by 100 ohms but is not biased.

Interactive console (RS-232 only)

Please note that it is recommended to use the encoded mode only for non interactive (machine to machine) operations.

Commands list

Command	Action	range	default
General			
C	List the available commands.	-	
?	Print the current detector configuration.	-	
!	Reset the detector.	-	
S	Set the detector's serial port baud rate : 0 : 9600 bauds 1 : 19200 bauds 2 : 38400 bauds 3 : 57600 bauds 4 : 1152000 bauds.	[0, 4]	4
Measures TX			
A	Set the measures transmission as ASCII messages.	-	ASCII
X	Set the measures transmission as encoded messages.	-	ASCII
U	Set the speed unit for the interactive mode	-	Km/h
Installation			
B	Toggle the detector between unidirectional and bidirectional mode.	-	UNIDIR
D	Set the detector offset (in dm). Note: This value is ignored in gantry mode.	[10, 120]	40
G	Toggle the detector between gantry and side mode.	-	GANTRY
I	Set the detector in incoming traffic mode. Note: In bidirectional mode, this means that the lane nearest to the detector has incoming traffic.	-	INCOMING
J	Set the gantry tilt angle with the respect to the horizontal. (in degrees) Note: This value is ignored in side mode.	[30, 60]	45
N	Toggle between normal and narrow road. Note: This value is ignored in gantry mode.	-	NORMAL
O	Set the detector in outgoing traffic mode. Note: In bidirectional mode, this means that the lane nearest to the detector has outgoing traffic.	-	INCOMING
On-site tuning			
s	Set the speed correction(s). (in 1/10 %)	[-100, 100]	0
l	Set the length correction(s). (in dm)	[-100, 100]	0

Encoded mode

Transmission scheme (RS-232 only)

1. The controlling device must wait for the detector acknowledge message before issuing a new message. The detector acknowledge is issued between 5 and 350 ms after the end of the request message depending of the opcode and the state of the detector at the time of the request. Functions requiring a reset must take into account the detector startup time of 2 s. Please note that these timings don't include any interface or adapter that could add non negligible delays in the transmission.
2. The delay between two bytes of the same message must be less than 150 ms.
3. Upon detecting a communication error (lack of acknowledge, wrongly formatted frame) wait 1s and check the baud rate.

Note: After a configuration session (containing as many messages as needed) it is necessary to reset the detector.

Protocol structure (RS-232 only)

The communication in encoded mode is done through fixed length messages. There are two types of messages:

- The messages initiated by the controlling device, that are acknowledged by the detector.
- The measures messages initiated by the detector, that are not acknowledged.

Each message is composed of 19 bytes and follows this structure:

START	1 byte
FUNCTION	1 byte
PAYLOAD	16 bytes
END	1 byte

Where:

- START = 0xFF
- END = 0x00 for messages sent by the controlling device
- END = 0x03 for messages sent by the detector

The timings and rules to observe are described here above (See also section "Good practices, p39").

For all versions :
The different available functions are:

FUNCTION	Description	Reference
0x3C	Start firmware loader	Page 39
0x44	Get status	
0x46	Reset to factory settings	
0x66	Get detector time	
0x77	Set detector time	
0xF9	Detector reset	
0xAA	Set basic parameters	
0x2A	Set installation parameters	
0xE8	Set detector name 1	
0xE4	Set detector name 2	
0xE6	Set detector name 3	
0xBB	Get basic parameters	
0x2B	Get installation parameters	
0xE9	Get detector name 1	
0xE5	Get detector name 2	
0xE7	Get detector name 3	

A complete description of each function is provided on the next page.
A specific communication scheme is needed to implement the flashing of a new detector firmware; this is described in section "Firmware loader procedure", p39.

Functions list

0x3C - Start firmware loader

This message starts the detector's firmware upload procedure.. See section "Firmware loader procedure", p39 for a complete description.

Please note that both the request and answer payloads contain no data.

Request message:

0xFF	0x3C	REQUEST PAYLOAD	0X00

Request payload:

Position	Description	Range (default)	Note
1	0x00		
...	0x00		
16	0x00		

Answer message:

0x02	0x3C	ANSWER PAYLOAD	0X03

Answer payload:

The answer payload is the same as the request payload.

0x44 – Get status

Request message:

0xFF	0x44	REQUEST PAYLOAD	0X00

Request payload:

Position	Description	Range (default)	Note
1	0x00		
…	0x00		
16	0x00		

Answer message:

0x02	0x44	ANSWER PAYLOAD	0X03

Answer payload:

Position	Description	Range (default)	Note
1	Version string	ASCII	
2	Version string	ASCII	
3	Version string	ASCII	
4	Version string	ASCII	
5	Version string	ASCII	
6	Version string	ASCII	
7	Version string	ASCII	
8	Version string	ASCII	
9	Version string	ASCII	
10	Version string	ASCII	
11	Version string	ASCII	
12	Version string	ASCII	
13	Version string	ASCII	
14	Version string	ASCII	
15	Version string	ASCII	
16	Version string	ASCII	

0x46 – Reset to factory settings

This function reset the detector immediately after its answer. Please take the 2 seconds of reset time into account before issuing new messages to the detector.

Request message:

0xFF	0x46	REQUEST PAYLOAD	0X00

Request payload:

Position	Description	Range (default)	Note
1	0x00		
...	0x00		
16	0x00		

Answer message:

0x02	0x46	ANSWER PAYLOAD	0X03

Answer payload:

The answer payload is the same as the request payload.

Note: After a configuration session (containing as many messages as needed) it is necessary to reset the detector.

0x66 – Get detector time

Request message:

0xFF	0x66	REQUEST PAYLOAD	0X00

Request payload:

Position	Description	Range (default)	Note
1	0x00		
...	0x00		
16	0x00		

Answer message:

0x02	0x66	ANSWER PAYLOAD	0X03

Answer payload:

Position	Description	Range	Note
1	ignored	0x00	
2	Hundredth of second	0x00 - 0x99	BCD
3	Second	0x00 - 0x59	BCD
4	Minute	0x00 - 0x59	BCD
5	Hour (24h format)	0x00 - 0x24	BCD
6	Day	0x00 - 0x31	BCD
7	Month	0x01 - 0x12	BCD
8	ignored	0x00	
9	ignored	0x00	
10	ignored	0x00	
11	ignored	0x00	
12	ignored	0x00	
13	ignored	0x00	
14	ignored	0x00	
15	Centrury (fixed to 0x20)	0x20	BCD
16	Year	0x00 - 0x99	BCD

Note BCD means binary coded decimal.

0x77 – Set detector time

Request message:

0xFF	0x77	REQUEST PAYLOAD	0X00

Request payload:

Position	Description	Range	Note
1	ignored	0x00	
2	Hundredth of second	0x00 - 0x99	BCD
3	Second	0x00 - 0x59	BCD
4	Minute	0x00 - 0x59	BCD
5	Hour (24h format)	0x00 - 0x23	BCD
6	Day	0x00 - 0x31	BCD
7	Month	0x01 - 0x12	BCD
8	ignored	0x00	
9	ignored	0x00	
10	ignored	0x00	
11	ignored	0x00	
12	ignored	0x00	
13	ignored	0x00	
14	ignored	0x00	
15	Century (fixed to 0x20)	0x20	BCD
16	Year	0x00 - 0x99	BCD

Note BCD means binary coded decimal.

Answer message:

0x02	0x77	ANSWER PAYLOAD	0X03

Answer payload:

The answer payload is the same as the request payload.

Note : this message is not a configuration message and doesn't require to reset the detector.

0xF9 – Detector reset

This function reset the detector immediately after its answer. Please take the 2 seconds of reset time into account before issuing new messages to the detector.

Request message:

0xFF	0xF9	REQUEST PAYLOAD	0X00

Request payload:

Position	Description	Range (default)	Note
1	0x00		
…	0x00		
16	0x00		

Answer message:

0x02	0xF9	ANSWER PAYLOAD	0X03

Answer payload:

The answer payload is the same as the request payload.

0xAA – Set basic parameters

Request message:

0xFF	0xAA	REQUEST PAYLOAD	0X00

Request payload:

Position	Description	Range (default)	Note
1	reserved		
2	reserved		
3	reserved		
4	reserved		
5	ignored		
6	Gantry angle	[30, 60]	See section "Gantry angle"
7	Speed unit in the interactive mode	[0, 1]	See section "Speed unit in interactive mode"
8	reserved		
9	Baud rate	[0, 4]	See section "Baud rate"
10	TX&Dir bitmap		See section "TX&Dir"
11	reserved		
12	reserved		
13	reserved		
14	reserved		
15	reserved		
16	reserved		

Answer message:

0x02	0xAA	ANSWER PAYLOAD	0X03

Answer payload:

The answer payload is the same as the request payload.

Note: After a configuration session (containing as many messages as needed) it is necessary to reset the detector.

0x2A – Set installation parameters

Request message:

0xFF	0x2A	REQUEST PAYLOAD	0X00

Request payload:

Position	Description	Range (default)	Note
1	Installation height	[10, 120]	dm
2	Installation offset (in side mode)	[10, 120]	dm
3	Speed correction (near lane)	[28, 228]	1/10 %
4	Speed correction far lane	[28, 228]	1/10 %
5	Length correction (near lane)	[28, 228]	dm
6	Length correction far lane	[28, 228]	dm
7	reserved		
8	reserved		
9	reserved		
10	reserved		
11	reserved		
12	Detector mode bitmap		bitmap
13	reserved		
14	reserved		
15	reserved		
16	reserved		

Answer message:

0x02	0x2A	ANSWER PAYLOAD	0X03

Answer payload:

The answer payload is the same as the request payload.

Note: After a configuration session (containing as many messages as needed) it is necessary to reset the detector.

0xE8 – 0xE4 - 0xE6 – Set detector name 1, 2 & 3

Note : It is advised to use only printable ASCII between 0x20 and 0x7E

Request message:

0xFF	0xE8|0xE4|0xE6	REQUEST PAYLOAD	0X00

Request payload:

Position	Description	Range (default)	Note
1	0x00		
...	0x00		
16	0x00		

Answer message:

0x02	0xE8|0xE4|0xE6	ANSWER PAYLOAD	0X03

Answer payload:

Position	Description	Range (default)	Note
1			Printable ASCII char
2			Printable ASCII char
3			Printable ASCII char
4			Printable ASCII char
5			Printable ASCII char
6			Printable ASCII char
7			Printable ASCII char
8			Printable ASCII char
9			Printable ASCII char
10			Printable ASCII char
11			Printable ASCII char
12			Printable ASCII char
13			Printable ASCII char
14			Printable ASCII char
15			Printable ASCII char
16			Printable ASCII char

Note: After a configuration session (containing as many messages as needed) it is necessary to reset the detector.

0xBB – Get basic parameters

Request message:

0xFF	0xBB	REQUEST PAYLOAD	0X00

Request payload:

Position	Description	Range (default)	Note
1	0x00		
...	0x00		
16	0x00		

Answer message:

0x02	0xBB	ANSWER PAYLOAD	0X03

Answer payload:

Position	Description	Range (default)	Note
1	reserved		
2	reserved		
3	reserved		
4	reserved		
5	Current tilt angle	[0, 90]	degrees
6	Gantry angle	[30, 60]	degrees
7	Speed unit in interactive mode	[0, 1]	[km/h, mi/h]
8	reserved		
9	Baud rate	[0, 4]	-
10	TX&Dir bitmap		bitmap
11	reserved		
12	reserved		
13	reserved		
14	reserved		
15	reserved		
16	reserved		

0x2B – Get installation parameters

Request message:

0xFF	0x2B	REQUEST PAYLOAD	0X00

Request payload:

Position	Description	Range (default)	Note
1	0x00		
…	0x00		
16	0x00		

Answer message:

0x02	0x2B	ANSWER PAYLOAD	0X03

Answer payload:

Position	Description	Range (default)	Note
1	Installation height	[10, 120]	dm
2	Installation offset (in side mode)	[10, 120]	dm
3	Speed correction (near lane)	[28, 228]	1/10 %
4	Speed correction far lane	[28, 228]	1/10 %
5	Length correction (near lane)	[28, 228]	dm
6	Length correction far lane	[28, 228]	dm
7	reserved		
8	reserved		
9	reserved		
10	reserved		
11	reserved		
12	Detector mode bitmap		bitmap
13	reserved		
14	reserved		
15	reserved		
16	reserved		

0xE9 – 0xE5 - 0xE7 – Get detector name 1, 2 & 3

Request message:

0xFF	0xE9|0xE5|0xE7	REQUEST PAYLOAD	0X00

Request payload:

Position	Description	Range (default)	Note
1	0x00		
...	0x00		
16	0x00		

Answer message:

0x02	0xE9|0xE5|0xE7	ANSWER PAYLOAD	0X03

Answer payload:

Position	Description	Range (default)	Note
1			Printable ASCII char
2			Printable ASCII char
3			Printable ASCII char
4			Printable ASCII char
5			Printable ASCII char
6			Printable ASCII char
7			Printable ASCII char
8			Printable ASCII char
9			Printable ASCII char
10			Printable ASCII char
11			Printable ASCII char
12			Printable ASCII char
13			Printable ASCII char
14			Printable ASCII char
15			Printable ASCII char
16			Printable ASCII char

Measures format

Encoded message format

Measure message:

0x02	0x99	MEASURE PAYLOAD	0X03

Measure payload:

Position	Description	Range (default)	Note
1	Speed value		In the current unit
2	Length		dm
3	Vehicle exit time, hundredth of second	0x00 - 0x99	BCD
4	Vehicle exit time, second	0x00 - 0x59	BCD
5	Vehicle exit time, minute	0x00 - 0x59	BCD
6	Vehicle exit time, hour (24h format)	0x00 - 0x24	BCD
7	Vehicle exit time, day and direction byte	0x00 - 0x31	*Cf. infra*
8	Vehicle exit time, month	0x01 - 0x12	BCD
9	Vehicle counter LOW8	[0,255]	
10	Vehicle counter MID8	[0,255]	
11	Vehicle counter HIG8	[0,255]	[0, 16M vehicles]
12	Vehicle *entry* time, hundredth of second	0x00 - 0x99	BCD
13	Vehicle *entry* time, second	0x00 - 0x59	BCD
14	Vehicle *entry* time, minute	0x00 - 0x59	BCD
15	Vehicle exit time, century	0x20	BCD
16	Vehicle exit time, year	0x00 - 0x99	BCD

See further for details on byte 7 (Vehicle exit time, day and direction byte).
Note: It is advised to ignore the *entry time* fields. If the entry time is necessary, the best is to re-compute the entry time from the exit time, the speed and the length of the vehicle.
Note: The vehicle counter loops on itself.

Month and direction byte:

Position	Parameter	Signification if 0	Signification if 1
Bit 7 (MSB)	Direction	Incoming direction	Outgoing direction
Bit 6	Not used		
Bit 5	Not used		
Bit 4	Month ten 0		
Bit 3	Month units 3		
Bit 2	Month units 2		
Bit 1	Month units 1		
Bit 0 (LSB)	Month units 0		

ASCII format (RS-232 only)

Two examples (depends of timestamp(s), units):

- 26/06/2013 16:58:51:95 +009 km/h 01.0 m\r\n
- 26/06/2013 16:58:51:97 +009 mi/h 04.0 m\r\n

Note: \r and \n do not appear on the screen (correspond to carriage return and line feed)

Good practices

1. The modification of the detector parameters is best done by a read-modify-write procedure. This allows a better compatibility of the controlling device software with future versions of the detector firmware as *reserved* fields could come into use.
2. As a measure message can come at any time, the controlling device should check the function of each received message to discriminate an expected acknowledge message from a detector-initiated measure message.

Firmware loader procedure

This section describes the procedure to implement firmware upload in the controlling device. The new firmware is stored in an ASCII file (intelhex format).

1. The controlling device sends the encoded message 0x3C.
2. The detector answers with the appropriate encoded message.
3. The detector changes its baud rate to 9600 bauds.
4. The detector waits for the prompt char (“>”) for 12s.
5. If the detector gets the prompt char, it echoes it and waits for the first line of the new firmware file.
6. Once the first line has been transmitted, the detector processes it and then sends the prompt char again and waits the second line.
7. And so on until the last line is sent.
8. The detector recognizes the last line and sends the status of the upload (OK/error description) and the reboot in normal mode.

In case of bad programming (e.g. power failure during upload), the detector stays in the step 4.

Chapter

6

Additional information

Legal notice

Hereby, Icoms Detections declares that this TMS-NET is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. A copy of the declaration can be asked per e-mail at info@icomsdetections.com.

Issue records

07/05/12: V.04.00:

- logo update

28/11/12: V04.01:

- cabling
- char. set to Frutiger
- Minor spelling corr.

07/03/13: V4.02:

- ASCII format details on p. 38
- Minor spelling corr.

19/07/13: V4.03:

- Correction and clarification of encoded message structure.
- Light formatting modification.

20/01/14: V4.04:

- Physical description (new housing)
- Specifications/Power supply
- RS485 : delete wiring, refer to add-on
- Correction clock hour range
- Table of content

01/04/14: V4.05:

- Info about rain
- Correction direction bit (see Encoded message format, p. 38)

01/04/14: V4.06:

- Name file change
- Version nr : 9 => 10
- "Get version", p. 27
- Correction direction bit (see Encoded message format, p. 38)

Contact details

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