Application Note

Reading real-time data from digital tachograph with IOBOX-CAN and FOX3 series

Intellectual Property

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Revision History

Date	Rev.	Comments
August 2017	1.0.0	Initial version.
October 2019	A	Initial Lantronix document. Added Lantronix document part number, logo, contact information, and links.

For the latest revision of this product document, please check our online documentation at www.lantronix.com/support/documentation.

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1   INTRODUCTION

This guide provides a quick overview on how to configure your FOX3 series devices in combination with the accessory box IOBOX-CAN, connect the IOBOX-CAN to D8 connector of the digital tachograph, read real time data from this interface and transfer them to your platform server.

1.1   What is a tachograph?

A digital tachograph is a device fitted to a vehicle that automatically records the vehicle identity number (VIN), the vehicle registration number and many others such as the tachograph time, vehicle speed, vehicle total distance, trip distance together with the driver's activity, tachograph status change events, driver IDs, work status changes, driver card insertion/removal events for both drivers etc. Digital tachographs have a D8 connection on pin 8 of the D connector that deliver serial data in several proprietary formats, e.g. VDO and Stoneridge. The IOBOX-CAN device can be connected to this pin to read this real time data. The IOBOX-CAN supports only the VDO and the Stoneridge formats, other tachograph formats are not supported.

1.2   Hardware Requirements

- A compatible digital tachograph (VDO or Stoneridge).
- IOBOX-CAN accessory device.
- FOX3 series devices with firmware 2.15.0 or higher.
- FOX3/-3G/-4G series with firmware 3.1.0 or higher (coming soon).
- Connection cable to interface the tachograph with IOBOX-CAN (CA38)
- Installation and power supply cable for FOX3 series device (CA68)
- The input IN4 (pin 8) of the IOBOX-CAN must be connected to the pin 8 of the D-sub connector (D8 pin) of the digital tachograph.

Please note that FOX3 series devices with the IOBOX-CAN can only read time data from the digital tachographs, but NOT remote download of DDD files (driver and vehicle file).
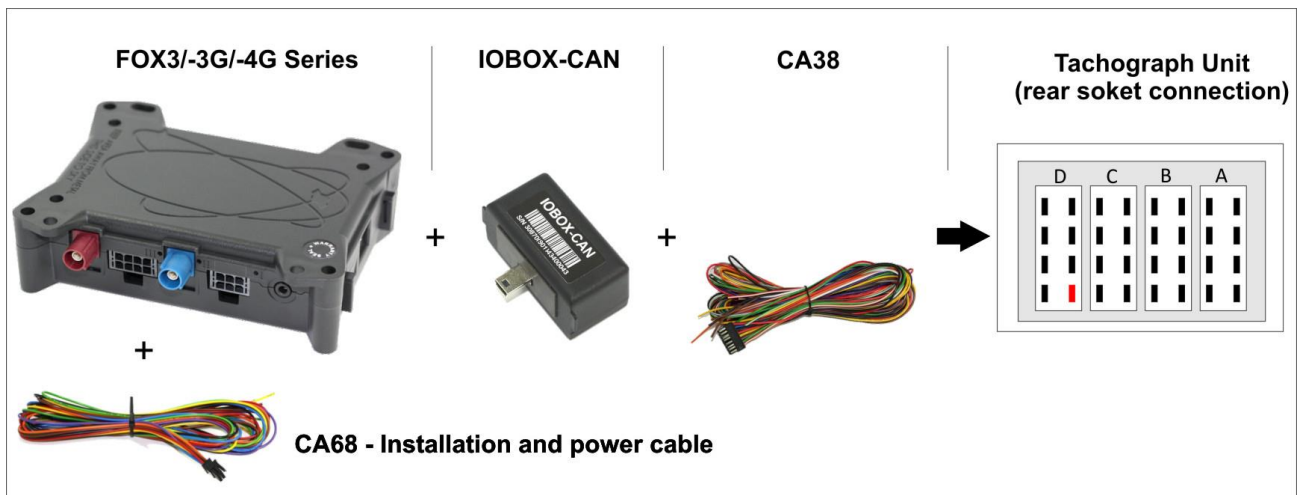

Fig. 1: Requirements for connection to D8 connector of the tachograph

1.3   Main features and benefits

The main features and benefits of digital tachograph data are:

✓   Automatic identification of vehicles and drivers

✓   Evaluation of driving behavior and safety

✓   Monitoring driving times and rest periods

2 READING REAL TIME DATA FROM TACHOGRAPH

2.1 Device configuration

To read this data, you have first to configure your FOX3 series device by sending the following PFAL script to the FOX3 series device with Workbench software. Install the FOX3 series device to the D8 connector of the digital tachograph and start reading of the real time data.

The Workbench software can be downloaded from the Lantronix website (see chapter 3.1). After you have installed it on your PC, load the PFAL script below into your device. More information on how to download the Workbench software, install and load the PFAL script can be found in the hardware manual of the device you are using (see also chapter 3.1).

Enable IN4 (PIN8) on 16pin connector of the IOBOX-CAN to read tachograph data:
$PFAL,Cnf.Set,DEVICE.DTCO.D8=B0,vdo   // for **VDO** $PFAL,Cnf.Set,DEVICE.DTCO.D8=B0,sre   // for **Stoneridge**
To read live data from the tachograph whenever the Drivers ID or state has changed, use the alarm configurations below:
$PFAL,CNF.SET,AL19=SYS.eDTCO.DRIVER.STATE:TCP.Client.Send,08,"COMPLETE:**&(DTCO.D8.COMPLETE)**   BLOB: **&(DTCO.D8.BLOB)**"
To read automatically, every minute, specific data from the tachograph together with GPS data *e.g. Speed, Date and Time*, use the alarm configuration below and enter the dynamic entries, in the format &(dynamic_entry) &(dynamic_entry) &(dynamic_entry), listed in chapter 0:
$PFAL,CNF.SET,AL18=SYS.Device.eStart:Sys.Timer0.Start=cyclic,6000 $PFAL,CNF.SET,AL19=Sys.Timer.e0:TCP.Client.Send,08,"SPEED: **&(DTCO.D8.VEHICLE_SPEED)** DATE: **& (DTCO.D8.DATE)** TIME: **&(DTCO.D8.TIME)**"
With the FOX3 series device and accessory box IOBOX-CAN, it is possible to automate reading of the tachograph data using the configuration below, for example, every minute:
$PFAL,CNF.SET,AL18=SYS.Device.eStart:Sys.Timer0.Start=cyclic,6000 $PFAL,CNF.SET,AL19=Sys.Timer.e0:TCP.Client.Send,08,"COMPLETE: **&(DTCO.D8.COMPLETE)** BLOB: **&(DTCO.D8.BLOB)**"
To request tachograph data from your server side, use the following command
$PFAL,TCP.Client.Send,08,"COMPLETE: **&(DTCO.D8.COMPLETE)** BLOB: **&(DTCO.D8.BLOB)**"
To deactivate the D8 interface on the IOBOX-CAN and use the IN4 (PIN8) on 16pin connector as digital input, use the command below:
$PFAL,Cnf.Set,DEVICE.DTCO.D8=off

In addition to the D8 interface, the IOBOX-CAN device offers several flexible features such as CAN-Bus interface and programmable inputs and outputs for almost every application within the automobile industry. For more details, please refer to the chapter 3.1, and download the document *"FOX3_3G_4G_HardwareManual.pdf"* from our website.

2.2 Supported parameters for tachographs on the AVL firmware version 2.15.0

The following table shows the implemented parameters for reading real time data from tachographs.

DTCO Parameters (Dynamic entries)	Description of data received from the D8 of the tachograph
DTCO.D8.COMPLETE	It reports a formatted text. e.g. **INFO-DATA**: ECU ID: DTCO SW:00 **Date/Time**: 29.04.2015 09:05:13 +120 min **Vehicle**: moving, 9.898 km/h, V **Vehicle ID**: ABCD01102013ABCDE **Vehicle Reg**: N BG 112 **Driver1 ID**:1100000007158000, ???, card ok **Driver2** available, no card **Motor**: 8192 rpm **Distance**: 731.485 km, trip: 3172.260 km **D1**=low **D2**=low **Ign**=on **Drawer**=closed **OpMode**=operational*42
DTCO.D8.BLOB	It reports a string with comma separated value fields: ECU ID, String ECU SW ID, 2 digits hex year UTC, 4 digits decimal month UTC, 2 digits decimal day UTC, 2 digits decimal hour UTC, 2 digits decimal minute UTC, 2 digits decimal second UTC, 2 digits decimal time offset to UTC, 3 digits decimal work state, 2 digits hex, according J1939, SPN 1612, 1613 driver1, 2 digits hex, according J1939, SPN 1615-1618 driver2, 2 digits hex, according J1939, SPN 1615-1618 status, 2 digits hex, according J1939,SPN 1620 speed, float, 3 significant figures, km/h distance, float, 3 significant figures, km trip distance, float, 3 significant figures, km K-factor, decimal, pulses/km engine speed, decimal, rpm additional, 4 digits hex, additional info D1 D2 Ignition Drawer op-mode vehicle ID, string vehicle reg., string driver1 ID, string driver2 ID, string Output example: "DTCO",00,2015,04,29,09,14,36,120,4b,10,c0,c0,9.898,733.035, 3173.810,12000,8192,0150,"ABCD01102013ABCDE","N BG 112 ","1100000007158000",""*68
DTCO.D8.ECU_ID	It reports max. 4 ascii characters. Output example DTCO*58
DTCO.D8.ECU_SW_ID	It reports 2 digits hexadecimal value

	Output example: 00*00
DTCO.D8.DATE	It reports the date dd.mm.yyyy UTC Output example: 29.04.2015*3B
DTCO.D8.TIME	It reports the time hh:mm:ss in UTC time Output example: 09:31:01*3A
DTCO.D8.TIME_ZONE	It reports the Time zone shift ([+/-]mmm) in minutes Output example: +120*33
DTCO.D8.VEHICLE_STATE	It reports a string: standing|moving|error Output example: moving*79
DTCO.D8.VEHICLE_SPEED	It reports a decimal number, 3 significant figures [km/h] Output example: 9.898*17
DTCO.D8.VEHICLE_ID	It reports a string, max 17 characters Output example: ABCD01102013ABCDE*04
DTCO.D8.VEHICLE_REG	It reports a string, max 14 characters Output example: N BG 112 *17
DTCO.D8.DRIVER1.ID	It reports a string, max 18 characters Output example: 1100000007158000*3A
DTCO.D8.DRIVER2.ID	It reports a string, max 18 characters Output example: 1100000007158000*3A
DTCO.D8.DRIVER1.WORKSTATE	It reports string: break|available|working|driving|error Output example: driving*0D
DTCO.D8.DRIVER2.WORKSTATE	It reports a string: break|available|working|driving|error Output example: available*18
DTCO.D8.DRIVER1.TIMESTATE	It reports a string: break within 15 min!!!|break!!!|error|ok Output example: ok*6B
DTCO.D8.DRIVER2.TIMESTATE	It reports a string: break within 15 min!!!|break!!!|error|ok Output example: ok*6B
DTCO.D8.DRIVER1.CARDSTATE	It reports a string: no card|card ok|card error|N/A Output example: card ok*53
DTCO.D8.DRIVER2.CARDSTATE	It reports a string: no card|card ok|card error|error Output example: no card*5B
DTCO.D8.DRIVER1.OVERSPEED	It reports string: overspeed|overspeed error|N/A|ok
DTCO.D8.DRIVER2.OVERSPEED	It reports a string: overspeed|overspeed error|ok
DTCO.D8.DISTANCE	It reports a decimal number, 3 significant figures [km] Output example: 742.055*18
DTCO.D8.TRIPDIST	It reports a decimal number, 3 significant figures [km] Output example: 742.055*18
DTCO.D8.D1	It reports a string: low|high|ERROR|N/A Output example: low*18
DTCO.D8.D2	It reports a string: low|high|ERROR|N/A Output example: low*18
DTCO.D8.IGN	It reports a string: off|on|ERROR|N/A Output example: on*6E

DTCO.D8.DRAWER	It reports a string: open|closed|ERROR|N/A
	Output example: closed*71
DTCO.D8.OPMODE	It reports a string: not activated|operational|control|calibration|company| unknown|error|N/A
	Output example: error*1D

Table 1: Tachograph parameters supported in the AVL firmware version 2.15.0

2.3   Installation steps

1. Connect the IOBOX-CAN to the FOX3 device via the mini-USB connector (refer to the hardware manual of the FOX3 device).

2. Connect the CA38 cable (see wiring diagram below) to the IOBOX-CAN 16pin connector and then connect the GREY wire (PIN 8 on the 16pin connector of IOBOX-CAN) to connector D8 of the tachograph (see below marked in red). Check with a multimeter the GND connection between vehicle and tachograph which should show 0 volts, if not then use PIN 16 on the 16pin connector of IOBOX-CAN for direct GND connection to tachograph.

3. Connect the CA68 cable (installation and power cable) to the main port (8pin connector) and then apply power to the device by connecting the BROWN wire of this cable to GND and the RED wire of this cable to 12/24VDC source in the vehicle's fuse box.

4. More information on how to install properly Lantronix devices in the vehicles is available in a separate document "*AppNotes_AVL_Installation_Guide_vx.x.x.pdf*".

5. The FOX3 device is now ready to receive the data from the D8 serial data port of the tachograph.
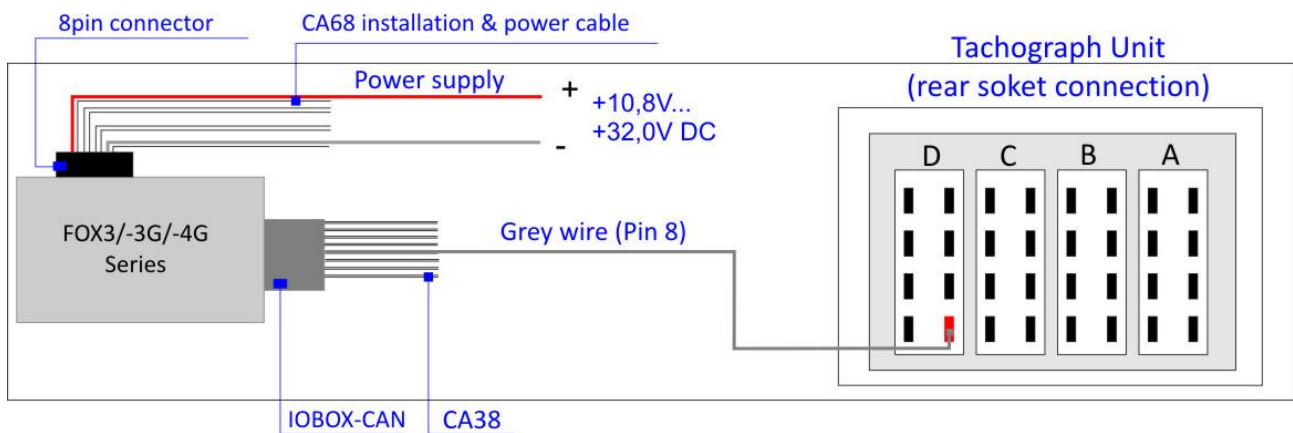

Fig. 2: Installation of FOX3/-3G/-4G series with IOBOX-CAN to the digital tachograph.

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3 DOCUMENTATION

3.1 Additional documentation & software tools

If this application note does not cover all the information you need to setup, refer to the additional documents listed below, which can be found on the *Product Index* or *Application Notes* pages.

Filename	Description
AVL_PFAL_Configuration_Command_Set.pdf	Lists and describes all PFAL commands supported by the AVL devices.
FOX3_3G_4G_HardwareManual.pdf	Contains instructions for safety and operation of the FOX3/-3G device.
AppNotes_AVL_Installation_Guide.pdf	Provides all the necessary information about installing the Lantronix products properly and safely.
Workbench Software	**Description**
Lantronix Workbench	Lantronix Workbench configuration tool (Windows XP, Windows Vista, Windows 7)