AVT110 Tachograph User Manual

EGPRS/LTE Cat-1

V1.02

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Contents

0. Revision History

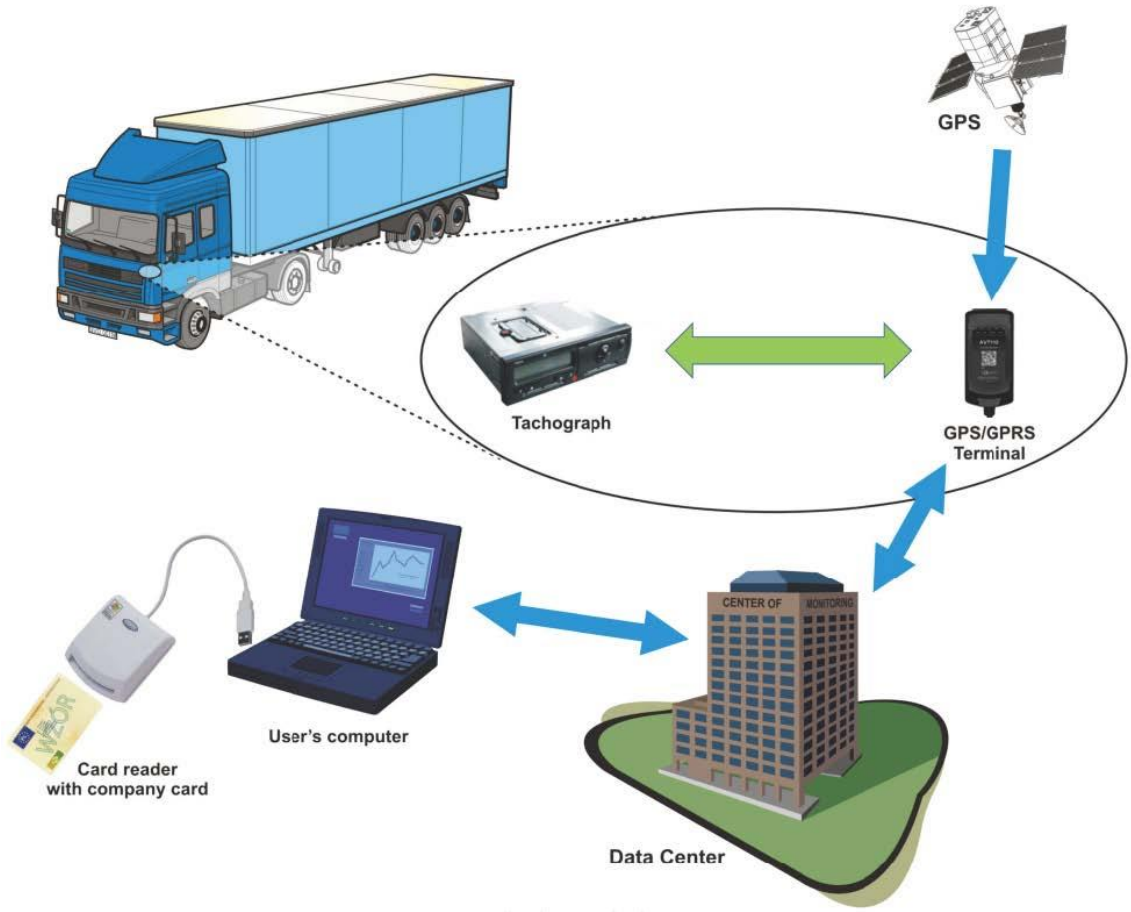
Revision	Date	Author	Description of Change
1.01	Jan 2, 2025	Joel	Initial

1. Introduction

1.1. Telemetric System

The terminal can remotely read DDD files from digital tachograph and driver card as a part of telemetric system. Commonly, in order to read files from tachograph, it is necessary to put company card directly into the vehicle's tachograph and download required files with a specific tool. The problem appears when the vehicles are far away in foreign countries but the company card is in the home office.
Data between tachograph and company card is exchanged over the Internet using the existing structure of telemetric system.

A typical vehicle monitoring system consists of a telemetric device (GNSS/GPRS terminal) placed in a vehicle, a server and software running on end user's computer.
In order to allow a remote download of DDD files from tachograph in a vehicle, the system must be connected with GNSS/GPRS terminal (which is connected to the vehicle's tachograph) and provide its communication with the company card, which is inserted into end user's computer by a card reader.

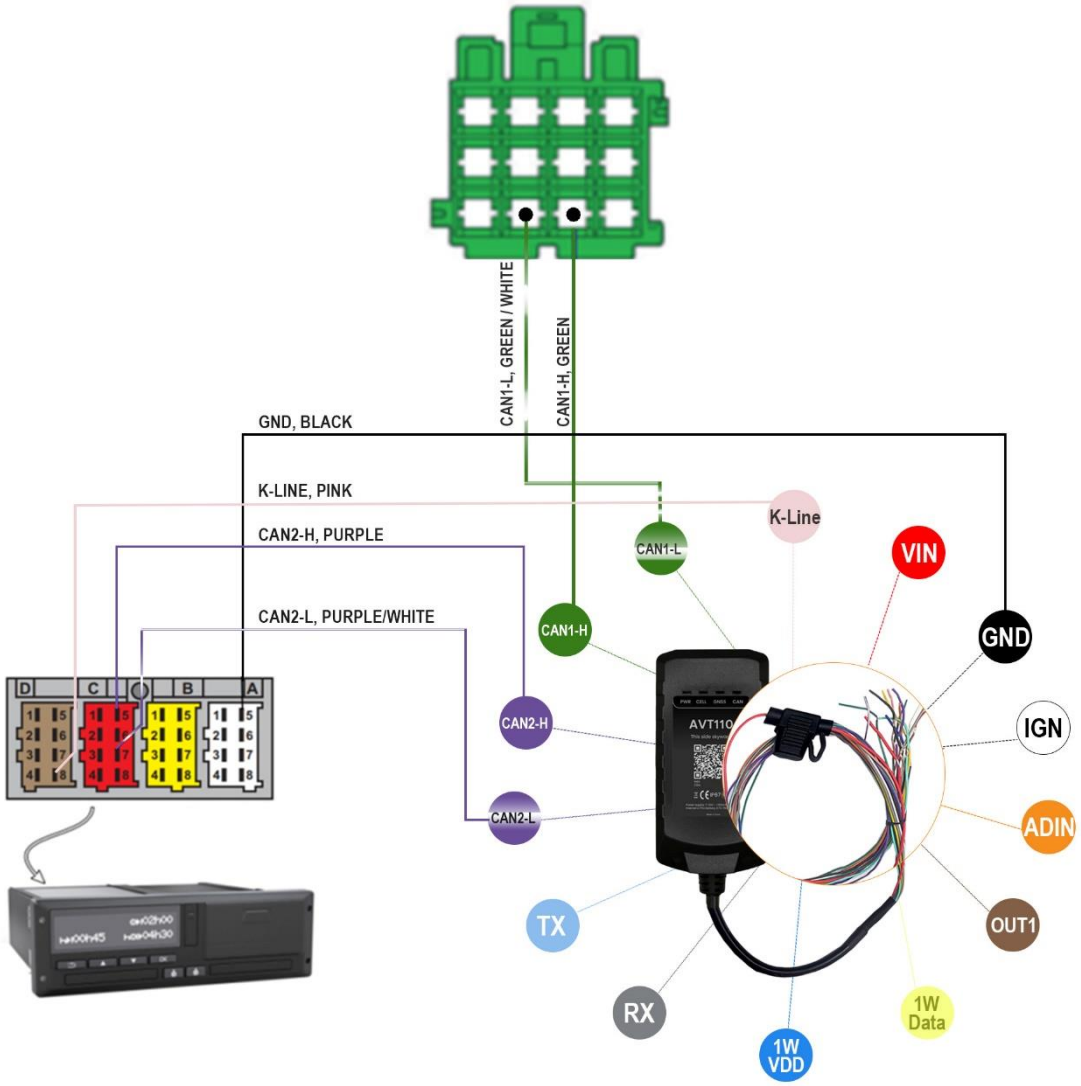


1.2. Connection FMS & Tachograph Connector for Trucks

The FMS connector can be connected to CAN1 of AVT110.

FMS connector shape and pinout may vary between truck makes and models. The picture is illustrative. For CAN1 connection position, please refer to the installation manual for the particular truck model. Installation diagram request – support@iot-at.com

Tachograph should be connected to CAN2, K-LINE and GND while car's CAN-bus is connected to CAN1. If only the tachograph is connected, connect it to CAN2, K-LINE, GND and run auto-synchronization.



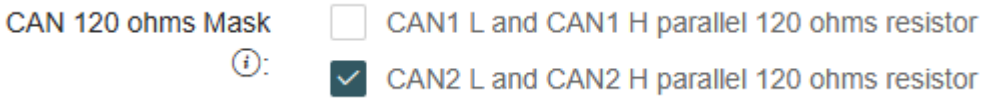
This is General connection diagram. For some other brand like Scania, connection diagram can be different, because in some market in Scania model, Tachograph connector C is occupied. If C connector is occupied, please connect CAN1 interface to FMS connector, and use only CAN 1 for DDD download &CANbus data.

1.3. CANbus & Tacho Configuration/CANbus Synchronization

1.3.1. CANbus & Tacho Configuration

- **CANbus & Tacho>CANbus settings** configure **AT@CAN** command Enable <mode> to 2, 3.

Very important resistance on Tachograph connector C pin 5/7. Measure resistance when CAN2 wires connected and Tachograph is OFF. If it's 120Ω, configure 120Ω resistor in **CANbus & Tacho>CANbus>AT@CAN. Finally, resistance on theses pins should be 60Ω**.



- **CANbus & Tacho>CANbus settings** configure **AT@CAN** enable CAN2 L and CAN2 H parallel 120Ω resistor (for some truck brand like Scania can be used only CAN1 interface for DDD download process) mask in <*CAN 120 ohms Mask*>.
- Enable <*Tachograph Info Mask*> parameter mask, the tachograph info mask includes tachograph information, tachograph overspeed signal, tachograph vehicle motion signal, tachograph driving direction, tachograph driver 1 card number, tachograph driver 2 card number, tachograph driver 1 name, tachograph driver 2 name, real time clock date and time.

1.3.2. CANbus Synchronization

CANbus codes auto-synchronization function allows AVT110 to detect the vehicle model to which the AVT110 is connected. Switch vehicle ignition on and send the command AT@RTO=at,14,2,,,,,FFFF# after the AVT110 is installed in the vehicle, and then the synchronization will start. During synchronization, the flashing of the CAN LED can be observed. For details which ID was synchronized, please refer to the command AT@RTO=at,14,0,,0001# sub command 14 in **RTO (Real Time Operation).**

Truck - only CAN1 connected to FMS synchronize to 1, 30, 31.
Truck - CAN1 and CAN2 connected to Tachograph synchronize to 75, 76, 77, 78, 83.
Truck - only CAN2 connected to the Tachograph, synchronize 79, 80
Truck - The connection to J1708 is group 70.

1.3.3. DDD file request process

- Using **AT@TAC** command to start DDD file download.
- DDD file can upload by +LDP messages to server or FTP server, it can set by <*Report Mode*> of AT@TAC command.
- DDD file can read from tachograph memory, Driver 1 card and Driver 2 card, read ways can set by <*Read File Type*> of AT@TAC command.
- The <*Start time*> and <*End time*> have valid, when <*Read File Type*> set as 1(request to read Tachograph memory).

1.4. Procedure of DDD Files Remote Download

The procedure of reading DDD files from tachograph has 2 stages:

- Authorization, where the tachograph exchanges several encrypted data packets and control commands with the company card.
- Files download, where GNSS/GPRS terminal reads requested data from tachograph memory or driver card.

To perform the authorization, the telemetric system must provide communication between the tachograph and the company card, as shown in the diagram below.

- Card reader with supporting application (TachoCardAuthorizer) to be run on the end user's computer.

Other elements are part of typical telemetric system, that must be adapted by:

- GNSS/GPRS terminal software must be able to send data packets to and from the company card in a timely manner.
- Server software must manage the whole process of remote files download from the time the end user makes a request to providing the DDD files he requested; it must also forward data packets from THR GNSS/GPRS terminal to TachoCardAuthorizer application running on the end user's computer.
- Application running on the backend user's must allow him to make a request of particular DDD files to download from a particular vehicle.
- Communication of GNSS/GPRS terminal with tachograph (all models of tachographs that are available on market and support remote DDD files download), it is required to connect GNSS/GPRS terminal to the tachograph according to the installation manual provided.
- TachoCardAuthorizer application to be run on end user's computer, which provides communication with card reader and company card.
- Communication protocol (over http/https) of TachoCardAuthorizer application with Server.

1.5. Implementation

The implementation of Server is a concern of customer as Assistant Telematics provides application TachoCardAuthorizer and GNSS/GPRS terminal device. This chapter contains step-by-step guidelines on how to implement support for GNSS/GPRS terminal on Server.
At the end of this section there is **Sequence diagram**, which shows the entire procedure of downloading DDD files remotely using GNSS/GPRS terminal and card reader application TachoCardAuthorizer.
This procedure refers to:

- AVT110 communication protocol;
- TachoCardAuthorizer technical documentation;

1.5.1. Request Procedure

Log in

The first step is to configure the TachoCardAuthorizer application to connect to the Server by editing the config.dat file. It is recommended to use debug version of the application and start it from command line to view detailed logs containing all outgoing and incoming http requests.
After start, the application asks the user for login data (username, password), which can be omitted during implementation and tests.

Waiting for files download request (the Request)

Server is the manager of all DDD files download requests, and it has to implement a queue of requests. Each Request has its unique request ID and is related to device with the gpsID number and the user who initiates the request.
TachoCardAuthorizer, after login, queries the Server about queue of Requests available for logged-in user. In response, the Server sends a queue of Requests that are ready to authorize. The queue should be empty until any Request is not initiated and confirmed by the GNSS/GPRS terminal.

Request initiation

User interface and way of its communication with the Server is not a concern of this manual. It is assumed, that there exists an interface, where user can make a Request (selecting the vehicle and the requested files) and enqueue it to the Server.
A new Request with status “queued” appears on Server. Server sends the Request command (including all parameters) to GNSS/GPRS terminal. After GNSS/GPRS terminal accepts the Request, Server can “hand over” it to TachoCardAuthorizer for authorization, place the Request in reply to TachoCardAuthorizer query (GET queue). Application confirms start of authorization procedure for specified Request (GET requests/<requestID>) and this changes Request status to “authorization”.
Now TachoCardAuthorizer starts querying Server about APDU packets directed from tachograph and GNSS/GPRS terminal.
At the same time Terminal starts querying GNSS/GPRS terminal about status and awaits the first APDU packet to be sent to company card.

Authorization

Authorization starts when GNSS/GPRS terminal reports that the first APDU packet is ready. Terminal passes it to Server, and when TachoCardAuthorizer asks about awaiting APDU packets (GET apdu/<requestID>/status) – Server confirms there is a APDU packet from device gpsID. Application reads the APDU packet (POST apdu/<gpsID>/dequeue), acknowledges its reception (POST apdu/<gpsID>/commit) and, after a while (fraction of second typically), sends back to Server a response from company card (POST apdu/<gpsID>).
Consecutive APDU packets delivered by GNSS/GPRS terminal should be numbered by Terminal (seqNumber) to keep packets order in case of GPRS connection problems. One packet can be retransmitted over GPRS (acknowledges are concern of the telemetric system), but it must not be delivered to GNSS/GPRS terminal twice. So if Terminal receives an APDU packet, which has already been sent to GNSS/GPRS terminal (recoginzd by seqNumber), it must be trashed. SeqNumber is passed with packet to Server and TachoCardAuthorizer. Reply of company card returns from TachoCardAuthorizer to Terminal with the same SeqNumber.
After Terminal passes the reply to GNSS/GPRS terminal, the Terminal continues querying about status and waits for next APDU packet from tachograph or for the end of authorization procedure.
Reply from company card to GNSS/GPRS terminal must be delivered within maximum 1 minute

(typically no more than 10 seconds), otherwise GNSS/GPRS terminal would restart authorization and report new APDU packet to Terminal without waiting for previous reply.
After the third failed attempt, the GNSS/GPRS terminal reports authorization error and cancels the Request.
If some error is detected on the Server side (i.e. timeout, connection error, canceled by user), the Request status should be changed to “error”, which causes the TachoCardAuthorizer to cancel the authorization and get ready for further Requests.

The end of authorization

When tachograph accepts authorization of company card, the GNSS/GPRS terminal changes its status and the terminal has to forward this information to the Server so that the status of Request changes to “transferring”, indicating that the files are being downloaded from the tachograph. The TachoCardAuthorizer will be the last, knowing that the authorization ends as it continues to query the Server about Request status (GET apdu/<requestID>/status).
When the status changes, the TachoCardAuthorizer shows a message to the end user and start to query the Server for the next enqueued Request (GET queue). Anyway, TachoCardAuthorizer may now be closed and card reader detached.

Download files from tachograph

Since that moment, only the Terminal and the Server are engaged in Request.
The Terminal continues to query Terminal about its status until it reports that files are ready. Then the Terminal must download files from the Terminal, including information about the name, length and checksum of the files, and forward them to the Server.
The Server stores the files or sends them to the end user, and the Request is over.

1.5.2. Sequence Diagram

Please check file “AVT110 Tachograph Sequence Diagram.svg”.