LOKI

USER MANUAL

CONTENTS

English

LOKI

1 LOKI: INTRODUCTION

1.1 Description

LOKI – software and hardware package for diagnostics and maintenance of Tesla vehicles.

Figure 1. General view

LOKI hardware is an independent module based on a single board computer running the Linux operating system. The module is connected to a vehicle through CAN and LAN interfaces (Fast Ethernet 100Base-T and BroadR-Reach 100Base-T1) using special cables.

The front panel of the module hosts a connector for cables and eight light-emitting diodes:

> **1–4.** CAN-bus indication
>
> **CH** – CAN Chassis
>
> **PT** – CAN Powertrain
>
> **BDY** – CAN Body
>
> **BFT** – CAN Body Fault Train
>
> **5. BL (Bootloader)** – Bootloader indication
>
> **6. MS (Main Server)** – Master program indication

7. T1 –BroadR-Reach (100Base-T1) indication

8. PWR – Module power supply indication

The rear panel hosts port RJ45 for connection to the Fast Ethernet (100Base-T) and USB ports for connection of peripherals (flash-drive with update files, cables with new interfaces, etc.). The module is powered from vehicle electric system (either through a diagnostic port in Model S/X or a USB port in Model 3). The module operating system is loaded within 20 minutes after power up. Steady led light of MS and BL indicators signals full module boot and readiness for operation.

1.2 Equipment set

The equipment set includes:

- Module LOKI

- LC001-CS – Cable CAN for Tesla Model S

- LC002-LS – Cable LAN for Tesla Model S/X

- LC003-CX – Cable CAN for Tesla Model SR, Model X

- LC004-L3 – Cable LAN for Tesla Model 3

2 CONNECTING LOKI TO TESLA

2.1 Connecting to Model S/X Tegra

⚠ **WARNING!** Do the following before starting:
- **Connect the vehicle to Wi-Fi (to avoid accidental loss of certificates);**
- **Connect the 12V battery to a charging device (to prevent it from "bricking" in the process of update or REDEPLOY).**

There are two special cables for connection of LOKI to Tesla Model S: LC001-CS – for connection via the CAN diagnostic port X437 located underneath the CID and LC002-LS for connection via LAN port X861 (on the dashboard) when FACTORY MODE is disabled
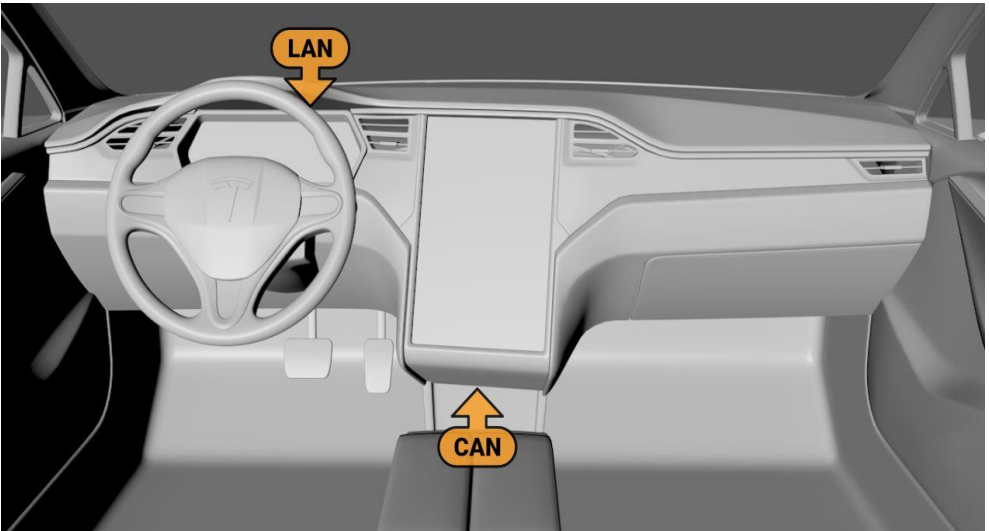

Figure 2. Connecting Tesla Model S (Pre-facelift) – FACTORY MODE is disabled

With FACTORY MODE enabled, the LAN diagnostic port X863 underneath the left dashboard becomes activated thus, allowing us to connect via this port without removing the fascia panel.

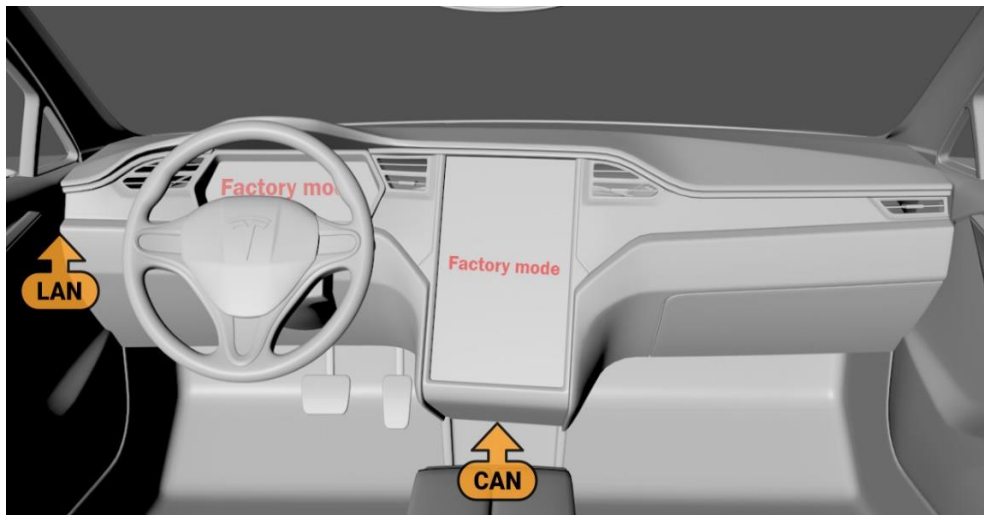**Figure 3. Connecting Tesla Model S (Pre-facelift) – FACTORY MODE is enabled**

2.2 Connecting to Model S (facelift) / X Tegra

There are two special cables for connection of LOKI to Tesla Model S/X 2015-2018 (facelift): LC003-CX – for connection via the diagnostic port CAN located underneath the CID and LC003-CX - for connection via LAN port X861 (on the dashboard) when FACTORY MODE is disabled.
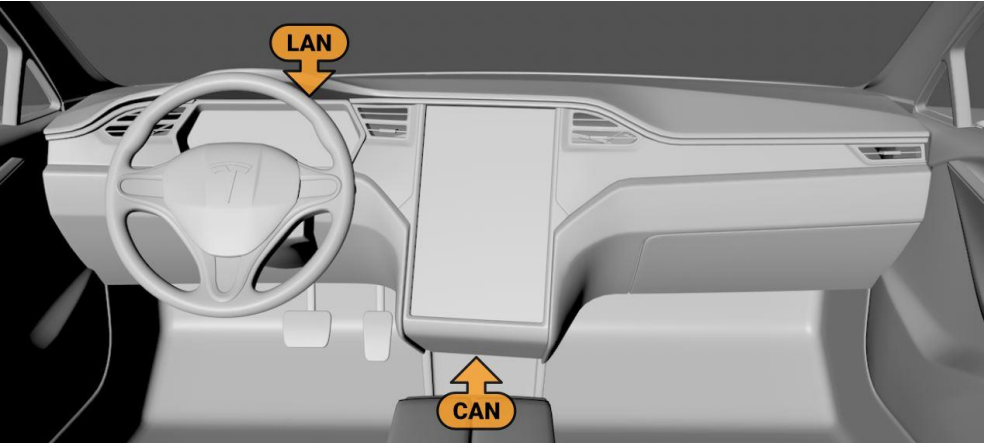
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Figure 4. Connecting to Model S (Facelift)/X Tegra) – FACTORY MODE is disabled

With FACTORY MODE enabled, the LAN diagnostic port underneath the CID becomes activated, which makes it possible to connect via this port without removing a fascia panel.
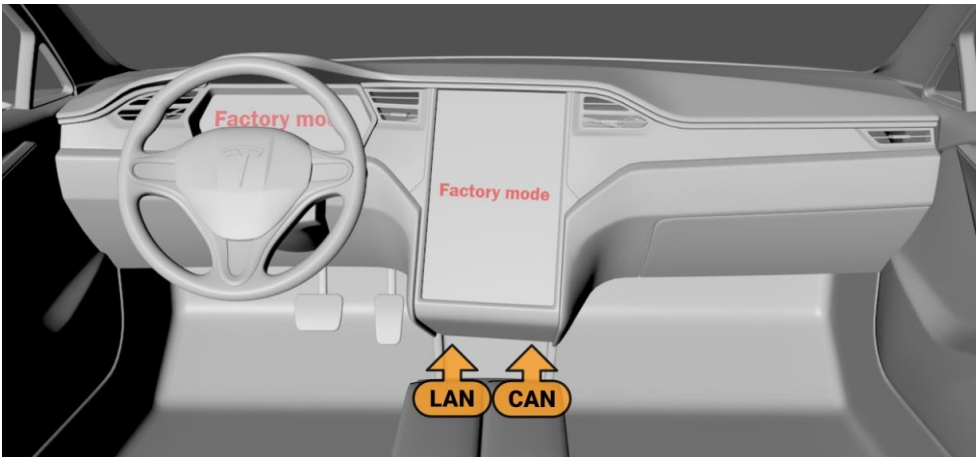
Figure 5. Connecting to Model S (Facelift)/X Tegra – FACTORY MODE is enabled

2.3 Connecting to Model S/X Intel

Special cables are required to connect LOKI to Tesla Model S/X: LC003-CX – for connection via the CAN diagnostic port underneath the CID and LC002-LS for connection via the LAN port of the autopilot module.
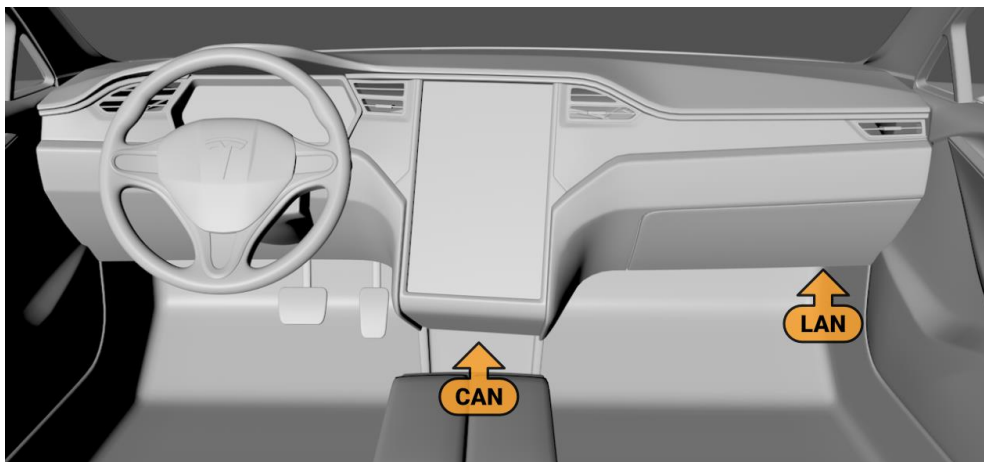
Figure 6. Connecting to Tesla Model S/X Intel

2.4 Connecting to Model 3

Cable LC004-L3 is used to connect LOKI to a vehicle - a USB connector of the cable should be plugged into the USB port of a car charger.

LOKI
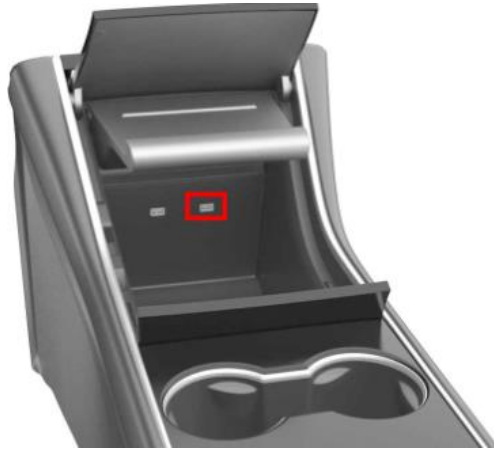
Figure 7. USB port in Tesla Model 3

The connector on the other end of the cable should be plugged into the MCU port underneath the glovebox:
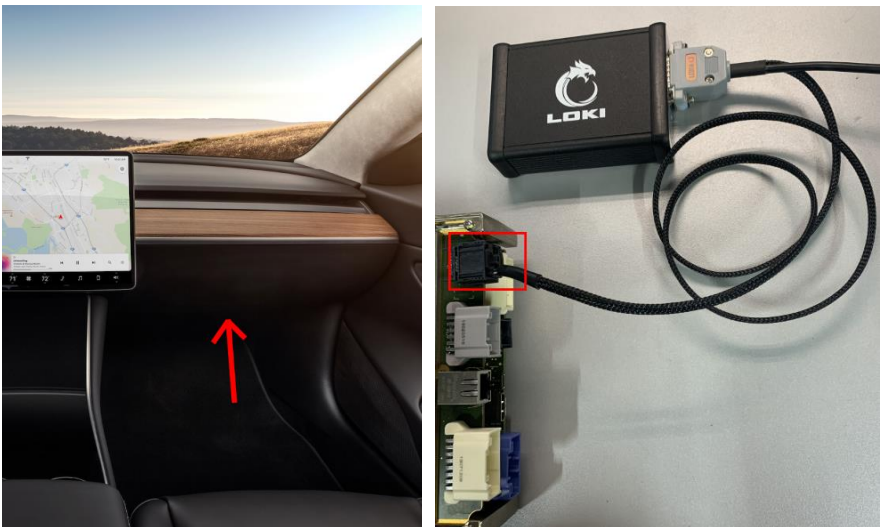
Figure 8. BroadR-Reach port for connecting LOKI to Tesla Model 3

2.5 IP-address screen

Selection of an IP-address for connection via LAN will depend on the port you use. The IP-address is selected in the SETTINGS menu.
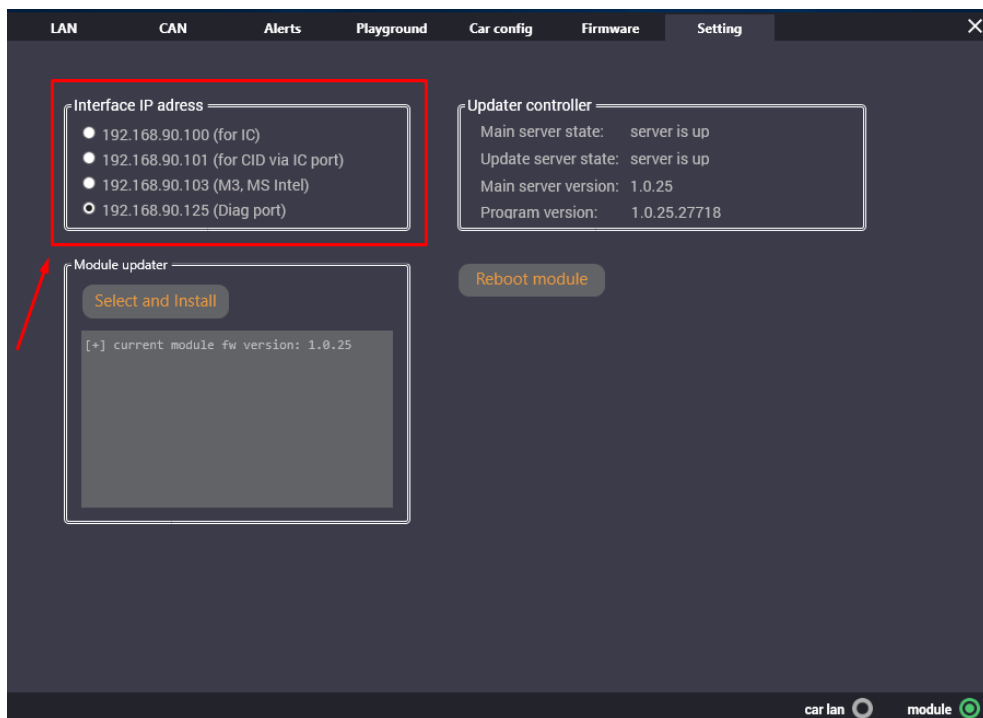
Figure 9. Interface IP-address screen

192.168.90.100 – temporary out of use
192.168.90.101 – for connection via MCU1 (Tegra) dashboard and for managing configurations in MSU2 (Intel)
192.168.90.103 – for connection via the Autopilot port
192.168.90.125 – for connection via the LAN diagnostic port underneath the CID and for managing configurations in MCU1.

3 LOKI operation guide

3.1 Software installation

Installation requirements for a laptop/computer
- OC – Windows 10 x64 (or x32)
- Wi-Fi module
- Either an external Wi-Fi module or the Ethernet port for connection to the Internet when required for LOKI operation
1. Download software using the link in bio of a general chat room or get it from the developers of LOKI.
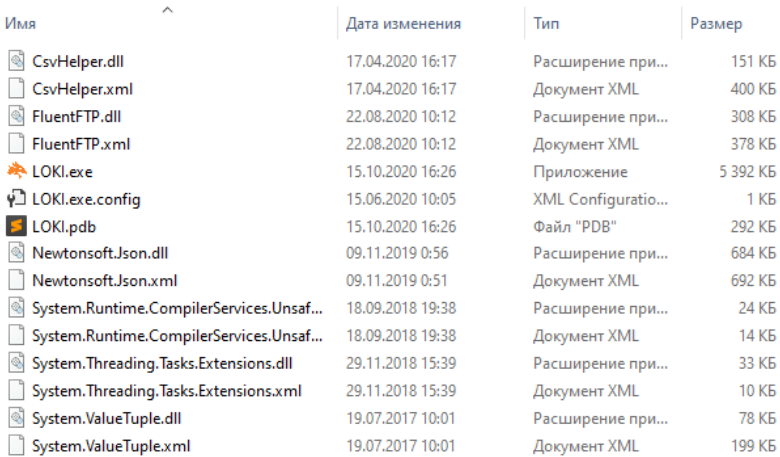2. Unzip the software folder to view the following:

Имя	Дата изменения	Тип	Размер
CsvHelper.dll	17.04.2020 16:17	Расширение при...	151 КБ
CsvHelper.xml	17.04.2020 16:17	Документ XML	400 КБ
FluentFTP.dll	22.08.2020 10:12	Расширение при...	308 КБ
FluentFTP.xml	22.08.2020 10:12	Документ XML	378 КБ
LOKI.exe	15.10.2020 16:26	Приложение	5 392 КБ
LOKI.exe.config	15.06.2020 10:05	XML Configuratio...	1 КБ
LOKI.pdb	15.10.2020 16:26	Файл "PDB"	292 КБ
Newtonsoft.Json.dll	09.11.2019 0:56	Расширение при...	684 КБ
Newtonsoft.Json.xml	09.11.2019 0:51	Документ XML	692 КБ
System.Runtime.CompilerServices.Unsaf...	18.09.2018 19:38	Расширение при...	24 КБ
System.Runtime.CompilerServices.Unsaf...	18.09.2018 19:38	Документ XML	14 КБ
System.Threading.Tasks.Extensions.dll	29.11.2018 15:39	Расширение при...	33 КБ
System.Threading.Tasks.Extensions.xml	29.11.2018 15:39	Документ XML	10 КБ
System.ValueTuple.dll	19.07.2017 10:01	Расширение при...	78 КБ
System.ValueTuple.xml	19.07.2017 10:01	Документ XML	199 КБ

Figure 10. Unzipped folder with LOKI software

3. Create a folder and save all the unzipped files to this folder.
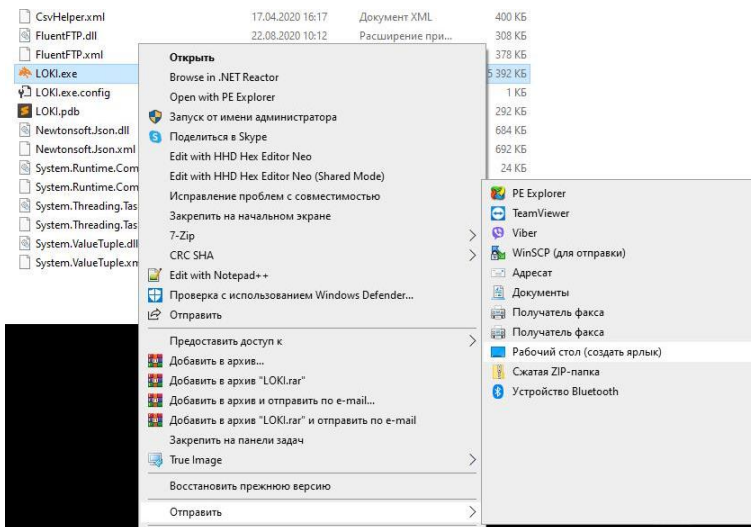4. Create a desktop shortcut for the program.

Figure 11. Creation of a shortcut on the desktop

5. Run the program. If the program shows an error – Net Framework 4.8 cannot be found, follow the link Net.Framework 4.8 (available in PDF version) to download and install it.
6. If Net Framework 4.8 is installed on your PC, the program start screen will be displayed:
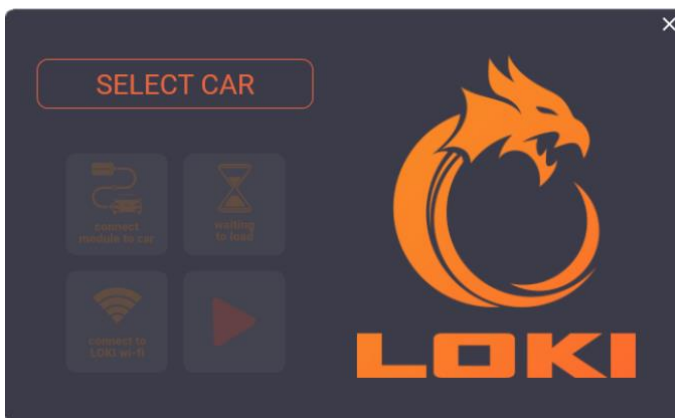
Figure 12. LOKI start screen

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3.2 Module firmware update

1. Get the update file from the LOKI developers.
2. Go to the SETTING menu on the main program screen and hit SELECT AND INSTALL

Figure 13. Menu SETTINGS

3. Select the update file upd_0X.XX.XX.lu. The update process will take about 10-15 seconds. Upon completion, a notification UPDATE FINISHED will be displayed and the new version will appear in the update log.

Figure 14. LOKI update file
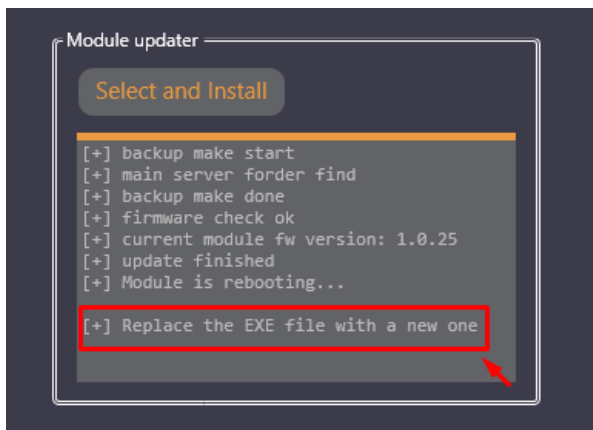
Figure 15. LOKI update screen

⚠️ **WARNING!** Take a note of the end line!

3.3 Pre-starting procedures

Open the LOKI program on your PC and select a vehicle model to start the diagnostic process.
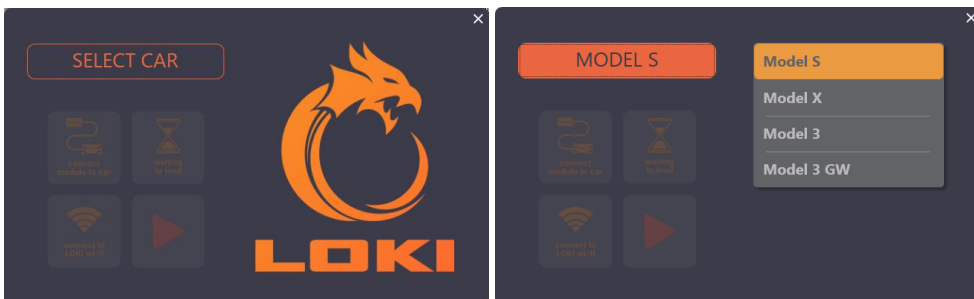
Figure 16. LOKI start screen

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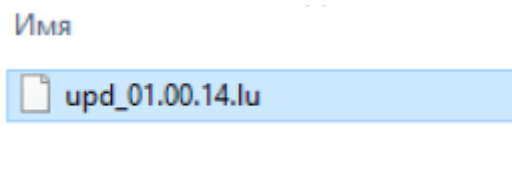When the vehicle model is selected, follow the program instructions to connect the diagnostic module to the vehicle. Confirm each step by hitting the appropriate button.
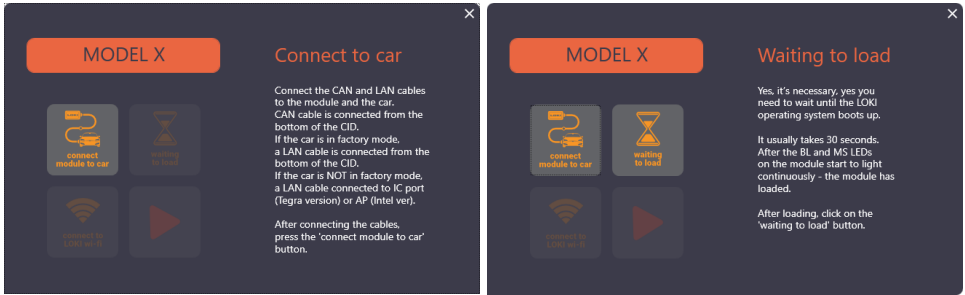
Figure 17. LOKI program start screen

It takes 20-30 seconds to launch the module. A steady light of MS and BL indicators signals full module boot and readiness for operation.
Once the download is completed, hit the appropriate button to confirm.

The module will create a Wi-Fi access point that will be used as a communication interface
Network name – LOKI_XX
Network password - wfCeCVk4wkGFgWbh

Figure 18. Connecting LOKI to Wi-Fi

3.4 Working via CAN

CAN and LAN are two communication channels used to work with a vehicle.
The CAN channel is for communication with the following vehicle control modules:
- **BDY** – Body control module
- **SEC** – Security control module
- **SUN** – Sunroof
- **LFT** – Liftgate
- **DDM** – Driver door module
- **THC** – Tesla Thermal Controller
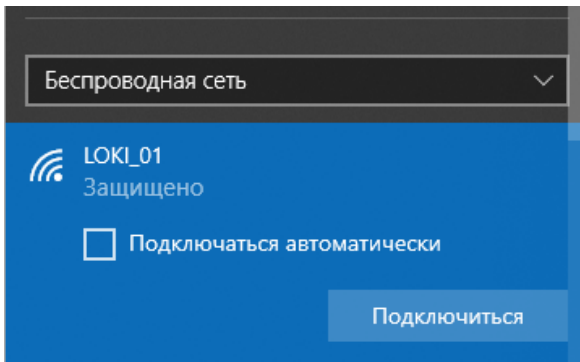- **CHG** – Master charger
- **BMS** – Battery Management System
- **CP** – Charge port
- **DCDC** – DC-DC converter
- **DI** – Master drive inverter
- **SRS/SDM** – Supplementary Restraint System
- **TPMS** – Tire Pressure Monitoring System
- **ABS/ESP** – ABS/ESP
- **TAS** – Air suspension
- **EPS** – Electric Power Steering
- **EPB** – Electric Park Brake
- **BCCEN** – Body Control Central Unit
- **MSM** – Memory Seat Module

The procedures that can be performed for all the above-listed control modules are as follows: DTC reading and clearing, access to service modes and functions, live data reading, calibrating. A menu with a list of available modules and possible functions is provided for working with the CAN part of a vehicle.
For example, in the SERVICE FUNCTIONS menu for TNC control module, we can enable the modes for coolant drain/fill and the system air purge; also we can monitor the parameters of individual system components. These functions are essential when it comes to removing or replacing a battery pack or engine.
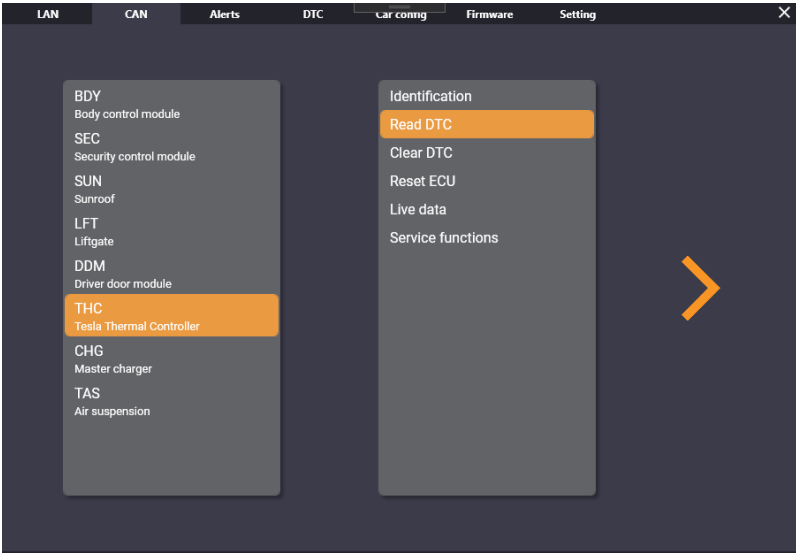
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Figure 19. Screen for working with a CAN bus
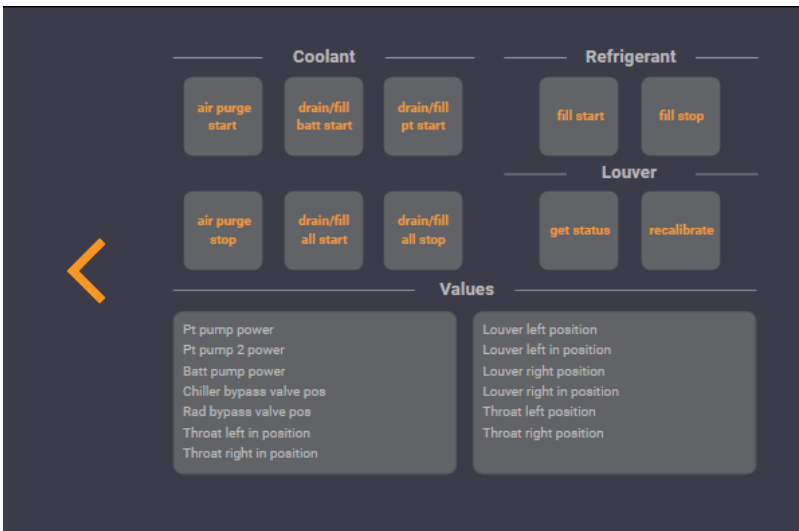
Figure 20. Screen for working with THC

3.4.1 Clearing Alerts and Crash in BMS and TAS

Some alerts as well as crash codes should be cleared in a manual way after the fault troubleshooting.

LOKI has a function of clearing Alerts and Crash codes from the BMS and TAS respectively. The steps for this are as follows: go to the CAN bus menu, select the control module, hit SERVICE FUNCTIONS, then NEXT, then delete the appropriate Alert.

Figure 21. Menu for clearing Alerts in BMS
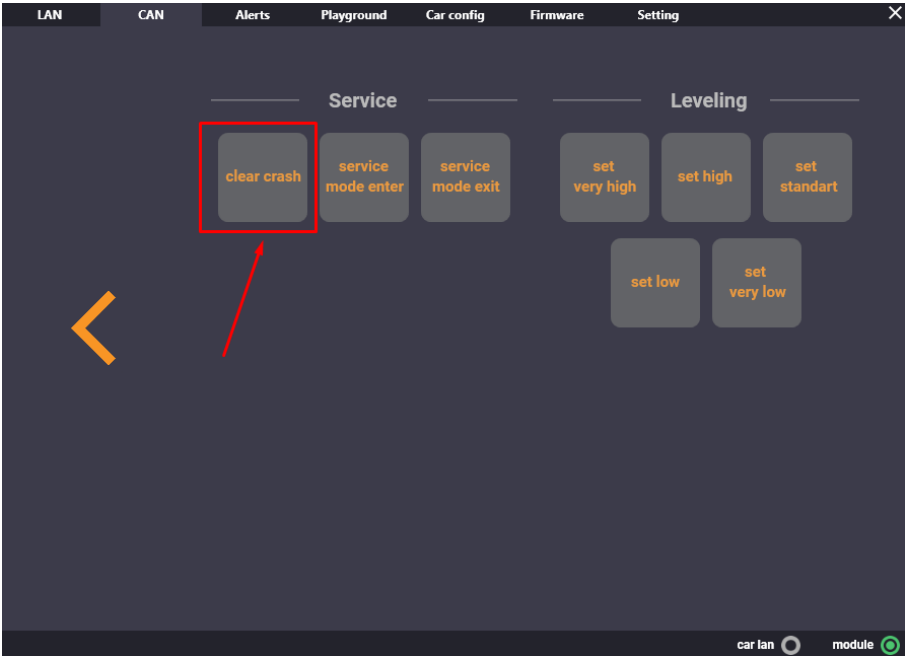
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Figure 22. Menu for clearing Crash in TAS

3.4.2 Recalibrating Steering Column and Seats

LOKI provides an opportunity to launch the calibration of a steering column and seats manually. The steps for this are as follows: go to the CAN bus menu, select the appropriate control module, hit SERVICE FUNCTIONS, then NEXT, then - CALIBRATE.
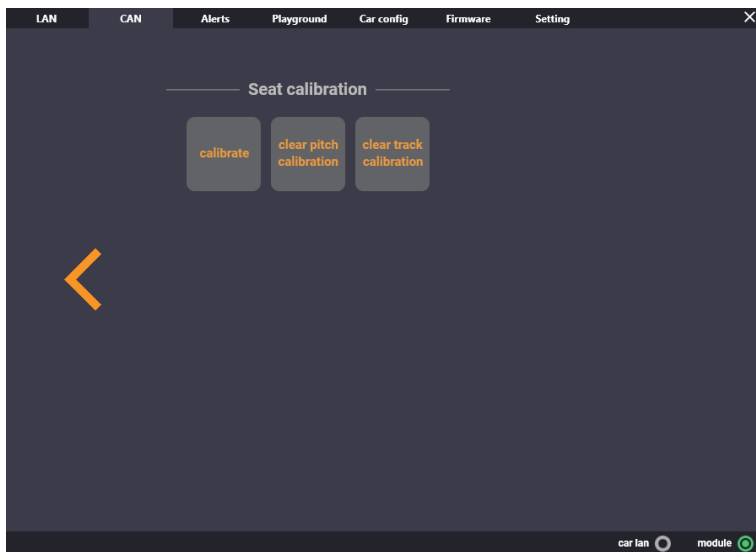
Figure 23. Seat calibration screen
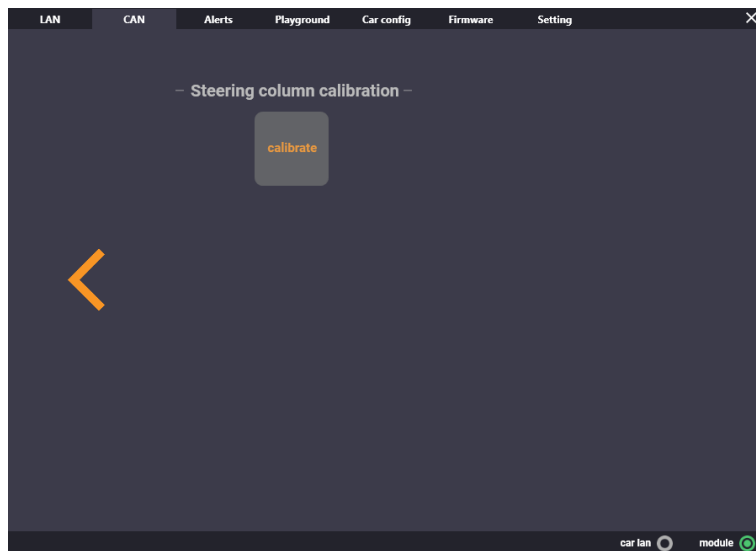
Figure 24. Steering column calibration screen

3.4.3 Radar calibration

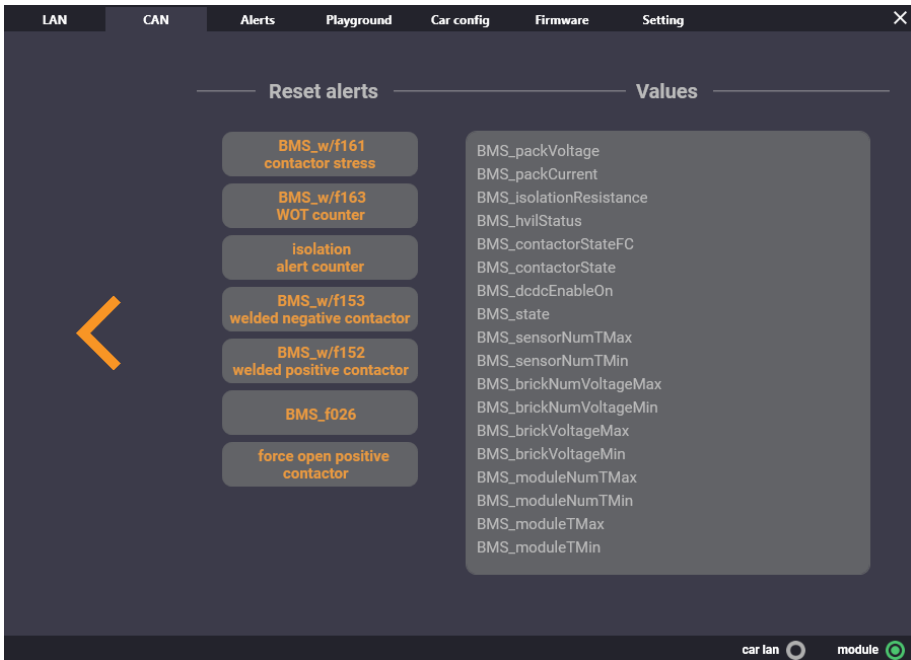⚠ **WARNING!** When calibrating the radar, at the point of driving, make sure there is someone else in the car except you who could monitor the calibration progress by hitting the SERVICE ALIGMENT GET RESULT button from time to time.

1. Connect to the CAN Chassis bus of the vehicle

The procedure of connection to the CAN Chassis bus is as follows:
- follow the instructions set forth in the previous items (for Model S/X)
- connect via the X935F port located near the right pillar on the passenger side (for Model 3)
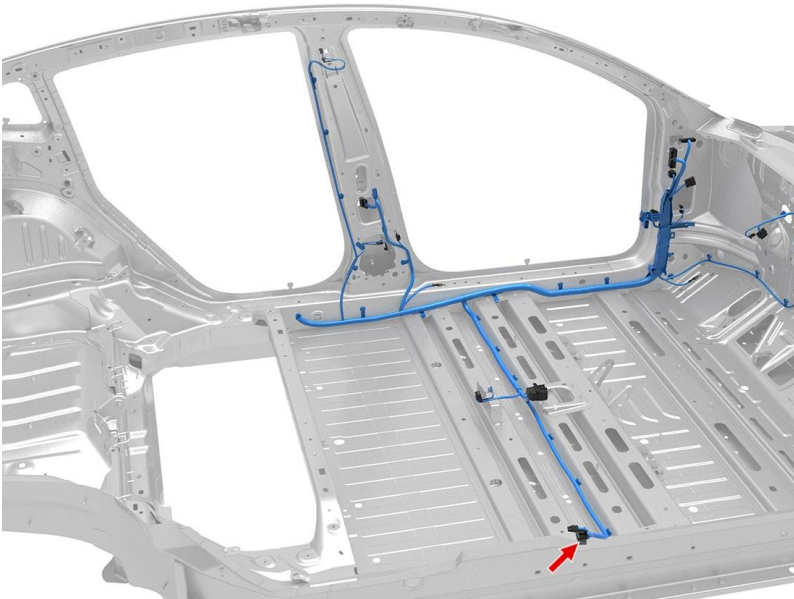
Figure 25. Port X935F location

The connection diagram is shown below. The connection procedure will require cable LC003-CX and other auxiliary tools.
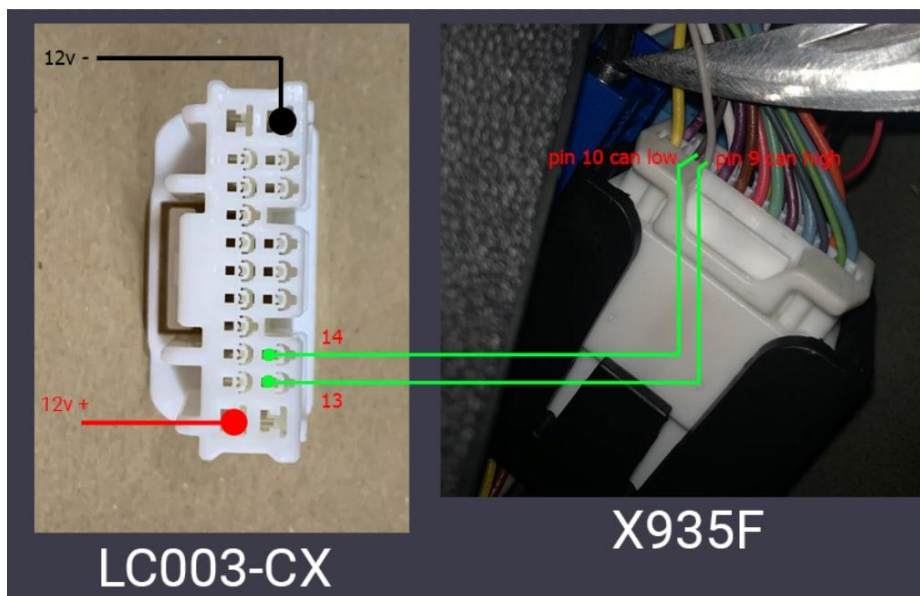
Figure 26. Pinout for connection to CAN RADC

2.   Reset the radar by hitting "Reset ECU"
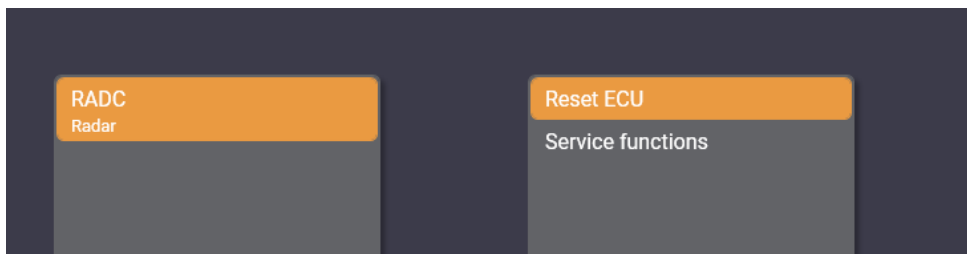
Figure 27. RADC menu

After reset, it will take the radar 10 seconds to wake up. Take no action during this time.
There are two steps of the calibration process: writing vehicle parameters to radar (PLANT MODE) and calibrating the radar itself in compliance with the data transmitted from a steering rack, ABS, autopilot cameras, etc.

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3. Enable PLANT MODE to write the vehicle parameters to the radar. To do so, hit PLANT MODE START, wait for 10-20 seconds, then hit PLANT MODE GET RESULT to check the result of the command execution.

In case all the parameters are successfully written, the following notifications will be displayed: in the PLANT MODE STATUS box - "ROUTINE-PASSED", in the PLANT MODE FAILURE box - "NO_ERROR". If no error has occurred at this stage, proceed to item 4.
If the PLANT MODE FAILURE box shows an error (like in the screenshot below), eliminate it and do all over again.
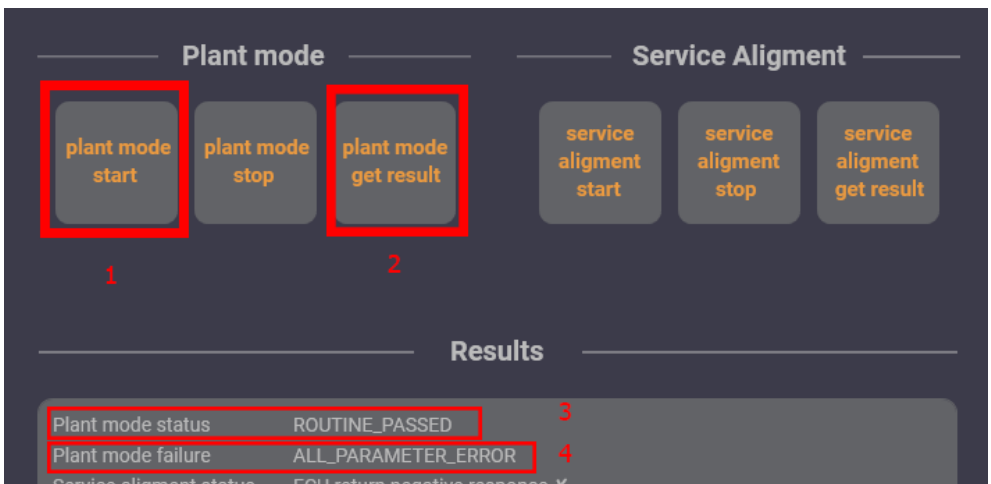
Figure 28. RADC operation screen

4. Switch to DRIVE gear and get ready for driving. With DRIVE gear enabled, hit SERVICE ALIGNMENT START and follow the instructions below. (drive gear)
5. As soon as the calibration process has been started, prepare to drive. To accelerate the process, hug the right side of the road (when on the dual road), try to maintain speed of 30 mph or 48 km per hour, and choose township roads. The procedure will take 2 to 5 minutes.
6. Keep hitting the SERVICE ALIGMENT GET RESULT button from time to time to monitor the radar calibration progress. Pay attention to the warning message in the beginning of item 3.4.3 of the actual Manual.
7. In case the calibration is successful, the alert code will disappear and the autopilot will visualize the surrounding objects.
8. If this does not happen after 2-5 minutes, hit the SERVICE ALIGNMENT button to read the result and description.

3.5 Enabling FACTORY MODE

3.5.1 Enabling FACTORY MODE in firmware versions before 2020.24

First, connect LOKI to the vehicle following the instruction. When connected, the CAR LAN indicator will light up green.
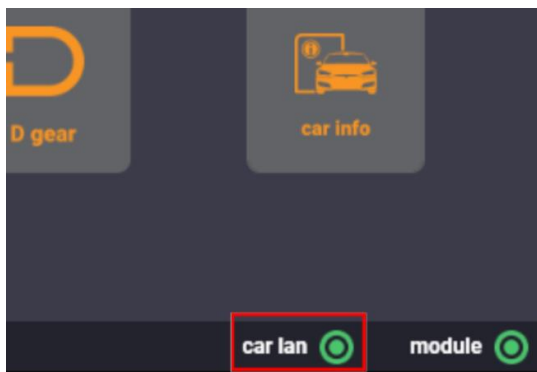
Figure 29. LAN connection indication

Enable DEVELOPER MODE by hitting the corresponding button:

Figure 30. Button to enable DEVELOPER MODE

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When enabled, the DEVELOPER caption will appear under the letter "T" on the vehicle CID and the diagnostic menu will be displayed:
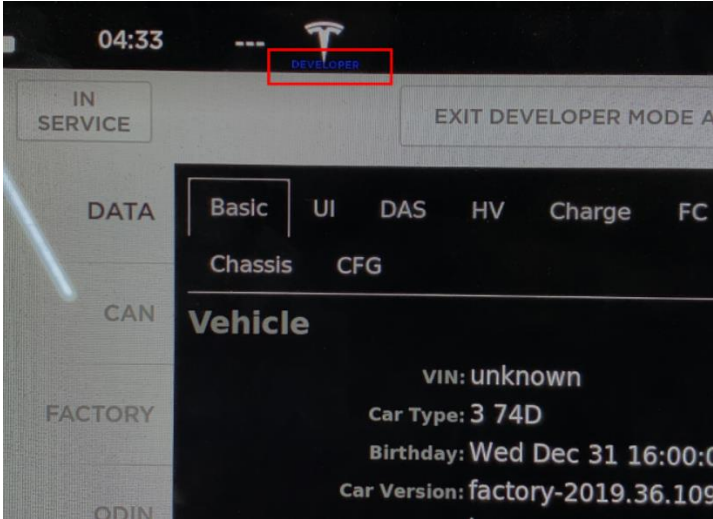
Figure 31. DEVELOPER MODE indication

In the menu displayed on the CID, go to the FACTORY (1) tab and check the Factory (2) switch status:
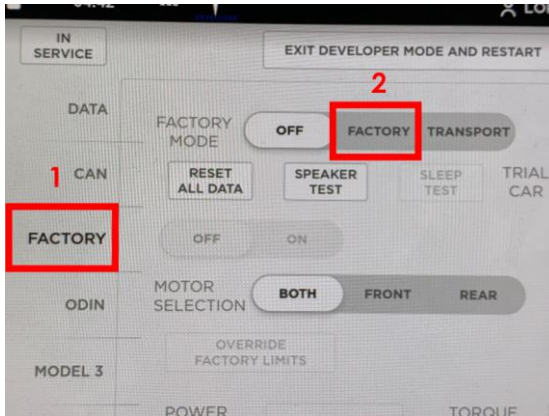
Figure 32. Menu to enable FACTORY MODE

3.5.2 Enabling FACTORY MODE in software versions after 2020.24

First, connect LOKI to the vehicle following the instruction. When connected, the CAR LAN indicator will light up green.

⚠️ **WARNING! Make sure there are no updates that are being downloaded or installed and no "hanging" alarms in the car updater at this very time. If some update is being downloaded or installed, do not start anything until completed**

1. Go to PLAYGROUND and hit TEST UPDATER HEALTH. If a message "CAR UPDATER IS ALIVE" appears in the log, it means everything is fine and you can continue.
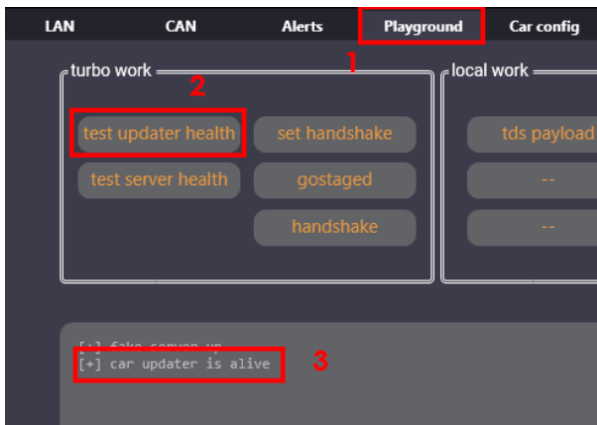
Figure 33. Updater check

2. Hit the SET HANDSHAKE button and wait until a message appears in the log. If it looks like this «[upd out]» and no other text is displayed, hit DEVELOPER PAYLOAD.

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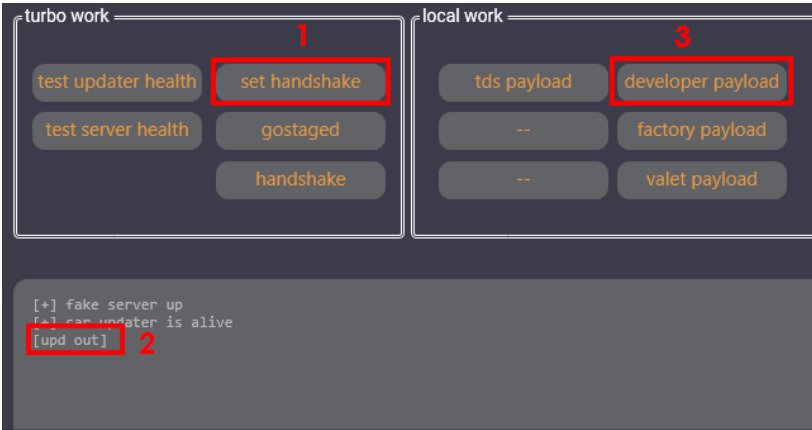
Figure 34. Updater availability check

3. Hit the HANDSHAKE button and wait for a message that reads as follows (2) to appear in the log (2 to 30 sec):

Figure 35. Response to HANDSHAKE

4. Once it is displayed, push GOSTAGED. A message (1) (see below) will appear and then it will take 10-40 seconds to enable DEVELOPER MODE on the vehicle.

Figure 36. Response to GOSTAGED

5. After DEVELOPER MODE has been enabled, wait until the update download window disappears from the SOFTWARE tab (10-60 sec).
6. Follow steps 2-4 to open the test menu on the CID, but this time select TDS PAYLOAD instead of DEVELOPER PAYLOAD.
7. Once the test menu appears on the CID, go to the FACTORY tab (1) and check the FACTORY switch (2) status:
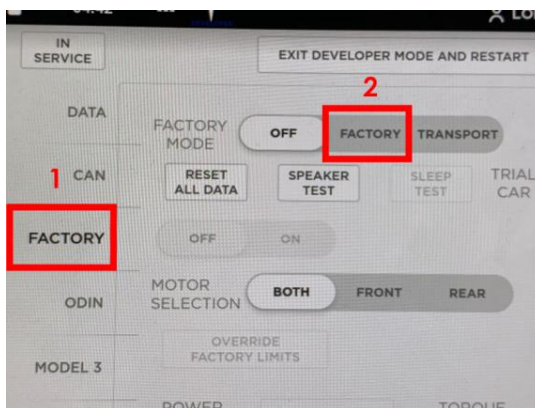
Figure 37. Screen to enable FACTORY MODE

If the FACTORY switch is active, turn it on to enable FACTORY MODE (the vehicle will reboot – this is normal)

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3.6 Working with Configuration

LOKI can be used to work with configurations of Tesla Model S, Model X and Model 3.

⚠️ **WARNING! A jumper wire is required to work with MCU2 and Model 3. The work with MCU1 and Model 3 doesn't require the use of a jumper.**

⚠️ **WARNING!** **Be careful with static electricity when working with the MCU. An accidental discharge can cause damage to the MCU and its subsequent replacement will be required. Wear an antistatic wristband and cotton clothing (no synthetics or wool) and use a static charge eliminator before starting work.**

⚠️ **WARNING! BACKUP THE VEHICLE CONFIGURATIONS TO MAKE SURE YOU CAN RETURN TO THE INITIAL CONFIGURATIONS IN CASE OF THEIR INCORRECT CHANGE.**

3.6.1 Connecting to work with Tegra Configuration

1. Activate FACTORY MODE on the vehicle.
2. Connect to the LAN port underneath the CID and select the following IP-address 192.168.90.125. Now, make settings in the resulted window - CAR CONFIG.
3. Follow the instructions set forth in item 3.6.5
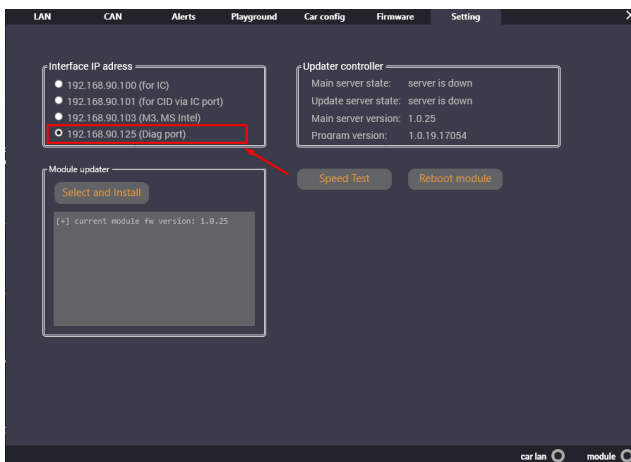
Figure 38. Screen for IP-address selection

3.6.2 Connecting to work with Model S/X Intel Configuration

1. Disconnect the 12V battery and remove the battery connector located under the hood. **It is important to follow the sequence of procedures strictly!**
2. With the car de-energized, access the MCU. Remove the glovebox if necessary. Remove the MCU cover.
3. After removing the cover, earth the contact on the MCU board:
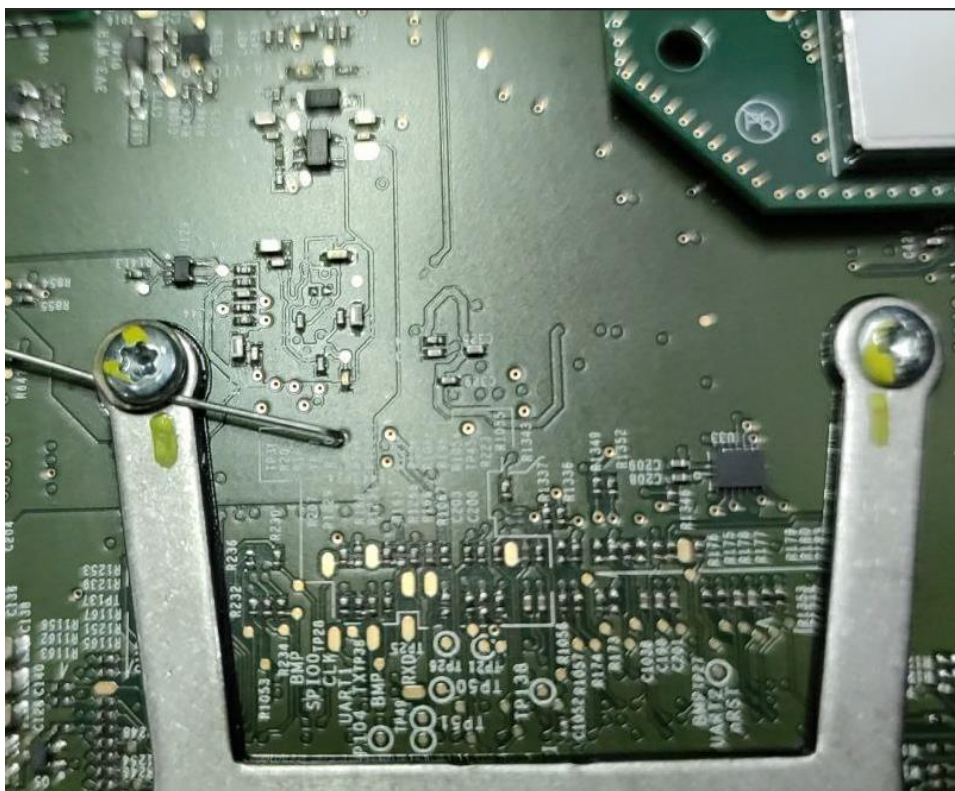
Figure 39. Jumper wire for MCU2 Model S/X

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4. When a jumper wire is installed (or soldered), turn the power on and set the timer for 5 minutes (10 minutes when the software version is 2020.48 or the later one). The ports will not open if you start doing anything with the Gateway before the expiry of 5 minutes. In that case you will have to start all over again. After 5 minutes, connect LOKI to the MCU using the Ethernet-Ethernet cable.
5. Follow the instructions set forth in item 3.6.5

3.6.3 Working with Model 3 Configuration (with a jumper wire)

Steps to follow before you start working with the configuration:

1. Disconnect the 12V battery and remove the battery connector located under the right backseat. **It is important to follow the sequence of procedures strictly!**
2. With the vehicle de-energized, remove the MCU front cover: half unscrew the four nuts on the frunk side that hold the MCU. Engage a spanner wrench to unscrew four supporting bolts while holding the nuts on the other side of the unit in place.
3. When the cover is removed, earth the contact on the MCU board.
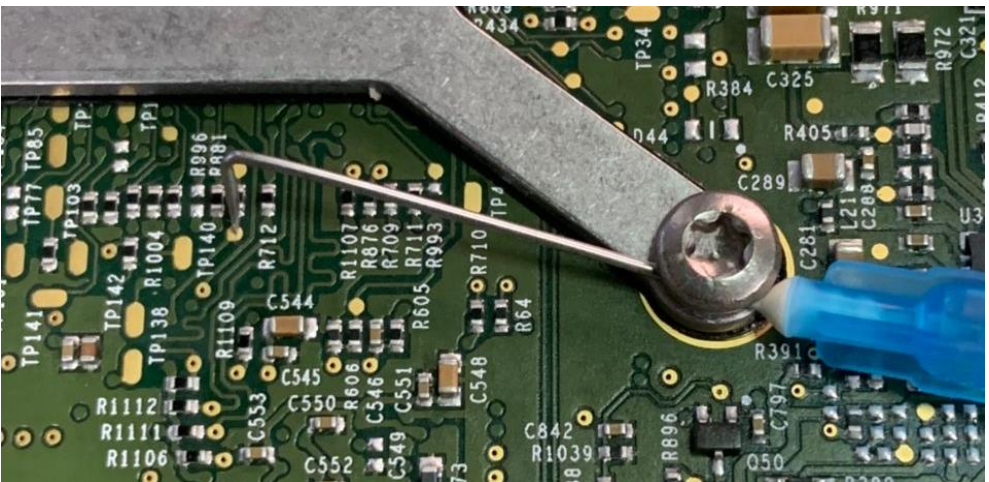
Figure 40. Jumper wire for Model 3

4. When the jumper wire is installed (or soldered), turn the power on (high-voltage connector and 12V) and wait until the green LED of the Gateway starts blinking (there are two of them: red and green; the green one starts blinking after 10-20 red flashes).
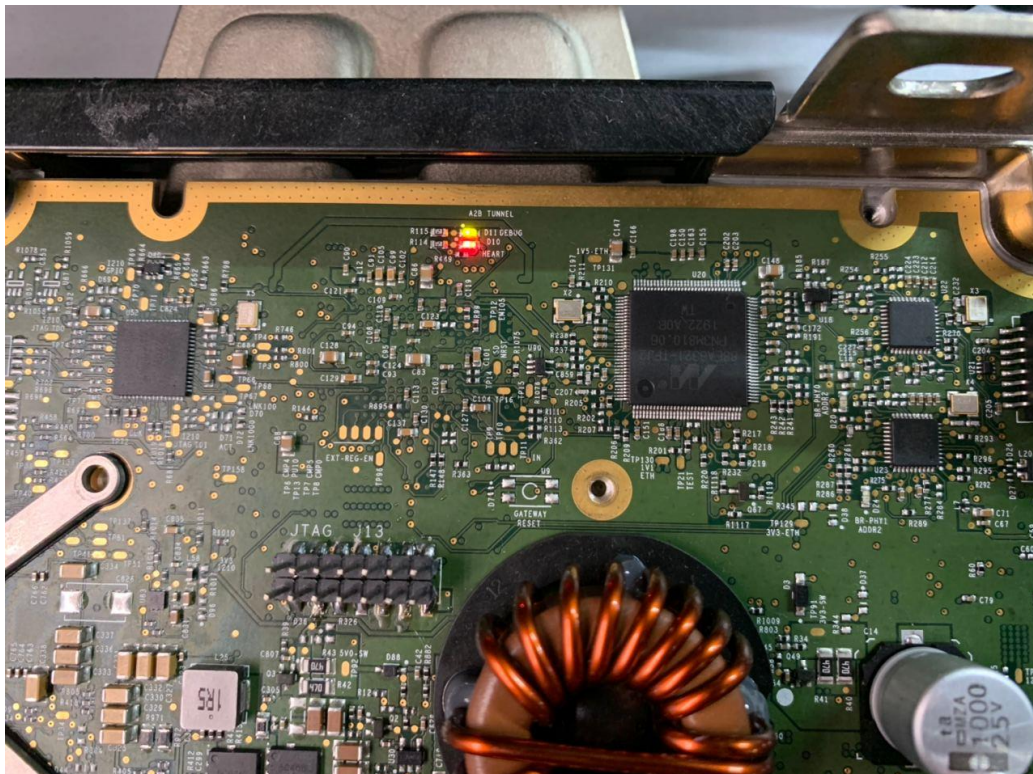
Figure 41. Updater indication in Model 3

5. Once the green LED starts blinking, set the timer for 5 minutes (10 minutes for 2020.48 and later software versions). Do not do anything with the Gateway before the expiry of 5 minutes, otherwise the ports will not open and you will have to start all over again. After 5 minutes, connect LOKI to the MCU via the Ethernet-Ethernet cable.
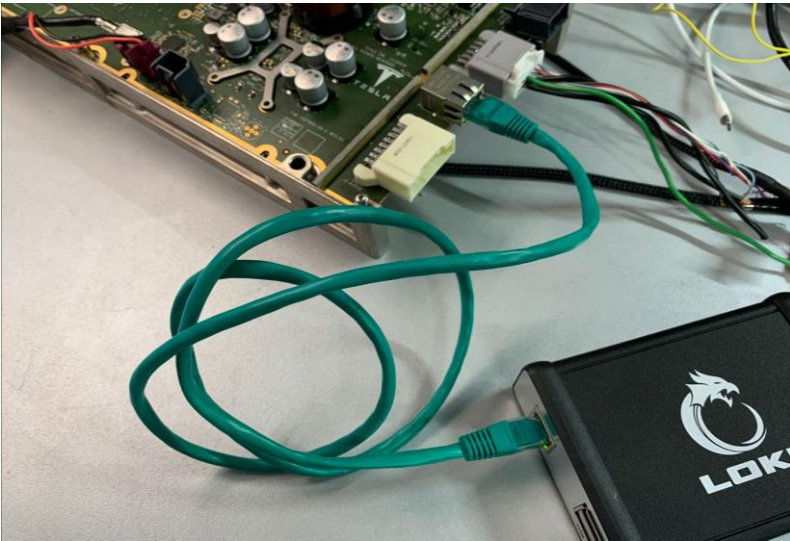
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Figure 42. LAN-connection to work with Configuration

6. Select Model 3 GW in the program
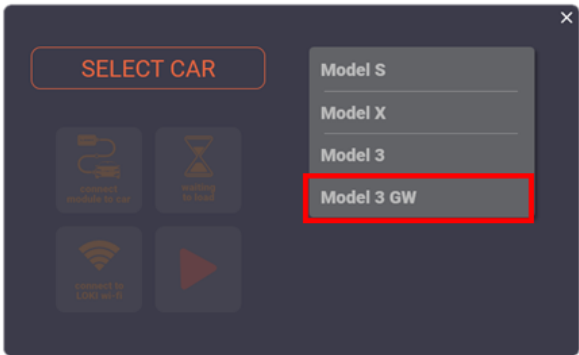
Figure 43. LOKI home screen

7. Select Car Config

Figure 44. LOKI top-level menu

8. Hit TEST GW CONNECTION to check the connection to the Gateway. A message "OK, CONNECT ACTIVE» signals that everything is fine and you may proceed.
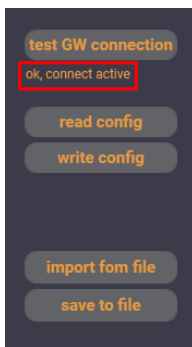
Figure 45. Updater connection indication

9. Follow the instructions set forth in item 3.6.5

3.6.4 Connecting to access Model 3 Configuration (w/o a jumper wire)

1. Connect to the BroadR-Reach port in Tesla Model 3

Figure 46. BroadR-Reach port for connection of LOKI to Tesla Model 3

2. Go to the PLAYGROUND menu.
3. Go to the TEST IT screen to start working with the configuration. There are two boxes there: CONFIG ID and CONFIG VAL. The first box is the identifier of some configuration parameters, while the other one shows the parameter value.
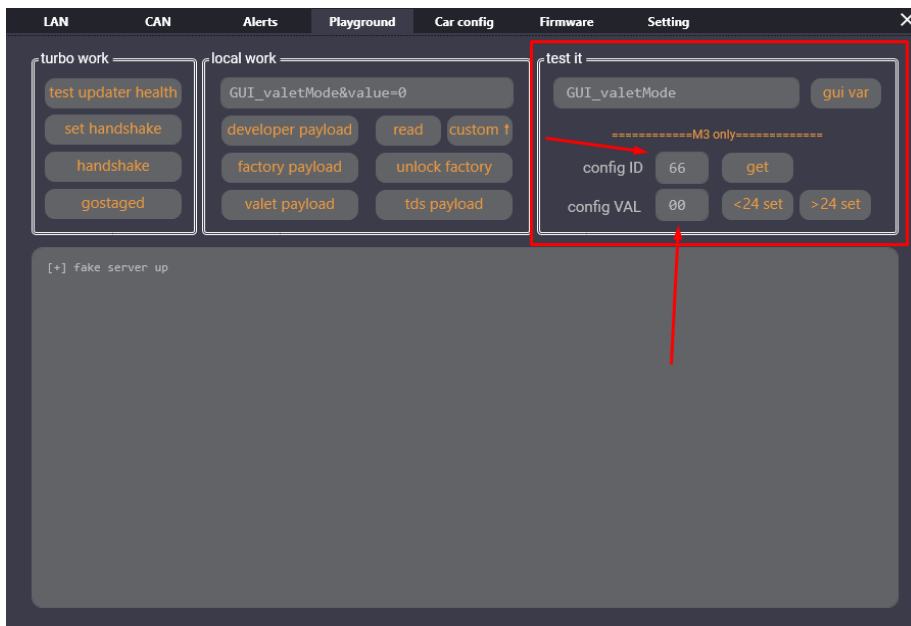
Figure 47. Screen TEST IT

4. Hit the GET button to read the current configuration value. To set a new value, enter it in the CONFIG VAL box and hit <24 SET.

⚠ **WARNING!** **The above applies to the software versions before 2020.24 only. For the software version released after 2020.24, follow the instructions below.**

5. **For 2020.24 and later versions.** Enter the required values in the CONFIG ID and CONFIG VAL boxes. Hit >24 SET.
6. Hit TEST UPDATER HEALTH→SET HANDSHAKE→HANDSHAKE (similarly to enabling FACTORY MODE in these software versions).
7. Go to DEVELOPER MENU on the vehicle CID and hit REBOOT GATEWAY in ACTIONS.

⚠ **WARNING!** **Any value you enter in the CONFIG ID and CONFIG VAL boxes should be a two-digit number, for example 01, 02, 03, etc.**

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3.6.5 CAR CONFIG screen (for working with a jumper wire and Tegra)

The Configuration screen is divided into two parts:
- CURRENT CAR CONFIG – current vehicle configuration
- CONFIG OPTIONS – values taken by any particular configuration item

⚠️ **WARNING! There is no such button as TEST GW CONNECTION in the screen for editing CONFIGURATION. You may use READ CONFIG to check the connection status. The connection is considered active when configuration parameters have been successfully read out.**
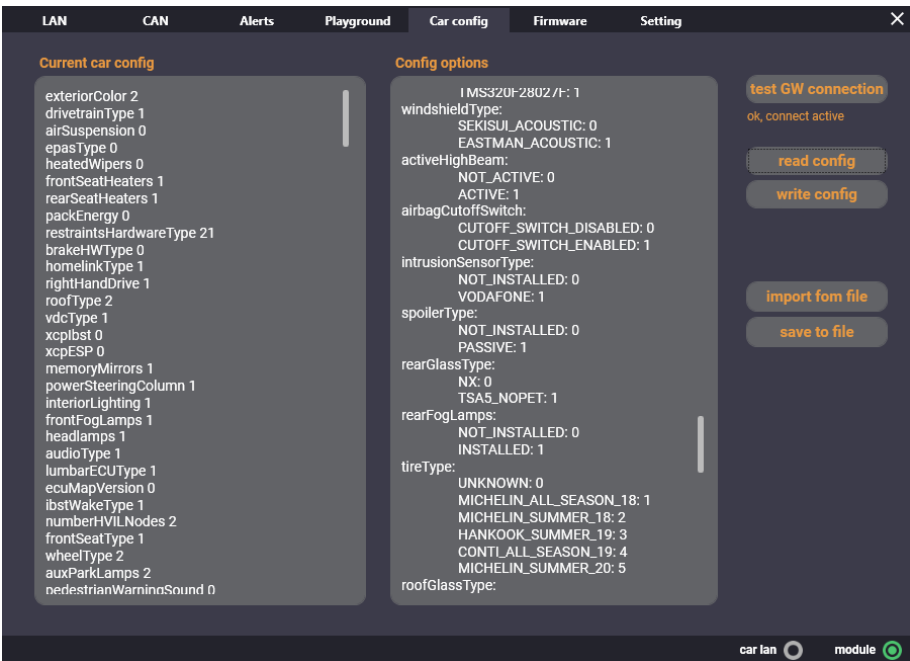
Figure 48. CAR CONFIG Screen

⚠ **WARNING! The configuration file can be edited the same way as a simple text file. However, the program will not save the new configuration file if you try to set nonexistent parameters or nonexistent values!**

After all the required values have been set, hit WRITE CONFIG. The following screen will pop up:

Figure 49. Screen to confirm configuration change

Confirm the selected changes. If they are correct, after hitting "OK", the following message will appear:

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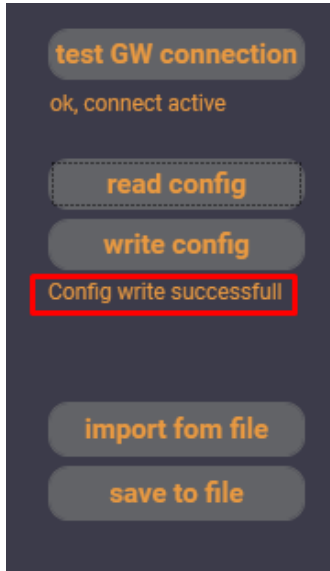
Figure 50. A message confirming that the new configuration has been successfully written

⚠️ **WARNING! The software version must be considered when changing configuration parameters!** This can be best shown by an example:
There are five selective values of battery capacity in Tesla Model 3 configuration settings:
packEnergy:
PACK_50_KWH: 0
PACK_74_KWH: 1
PACK_62_KWH: 2
PACK_100_KWH: 3
PACK_75_KWH: 4
You can select any of the above values but, for instance, there is no battery with the capacity of 100kW in Tesla Model 3. By selecting this value for Tesla Model 3, you can create a problem. It is strongly recommended to review the vehicle configuration before making any changes. Seek advice in technical support chat in case you have any doubts.

REMEMBER THAT ANY CHANGES MADE TO A VEHICLE CONFIGURATION ARE WITHIN YOUR PERSONAL RESPONSIBILITY!

3.7 Navigation installation

First, connect LOKI to the vehicle following the instruction.

⚠️ **WARNING! Convert map CONFIG to EU before you start installation.**

⚠️ **WARNING! Before starting installation, make sure there are no software updates being downloaded or installed and no "hanging" alarms in the updater at this time. In case any of this is going on, wait until completed.**

⚠️ **WARNING! Connect the vehicle to Wi-Fi to update maps and wait about 10 minutes to make sure the vehicle will not start upgrading firmware while the maps are being installed.**

1. Go to the FIRMWARE tab to install maps
2. Select the map file
3. Select the INSTALL AS MAP check box
4. Hit the button to launch
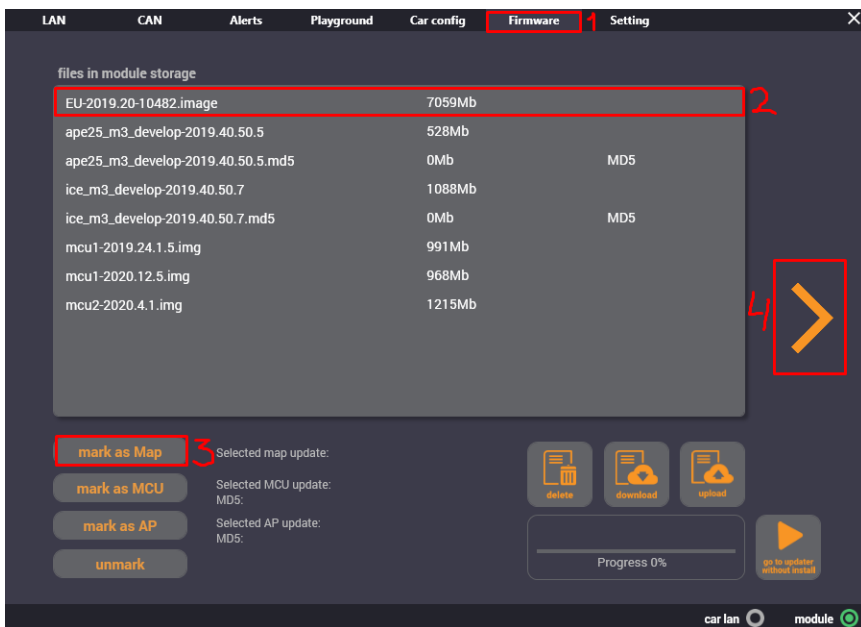
Figure 51. Screen for of map installation

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In the firmware versions before 2020.24, the installation of maps will start after the following message appears in the log:
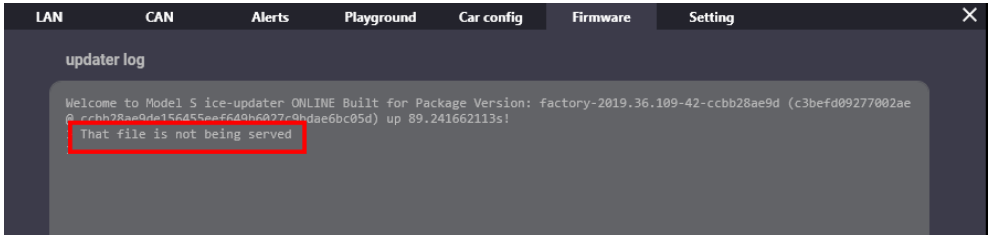
Figure 52. UPDATER LOG screen

In the firmware versions after 2020.24, the installation of maps will start after the following message appears in the log:
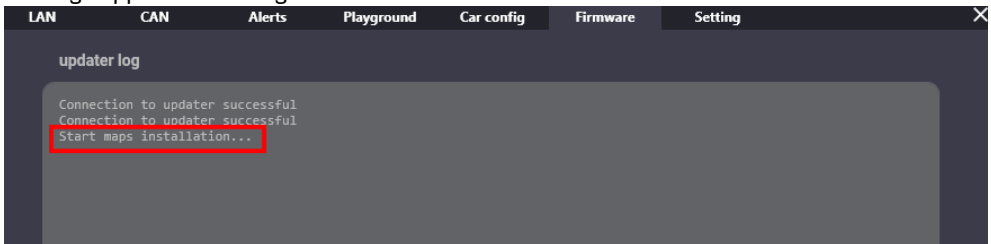
Figure 53. UPDATER LOG screen

Configuration parameters for Tesla Model 3

exteriorColor (id 7):
      RED_MULTICOAT: 0
      SOLID_BLACK: 1
      SILVER_METALLIC: 2
      MIDNIGHT_SILVER: 3
      DEEP_BLUE: 5
      PEARL_WHITE: 6
drivetrainType (id 8):
      RWD: 0
      AWD: 1
airSuspension (id 9):
      NONE: 0
      TESLA_STANDARD: 1
      TESLA_ADAPTIVE: 2
heatedWipers (id 11):
      FALSE: 0
      TRUE: 1
frontSeatHeaters (id 12):
      NONE: 0
      KONGSBERG_LOW_POWER: 1
rearSeatHeaters (id 13):
      NONE: 0
      KONGSBERG_LOW_POWER: 1
packEnergy (id 14):
      PACK_50_KWH: 0
      PACK_74_KWH: 1
      PACK_62_KWH: 2
      PACK_100_KWH: 3
      PACK_75_KWH: 4
restraintsHardwareType (id 16):
      NA_M3: 21
      EUROW_ECALL_M3: 22
      EUROW_NO_ECALL_M3: 23
brakeHWType (id 17):
      BREMBO_P42_MANDO_43MOC: 0
      BREMBO_P42_BREMBO_44MOC: 1
homelinkType (id 18):
      NONE: 0
      HOMELINK_V_OPT_2: 1

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rightHandDrive (id 19):
      LEFT: 0
      RIGHT: 1
roofType (id 20):
      METAL: 0
      FIXED_GLASS: 1
      PANORAMIC: 2
vdcType (id 21):
      BOSCH_VDC: 0
      TESLA_VDC: 1
xcpIbst (id 22):
      FALSE: 0
      TRUE: 1
xcpESP (id 23):
      FALSE: 0
      TRUE: 1
memoryMirrors (id 24):
      NOT_INSTALLED: 0
      SMR: 1
powerSteeringColumn (id 25):
      NOT_INSTALLED: 0
      TK: 1
interiorLighting (id 26):
      BASE: 0
      PREMIUM: 1
frontFogLamps (id 27):
      NOT_INSTALLED: 0
      INSTALLED: 1
headlamps (id 28)**:**
      BASE: 0
      PREMIUM: 1
audioType (id 31):
      BASE: 0
      PREMIUM: 1
      BASE_WITH_PREMIUM200: 2
lumbarECUType (id 32):
      NONE: 0
      ALFMEIER: 1
ibstWakeType (id 34):
      NONE: 0
      WAKE_PIN_20: 1
numberHVILNodes (id 35):
      HVIL_NODES_0: 0

//

      HVIL_NODES_1: 1
      HVIL_NODES_2: 2
      HVIL_NODES_3: 3
      HVIL_NODES_4: 4
      HVIL_NODES_5: 5

frontSeatType (id 36):
      BASE_TESLA: 0
      PREMIUM_TESLA: 1

wheelType (id 41):
      PINWHEEL_18: 0
      STILETTO_19: 1
      STILETTO_20: 2
      STILETTO_20_DARK_STAGGERED: 3
      GEMINI_19_SQUARE: 4
      GEMINI_19_STAGGERED: 5
      STILETTO_20_DARK_SQUARE: 14

auxParkLamps (id 43):
      NA_BASE: 0
      NA_PREMIUM: 1
      EU: 2
      NONE: 3

pedestrianWarningSound (id 44):
      NONE: 0
      SPEAKER: 1

hvacQuietSnorkelType (id 45):
      DEFAULT: 0
      QUIET_V1: 1

hvacPanelVaneType (id 46):
      PARALLEL_V1: 0
      CONVERGENT_V1: 1

CabinBlowerCtrlType (id 47):
      LV8907: 0
      TMS320F28027F: 1

windshieldType (id 50):
      SEKISUI_ACOUSTIC: 0
      EASTMAN_ACOUSTIC: 1

activeHighBeam (id 51):
      NOT_ACTIVE: 0
      ACTIVE: 1

airbagCutoffSwitch (id 52):
      CUTOFF_SWITCH_DISABLED: 0
      CUTOFF_SWITCH_ENABLED: 1

intrusionSensorType (id 53):

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NOT_INSTALLED: 0
VODAFONE: 1

spoilerType (id 55):
NOT_INSTALLED: 0
PASSIVE: 1

rearGlassType (id 56):
NX: 0
TSA5_NOPET: 1

rearFogLamps (id 58):
NOT_INSTALLED: 0
INSTALLED: 1

tireType (id 59):
UNKNOWN: 0
MICHELIN_ALL_SEASON_18: 1
MICHELIN_SUMMER_18: 2
HANKOOK_SUMMER_19: 3
CONTI_ALL_SEASON_19: 4
MICHELIN_SUMMER_20: 5

roofGlassType (id 63):
TSA3_PET: 0
TSA5_NOPET: 1

eCallEnabled:
DISABLED: 0
ENABLED: 1

mapRegion (id 66):
US: 0
EU: 1
NONE: 2
CN: 3
AU: 4
JP: 5
TW: 6
KR: 7
ME: 8

rearLightType:
NA: 0
EU_CN: 1

rearDriveUnitType:
LARGE_REAR: 0
SMALL_REAR: 1

chassisType:
MODEL_S_CHASSIS: 0
MODEL_X_CHASSIS: 1

MODEL_3_CHASSIS: 2
towPackage (id 72):
      NONE: 0
      TESLA_REV1: 1
refrigerantType:
      Default: 0
      R134A: 1
      R1234YF: 2
passengerOccupancySensorType:
      OCS: 0
      RESISTIVE_PAD: 1
tpmsType (id 76):
      CONTI_2: 0
      TESLA_BLE: 1
coolantPumpType:
      DUAL: 0
      SINGLE_PUMP_BATT: 1

Tesla Model S Data Bus (pre-facelift)
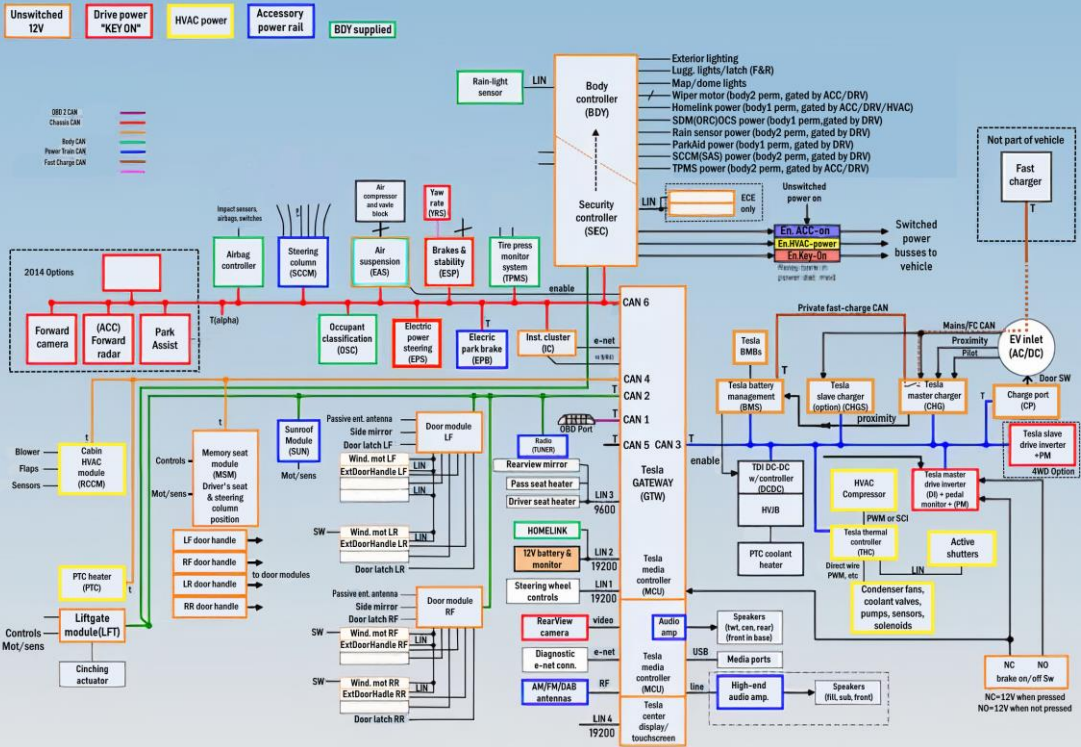
TSD0137

Tesla Model 3 Data Bus

KEY - Model 3 Communication Topology

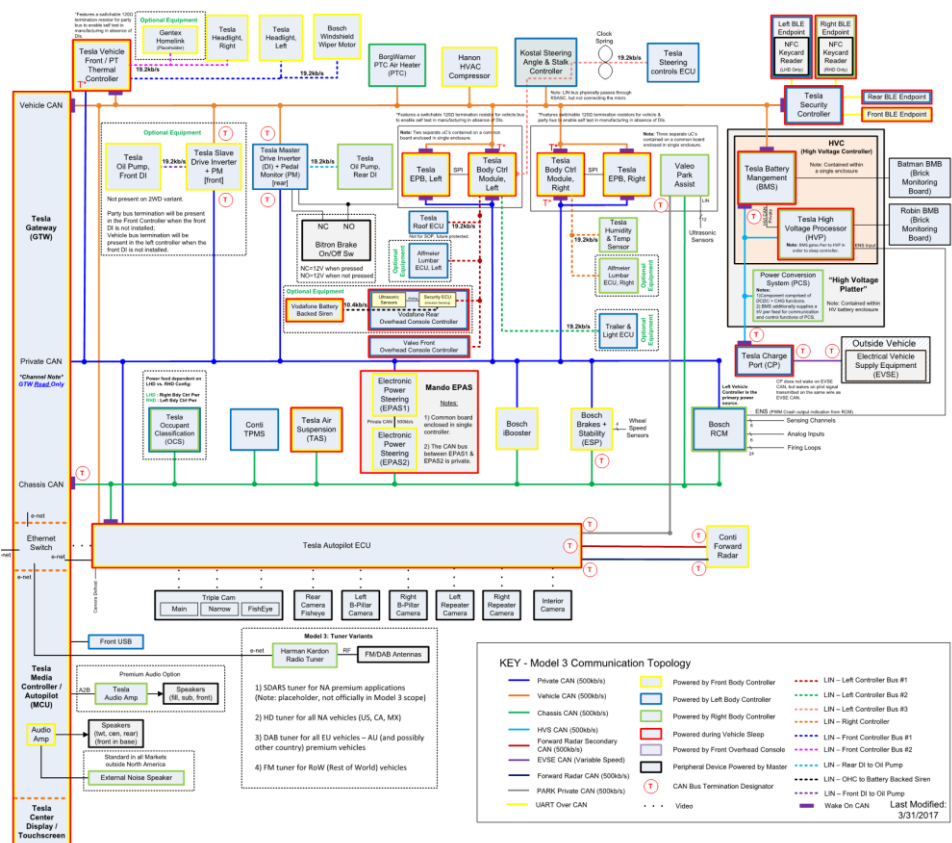|		
Private CAN (500kb/s)	Powered by Front Body Controller	LIN – Left Controller Bus #1
Vehicle CAN (500kb/s)	Powered by Left Body Controller	LIN – Left Controller Bus #2
Chassis CAN (500kb/s)	Powered by Right Body Controller	LIN – Left Controller Bus #3
HVS CAN (500kb/s)	Powered during Vehicle Sleep	LIN – Right Controller
Forward Radar Secondary CAN (500kb/s)	Powered by Front Overhead Console	LIN – Front Controller Bus #1
EVSE CAN (Variable Speed)	Peripheral Device Powered by Master	LIN – Front Controller Bus #2
Forward Radar CAN (500kb/s)	(T) CAN Bus Termination Designator	LIN – Rear DI to Oil Pump
PARK Private CAN (500kb/s)		LIN – OHC to Battery Backed Siren
UART Over CAN	Video	LIN – Front DI to Oil Pump
		Wake On CAN

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