Technical training.
Product information.

F39 X2 M35i Transmission

Edited for the U.S. market by:
BMW Group University
Technical Training
ST1845 10/1/2018

BMW Service

General information

Symbols used

The following symbol is used in this document to facilitate better comprehension or to draw attention to very important information:

Contains important safety information and information that needs to be observed strictly in order to guarantee the smooth operation of the system.

Information status: October 2017

BMW Group vehicles meet the requirements of the highest safety and quality standards. Changes in requirements for environmental protection, customer benefits and design render necessary continuous development of systems and components. Consequently, there may be discrepancies between the contents of this document and the vehicles available in the training course.

The information contained in the training course materials is solely intended for participants in this training course conducted by BMW Group Technical Training Centers, or BMW Group Contract Training Facilities.

This training manual or any attached publication is not intended to be a complete and all inclusive source for repair and maintenance data. It is only part of a training information system designed to assure that uniform procedures and information are presented to all participants.

For changes/additions to the technical data, repair procedures, please refer to the current information issued by BMW of North America, LLC, Technical Service Department.

This information is available by accessing TIS at www.bmwcenternet.com.

Additional sources of information

Further information on the individual topics can be found in the following:

- Owner's Handbook
- Integrated Service Technical Application
- Aftersales Information Research (AIR)

F39 X2 M35i Transmission

Contents

F39 X2 M35i Transmission

1. Gearbox

The F39 X2 M35i will be equipped with a newly designed automatic transmission.

In the following section, the new 8G45-460 automatic transmission is referred to as the “AISIN TU” automatic transmission, and the GA8F22AW is called the “AISIN” automatic transmission.

The AISIN TU automatic transmission (8G45-460) features an electronic gear selector switch GWS. The AISIN transmission (GA8F22AW), on the other hand, has a gear selector lever with a cable.

F39 Gear selector switch variants

Index	Explanation
A	Electronic gear selector switch GWS
B	Gear selector switch with cable

	AISIN (GA8F22AW)	AISIN TU (8G45-460)
Electronic gear selector switch GWS		●
Hydraulic actuation of the shift elements	●	●

F39 X2 M35i Transmission

1. Gearbox

F39 Gear selector switch GWS

The electronic gear selector switch (GWS) is used for selecting a drive position. The electronic gear selector switch (GWS) is a designed as a separate control unit. It consists of a control electronics and the selector lever. The control electronics contains the sensors for detecting the selector lever position and the locks to prevent accidental shifting.

The selector lever position of the gear selector switch is detected without contact by means of Hall effect sensors and transmitted to the transmission control (EGS) via the PT-CAN2.

In the AISIN TU transmission, the selector lever position cannot be changed from "P" to "N" without switching on the engine. The hydraulic pressure needed to actuate the shift elements can only be built up if the engine is running.

1.1. Overview

For the launch in November, the F39 X2 M35i will be equipped with a 8G45-460 automatic transmission along with the B48A20T1 engine.

Model	Engine	Automatic transmission
BMW X2 M35i	B48A20T1	AISIN TU

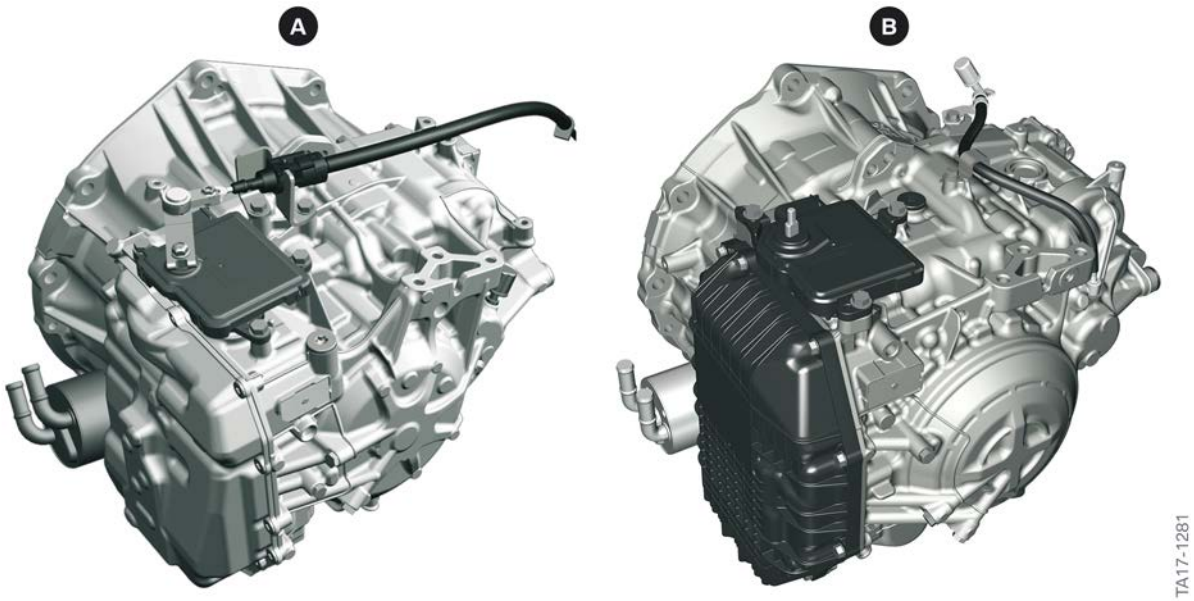
F39 X2 M35i Transmission

1. Gearbox

1.2. Automatic transmission

1.2.1. Overview

The AISIN automatic transmission (GA8F22AW) is still used in the F39 X2 sDrive28i and xDrive28i, while the new AISIN TU automatic transmission 8G45-460 is only used in the X2 M35i.



F39 Automatic transmission

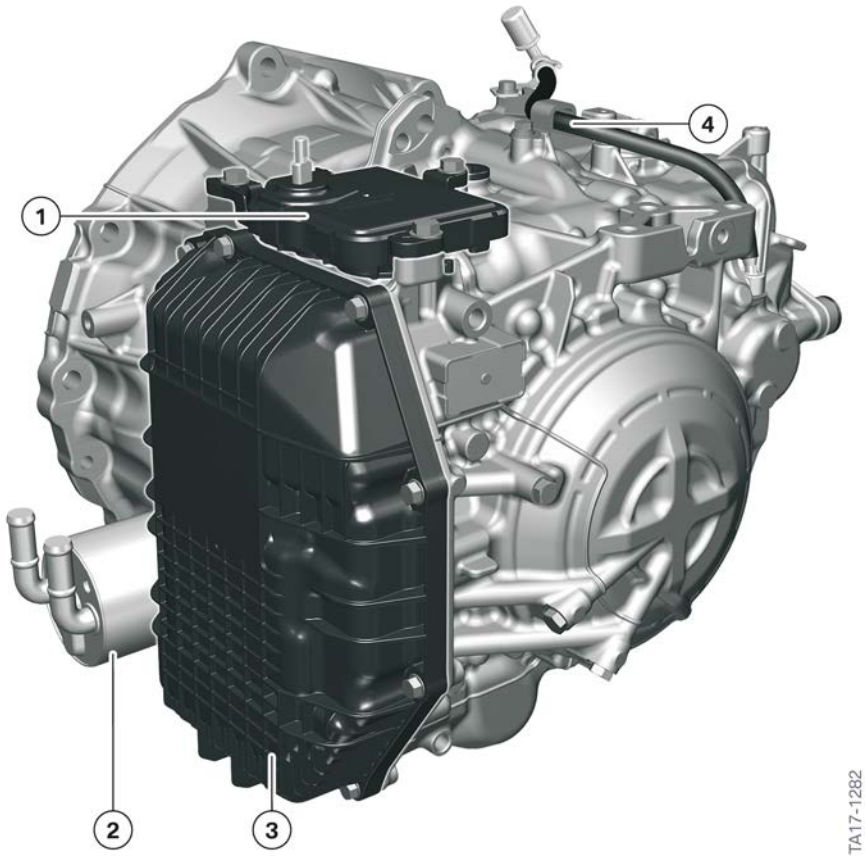
Index	Explanation
A	AISIN (GA8F22AW)
B	AISIN TU (8G45-460)

1.2.2. AISIN TU 8G45-460 automatic transmission

The transmission is an advancement of the AISIN automatic transmission (GA8F22AW).

F39 X2 M35i Transmission

1. Gearbox



AISIN TU (8G45-460) automatic transmission

Index	Explanation
1	Electronic transmission control EGS
2	Engine oil cooler
3	Cover, hydraulic unit
4	Tank ventilation line

The following changes were implemented:

- Electronic gear selector switch GWS
- Torque converter with new dampers
- Band brake B1 replaced by disc brake
- New hydraulic unit
- Oil pump with parallel axes
- Gear set changes
- Weight-optimized housing
- Use of low-friction oil

F39 X2 M35i Transmission

1. Gearbox

- Coasting available in starting mode
- Mechanical limited slip differential on the front axle integrated in the transmission
- Launch Control xDrive

These changes result in the following improvements:

- Improved shifting comfort
- Improved dynamic gearshifts that result in a sportier vehicle characteristic
- Increased ride comfort
- Reduction in consumption
- Improved acoustic comfort due to new dampers
- Direct driving feedback due to earlier and faster closing of the converter lockup clutch.

Extension of the coasting function

The coasting function, which was previously only enabled in the "ECO-PRO" driving program, is now also used in the "COMFORT" driving program. The extended operating strategy guarantees that the coasting function is only activated when the driving situation permits an energy-related advantage to the coasting overrun. The configuration via iDrive is now omitted.

Coasting display in CID

Torque converter

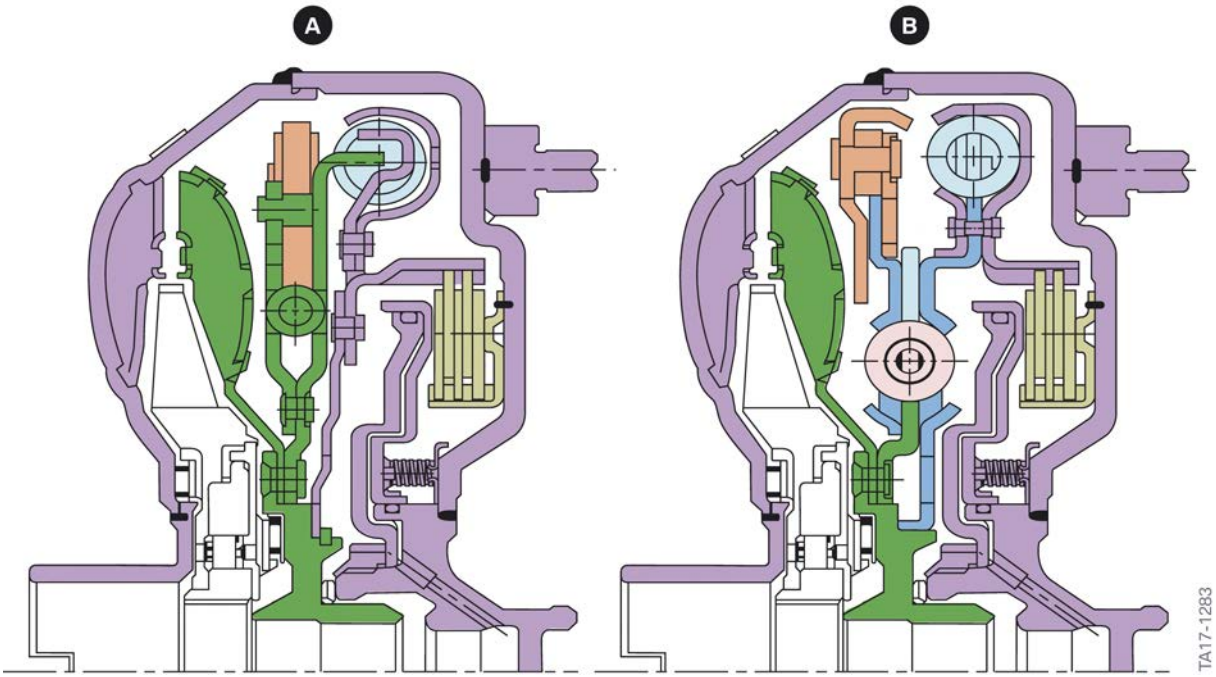
The torque converter was optimized for the new dampers. The pump impeller, turbine wheel and stator and the 3-line converter lockup clutch were reduced in size for the new dampers. However, reducing the packaging space does not limit the drive-off behavior and the controllability of the system.

Two different dampers are used, depending on the engine versions:

- Centrifugal pendulum.
- Fixed frequency tuned mass damper.

F39 X2 M35i Transmission

1. Gearbox



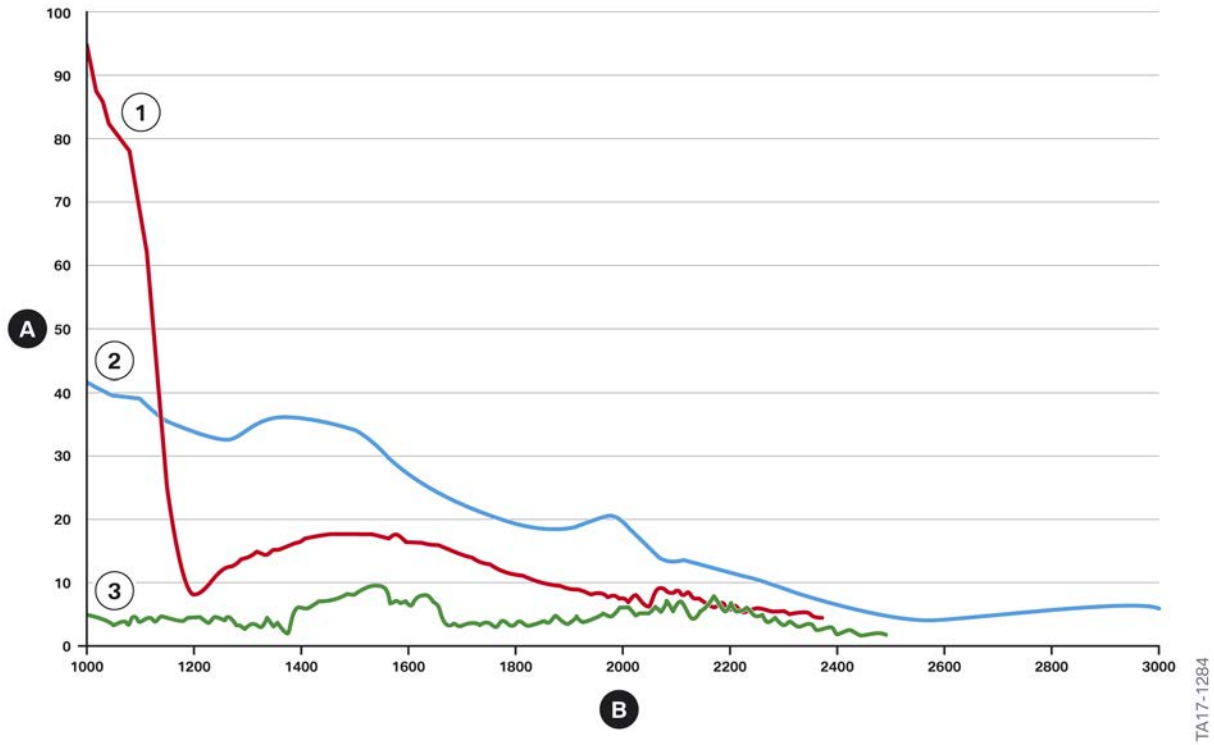
AISIN TU (8G45-460) Dampers

Index	Explanation
A	Torque converter with centrifugal pendulum
B	Torque converter with fixed frequency tuned mass damper

Due to the high rotational vibration damping of both dampers, the converter lockup clutch can be closed earlier, which lowers the fuel consumption.

F39 X2 M35i Transmission

1. Gearbox



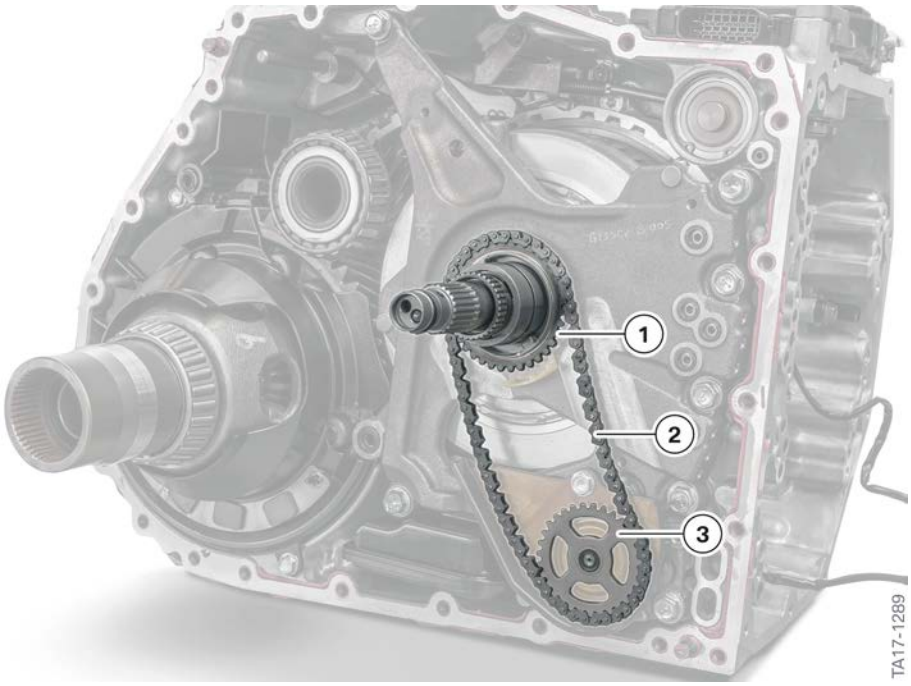
Comparison of rotational vibration damping

Index	Explanation
A	Dynamic torque (Nm)
B	Engine speed (rpm)
1	Fixed frequency tuned mass damper
2	Super long travel damper II (old system)
3	Centrifugal pendulum

F39 X2 M35i Transmission

1. Gearbox

Transmission oil pump



AISIN TU (8G45-460) Oil pump

Index	Explanation
1	Drive gear, engine
2	Chain
3	Gear, transmission oil pump

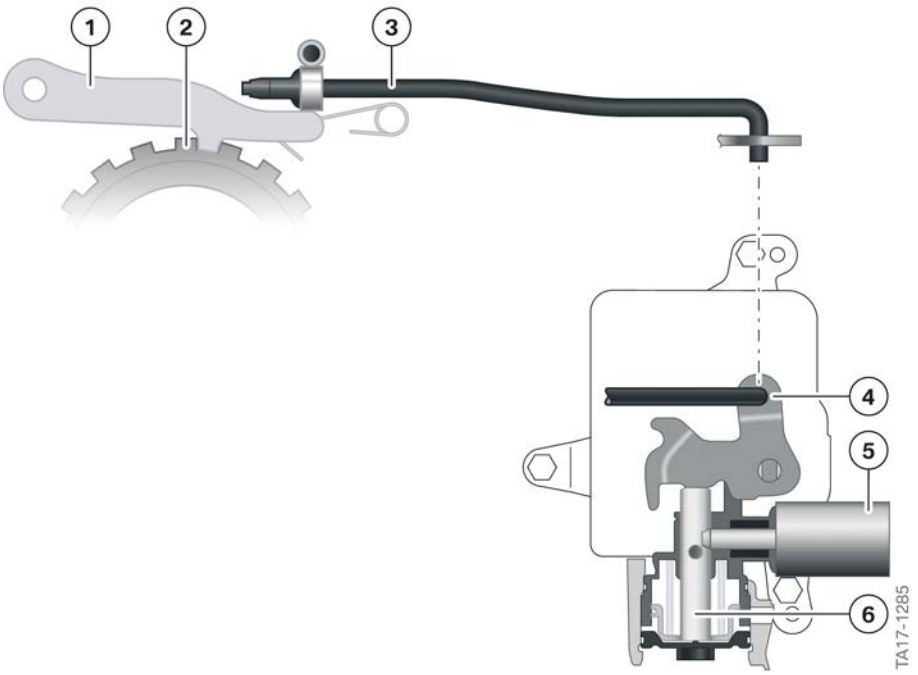
The transmission oil pump is driven by a chain and supplies the transmission and the oil volume reservoir with the necessary transmission oil pressure.

Parking lock

The parking lock in the transmission is engaged automatically when the engine is switched off. This is implemented via a piston located next to the EGS control unit and connected to the parking linkage and parking pawl by a lever.

F39 X2 M35i Transmission

1. Gearbox



AISIN TU (8G45-460) Parking lock

Index	Explanation
1	Parking pawl
2	Gear
3	Parking linkage
4	Lever
5	Stop valve
6	Parking cylinder

When the engine is switched on, the parking cylinder is supplied with hydraulic pressure and the piston presses the level upward. This keeps the parking pawl above the gear and unable to engage. When the parking position is engaged, the hydraulic pressure is reduced in the parking cylinder and the parking cylinder and lever move down. The movement is transferred to the parking linkage and lets the parking pawl engage. The stop valve keeps the parking lock in its position.

In case of a breakdown, the automatic transmission can be electronically or mechanically emergency-released.

1.2.3. AISIN TU – Electronic emergency transmission release

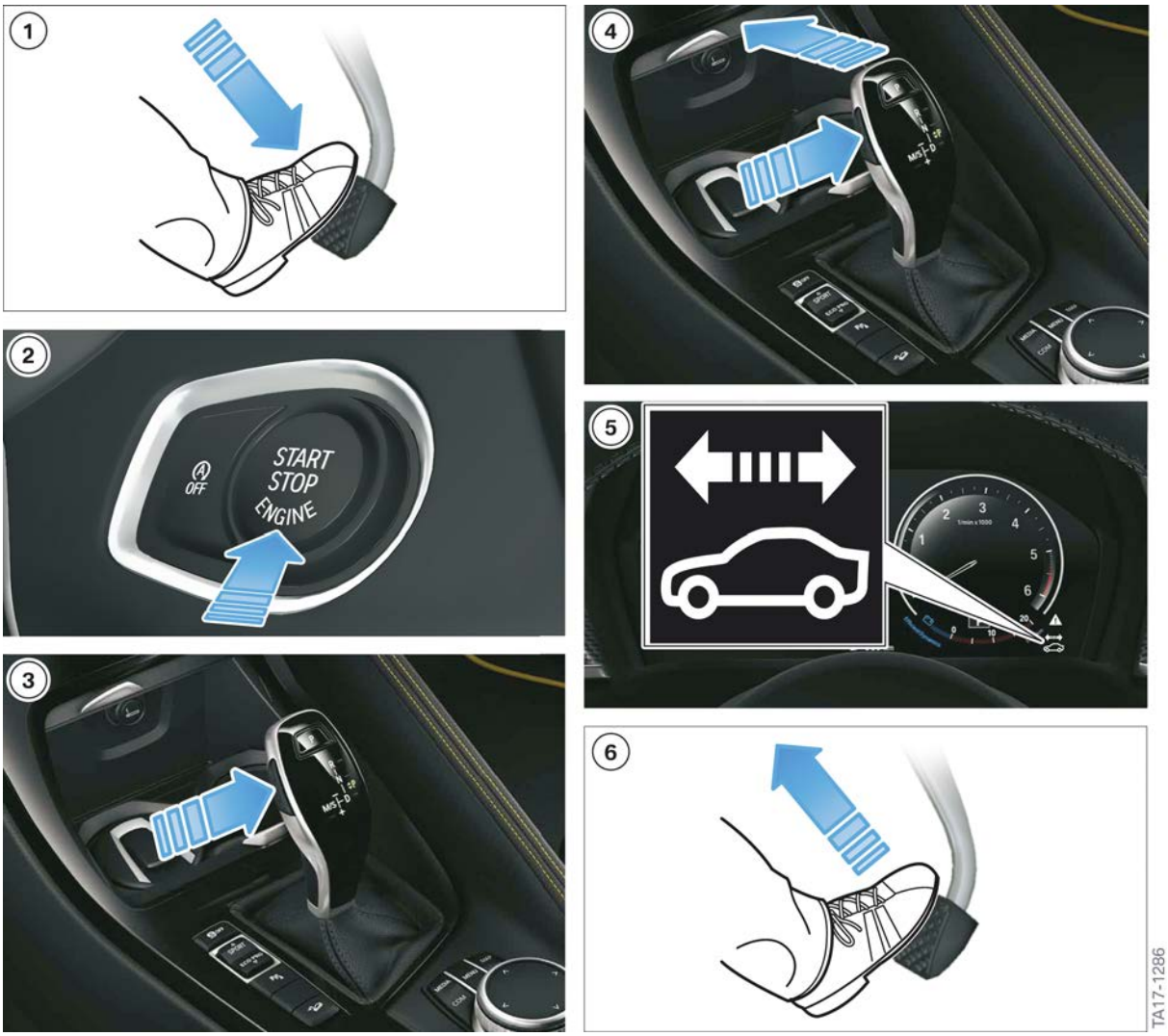
Electronic release of the parking lock is only possible if the starter motor can crank the engine.

The vehicle can roll away when the lock is released. Only release the parking lock with the vehicle parked on level ground and protect the vehicle against rolling away.

F39 X2 M35i Transmission

1. Gearbox

The parking lock can be released electronically as follows:



AISIN TU (8G45-460) Electronic emergency transmission release

Index	Explanation
1	Press and hold the brake pedal throughout the entire process.
2	Press the START/STOP button – the starter motor must start up audibly.
3	Press and hold down the release button.
4	Move the selector lever to selector lever position N and hold.
5	Hold the N position until the selector lever position N is displayed in the instrument cluster (a Check Control message is displayed).
6	Release the selector lever and release the brake as soon as the starter motor stops.

If the parking lock cannot be released electronically, it can also be released manually.

F39 X2 M35i Transmission

1. Gearbox

1.2.4. AISIN TU – Mechanical emergency transmission release

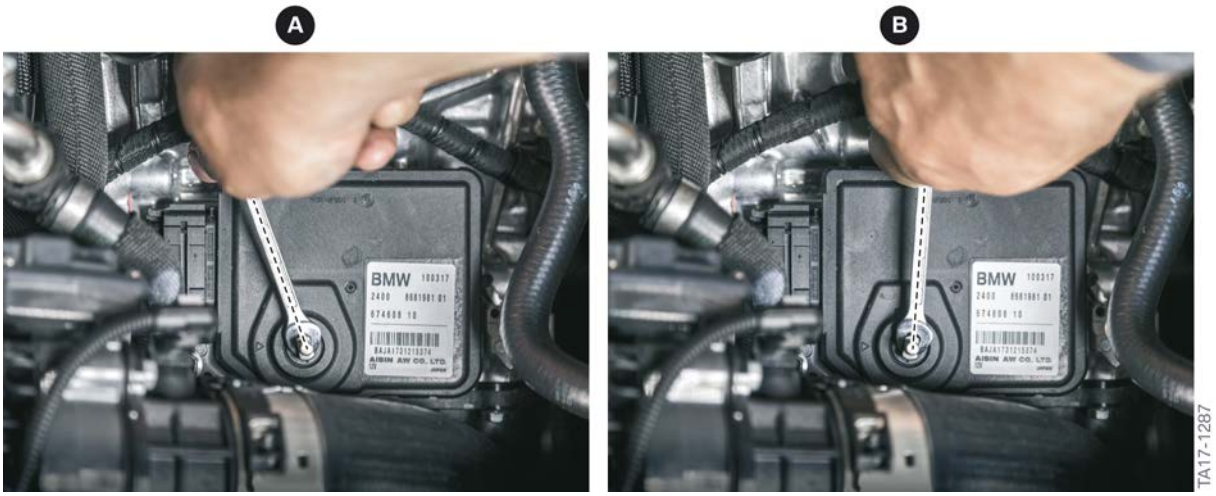
The vehicle can roll away when the lock is released. Only release the parking lock when the vehicle is parked on level ground and secure the vehicle against rolling away.

The parking lock can be released mechanically as follows: The ignition is not permitted to be switched on:

1 Remove the air filter housing from the engine compartment.

2 Mechanically turn the shaft on the transmission clockwise to the stop in the N position (attention: danger of rolling away!).

3 To move the vehicle, the ignition must be switched on (if the transmission jumps back into P automatically, let the vehicle "fall asleep" until the lit P on the selector lever goes out; then begin again with step 2).



AISIN TU (8G45-460) Manual emergency release of parking lock

Index	Explanation
A	P position of transmission
B	N position of transmission

1.2.5. AISIN TU – Oil volume reservoir

The oil volume reservoir enables the automatic engine start-stop function 2.3. The AISIN TU thus features additional MSA functions compared to its predecessor AISIN automatic transmission (MSA 2.2):

F39 X2 M35i Transmission

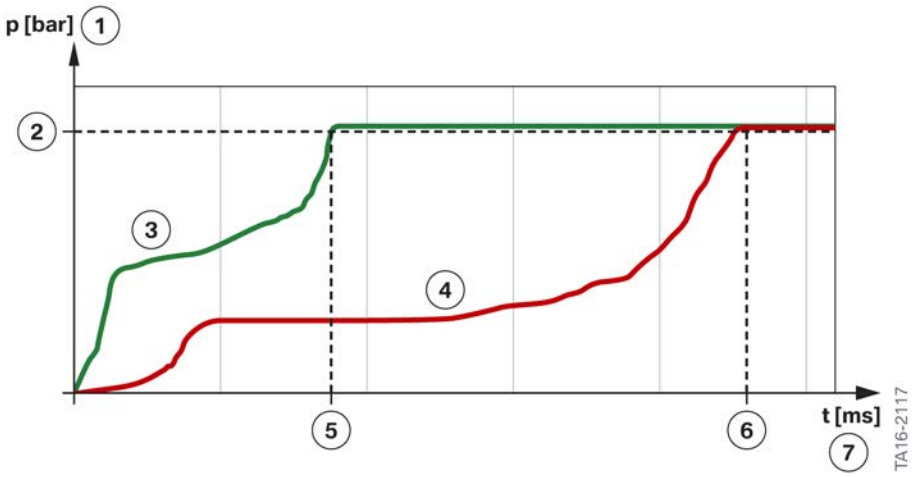
1. Gearbox

- MSA stop on inclines
- Shortening of the starting times
- Reflex start in the event of a change in mind
- Automatic engine stop at driver request
- Manoeuvrability for automatic engine start-stop function coasting or stop
- Improved stopping and starting comfort.

The transmission oil pump is no longer driven during the engine stop phases. When the automatic engine start-stop function is activated, the maximum gearbox oil pressure must be present for the starting process to take place dynamically without a noticeable delay. However, the mechanically driven transmission oil pump cannot build up this pressure quickly enough when the engine starts.

An oil volume reservoir is used for this reason. Owing to the volume of transmission oil stored here under pressure, the shift elements can be charged as soon as the vehicle is driven off, even before the transmission oil pump has built up the necessary pressure.

The oil volume reservoir is therefore always charged when the engine is running and the transmission oil pump is activated. When charging, transmission oil flows into the hydraulic cylinder.



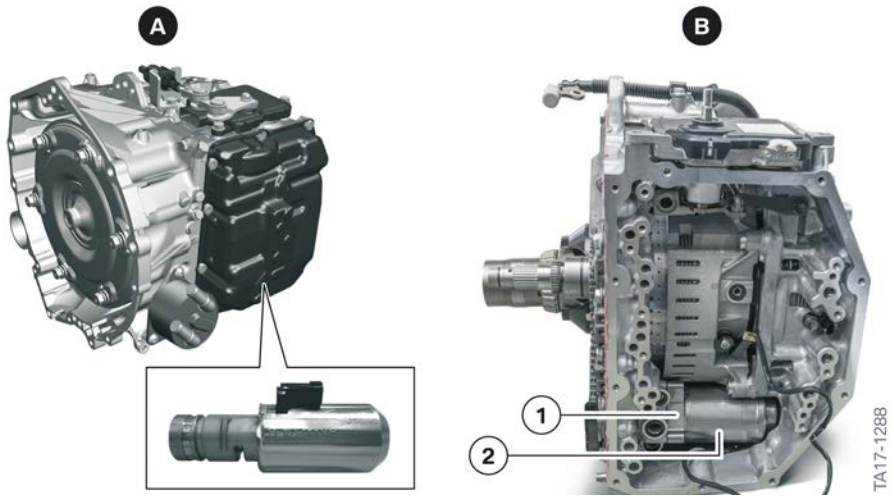
Variation in gearbox oil pressure over time at engine start

Index	Explanation
1	Gearbox oil pressure
2	Nominal value of the gearbox oil pressure which is required to hydraulically actuate the shift elements
3	Transmission oil pressure curve **with** hydraulic impulse storage
4	Transmission oil pressure curve **without** hydraulic impulse storage
5	Time at which the automatic transmission **with** hydraulic impulse storage is ready for driving off
6	Time at which the automatic transmission **without** hydraulic impulse storage is ready for driving off
7	Time

F39 X2 M35i Transmission

1. Gearbox

In the AISIN automatic transmission (GA8F22AW), an electrical transmission oil pump is used instead of an oil volume reservoir to implement the MSA 2.2. Both are integrated in the automatic transmission.



Installation location of the hydraulic impulse storage

Index	Explanation
A	AISIN automatic transmission (GA8F22AW) with electrical transmission oil pump
B	AISIN TU automatic transmission (8G45-460)
1	Mechanical transmission oil pump
2	Hydraulic impulse storage

1.2.6. AISIN TU – Notes for service

The car wash mode is active for 15 minutes. During this time, the ignition is not permitted to be switched off.

The transmission is provided with a life-time oil filling. No oil change is required throughout the entire running time.

The following servicing must be performed when the control unit is exchanged:

- Programming the P position
- Hydraulic pressure adaptation.

When the entire automatic transmission is exchanged, a new electronic transmission control (EGS) is also supplied. The EGS contains the information status for a new vehicle and first needs to be adapted. For this reason, minor restrictions in comfort may occur after installation of a new automatic transmission until the adaptation is completed.

F39 X2 M35i Transmission

1. Gearbox

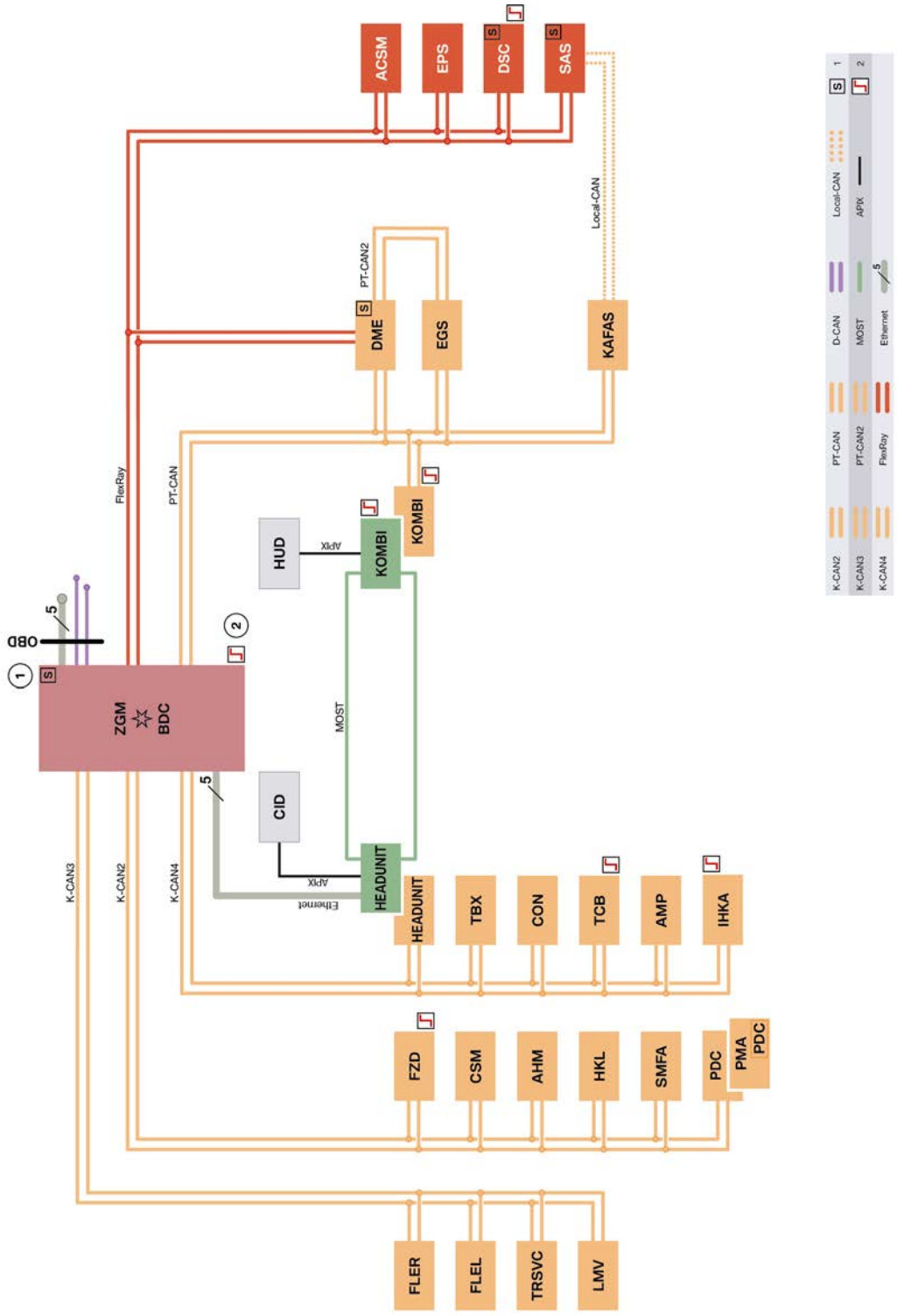
The following components can be replaced:

- Electronic transmission control EGS
- Torque converter
- Differential oil seals
- Oil sump
- Hydraulic shift unit
- Hydraulic shift unit wiring harness
- Transmission input-speed sensor
- Engine oil cooler
- Tank ventilation line
- Oil filler plug.

F39 X2 M35i Transmission

2. General Vehicle Electronics

2.1. Bus overview



F39 bus overview

TE17-1094_2

F39 X2 M35i Transmission

2. General Vehicle Electronics

Index	Explanation
1	Start-up node control units for starting and synchronizing the FlexRay bus system
2	Control units with wake-up authorization
ACSM	Advanced Crash Safety Module
AHM	Trailer module
AMP	Audio amplifier
BDC	Body Domain Controller
CID	Central Information Display
CON	Controllers
CSM	Car Sharing Module
DME	Digital Motor Electronics
DSC	Dynamic Stability Control
EGS	Electronic transmission control
EPS	Electronic Power Steering
FLEL	Frontal Light Electronics Left
FLER	Frontal Light Electronics Right
FZD	Roof function center
GWS	Gear selector
HEAD UNIT	Head unit
HKL	Automatic operation of tailgate
HUD	Head-Up Display
IHKS	Integrated heating and A/C control unit
IHKA	Integrated automatic heating / air conditioning
KAFAS	Camera-based driver support systems
KOMBI	Instrument panel
LMV	Longitudinal torque distribution
PDC	Park Distance Control
PMA	Parking Manoeuvring Assistant
SAS	Optional equipment system
SMFA	Seat module, driver
TBX	Touchbox
TCB	Telematic Communication Box
TRSVC	Control unit for rear view camera and Side View
ZGM	Central gateway module