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auto-mate

Mitsubishi Challenger PB, PC (2009-2015)
Mitsubishi Triton MN 4 speed (2009-2015)



Operating Instructions

Rev F: 09 Feb 2021



Watch our installation and operation videos
on the **MM 4X4** Channel

OWNERS COPY – Save these instructions for future reference

Thanks for purchasing **auto-mate**; a fantastic product to protect the transmission from over-heating, to improve fuel economy, and to avoid the LIMP/self protect issue that affects the Mitsubishi Challenger and Triton vehicles.

auto-mate Features

FEATURES

BENEFIT

General Benefits of auto-mate

Significantly reduces automatic transmission heat build-up

Prolong the life of the transmission oil and help avoid over-heating related transmission failures.

Resolves Challenger/Triton's transmission LIMP/self protect mode issue that occurs after prolonged towing up-hill

Self Protect mode results in the vehicle significantly dropping in power, and forcing 3rd gear selection.

*The Challenger/Triton is prone to causing this mode after a long period of high slippage of the torque converter (such as climbing a long hill). **auto-mate** resolves this issue.*

Improved fuel economy

The unit will pay for itself in the long run.

Micro-processor controlled

Provides advanced lockup control and features.

Fully automatic lock/unlock control of the Torque Converter Clutch (TCC)

Easy to use. A driver may not even know it's there!

Overdrive gear lockout mode
(4th or 5th gear depending on transmission)

*When active, only gears 1-4 are used
(1-3 in the 4 speed gearbox).*

Doesn't change the factory ECU software

No re-mapping of the transmission ECU required.


Simpler installation with comprehensive installation instructions

DIY saves money, or reduces cost if installed by an auto-electrician.

 SafeLock™ - Clutch Protection Technology

Protect the clutch from excessive wear for longer life and reliability

TCC lockup using the same low slip criteria as factory ECU before engaging the clutch.

 Emergency Braking - Clutch Protection Technology

Protect the transmission and clutch from potential damage should an impact occur.

TCC unlocks during emergency braking

FEATURES

auto-mate Operation

Lockup control unit uses Speed, RPM, Throttle Pedal position, 4WD mode, transmission mode (SPORT or DRIVE), transmission temperature, and current gear to optimise automatic operation

Vehicle status is obtained from the vehicle's internal vehicle digital network (CANBus), via connection to the car's existing OBD2 port

Still use your favourite OBD2 devices as it won't interfere with them

Works when transmission is in either SPORT or DRIVE mode (except 4LLc DRIVE)

Can be enabled or disabled using the switch

Small custom switch/LED



LED mode (Drive/Sport indicator or Lockup Status)

LED flashes if the TCC is unlocked (When in SPORT mode in 3rd gear and above)

LED pulses during transmission warm up period

Updates to user's settings using the LED/switch

Automatically adjusts for 4WD low-range use

LED is visible in sunlight, and automatically dims for night use (headlights are on)

Headlight dimming can be overridden by the driver

Compatible with other vehicle modifications (eg, pedal re-mapping devices (eg, Windbooster), re-tuned engines, and exhaust upgrades

BENEFIT

Complex logic to ensure the TCC is locked up whenever possible, and unlocked when it's not.

Lockup only commences when the transmission oil is 40°C or above.

Precise and reliable information.

Simpler installation – no cutting of wires to obtain vehicle information.

Immunity to electrical noise.

Doesn't use OBD2 messages and passively listens to the CANBus, so it's compatible with your existing Scan-gauge, GPS HUD etc.

Keeping the blue LED on helps keep the transmission cool!

Can be switched off if desired.

Discrete and simple installation.

Know if you're in Drive or Sport mode, alternatively when the TCC is locked or not.

Informs the driver to change to a lower gear to enable lockup to occur.

Drive knows auto-mate is working and is waiting for the transmission oil to get to 40degC before allowing TCC lockup.

*No need for an extra display or to access the **auto-mate** controller to adjust the settings.*

Simple use.

Avoids a glaring LED at night.

LED will be visible during the daytime when driving with the headlights on.

Compatibility with a wide range of modifications.

FEATURES

BENEFIT

Installation Features

Detailed installation instructions

Easy to follow, DIY installation saving you money.

Automatic VIN check

Automatically disables if installed into an unsupported vehicle.

Compact design. Installed in 1-2 hours

Simpler installation.

User Configurable Settings

1. Protection Mode

Enable SafeLock™ and Excessive Engine Load (SPORT mode only) protections

2. Startup state (auto-mate on or off)

Remembers the switch setting.

3. LED brightness override

Brighten the LED during daytime operation when the headlights on.

4. Adjustable shift pattern

Tune the shift pattern for your vehicle. Compensate for larger tyres or just a sportier response.

5. Stores user settings in micro-processor's non-volatile memory

Remembers all settings when power is removed.

Other Benefits

Free firmware updates

The control unit will need to be returned to MM4X4 for firmware updates.

Expandable with new MM 4X4 products.

Simpler installation and avoids additional bulky OBD2 cables.

CAN Bus connection can be daisy chained off the first MM 4X4 product that is connected to the OBD2 port to future MM 4X4 products.

Adaptable for specialised vehicles – such as with transfer case reduction gears or non-standard diff ratio.

Via special order. Contact us for details.

Complex electrical control of the TCC solenoid

Smoother TCC engagement.

✓ Technical support

✓ Made in Australia

✓ 12 month warranty

30 day money back satisfaction guarantee

ADJUSTING AUTO-MATE TO SUIT YOUR DRIVING PREFERENCES

auto-mate allows the driver to adjust the following parameters:

1. **On or Off** - When Off, the factory transmission ECU (AT ECU) controls the lockup solenoid.
2. **LED brightness headlight override** - The LED brightness automatically dims when the headlights are turned on. This can be overridden if full brightness is desired for day time use.
3. **Protection Mode** – Two protection features are enabled by default. SafeLock™ and Excessive Engine Load modes. SafeLock™ only allows clutch engagement under low slip conditions. Excessive Load mode will unlock the torque converter (when in SPORT mode) if the pedal, speed and gear combination places excessive load on the engine.
4. **Overdrive gear lockout mode** - Used only in DRIVE mode. When active, only gears 1-4 are used (5 speed gearbox), or gears 1-3 (4 speed gearbox) . Useful when driving through hilly countryside.
5. **Adjustable Shift pattern** – Tune the gear shift pattern to change gears 'later' or 'earlier'. Used to compensate for larger tyres or for a sportier response.

INTRODUCTION TO THE SWITCH

All features are controlled via auto-mate's combination LED/switch.

The LED/switch has a LED in the centre. This is also a momentary switch which can be pressed.

Quick press and release to switch the unit on or off, *or*

Press and hold or double click to access features.

NOTE: Pajero unit is shown in the photo. Challenger is similar.



ADJUSTMENT INSTRUCTIONS

1. Switching auto-mate ON and OFF

auto-mate can be switched on and off is using the LED/Switch.

The LED can be pushed to activate the momentary switch.

Between engine starts, **auto-mate** remembers the previous switch status.

When pressed, ON = a long flash of the LED (1.5 seconds duration)

OFF = a short flash (0.5 seconds)

During driving with auto-mate ON, the LED is always ON in DRIVE mode, and OFF in SPORT mode.

The instrument cluster always displays the current transmission gear, so the LED indicates whether you are in SPORT or DRIVE mode.

2. Toggle between day-time and night-time LED brightness

When driving with your headlights on in the day-time, you can override the 'night mode' LED intensity (which is too dim).

Night-time LED intensity operation is linked to the headlights.

Press and hold the LED/switch for 3-5 seconds. The LED will momentarily illuminate with the current LED intensity.

NOTE: If you accidentally turn the unit off while performing this action, just briefly press the switch again to turn it back on.

3. Protection mode

To toggle between the Protection Mode ON and OFF, press and hold the LED/Switch for 10+ seconds.

The LED will respond with:

5 flashes – Protection Mode is **ON**

2 flashes – Protection Mode is **OFF** (not recommended)

The unit saves the mode setting into non-volatile memory.

ON (default)

There are two protection features built into **auto-mate**.

- 1. Clutch Protection** – **auto-mate** includes SafeLock™ which will delay locking the torque converter until the amount of slip is low. It uses the same criteria as the factory ECU before engaging the clutch. This ensures the wear of the clutch when it engages is no different to normal use, ensuring maximum life from the clutch.

2. Excessive Engine Load (SPORT mode ONLY)– The position of the accelerator pedal is used in the algorithm that determines when **auto-mate** will release the TCC. This improves vehicle drivability and prevent excessive load on the engine. For example, if cruising at 60 KPH (gentle pedal) the engine is only at ~1500 RPM. The vehicle is not able to accelerate quickly at this RPM, as the engine is not able to generate much power/torque. Pushing the pedal harder (eg, to 50%) will release the TCC (momentarily) so the car's RPM increases and will more quickly accelerate.

OFF

This mode is provided for customers who want more manual control over lockup clutch engagement and disengagement, or have specific reason to do so.

When Protection Mode is OFF, **auto-mate** activates (locks) the TCC when it can, and thereafter keeps it locked regardless of the engine load (pedal position). It will only unlock again once the RPM drops below 1200.

It disables SafeLock™ and lockup will engage the clutch without a delay.

CAUTION

Switching Protection Mode OFF is for the savvy/advanced driver who specifically wants full control. It relies on the driver making the right gear choices and under the right engine load to avoid excessive engine strain or clutch wear.

This mode may cause a small amount of extra wear on the torque converter clutch compared to the standard factory engagement limit, as the clutch can engage under high slip conditions (ie, when under medium to high acceleration).

4. Adjustable Shift pattern

Adjust the shift pattern to suit your vehicle or driving preference.

Range 1 to 20 (default is 3). Each value represents a 1% change, where setting 3=0%

For vehicles with 32" tyres (setting 8), 33" tyres (setting of 13)

To adjust:

1. Switch ignition OFF, and put in transmission in Park.
2. Turn Ignition ON (but don't start the car).
3. Move the Transmission shift lever to SPORT position (so you can use + and -)
4. Now press the LED/switch to enter configuration mode. The LED will flash according to the current setting (eg, 3 flashes = setting 3)
5. Use the transmission shift lever + or – to increase or decrease the setting. The LED will flash according to the chosen setting each time the shift lever is pressed and released.
6. To exit, move the shift lever back to PARK. The LED will flash once.

5. LED mode (Drive/Sport indicator or Lockup Status)



The LED can be selected to either show DRIVE(on)/SPORT(off) status, or the Lockup status (on/off). D/S mode is the default.

To toggle modes, press and hold LED as the ignition is switched from OFF to ON

LED will flash. 3 = D/S mode, 6 = Lockup Status mode

OTHER FEATURES

Transmission warm up feature

auto-mate waits until the transmission oil has reach 40 deg C before locking the torque converter. This is the same behaviour as the factory computer.

The instrument cluster displays D to indicate **auto-mate** is not controlling the gears.

While waiting for the transmission to warm up, the LED will pulse to let the driver know the unit is working.

TCC Slip Alert warning feature (SPORT mode only)

When driving in SPORT mode, if the driver has selected a gear which is too high to allow the TCC to lockup, the LED will flash.

This is to remind the driver to change down a gear to avoid heat building up in the transmission. When coasting downhill the warning LED does not flash. It will only flash when the accelerator pedal is depressed.

Downhill Engine Braking

In DRIVE, **auto-mate** unlocks the torque converter when coasting. This provides smoother down-shifts.

But, keeping the torque converter locked can be used to improved engine braking, and cool the transmission faster.

If better engine braking is required downhill, move to SPORT mode and select the appropriate gear.

If you change back to DRIVE (and still coasting) **auto-mate** will hold the chosen gear until you touch the accelerator again.

Did you know, coasting downhill causes the torque converter to slip and generate heat? Coasting does not cool the transmission like you'd expect.

auto-mate is designed to protect your transmission from high temperatures. If in DRIVE mode it detects the transmission temperature is above 80 Deg C, instead of unlocking the torque converter when coasting (for smoother downshifts), it will keep the torque converter locked to improved cooling performance. [Note: 4 speed gearbox version doesn't unlock the when coasting]

Low Range 4WD Operation

Driving in low range presents a wide variety of driving conditions. It is best to use SPORT mode if driving in conditions that require low range 4WD.

auto-mate does not operate in 4WD low range DRIVE, only SPORT. The factory ECU controls the transmission in DRIVE.

In SPORT mode, **auto-mate** will lock the torque converter clutch in 1st gear when the RPM is above ~2000RPM.

Our recommendation is to only use **auto-mate** in 4LLc condition when you either:

1. Need to manage transmission temperatures (eg, very long steep climbs or sand driving); or
2. For improved engine braking down steep hills

In off-road conditions the torque converter provides benefits, such as reduced driveline shock when dropping a lifted wheel, and improved low speed control.

SafeLock™ - Clutch Protection Technology

Exclusive to MM4X4 is **SafeLock**, which prevents excessive wear that may occur if the torque converter clutch is engaged under high slip conditions. The Advanced Digital Control of **auto-mate** reads the real-time vehicle status and is able to determine the amount of slip in the torque converter. Using the same slip limits as the factory ECU, it will only engage the clutch when within this range giving maximum longevity and reliability of the clutch.

Under light acceleration, the lockup clutch will engage at a lower speed as there will be low slip. Under heavy acceleration it will lockup later as **SafeLock** is delaying engagement until the slip is low. If active the driver need only back off on the accelerator a little to reduce the RPM (and slip) for the clutch to then engage.

Emergency Braking unlock - Clutch Protection Technology

In the event of hard braking due to a potential incident (eg. avoiding upcoming washout) the lockup clutch will be disengaged to help protect the clutch and transmission from any potential shock or damage due to an impact.

OPERATING RECOMMENDATIONS

<i>Driving Condition</i>	<i>Recommendation</i>
City, country and highway	auto-mate ON Reason: Excellent protection from high transmission temperatures and better fuel economy. Use SPORT mode for better downhill engine braking. For country driving in the hills, SPORT mode is recommended with the gear chosen to maintain lockup (keep the blue LED ON to “keep cool and save fuel”).
Rocks and creek-beds	auto-mate OFF * * Leave OFF only unless the transmission oil becomes hot (eg, >80°C), then switch auto-mate ON to reduce the transmission temperature. Reason: The torque converter absorbs driveline shock caused by the highly variable nature of rock driving, eg, lifting/dropping wheels or hitting rock ledges.

Driving Condition

Recommendation

Steep hills (4L ascent)

auto-mate ON or OFF, use SPORT mode

Short hills: Leave OFF unless the transmission oil becomes hot (eg, >80°C), then switch **auto-mate** ON to reduce the transmission temperature.

Use SPORT mode and climb in 2nd gear where possible to allow the TCC to lockup. The transmission will not lockup in 1st gear.

Reason: The torque converter absorbs driveline shock.

Long hills: Steep hill climbs will rapidly heat-up the transmission oil, so if conditions are suitable switch **auto-mate** ON and climb in 2nd gear.

Steep hills (descent)

auto-mate ON or OFF

Typically a 4L steep descent is conducted in 1st gear. Since the transmission cannot not lockup in 1st gear the use of **auto-mate** doesn't make a difference.

For better 4H engine braking on the asphalt, switch **auto-mate ON** and use SPORT mode.

Sand (beach run at higher speeds >40 kph)

auto-mate ON

Use SPORT mode - ensure the blue LED stays on.

Reason: Keep the transmission cool and better fuel economy.

Sand (dunes and deep sand)

auto-mate ON or OFF

ON for sustained deep sand driving to avoid high transmission temperatures. Use SPORT mode to choose an appropriate gear and keep the revs high so when it needs the power and the RPM drops, the engine is still at high torque and boost.

OFF for short sections. If transmission oil becomes hot (eg, >80°C), then switch **auto-mate ON** to reduce the transmission temperature. Deep sand and mud are a highly variable situation. When a deep section is entered more power is urgently needed to maintain momentum. The torque converter slippage allows the RPM to quickly increase for more turbo boost and power.

Mud

DRIVING TIPS

Less torque converter slip = fuel savings + lower heat

auto-mate works in both DRIVE and SPORT modes of the automatic transmission.

DRIVE Mode

Maximum automation – just set and forget. Let **auto-mate** change gears for you to optimise torque converter lockup, fuel efficiency and reduced transmission temperatures.

auto-mate locks the torque converter when in 2nd gear and at above 30 kph. It will then change gear when needed to keep it locked up. In low range 4WD (SPORT) it locks in 1st gear when the engine is above 2000RPM.

DRIVE mode provides fully automatic operation of **auto-mate**.

But, if you're finding the transmission is changing between 4th and 5th too often, use the 5th gear lockout feature. Just double-click the LED to toggle this mode. Alternatively, use SPORT mode.

SPORT Mode

It essentially turns the transmission into a clutch-less manual. This thought should guide how to best drive the vehicle when in this mode.

Imagine it is a manual transmission, so you need to change gears according to the RPM. Changing gears needs to occur at higher RPM, and gear changes are not as smooth (but better than if you had a manual transmission!)

auto-mate will unlock the torque converter if the RPM is too low, to avoid stalling.

In SPORT mode, if the torque converter clutch unlocks and the driver accelerates, **auto-mate** will flash the LED to remind the driver to down-select a gear (flashes only in 3rd gear or higher).

Tips when driving in SPORT mode

- ✓ Change from 1st gear to 2nd gear soon. You can also takeoff in 2nd gear. Wait for TCC lockup in 2nd gear and then change to 3rd once the RPM has increased again.
- ✓ When driving gently, change gears at ~2200-2400RPM. If accelerating quickly, around 3000RPM.
- ✓ Experiment with RPM and load to determine the right time for the smoothest gear changes.
- ✓ When using engine braking downhill, if you slightly tap the accelerator pedal as you change gears it can make the downshift a bit smoother (just like you would with a manual).
- ✓ As you slow down in SPORT mode, the transmission will automatically change from 4th to 3rd etc (and **auto-mate** will unlock). You can avoid this by down-shifting early to stay within lockup conditions (ie, keep the RPM high enough to lockup)
- ✓ Keeping the TCC locked improves vehicle responsiveness. When locked up, as soon as power is applied it goes straight to the road and there is no loss through the transmission.

WARRANTY POLICY

MM 4X4 is committed to providing quality products to you and this policy outlines our warranty against defective products manufactured by MM 4X4.

MM 4X4 warrants our manufactured products against defects in workmanship or materials for the Warranty Period. The warranty does not cover damage due to normal wear and tear (for example marks and scratches). This warranty is not applicable to products re-sold by MM 4X4. Warranties for these products are defined by the manufacturer.

MM 4X4 accepts no liability for damage to the vehicle as a result of product installation or use.

Warranty Period

MM 4X4 warrants MM 4X4 manufactured products for a period of 12 months commencing from the date of purchase.

Warranty Entitlement

To be entitled to claim a warranty claim, the customer must:

1. Fit the product according to the provided installations instructions;
2. Provide evidence of purchase;
3. Return the faulty product to MM 4X4 for assessment against the Warranty Entitlement Exclusions; and
4. Make a claim within the Warranty Period.

Warranty Entitlement Exclusions

The Customer is not entitled to a warranty claim if:

1. The defect is the result of misuse, inappropriate use, incorrect installation, or installation into a vehicle not supported by the product; or
2. The product has been modified; or
3. The product housing has been opened; or
4. The product has been damaged.

Making a Warranty Claim

To make a warranty claim:

1. Contact MM 4X4 (enquiries@mm4x4.com.au) to discuss the claim;
2. If directed by MM 4X4, return the product to the address provided by MM 4X4 (at the customer's expense) and ensure the product is accompanied with the following information:
 - a. A copy of the proof of purchase;
 - b. The return merchandise authorisation (RMA) number provided by MM 4X4;
 - c. The customer's name and contact details;
 - d. A return shipping address.

Upon receipt of the faulty product, MM 4X4 will assess the claim against the Warranty Entitlement and Exclusions.

For valid warranty claims, MM 4X4 will repair or replace the goods and ship them (free of charge) to the provided shipping address.

For warranty claims that are assessed as invalid, MM 4X4 will contact the customer to seek further direction, which may include:

- a. Reasons for denying the warranty claim;
- b. A quote to repair the fault product;
- c. Returning the faulty or repaired product to the provided shipping address (at the customer's expense);
- d. Agreement to dispose of the faulty product; or
- e. A quote to supply a replacement product.

Warranty Complaints and Enquiries

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.



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