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lockup-mate

Mitsubishi Challenger PB, PC (2009-2015)

Mitsubishi Triton MN (2009-2015)



Operating Instructions

Rev E: 13 Nov 2020



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

OWNERS COPY – Save these instructions for future reference

Thanks for purchasing **lockup-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 Challengers.

lockup-mate Features

FEATURES

General Benefits of lockup-mate

Significantly reduces automatic transmission heat build-up

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

 SafeLock™ - Clutch Protection Technology

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

Improved fuel economy

Micro-processor controlled

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

Doesn't change the factory ECU software

Simpler installation with comprehensive installation instructions

lockup-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

BENEFIT

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

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

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

Protect the clutch from excessive wear for longer life and reliability

The unit will pay for itself in the long run

Provides advanced lockup control and features

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

No re-mapping of the transmission ECU required

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

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

FEATURES

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

Works when transmission is in either SPORT or DRIVE mode

Can be enabled or disabled using the switch

Small custom switch/LED

LED indication of the 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

Installation Features

Self diagnostic mode

Detailed installation instructions

Automatic VIN check

Compact design

BENEFIT

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

*Optimum heat saving results are obtained in SPORT mode – you shift gears to maximise lockup time. Keeping the **blue** LED on helps keep the transmission **cool**!*

Can be switched off if desired

Discrete and simple installation

Driver knows then the TCC is locked

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

Driver knows lockup-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 **lockup-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

Confirms correct installation whenever the unit is powered on. The LED flashes constantly and unit is disabled if there is a fault detected.

Easy to follow, DIY installation saving you money

Automatically disables if installed into an unsupported vehicle

Simpler installation

FEATURES

Installed in 1-2 hours

User Configurable Settings

1. Protection Mode
2. Startup state (on or off)
3. LED brightness override

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

Other Benefits

Free software upgrades

Expandable with new MM 4X4 products.

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

Complex electrical control of the TCC solenoid

- ✓ Technical support
- ✓ Made in Australia
- ✓ 12 month warranty
- ✓ 30 day money back guarantee

BENEFIT

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

Remembers the switch setting

Brighten the LED during daytime operation when the headlights on.

Remembers all settings when power is removed

The control unit will need to be returned to MM 4X4 for SW updates

Simpler installation and avoids additional bulky OBD2 cables

Via special order. Contact us for details.

Smoother TCC engagement

Adjusting lockup-mate to suit your driving preferences

lockup-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. Accelerator Pedal mode.** The default in high-range (2H,4H,4HLc) is to use the pedal position as part of the lockup/unlock algorithm, ie, **lockup-mate** will release the TCC based on pedal, speed and gear. In low range (4LLc), the pedal is not used.

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 to activate features or modes.

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



1. Switching lockup-mate ON and OFF

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

The LED can be pushed to activate the momentary switch.

Between engine starts, **lockup-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, the LED displays the state of the TCC lockup condition. It illuminates blue when the TCC is locked.

The aim is to maximising the time the LED is blue, to keep the transmission temperature the lower.

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 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 **lockup-mate**.

- 1. Clutch Protection** – **lockup-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 **lockup-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 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, **lockup-mate** activates (locks) the TCC when it can, and there-after 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. Transmission warm up feature

Lockup-mate waits until the transmission oil has reach 40 degC before locking the torque converter. This is the same behavior as factory computer.

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

5. Excess Slip Alert - TCC unlocked warning feature

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 down hill the warning LED does not flash. It will only flash when the accelerator pedal is depressed.

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 **lockup-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.

OPERATING RECOMMENDATIONS

Driving Condition

Recommendation

City, country and highway

lockup-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

lockup-mate OFF *

* Leave OFF only unless the transmission oil becomes hot (eg, >80°C), then switch **lockup-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.

Steep hills (4L ascent)

lockup-mate ON or OFF, use SPORT mode

Short hills: Leave OFF unless the transmission oil becomes hot (eg, >80°C), then switch **lockup-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 **lockup-mate** ON and climb in 2nd gear.

Steep hills (descent)

lockup-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 **lockup-mate** doesn't make a difference.

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

Driving Condition

Recommendation

Sand
(beach run at higher speeds
>40 kph)

lockup-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)

lockup-mate ON or OFF

ON for sustain 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 turbo boost.

OFF for short sections. If transmission oil becomes hot (eg, >80°C), then switch **lockup-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.

Driving Tips

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

DRIVE Mode

Drive mode provides the smoothest operation of the transmission. **lockup-mate** will only lockup above 60 KPH. This is because below 60kph, the factory AT ECU selects 5th gear which is too low for locking the TCC.

When not towing and driving around town or cruising, DRIVE provides the greatest ease of use. Using **lockup-mate** to manage transmission temperatures is not needed unless it is a very hot day. The transmission temperatures should stay within normal temperature range.

SPORT Mode

In SPORT mode, the driver is able to get maximum benefit from **lockup-mate**.

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 as a manual, and you need to change gears when the RPM is high enough.

Changing gears needs to occur at higher RPM, and gear changes are not as smooth (but better than if you had a manual transmission)!

When driven correctly in SPORT mode (ie, blue light stays on), you get maximum benefit from **lockup-mate** - lowest transmission temperature and best fuel economy.

Significantly better fuel economy can be achieved.
10-20+% depending on conditions.

Less torque converter slip = fuel savings + lower heat

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 ~2200-2400 RPM. If accelerating quickly, around 3000 RPM.
- ✓ Experiment with RPM and load to determine the right time for the smoothest gear changes.
- ✓ When using engine braking down hill, 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 **lockup-mate** will unlock). You can avoid this by down-shifting early to stay within lockup conditions (ie, keep the RPM is 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.

Enjoy!

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 faulty 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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