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# lockup-mate

Mitsubishi Pajero NT, NW, NX (2009+)



## Operating Instructions

*Rev I: 07 Mar 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, and to improve fuel economy.

PLEASE REFER TO IMPORTANT INFORMATION SECTION FOR A SAFETY WARNING

## lockup-mate Features

FEATURES	BENEFIT
<b>General Benefits of lockup-mate</b>	
Significantly reduces automatic transmission heat build-up	<i>Prolong the life of the transmission oil and help avoid over-heating related transmission failures</i>
Improved fuel economy	<i>The unit will pay for itself in the long run</i>
Micro-processor controlled	<i>Provides advanced lockup control and features</i>
Fully automatic operation	<i>Easy to use</i>
Doesn't change the factory ECU software	<i>No re-mapping of the transmission ECU required</i>
Simpler installation with comprehensive installation instructions	<i>DIY saves money, or reduces cost if installed by an auto-electrician.</i>

## lockup-mate Operation

Fully automatic lock/unlock control of the Torque Converter lockup clutch	<i>Simple operation for the driver.</i>
Lockup controller uses Speed, RPM, Throttle Pedal position, 4WD mode, transmission mode (SPORT or DRIVE) and current gear	<i>Complex logic to ensure the TCC is locked up whenever possible.</i>
Vehicle status is obtained from the vehicle's internal vehicle digital network (CANBus), via connection to the car's existing OBD2 port.	<i>Precise and reliable information</i> <i>Simpler installation – no cutting of wires to obtain vehicle information.</i> <i>Immunity to electrical noise</i>

FEATURES	BENEFIT
Still use your favourite OBD2 devices as it won't interfere with them	<i>Doesn't use OBD2 messages and passively listens to the CANBus, so it's compatible with your existing Scan-gauge, GPS HUD etc</i>
Works when transmission is in either SPORT or DRIVE mode	<i>Optimum heat saving results are obtained in SPORT mode – You shift gears to maximise lockup time. Keeping the blue light on helps keep the transmission cool!</i>
SPORT mode uses a hybrid SPORT/DRIVE mode to avoid the 1 <sup>st</sup> gear quirks	<i>When under 30kph, the transmission is placed into DRIVE to avoid the 1<sup>st</sup> gear quirks caused when using any lockup kit.  REFER TO SAFETY WARNING in the IMPORTANT INFORMATION section of this manual</i>
Can be enabled or disabled using the switch	<i>Can be switched off if desired</i>
Small custom switch/LED	<i>Discrete and simple installation</i>
LED indication of the lockup status	<i>Driver knows then the TCC is locked</i>
Updates user's settings using existing Instrument Cluster and Cruise Control switches as the user interface.	<i>No need for an extra display or to access the <b>lockup-mate</b> controller to adjust the settings.</i>
Automatically adjusts for 4WD low-range use	<i>Simple use</i>
LED is visible in sunlight, and automatically dims for night use (headlights are on)	<i>Avoids a glaring LED at night</i>
Headlight dimming can be overridden by the driver.	<i>LED will be visible during the daytime when driving with the headlights on</i>

## FEATURES

Compatible with vehicle modifications (eg, pedal re-mapping devices, re-tuned engines.

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

## BENEFIT

**Lockup-mate** has adjustable sensitivity to tune it to your own car's setup.

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

## Installation Features

User initiated self diagnostic mode, displaying results on the instrument cluster.

*Confirms correct installation and assists with fault finding*

Detailed installation instructions

*Easy to follow, DIY installation saving you money*

Automatic VIN check

*Self disables if installed into an unsupported vehicle*

Compact design

*Simpler installation*

Installed in 1-2 hours

*Minimum removal of trim*

## User Configurable

1. Adjustable sensitivity

*Fine tune when the TCC lockup engages*

2. Gear at which lockup commences

*Select 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> etc. (default is 2<sup>nd</sup>)*

3. LED brightness

*Adjustable to your preference, for both day and night.*

4. Startup state (on or off)

*Remembers the switch setting*

Reset to factory defaults

*Restore settings to the original*

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

*Remembers all setting when power is removed*

Enters user configuration mode only when vehicle engine is off

*Safety feature*

Updates user's settings using existing Instrument Cluster and Cruise Control switches as the user interface.

FEATURES	BENEFIT
<b>Other Benefits</b>	
Free software upgrades	<i>Unit will need to be returned to MM 4X4 for SW updates</i>
Expandable with new MM 4X4 products. CANBus connection can be daisy chained off the first the MM 4X4 product that is connected to the OBD2 port to future MM 4X4 products.	<i>Simpler installation and avoids additional bulky OBD2 cables</i>
Adaptable for specialised vehicles - such as with transfer case reduction gears or non-standard diff ratio	<i>Via special order. Contact us for advice.</i>
Electrical control of the TCC clutch is the same as the factory ECU	<i>Mimics the factory control for confidence, and smoother TCC engagement</i>

- ✓ Technical support
- ✓ Made in Australia
- ✓ 12 month warranty

# Adjusting lockup-mate to suit your vehicle or driving preferences

**lockup-mate** allows the driver to adjust the following parameters:

1. Lockup sensitivity, ie how much engine load is applied (and also considering speed) before **lockup-mate** will release the torque converter clutch.
2. The minimum gear that lockup override will occur. Default is 2<sup>nd</sup> gear, i.e. it will lockup in 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> gears
3. LED brightness. The LED brightness is adjustable separately for day and night viewing.

1. Switch Ignition ON, ENGINE OFF

Engine must not be running.

2. Press and hold ON/OFF button for 5 seconds  
(Wait until the instrument cluster displays a number on the speedo)

Blue LED illuminates

To reset to factory defaults,  
Press and hold COAST/SET instead of ON/OFF button

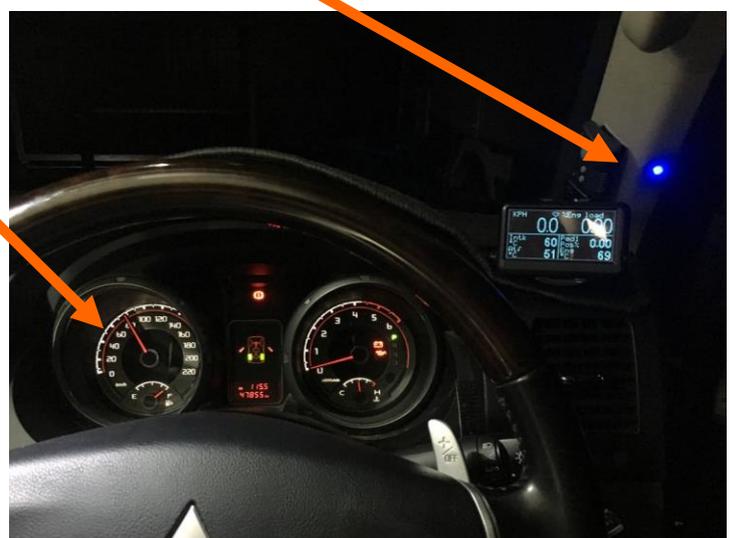


3. Lockup Sensitivity is displayed

Default is 100.

Allowable range 60-160

Adjust the sensitivity using the cruise control buttons ACC/RES (to increase) or DEC/SET (to reduce).



A lower value of sensitivity causes **lockup-mate** to hold the TCC locked for longer. A larger value results in the TCC lockup releasing easier.

4. Press ON/OFF (ie, next)

The minium gear is displayed on the Tacho.

Default is 3<sup>rd</sup>

Valid range is 1 to 5 (1<sup>st</sup> to 5<sup>th</sup>).

Use ACC/RES and COAST/SET to adjust.

The transmission does not lockup in 1<sup>st</sup> gear.

Do not use 1<sup>st</sup> unless you have a nomad value body fitted with the 1<sup>st</sup> gear lockup modification, as it has no effect.

**NOTE:** 1<sup>st</sup> can also cause AT ECU errors (CEL) when changing from 1<sup>st</sup> to 2<sup>nd</sup> gear.

**Avoid adjusting sensitivity too low which results in drivetrain pulsing (shudder)**



5. Press ON/OFF (ie, next)

The LED brightness is displayed, and the LED intensity is adjusted to the current value.

Use ACC/RES and COAST/SET to adjust.

Use the headlights switch to toggle between night-time brightness and daytime brightness.

Night-time brightness is best adjusted when dark.



6. Press ON/OFF

Adjustments are now complete.

The speedo and tacho will go full deflection and return to zero.

The values are written into non-volatile memory as they are entered.



At any time, CANCEL can be pressed to exit user settings mode.



**NOTE:** User settings cannot be adjusted when driving. The engine must be off.

## Operation Whilst Driving

### Switching **lockup-mate** ON and OFF

Turn **lockup-mate** on and off by using the SWITCH/LED.

The LED can be pushed to activate the momentary switch.

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

When switched on, you can hear the relay in the **lockup-mate** control module 'click'.

When pressed during driving, a long flash of the LED indicates it is on. A short flash is off.

### 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 CANCEL for 3 seconds. The LED will momentarily illuminate with the LED intensity.



**lockup-mate** now stores the headlight override choice in non-volatile memory, so the setting is remembered between engine starts.

## Accelerator Pedal Mode

### ON (default)

The position of the pedal is used in the algorithm that determines when **lockup-mate** will activate or release the TCC.

This improves vehicle drivability. 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.

NOTE: If the TCC unlocks for a sustained period (eg, climbing a hill) the transmission temperatures will slowly rise. In this circumstance it is better to change down a gear so the TCC locks again.

### OFF

When Pedal Mode is OFF, **lockup-mate** activates (locks) the TCC when it can, and there-after keeps it locked regardless of the pedal position. It will only unlock again once the RPM drops below 1200.

So, in the above scenario at 60 KPH, as you push harder on the accelerator pedal the TCC will remain locked, and the car will struggle to accelerate. The driver must change down a gear to 3<sup>rd</sup> to increase RPM so the vehicle has the power to accelerate.

Which mode is used is entirely up to the driver's individual preference.

### Changing Modes

To toggle between the Pedal modes, press and hold the LED/switch for >10 seconds.

The LED will respond with:

**5 flashes** – Pedal mode is **ON** (ie, is used) - default in high range – 2H,4H,4HLc

**2 flashes** – Pedal mode is **OFF** (ie, is ignored) **NOTE: It is always OFF when in 4LLc**

When in 4LLc, experience has shown it's best to ignore the pedal and always use SPORT mode.

**The unit saves the mode in non-volatile memory**

## **Avoid 1<sup>st</sup> gear quirks feature (SPORT mode and high range 4WD ONLY)**

The **lockup-mate** feature of automatically switching between DRIVE and SPORT to avoid the quirks can be switched off by pressing and holding the LED switch for 3-4 seconds (each press toggles the feature on and off). The LED flashes twice to acknowledge the command.

See IMPORTANT INFORMATION section for more details about the quirks (overleaf).

# IMPORTANT INFORMATION

We have now improved **lockup-mate** to automatically avoid the quirk with the Pajero's transmission, but there are some things you need to know about this feature.

The **lockup-mate** control module now has additional electronics installed and the LED/switch harness modified to include an additional harness with genuine Mitsubishi connectors that connects to the transmission shift assembly.

You can switch this new feature on and off to mask the quirks.

## Understanding the quirks

In SPORT mode, the Pajero NT+ has annoying quirks that sometimes:

- prevents the transmission selecting 2nd gear until above ~3000RPM (30 kph); and
- downshifts into 1st gear too early (30 kph).

The quirk is only generated when in high range, and is like a 'mode' that the transmission enters. The work-around was to simply shift the transmission into DRIVE when below 30 kph, and back to SPORT mode when above 30 kph. **lockup-mate** now does this for you. SPORT mode is now like a hybrid SPORT/DRIVE.

Refer to Safety Feature for Engine Braking.

## SAFETY FEATURE – Engine Braking

**lockup-mate** does not shift into DRIVE at 30 kph when you are in 1<sup>st</sup> or 2<sup>nd</sup> gear (SPORT mode) and are decelerating using engine braking (foot off accelerator pedal). Shifting into DRIVE releases engine braking and has the potential to cause an accident if unexpected.

At 30 kph and below, the transmission may either stay in 2<sup>nd</sup> gear, or switch to 1<sup>st</sup> gear (ie. quirk is not avoided). Although the quirk is not avoided, unexpected switching into 1<sup>st</sup> gear has the effect of increased engine braking and is safer compared to the alternative of releasing engine braking by switching to DRIVE.

Alternatively, for predictable gear control and to avoid the 1<sup>st</sup> gear quirk, switch off **lockup-mate** using the LED/switch. Down-hill descents that require engine braking will not over-heat the transmission. Locking the torque converter in the Pajero's AISIN transmission does not improve engine braking performance

## How to clear the quirk mode

Starting and stopping the vehicle using the ignition key does NOT clear it.

### To determine if the quirk mode is active:

Vehicle stationary - ignition or engine on - low or high range 4WD:

1. Turn off **lockup-mate**
2. Put the transmission into SPORT
3. Try to change up to 2<sup>nd</sup> gear (shift lever +).

If the mode is active it will not let you go into second gear.

### There are two ways to 'clear' the quirk mode:

1. Put the transmission into PARK and use your OBD2 reader (ScanGauge, UltraGauge, Torque Pro, etc) to issue a CEL reset. It MUST be in PARK. Even though there may be no engine trouble codes, this works.
2. In high range (2H,4H,4HLc) turn **lockup-mate** OFF and drive normally to above 30 kph, such that the torque converter slips.

## Driving in SPORT mode (2H, 4H, 4HLc)

If the feature is activated to avoid the quirk (default is ON), when the car is below 30 kph, the transmission is actually in DRIVE, and the green D is illuminated on the instrument cluster.

As the car accelerates above 30 kph, **lockup-mate** switches back to SPORT, and the gear number is displayed (1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup>). You're now back in the normal SPORT mode.

As you accelerate from stop, you don't need to manually shift gears until you're above 30 kph.

Shifting + and – when below 30 kph (ie. in DRIVE) has no effect.

In concept, it's like a hybrid DRIVE/SPORT mode

**lockup-mate** will only lock the torque converter clutch (TCC) when you're above 30 kph and in 'normal' SPORT mode.

It does not lockup the TCC when you're below 30 kph.

## Using 4LLc (low range 4WD)

This quirk is not caused when the 4LLc is used, however, you should clear it before using 4LLc.

When in 4LLc, if you've cleared the quirk mode, SPORT operates as you'd normally expect and TCC locks when in 2<sup>nd</sup> gear or above.

## **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](mailto: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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