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# lockup-mate

**Mitsubishi Pajero NS (2007-2008)**



## Operating Instructions

*Rev C: 22 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.

## lockup-mate Features

### FEATURES

#### General Benefits of lockup-mate

Significantly reduces automatic transmission heat build-up

Improved fuel economy

Micro-processor controlled

Fully automatic operation

Doesn't change the factory ECU software

Simpler installation with comprehensive installation instructions

Ability to lockup the torque converter in 1<sup>st</sup> gear low range 4WD

### BENEFIT

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

*The unit will pay for itself in the long run*

*Provides advanced lockup control and features*

*Easy to use*

*No re-mapping of the transmission ECU required*

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

*Improved engine braking on steep descents, and reduced transmission temperatures on prolonged steep climbs.*

**NOTE: See WARNING in Section 5**

#### lockup-mate Operation

Fully automatic lock/unlock control of the Torque Converter lockup clutch

Lockup controller uses Speed, RPM, Throttle Pedal position, 4WD mode, transmission mode (SPORT or DRIVE) and current gear

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

*Simple operation for the driver.*

*Complex logic to ensure the TCC is locked up whenever possible.*

*Precise and reliable information*

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

*Immunity to electrical noise*

*Doesn't use OBD2 messages, so it's compatible with your existing Scan-gauge, GPS HUD etc*

Works when transmission is in either SPORT(Tritronic) or DRIVE mode

Can be enabled or disabled using the switch

Small custom switch/LED

LED indication of the lockup status

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

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 (e.g. Windbooster), re-tuned engines, and exhaust upgrades.

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

## Installation Features

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

Detailed installation instructions

Automatic VIN check

Compact design

Installed in 1-2 hours

## User Configurable

1. Adjustable sensitivity
2. Gear at which lockup commences
3. LED brightness
4. Startup state (on or off)

Reset to factory defaults

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!**

*Can be switched off if desired*

*Discrete and simple installation*

*Driver knows then the TCC is locked*

*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*

***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*

*Confirms correct installation and assists with fault finding*

*Easy to follow, DIY installation saving you money*

*Automatically disables if installed into an unsupported vehicle*

*Simpler installation*

*Minimum removal of trim*

*Fine tune when the TCC lockup engages*

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

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

*Remembers the switch setting*

*Restore settings to the original*

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

Enters user configuration mode only when vehicle engine is off

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

## Other Benefits

Free software upgrades

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.

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

Electrical control of the TCC clutch is the same as the factory ECU

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

*Remembers all setting when power is removed*

*Safety feature*

*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 advice.*

*Mimics the factory control for confidence, and smoother TCC engagement*

# 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 3<sup>rd</sup> gear, i.e. it will lockup in 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 speed)

Blue LED illuminates

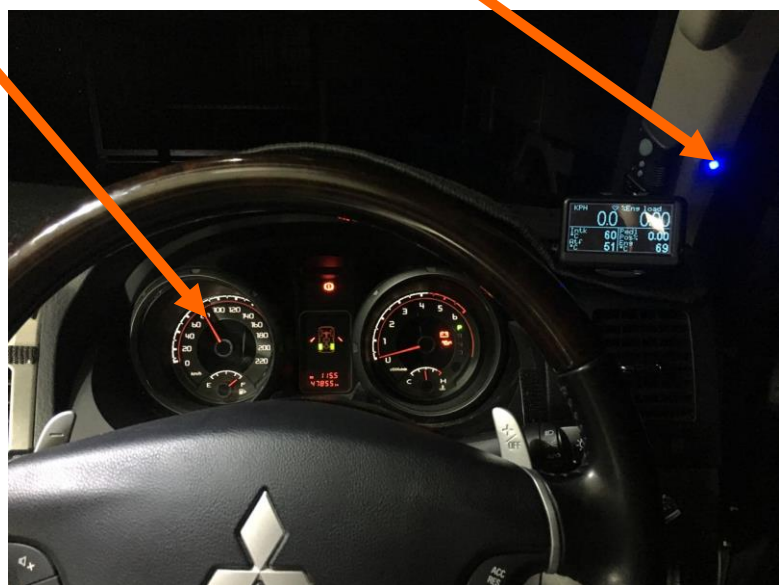
To reset to factory defaults,  
Press and hold COAST/SET instead of ON/OFF button



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.



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

4. Press ON/OFF (ie, next)

The minimum gear is displayed on the Tacho.

Default is 2<sup>nd</sup>

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

Use ACC/RES and COAST/SET to adjust.

**See WARNING in Section 5 if 1<sup>st</sup> or 2<sup>nd</sup> gear is selected**



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

### 1. Switching lockup-mate ON and OFF

Turning **lockup-mate** on and off is 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.



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

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.





### 3. 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 thereafter 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** (i.e. is used) - default in high range – 2H,4H,4HLc

**2 flashes** – Pedal mode is **OFF** (i.e. 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 Pedal mode in non-volatile memory so it is remembered when the unit is powered off.**

## 4. 4LLc – low range

Unlike the other Gen 4 Pajeros, the NS Pajero transmission is able to lockup in 1<sup>st</sup> gear. The default lockup gear is 2<sup>nd</sup> gear.

If lockup in 1<sup>st</sup> gear is desired, follow the instructions in Section 1 above to change the lockup minimum gear to 1.

Lockup in 1<sup>st</sup> gear commences after 2000RPM, and unlocks below 1400 RPM.

## 5. Lockup at very slow speeds

### WARNING

Whilst the torque converter is locked up and when travelling very slowly, applying emergency braking may cause the **engine to stall**. For example, when driving in low range (4LLc) and in 1<sup>st</sup> or 2<sup>nd</sup> gear at <2000 RPM. NOTE: The stall is instant and not preceded by any driveline shudder.

By applying emergency braking (ie very fast and firm brake pedal force), the brakes will stop the wheels immediately, especially if on a slippery surface such as dirt or gravel.

**lockup-mate**, in this circumstance, does not receive vehicle status over the CANBus quickly enough to then respond by unlocking the torque converter, and the result is the engine may stall.

**If the engine has stalled, steering performance is reduced. In rare circumstances and depending on the driving circumstance this may be hazardous and result in an accident and cause personal harm.**

For example, emergency braking while on a very steep descent, stalling, and then sliding and immediately needing to release the brake to regain control.

**Should the engine stall, if possible you should maintain brake pressure and restart the engine before continuing.**

The likelihood of this occurring is reduced by selecting the minimum lockup gear as 2<sup>nd</sup> or 3<sup>rd</sup> gear (refer Section 1, Step 4). Alternatively, switch **lockup-mate** OFF.

## **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 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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