

Frequently Asked Questions (Mitsubishi)

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What's the difference between **lockup-mate**, **auto-mate**, and **auto-matePRO**?

lockup-mate, **auto-mate**, and **auto-matePRO** are for the Mitsubishi vehicles only. **lockup-matePLUS+** is for Toyotas only. This FAQ is for the Mitsubishi products.

lockup-mate is the entry level product, and works best in SPORT mode of the transmission, with the driver controlling the gear choice. In DRIVE it only works at speeds >80kph. In DRIVE, the factory ECU is in control of the gear changes.

auto-mate is more advanced, and replaces DRIVE mode with and controls the gear changes and lockup solenoid at speeds above 30 kph.

auto-mate has the following additional features:

- Full control of the gears in DRIVE mode for optimised torque converter lock up and fuel savings.
- User adjustable transmission shift profile – to adjust for your specific car, or for a sportier response. (Pajero, Triton MQ only)
- Displays the current gear number in the instrument cluster, even when in DRIVE.
- 5th gear lockout. Ability to set the top gear as 4th.
- Will hold the lower gear during downhill engine braking even after switching back from SPORT to DRIVE.
- Fully automatic operation – set and forget!

With **lockup-mate** you get the most benefit when it's used in SPORT mode, as the driver needs to ensure the right gear is chosen to keep gear and RPM combination suitable for torque converter lockup conditions.

auto-mate uses the computer to control gear changes and TCC lockup for a fully integrated solution. So, it's just 'easier' to use.

This means **auto-mate** is 'like' a new DRIVE mode, optimised to keep the transmission's torque converter locked up. The transmission actually remains in SPORT mode but the **auto-mate** computer does the work for you.

I don't get it? So they both work in DRIVE? Yes, and it can be confusing.

When in DRIVE with **lockup-mate**, the factory ECU is controlling the gear choices. You get nice, smooth gear changes, but when under 70 KPH the conditions aren't suitable for locking up. At 60 KPH the factory ECU will choose 5th gear, but you need to be in 4th for lockup to be possible. To achieve this you need to go to SPORT mode.

When in DRIVE with **auto-mate** however, it will actually keep the transmission in SPORT mode but takes control when the gears change. **auto-mate** will select 4th when at 60 KPH.

Can I go back to the normal factory DRIVE mode with **auto-mate**? Yes, just push the LED/switch and **auto-mate** will switch off.

Can I still use SPORT mode with **auto-mate**? Yes. Just by moving the shift lever across to SPORT mode.

Which one should I buy? **lockup-mate** or **auto-mate**?

There are 3 main considerations when deciding which one is best for you.

- How you like to drive the car - if you don't mind (or enjoy) using SPORT mode then all the benefits can be achieved with **lockup-mate**.

- **lockup-mate** may suit you if you'd only intend to use it infrequently when towing.
- **auto-mate** better suits the driver who bought an automatic because they don't want to change gears, or to maximise the potential fuel saving that can be achieved. Plus you get the extra features not available in the standard car such as 5th gear lockout and adjustable shift profile (Pajero only).
- Price.

Can I upgrade my **lockup-mate** to an **auto-mate** at a later date?

Yes - Although they sound very similar, **auto-mate** is a new product and uses different hardware and electrical harness. An upgrade path will be offered in early 2018.

Can my wife use it?

We often get asked "Can my wife drive the car with **lockup-mate** or **auto-mate** installed?". Absolutely. They work automatically and are suitable for all people (male and female) regardless of their technical expertise. Just place the car in DRIVE and you wouldn't know it's there.

Can I still use my torque Pro to monitor transmission temperatures?

Yes - You can still use your OBD2 device and the kit comes with a Y-splitter cable so you can have **lockup-mate** and your OBD2 device installed together.

Will it stall the engine when I stop?

No. **lockup-mate** and **auto-mate** are fully automatic. Even during an emergency stop (eg, full braking at 60 KPH), they will disengage the TCC to avoid stalling the engine.

Does it need to be removed for servicing?

No, but unplugging the OBD2 cable from the car removes power from **lockup-mate/auto-mate**, and the car simply reverts back to the normal factory operation.

Why would I need **lockup-mate** or **auto-mate**?

To protect your automatic transmission from damage caused by high temperatures when driving the car under heavy load conditions. Conditions such as towing, climbing very steep hills when off-road, or sustained driving in softer sand can result in very high transmission temperatures. A **lockup-mate** and **auto-mate** keep transmission temperatures lower by automatically controlling the TCC to minimise slippage and excessive heat build-up.

Why does the transmission get too hot?

The transmission gets hot as a result of the excessive slippage of the torque converter; this slippage generates heat. The heat is normally removed by a transmission cooler (radiator) located just in front of your engine's radiator. Under normal conditions this little radiator can remove enough heat to keep the transmission

temperatures under control. However, when driving under heavy load, the transmission cooler may not keep and dissipate the heat that is generated. The result is higher and higher temperatures which, if not managed, can result in the transmission overheating. This is why mechanics suggest a transmission cooler upgrade if you tow. But, there is another solution; **lockup-mate** or **auto-mate**.

How hot is too hot?

Ideally the transmission oil temperature should be under 95 deg C. Did you know the Pajero's transmission temperature warning light only comes on at 147 degC, and goes off again at 127 degC? That is very, very hot. At these temperatures the transmission oil is already starting to degrade. It's much better to avoid it getting hot in the first place.

Unfortunately, there isn't a gauge on the dash to show the driver the transmission temperature. That's why many use OBD2 devices to monitor the transmission oil temperature, and should take action to cool it down well before these high temperatures are reached.

How does **lockup-mate** protect the transmission? What does it do?

Heat is generated by the torque converter slipping. **lockup-mate** stops the slippage by taking control of the TCC and ensures it is locked whenever possible so heat build up is prevented in the first place.

What is a torque converter clutch (TCC)?

Modern automatic transmissions include a feature to lockup the torque converter using a TCC (TCC) mechanism. When cruising, this improves fuel economy. With the TCC locked it's just like driving the car with a manual gearbox. The 'slushbox' feel of the automatic is gone. But, if the TCC is not unlocked as you slow to a stop the car it will stall; just like with a manual transmission. The TCC is electronically controlled by the transmission ECU – instead, **lockup-mate** controls it automatically.

Why doesn't it come like this from the factory?

The factory engineers need to balance the car's design within varying constraints. Smoothness, fuel economy, emission control regulations, customers' expectations and limited R&D budgets - to name just a few.

It's the same reason there are so many after-market accessories available for our 4x4s. Not one size fits all customers.

Customers like a smooth and refined transmission, and not all customers tow caravans, trailers, boats or horse floats. Hence compromises are made to achieve a balance. **lockup-mate** and **auto-mate**'s role is to optimise the control of the TCC to reduce transmission temperatures, plus get other benefits like fuel savings.

Can **lockup-mate** and **auto-mate** be switched off?

Yes. **lockup-mate** includes an illuminated LED/switch. When **lockup-mate** is off, the factory ECU is back in control of the TCC operation. This switch also illuminates to inform the driver when the TCC is locked to provide feedback.

lockup-mate works with the transmission in either DRIVE or SPORT modes. Which is better?

With **lockup-mate**, SPORT mode is best. For everyday driving in normal conditions the use of DRIVE is perfectly ok. After all, the factory engineers have optimised the vehicle for such use. It creates very smooth gear changes that result in a refined driving experience. The transmission cooler is sized adequately for normal use.

But when using the car under heavy loads, the best choice is to use the SPORT mode of your transmission. This enables you (not the computer) to ensure the engine is working in the best RPM range depending on your situation and to enable conditions that allow the TCC to be locked. After all, that's why they provide a SPORT mode.

In DRIVE, the automatic's ECU chooses a gear that is too high, and as a result the torque converter slips and excessive heat is created. Dropping down a gear (eg, 5th to 4th, or 4th to 3rd) brings the engine revs up and can create conditions that are suitable for locking the TCC. Generally speaking, keeping the RPM above 2000-2200 is best when driving under load. With the TCC locked, the torque converter doesn't slip and heat isn't generated. This keeps the transmission temperatures much lower.

By selecting the correct gear using SPORT mode it ensures the engine and transmission are working in the optimum RPM range to enable the TCC to lock.

Does **lockup-mate** and **auto-mate** work in 4WD mode?

Yes. **lockup-mate** reads the status of the 4WD transfer level and automatically adjusts when low range is selected (4LLC). Operation in 4LLC has been extensively tested and no other kit available works as easily when in low range. **auto-mate** does not control gear changes when in 4LLC (DRIVE).

Can I tow in 5th gear with the TCC locked?

Yes, but it needs to be according to the conditions. Under the right conditions you can tow in 5th with the TCC locked and be rewarded with fuel savings. The 'right conditions' are situations that don't labour the engine too much, such as on flat roads or with a tailwind. This gives you an additional saving of about 2L/100 km and ensures your transmission stays cooler.

When climbing hills or travelling into a headwind it's better to drop down to 4th gear.

When driving in SPORT, you still need to sensibly change gears when the revs get low, just like you would if you were driving with a manual transmission.

Don't just leave it in 4th or 5th gear and hope for the best. Drive it like it's a manual, and keep the revs in the right range for best performance.

Would **lockup-mate** and **auto-mate** help when I'm not towing?

Yes. Even when cruising on the highway the factory ECU will not lock the TCC at 90 KPH in 5th gear. **lockup-mate** and **auto-mate** will, and better fuel economy is the reward.

I've been told to tow in 4th gear. Is this right?

It depends. The aim is to have the TCC locked. With a heavy load you can tow in 5th gear at 95 KPH, but the TCC under factory ECU control will not lock. Instead it slips consistently and heat builds up. Over a long drive this can be significant. Ever noticed your left leg getting warm against the transmission tunnel inside the car after a few hours of towing?

In DRIVE, the factory ECU will normally choose 5th gear at 95 KPH. If you select SPORT mode and drop to 4th gear, the engine RPM will rise and the torque converter will lockup. This is why you're advised to tow in 4th gear as it minimises heat build up.

However, with **lockup-mate** and **auto-mate** it will hold the torque converter locked as you cruise. This can reduce fuel usage by up to 2L/100 km. You can't always tow in 5th though. Up slight grades or with a headwind, the engine needs to work harder and leaving it locked can cause the engine to labour. You will need to select the right gear for your speed and the conditions.

How is **lockup-mate** different to other after-market lockup kits?

In a nutshell - it's fully automatic, works at all speeds, and in low range 4WD (4LLC). Other kits rely on the driver manually controlling a switch to enable and disable the TCC. **lockup-mate** connects to the car's internal digital network (the CAN Bus) to read the vehicle's status and extract the parameters needed for automatic control. **lockup-mate** processes the current speed, gear, RPM, 4WD lever position, throttle pedal position and engine load to determine when to lock and unlock the torque converter.

Is **lockup-mate** difficult to install?

No. **lockup-mate** has been designed for simple installation and includes detailed instructions to allow most people to DIY install. DIY saves you money. For **lockup-mate** installation involves:

- Cutting two wires onto which the **lockup-mate** electrical harness is connected to control the TCC (just one wire for the Challenger version);
- Installation of a resistor onto a metal surface; and
- Plug-in connector to the vehicle's standard OBD2 port.

Typically it can be completed in 1-2 hours.

Can I still use my OBD2 device?

Yes. Retaining use of your existing OBD2 device was a primary requirement of **lockup-mate**. **lockup-mate** comes with a Y-splitter cable so two OBD2 devices can be connected at a time. Whilst **lockup-mate** uses the OBD2 connector, the **lockup-mate** computer does not use the OBD2 commands on the CAN Bus like other OBD2 devices. It passively listens to the CAN Bus message traffic to read RPM, speed etc. This means it doesn't interfere with the operation of the devices that use OBD2 messages. This is a key feature of **lockup-mate**.

Which models are supported?

Available now are:

- Mitsubishi Pajero NS, NT, NT, NX 2009+ Auto Diesel

- Mitsubishi PB-PC Challenger 2009+ Auto Diesel

The next models to be supported are:

- Mitsubishi Triton
- Toyota Prado 150
- Toyota Landcruiser 200 series

And more...

At what temperature is the transmission 'too hot'?

You can monitor the transmission temperatures using after-market OBD2 devices such as ScanGauge, UltraGauge.

Once 100 degC is reached you should start to act to lower the temperature. This may mean backing off and not pushing the vehicle so hard.

In the Challenger, where the temperature is measured in the oil pan, at temperatures above 110 degC should be avoided.

In the Pajero, where the temperature is measured at the output of the torque converter, temperatures above 125 degC should be avoided.

Is it on all the time or does it run automatically in the background?

The unit remembers the last on/off position between engine starts. When ON, it just runs in the background without needing any attention. When OFF, the AT ECU controls the TCC lockup as normal. Only under certain circumstances you may wish to disable **lockup-mate**. An example is when driving on rocky or rutted tracks. The torque converter acts as a sponge to absorb driveline shock, eg, a raised wheel coming back to ground. So this helps avoid CV joint breakages, etc.

What determines when it locks and unlocks?

Is it RPM, speed, throttle pedal position, or a combination of all or some? Does the lock up point vary due to conditions?

Yes. Speed, RPM, pedal position, transmission temperature, 4WD lever position, and current gear are all used to determine the right lock/unlock behaviour.

Here are some examples of how it behaves:

Say you're driving at 80 KPH under light engine load (20%) - it will lockup in 5th gear - the RPM is ~1600. If you then accelerate, it will immediately unlock the torque converter so you get the power you're after. Once you've backed off it will lockup again. But if you keep accelerating and the conditions become right for lockup - say you hit 100 KPH, it will lockup again while still accelerating.

Another example - you're cruising at 5th gear doing 110 KPH (~2200 RPM) and push hard to overtake. Since the conditions are still ok for lockup - it remains locked, ie, you can plant the foot and it doesn't unlock. If you do want more power you though, just manually change to 4th using SPORT mode.

Why is the sensitivity adjustable?

In the Pajero, you can tune **lockup-mate** to your vehicle's unique configuration or your driving preference.

The adjustable sensitivity controls how 'easily' or 'late' the lock/unlock occurs. Some people like to push it to the limit, others want it to unlock earlier - set it to your personal choice, but the default is a good compromise.

The Challenger's sensitivity is set and cannot be adjusted. The Challenger's driveline is less sensitive to shudder and adjustment is not needed.

Can it lockup in 1st gear?

The Pajero AISIN (2009 NT+) transmission does not lockup in 1st gear - so **lockup-mate** is only effective in 2nd and above. The only exception is if you've had a nomad valve body upgrade installed by Whole Automatics which has also included a modification to allow 1st gear lockup.

I use 2nd gear as my selection and leave it there. 2nd gear is a better choice when in 4LLC in situations where the transmission may become hot. An example is deep sand driving or climbing long steep hills in the Victorian High Country.

The default when delivered is 3rd gear, but this is easily changed. You don't need to access the control module to change parameters. This is all done via the cruise control switches and instrument cluster as the display when the engine is off.

The Challenger PB, PC allows lockup in 1st gear. **lockup-mate** is programmed to use 1st gear lockup in low range only. In high range, lockup commences from 2nd gear.

Switch real estate in the Mitsubishi is not abundant. How is it installed?

The control module is about the size of your hand's palm - there is plenty of room for it above the transmission tunnel. The switch is installed on the driver's pillar - very quick and easy and doesn't require access to the factory switch locations.

How does **lockup-mate** work when the transmission is in DRIVE mode?

lockup-mate works a little differently when in DRIVE mode compared to SPORT. In SPORT, driver is in control of gear shifts, so when driving you need to 'think' like you're driving the car as if it's a manual - because with the torque converter locked up, it's exactly like a manual transmission, ie, change gears when the revs are high enough. When towing, this would mean changing at about 3000 RPM.

When in DRIVE mode, the AT ECU computer is controlling the gear changes. Because of this, **lockup-mate** does not work well at speeds below 70 KPH. When under 70 KPH, the AT ECU always selects 5th gear which is too low to lockup. So, when in DRIVE, **lockup-mate** will only lockup the TCC when speed is above 75 KPH.

In practice, this works well. Say you are doing 90 KPH in 5th and plant the foot - the AT ECU will change down to 4th and **lockup-mate** keeps the TCC locked up. For general cruising I've found DRIVE mode works really well. If cruising at between 80 and 100 KPH in 5th, you also get excellent fuel economy savings - as it uses much less fuel in 5th gear at these speeds. Above these speeds the AT ECU locks it up anyway.

