

Spitronics TCU - Tuner and Driver Instructions

The Spitronics TCU is a standalone transmission controller, fully tunable by the installer, with a wide range of features. It can be connected to the ECU for functions such as limp-mode and torque control. If this connection is not made, the driver must take extra care to prolong the transmission's lifespan. Below are key considerations:

Torque Control

During a transmission shift, the TCU will command the ECU to reduce power. Shifts involve a brief overlap where one clutch disengages, and another engages, causing friction. This friction increases with engine load, making power reduction critical. Commercial transmissions are not designed to shift under full load.

For **petrol engines**, most ECUs can retard timing on command. The TCU sends a ground signal to the Retard pin when a shift begins, maintaining it until the shift is complete. Retarding ignition timing by about 15 degrees usually ensures smooth transitions.

For **diesel engines**, power cannot be controlled in the same way. The best approach is to manipulate the throttle signal to reduce diesel injection via the ECU. However, Spitronics does not offer a controller for this function.

Overheating

Oil temperature is crucial. Overheating can burn the clutches and cause significant damage. Factors contributing to heat include the torque converter, oil pump, and clutch friction during shifts. Prevent overheating through:

- Mechanical cooling
- Engaging the lockup clutch to minimize torque converter slip
- Reducing line pressure to decrease heat from the oil pump
- Lowering torque during shifts

If overheating becomes critical, the TCU can activate limp mode.

Lockup Engagement

The lockup clutch is vital but delicate. It usually does not engage under load, only when the driver reduces throttle. In modern vehicles, it functions like an additional gear between shifts. Spitronics engages the lockup clutch under light load conditions. It won't engage during heavy acceleration in lower gears, but will activate when coasting.

When **towing**, the lockup may not engage. In such cases, monitor the transmission temperature. Shift to a lower gear on steep inclines to engage the lockup quickly, and keep the throttle below the disengagement threshold.

Offroad Driving

Sand driving can be hazardous, and managing the lockup is critical. Heavy loads prevent lockup engagement, leading to rapid heat buildup. OEM systems can detect overheating and either force

a lockup with torque control or initiate limp mode. In slow driving, lockup is disengaged to allow for smooth acceleration.

Spitronics includes an optional LED indicator that can be installed on the dashboard. When driving on sand, shift to the desired gear, briefly back off the throttle, and the lockup will engage, signaled by the LED. At this point, you can resume acceleration without overheating the transmission.

Rock crawling doesn't allow lockup engagement, which generates additional heat due to the lack of airflow for cooling. Consider installing additional oil coolers and fans.

Racing

For **drag racing**, the lockup clutch should only be used with extreme caution, as it would need to engage under heavy load. Ensure you have a robust oil cooling system and reinforced transmission internals. While this reduces the lifespan of the transmission, racing priorities often outweigh longevity. The driver assumes full responsibility for any damage.

High-power engines may overpower the lockup clutch. If full power is applied while lockup is engaged, the clutch may fail to hold. To prevent this, the tuner should set the TCC Lock High % value based on engine power and throttle position. This can be determined either by measuring power output on a dyno or by observing throttle settings during highway cruising.

Recommendations for Proper Installation

- **Torque control** should be implemented for smooth shifting.
- Install a **lockup LED** on the dashboard for visibility without distraction.
- Add a **warning system** for oil temperature to avoid overheating.
- Ensure **adequate oil coolers** are installed.
- Instruct customers on proper care, especially for **sand driving**.

Power Supply Recommendations

Ensure the power source is activated when the ignition is switched to the run position (not ACC). Avoid sharing this power with inductive loads. Instead, use **Relay 3** as specified in the Power Distribution TCU diagram. Verify that all diodes and their values are correctly installed in the power circuit, and use the smallest appropriate fuses for each relay. The TCU electronics typically draw less than 1A.