

# ROVERTEC

## TORNADO EVOLUTION series Fuel Injection Control Units

### Fuel Injection Control Unit (FICU)

Serial no: XD \_\_\_\_\_  
Lucas part no: 8 \_\_\_\_\_ / type 4CU  
Lucas Serial no: \_\_\_\_\_

### Remote Control Unit (RCU)

Serial no: KC \_\_\_\_\_  
Initial Cruise mixture setting: \_\_\_\_\_ turns anticlockwise  
Initial Power mixture setting: \_\_\_\_\_ on dial

**Please read these instructions before fitting the units - you could be saved from making an expensive mistake! Keep them to hand for future reference.**

## PRECAUTIONS

The RCU can be easily damaged by static electricity. While the RCU is not connected, it should be stored in the anti-static bag in which it is supplied. To reduce the risk of damage do not remove the back of the unit, and do not touch the pins of the connector. There is very little danger to the RCU when it is connected to the FICU.

When fully installed and connected, the metal cases of the FICU and the RCU are electrically connected to the negative earth of the vehicle. Take care to avoid contact between the cases of the units and any 12 Volt live feeds - serious damage can be done to both Fuel Injection units.

After installation, as always, the car's battery should be disconnected during charging or arc welding to the vehicle to prevent the possibility of damage to the various electronic control units. If you provide a jump start for another car, ensure your ignition is switched off while the other car attempts to start.

Do not pull on the cable where it enters the RCU body or connector. Do not crush or apply sharp bends to the cable. All cables are fully screened, and should neither pick up nor radiate interference.

## INSTALLATION

The workshop manual for the car should show the procedure for changing the FICU (sometimes referred to by the generic name of ECU or Electronic Control Unit), but here is an abridged version for Rover SD1 cars. It is a good idea to study the connector on the new FICU so that you understand how it works - this will save you hours of fun later!

1. The standard FICU is located on a metal frame at the front of the passenger footwell. Remove any mats in the footwell, and pull back the carpets and soundproofing.
2. Underneath the carpets you will find a metal frame. On most cars there is a metal plate on the left part of the frame which is secured by three screws. Remove the plate to reveal the FICU connector.
3. The frame itself should be secured by three screws at the bottom, and one or two at the top. Remove all securing screws.
4. The FICU must be disconnected at the same time the frame is removed. Look carefully at the FICU connector. Underneath the end where the wires enter the connector you will see a metal wing - push this upwards and pull out the top end of the connector. Now withdraw the frame whilst rotating it clockwise to disengage the bottom end of the connector.
5. Remove the FICU from the frame by undoing the three bolts that secure it.

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6. Before fitting the new FICU to the frame, it will be necessary to make clearance for the RCU connector. A test assembly will reveal where relief is required.
7. Install the new FICU on the frame.
8. Connect the RCU to the FICU. To make the connection, line up the pins on the connector with the socket on the FICU and push the connector home by its black plastic back - it will not engage if you push it by the aluminium body. A click will be heard as the connector goes home. To remove the connector, pull the aluminium body. The connector cannot be removed by pulling on the cable.
9. Refit the frame and connect the FICU as follows. Offer the frame up rotated about 45 degrees clockwise, and pass the hook at the bottom of the connector under the small bridge on the FICU. Rotate the unit anticlockwise and press home the connector, making sure that the wing at the top end of the connector engages. You will have to use firm pressure but do not force it. The connector sometimes gets stuck over one of the protrusions either side of the FICU socket.
10. Reassembly is now a straightforward reversal of the removal procedure. Make sure you don't trap the carpet under the right hand edge of the frame as you reinstall it.
11. Siting of the RCU is a matter of personal preference. It is fitted with approximately 1.8 metres of cable. Suggested sites are passenger or driver side glovebox, or the cassette box in the centre console.

## OPERATION

The FICU cannot be used without the RCU connected.

Mixture control is provided for two distinct modes of engine operation. This gives a lean mixture for cruising economy, and a much richer mixture for maximum power. Below half throttle the system operates in economy cruise mode; above half throttle it operates in power mode. Special circuitry ensures smooth transition between the two modes.

This represents a major step forward from other adjustable units, which only provide one level of adjustment over the entire operating range. That has a serious effect on fuel economy for normal driving.

To set up the unit, the cruising mixture should be set first. This is done by adjusting the small Cruise screw on the RCU, found on the opposite side to the cable entry. As supplied, the cruise setting should suit most vehicles anyway.

Turning the cruise screw clockwise enriches the mixture, and anticlockwise weakens it. There are fifteen turns to cover the complete range of adjustment; the adjuster is not damaged by turning it too far one way or the other. If you completely lose the setting, turn it at least fifteen turns clockwise, and then anticlockwise by the number of turns indicated at the head of this document.

Power mixture is enriched by turning the large RCU dial clockwise. Mixture leaning is achieved by turning the dial anticlockwise. Note that this adjustment actually sets the step up from the cruise mixture, so adjusting cruise mixture will affect the power mixture. The setting (shown in the dial counter window) given at the head of this document is recommended for standard cars to give 5% extra enrichment.

Note that there is a lock below the dial - move the lever left to release, or right to lock. The dial is intentionally stiff to turn in the unlocked position to prevent it being accidentally knocked out of adjustment.

Adjustment is not linear over the full range. Working up from 000, the initial value movement is fairly linear without producing too dramatic an increase in the mixture. As the adjustment reaches its maximum, the mixture is enriched quite quickly so go carefully if you reach this region.

If setting up on a rolling road, you should be looking for an exhaust gas CO content of 0.5 to 1% when cruising at 70mph/70BHP. Many people have found it possible to operate at levels of 0.3% for

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maximum cruise economy, with no ill effects. Under full power, CO content should rise to between 5 and 6%. The original unit fitted to cars at the factory gave about 2% under all conditions, which is not ideal for power or economy.

There are three or four light emitting diodes (LEDs) on the RCU according to the type - two green, one yellow and one red. The yellow LED indicates that the FICU is operating in power mode (ie not cruise mode) - this is not fitted to Evolution I or II units.

The lower two (green) are present for information and entertainment purposes only, however they can be useful in diagnosing faults when you understand how they work. One is connected to the nearside bank of injectors, and the other to the offside (since injectors are fired in cylinder banks). When the injectors are open, the appropriate LED is on. The longer they are open, the brighter the LEDs will appear. Note that the LEDs are driven by an internal ECU signal, and because they are on does not guarantee that the injectors are open under fault conditions.

If injector saturation (permanently open) or inactivity (permanently closed) is detected on either bank of injectors, the upper (red) LED will come on. Normally, this will be on only under the following conditions: ignition on with engine static; large throttle openings on cold engine; fuel enrichment setting too high. When injector saturation is reached, it is impossible for the injection system to supply any more fuel. This is obviously a dangerous condition if the engine is already running lean, so don't make the engine work any harder.

If the ignition is switched on but the engine is static, depressing the throttle will cause the green injector LEDs to flash once or twice. This is because the FICU will fire all injectors simultaneously when the throttle is opened, to give good pick up. This also indicates that the throttle potentiometer is in good condition.

Use of very large values of enrichment reduces the ability of the fuel injection system to compensate for changes in air temperature. In this case you should note air temperature when setting up the engine (preferably on a rolling road or engine dynamometer). Slightly more enrichment may be required in very cold conditions, and slightly less in very hot conditions, if you are really particular!

This type of fuel injection (flap type airflow meter) cannot compensate for altitude, so if operating at very high altitudes (i.e. more than 7,000 feet (approximately 2000 metres) above sea level) then it is a good idea to weaken the mixture slightly.

## NOTICE

Whilst every care has been taken to ensure the above information is correct, we can accept no responsibility for any errors or omissions. Setting up information is provided for guidance only, and the selection of appropriate operating settings is the responsibility of the user.

## HELP, ADVICE, SALES AND SERVICE

Do not hesitate to contact us if you need any of the above services! The address is given below.

This product is one of an integrated range of specialised fuel injection tuning parts, which are a result of a careful development program proven on the dynamometer. Components are available to give further improvements in torque, power or economy (or even all three!). Please call with your requirements.

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