

### III. Supported Trouble Codes

The goal of this section is to define all supported DTCs for the Ural motorbike application. Though DTCs make the debugging process very efficient, certain conditions can not be detected by the ECUs for various reasons. These conditions must be understood, but there will be no accompanying DTCs to assist with their diagnosis. Debugging procedures for these special conditions, along with the supported DTCs, will be described in the following section.

It should be noted that the PC diagnostic software clearly identifies which cylinder the DTC is associated with. As a result, one DTC value is able to indicate the same fault on both ECUs. However, when using blink mode, this approach is not possible, since there is one MIL shared amongst both ECUs. As a result, each DTC that can be set on both ECUs is linked to a unique blink code, depending on the cylinder that the DTC is present on. Other DTCs are system level faults (i.e. System Voltage High), so these DTCs are mapped to a single blink code common for both ECUs.

Condition	DTC	Blink Code
ECU Read Only Memory Error	P0605	LC: 111 / RC: 211
Fuel Pump Control Circuit Low	P0628	321
Fuel Pump Control Circuit High	P0629	322
Fuel Injector Circuit Low	P0261	LC: 131 / RC: 231
Fuel Injector Circuit High	P0262	LC: 132 / RC: 232
Engine Coolant Temperature Sensor Circuit	P0115	LC: 151 / RC: 251
Ignition Coil Primary Control Circuit Low	P2300	LC: 133 / RC: 233
Ignition Coil Primary Control Circuit High	P2301	LC: 134 / RC: 234
System Voltage High	P0563	311
System Voltage Low	P0562	312
O2 Sensor Circuit High Voltage	P0132	LC: 142 / RC: 242
O2 Sensor Circuit Low Voltage	P0131	LC: 141 / RC: 241
ECU EEPROM Error	P062F	LC: 112 / RC: 212
ECU Programming Error	P0602	LC: 113 / RC: 213
Malfunction Indicator Lamp Control Circuit	P0650	N/A
Intake Air Temperature Circuit	P0110	LC: 121 / RC: 221
O2 Sensor Heater Control Circuit Low	P0031	LC: 143 / RC: 243

Condition	DTC	Blink Code
O2 Sensor Heater Control Circuit High	P0032	LC: 144 / RC: 244
ECU Performance	P0607	LC: 125 / RC: 225
Barometric Pressure Circuit	P2226	LC: 122 / RC: 222
ECU Processor	P0606	LC: 123 / RC: 223
Intake Air Pressure Circuit	P0105	LC: 124 / RC: 224
Vehicle Communication Bus	U0028	331
Lost Communication With Other ECU	U0100	332

## IV. Detailed Diagnosis by DTC

This section will provide a detailed debugging procedure for each DTC in the system. This will include not only the procedure but also the required steps to ensure that the issue has been resolved, so the motorbike can be returned to the owner in working order.

### ECU Read Only Memory Error (P0605)

This DTC indicates that the calibration memory inside of the ECU is corrupt. **When this DTC is active, the ECU will intentionally prevent its cylinder from running.** This can occur in the following conditions, in order of decreasing likelihood:

- The ECU was tampered with using a third party calibration tool.
- An unexpected error occurred while reprogramming the ECU, using the ElectroJet diagnostic software.
- An intermittent (nonpermanent) calibration memory failure occurred.
- The calibration memory has become permanently damaged.

The following procedure should be followed to resolve this DTC:

- Ensure the ECUs have a stable power supply from a healthy charged battery.
- Use the ElectroJet diagnostic software to reprogram the ECU with the latest service package.
- Clear DTCs
- Observe whether P0605 is still Active
  - If P0605 is still active, the ECU calibration memory is permanently damaged and the ECU must be replaced. Follow the ECU replacement procedure found later in this document.
  - If P0605 is no longer active, the ECU has been recovered and is safe to use moving forward.
- Reset fuel trim parameters on both ECUs go through the recommended driving cycle.

### ECU EEPROM Error (P062F)

This DTC indicates that the electrically erasable programable read only memory (EEPROM) inside of the ECU has failed. This memory stores parameters such as the fuel trim parameters, so the information can be retained while the ECU is in PD mode. This DTC is considered noncritical, so the engine will be allowed to run with degraded performance. This can occur in the following conditions, in order of decreasing likelihood:

- An intermittent (nonpermanent) EEPROM failure occurred.
- The EEPROM has become permanently damaged.

The following procedure should be followed to resolve this DTC:

- Ensure the ECUs have a stable power supply from a healthy charged battery.
- Use the ElectroJet diagnostic software to reprogram the ECU with the latest service package.
- Clear DTCs
- Observe whether P062F is still Active
  - If P062F is still active, the ECU EEPROM is permanently damaged and the ECU must be replaced. Follow the ECU replacement procedure found later in this document.
  - If P062F is no longer active, the ECU has been recovered and is safe to use moving forward.
- Reset fuel trim parameters on both ECUs go through the recommended driving cycle.

### **ECU Programming Error (P0602)**

This DTC indicates that the memory containing the ECU program has become corrupted. **When this DTC is active, the ECU will intentionally prevent its cylinder from running.** This can occur in the following conditions, in order of decreasing likelihood:

- The ECU was tampered with using a third party calibration tool.
- An unexpected error occurred while reprogramming the ECU, using the ElectroJet diagnostic software.
- An intermittent (nonpermanent) program memory failure occurred.
- The program memory has become permanently damaged.

The following procedure should be followed to resolve this DTC:

- Ensure the ECUs have a stable power supply from a healthy charged battery.
- Use the ElectroJet diagnostic software to reprogram the ECU with the latest service package.
- Clear DTCs
- Observe whether P0602 is still Active
  - If P0602 is still active, the ECU program memory is permanently damaged and the ECU must be replaced. Follow the ECU replacement procedure found later in this document.
  - If P0602 is no longer active, the ECU has been recovered and is safe to use moving forward.
- Reset fuel trim parameters on both ECUs go through the recommended driving cycle.

## ECU Performance (P0607)

This DTC indicates that a critical device inside of the ECU has failed. **When this DTC is active, the ECU will intentionally prevent its cylinder from running.** This can occur in the following conditions, in order of decreasing likelihood:

- The ECU has been physical tampered with.
- The ECU has been tampered with using a third party calibration tool.
- The critical device inside of the ECU has truly failed.

The following procedure should be followed to resolve this DTC:

- Inspect the ECU for signs of physical tampering. Look for pry marks between the throttle body metal and the plastic cover of the ECU. Look for broken locking tabs on the plastic cover of the ECU. Look for small holes in the plastic cover of the ECU, including checking in the connector cavity. If tampering is present, no warranty should be honored for the ECU. Regardless of whether tampering is present or not, proceed with the following steps to attempt to repair the problem.
- Ensure the ECUs have a stable power supply from a healthy charged battery.
- Use the ElectroJet diagnostic software to reprogram the ECU with the latest service package.
- Clear DTCs
- Observe whether P0607 is still Active
  - If P0607 is still active, the ECU is permanently damaged and the ECU must be replaced. Follow the ECU replacement procedure found later in this document.
  - If P0607 is no longer active, the ECU has been recovered and is safe to use moving forward. In this case, it is likely that the ECU was tampered with using a third party calibration tool.
- Reset fuel trim parameters on both ECUs go through the recommended driving cycle.

## ECU Processor (P0606)

This DTC indicates that a noncritical device inside of the ECU has failed. This can occur in the following conditions, in order of decreasing likelihood:

- The ECU has been physical tampered with.
- The ECU has been tampered with using a third party calibration tool.
- The noncritical device inside of the ECU has truly failed.

The following procedure should be followed to resolve this DTC:

- Inspect the ECU for signs of physical tampering. Look for pry marks between the throttle body metal and the plastic cover of the ECU. Look for broken locking

tabs on the plastic cover of the ECU. Look for small holes in the plastic cover of the ECU, including checking in the connector cavity. If tampering is present, no warranty should be honored for the ECU. Regardless of whether tampering is present or not, proceed with the following steps to attempt to repair the problem.

- Ensure the ECUs have a stable power supply from a healthy charged battery.
- Use the ElectroJet diagnostic software to reprogram the ECU with the latest service package.
- Clear DTCs
- Observe whether P0606 is still Active
  - If P0606 is still active, the ECU is permanently damaged and the ECU should be replaced. Follow the ECU replacement procedure found later in this document.
  - If P0606 is no longer active, the ECU has been recovered and is safe to use moving forward. In this case, it is likely that the ECU was tampered with using a third party calibration tool.
- Reset fuel trim parameters on both ECUs go through the recommended driving cycle.

### **Intake Air Pressure Circuit (P0105)**

This DTC indicates that the internal intake air pressure sensor has failed. **When this DTC is active, the ECU will intentionally prevent its cylinder from running.** This can occur in the following conditions, in order of decreasing likelihood:

- The ECU has been physical tampered with.
- The ECU has been tampered with using a third party calibration tool.
- The intake air pressure sensor inside of the ECU has truly failed.

The following procedure should be followed to resolve this DTC:

- Inspect the ECU for signs of physical tampering. Look for pry marks between the throttle body metal and the plastic cover of the ECU. Look for broken locking tabs on the plastic cover of the ECU. Look for small holes in the plastic cover of the ECU, including checking in the connector cavity. If tampering is present, no warranty should be honored for the ECU. Regardless of whether tampering is present or not, proceed with the following steps to attempt to repair the problem.
- Ensure the ECUs have a stable power supply from a healthy charged battery.
- Use the ElectroJet diagnostic software to reprogram the ECU with the latest service package.
- Clear DTCs
- Observe whether P0105 is still Active
  - If P0105 is still active, the ECU is permanently damaged and the ECU must be replaced. Follow the ECU replacement procedure found later in this document.

- If P0105 is no longer active, the ECU has been recovered and is safe to use moving forward. In this case, it is likely that the ECU was tampered with using a third party calibration tool.
- Reset fuel trim parameters on both ECUs go through the recommended driving cycle.

### **Intake Air Temperature Circuit (P0110)**

This DTC indicates that the internal intake air temperature sensor has failed. The engine will be allowed to run with degraded performance in this situation. This can occur in the following conditions, in order of decreasing likelihood:

- The ECU has been physical tampered with.
- The ECU has been tampered with using a third party calibration tool.
- The intake air temperature sensor inside of the ECU has truly failed.

The following procedure should be followed to resolve this DTC:

- Inspect the ECU for signs of physical tampering. Look for pry marks between the throttle body metal and the plastic cover of the ECU. Look for broken locking tabs on the plastic cover of the ECU. Look for small holes in the plastic cover of the ECU, including checking in the connector cavity. If tampering is present, no warranty should be honored for the ECU. Regardless of whether tampering is present or not, proceed with the following steps to attempt to repair the problem.
- Ensure the ECUs have a stable power supply from a healthy charged battery.
- Use the ElectroJet diagnostic software to reprogram the ECU with the latest service package.
- Clear DTCs
- Observe whether P0110 is still Active
  - If P0110 is still active, the ECU is permanently damaged and the ECU must be replaced. Follow the ECU replacement procedure found later in this document.
  - If P0110 is no longer active, the ECU has been recovered and is safe to use moving forward. In this case, it is likely that the ECU was tampered with using a third party calibration tool.
- Reset fuel trim parameters on both ECUs go through the recommended driving cycle.

### **Barometric Pressure Circuit (P2226)**

This DTC indicates that the internal barometric air pressure sensor has failed. The engine will be allowed to run with degraded performance in this situation. This can occur in the following conditions, in order of decreasing likelihood:

- The ECU has been physical tampered with.
- The ECU has been tampered with using a third party calibration tool.

- The barometric pressure sensor inside of the ECU has truly failed.

The following procedure should be followed to resolve this DTC:

- Inspect the ECU for signs of physical tampering. Look for pry marks between the throttle body metal and the plastic cover of the ECU. Look for broken locking tabs on the plastic cover of the ECU. Look for small holes in the plastic cover of the ECU, including checking in the connector cavity. If tampering is present, no warranty should be honored for the ECU. Regardless of whether tampering is present or not, proceed with the following steps to attempt to repair the problem.
- Ensure the ECUs have a stable power supply from a healthy charged battery.
- Use the ElectroJet diagnostic software to reprogram the ECU with the latest service package.
- Clear DTCs using Dealer tool.
- Observe whether P2226 is still Active
  - If P2226 is still active, the ECU is permanently damaged and the ECU must be replaced. Follow the ECU replacement procedure found later in this document.
  - If P2226 is no longer active, the ECU has been recovered and is safe to use moving forward. In this case, it is likely that the ECU was tampered with using a third party calibration tool.
- Reset fuel trim parameters on both ECUs go through the recommended driving cycle.

### **Fuel Pump Control Circuit Low (P0628)**

This DTC indicates a issue with the fuel pump circuitry where the ECU has detected low voltage. The following conditions are examples of what may occur causing this fault:

- Wiring to the fuel pump has become damaged and shorting to the chassis.
- The electrical connector at the fuel pump has become disconnected or damaged.
- The fuel pump has electrically failed and is no longer operational.

The following procedure should be followed to resolve this DTC.

- Check the electrical connector is positively fixed to the fuel pump.
- Inspect wiring to the fuel pump and pump body for damage. Repair and replace as necessary.
- Using a multimeter, check the resistance of the fuel pump. Nominal resistance is approximately 12 ohms. If open circuit, replace the fuel pump.
- Clear DTCs using dealer tool.
- Observe whether P0628 is still Active.
  - If still active, further inspection and diagnostics will be required before returning vehicle to service.
  - If no longer active, return the vehicle to service.



## **Fuel Pump Control Circuit High (P0629)**

This DTC indicates a issue with the fuel pump circuitry where the ECU has detected high voltage. The following conditions are examples of what may occur causing this fault:

- Wiring to the fuel pump has become damaged and shorting to a battery voltage source.
- The fuel pump has electrically failed and is no longer operational.

The following procedure should be followed to resolve this DTC.

- Check the electrical connector is positively fixed to the fuel pump.
- Inspect wiring to the fuel pump and the pump body for damage. Repair and replace as necessary.
- Using a multimeter, check the resistance of the fuel pump. Nominal resistance is approximately 12 ohms. If shorted with resistance approximately zero ohms, replace the fuel pump.
- Clear DTCs using Dealer tool.
- Observe whether P0629 is still Active.
  - If still active, further inspection and diagnostics will be required before returning vehicle to operation.
  - If no longer active, return the vehicle to operation.

## **Fuel Injector Circuit Low (P0261)**

This DTC indicates a issue with the fuel injector circuitry where the ECU has detected low voltage. The following conditions are examples of what may occur causing this fault:

- Wiring to the fuel injector has become damaged and shorting to the chassis.
- The electrical connector at the fuel injector has become disconnected or damaged.
- The fuel injector has electrically failed and is no longer operational.

The following procedure should be followed to resolve this DTC.

- Check the electrical connector is positively fixed to the fuel injector.
- Inspect wiring to the fuel injector and the injector body for damage. Repair and replace as necessary.
- Using a multimeter, check the resistance of the fuel injector. Nominal resistance is approximately 12 ohms. If open circuit, replace the fuel injector.
- Clear DTCs.
- Observe whether P0261 is still Active.
  - If still active, further inspection and diagnostics will be required before returning vehicle to service.
  - If no longer active, return the vehicle to service.

## **Fuel Injector Circuit High (P0262)**

This DTC indicates a issue with the fuel injector circuitry where the ECU has detected high voltage. The following conditions are examples of what may occur causing this fault:

- Wiring to the fuel injector has become damaged and shorting to a battery voltage source.
- The fuel injector has electrically failed and is no longer operational.

The following procedure should be followed to resolve this DTC.

- Check the electrical connector is positively fixed to the fuel injector.
- Inspect wiring to the fuel injector and injector body for damage. Repair and replace as necessary.
- Using a multimeter, check the resistance of the fuel injector. Nominal resistance is approximately 12 ohms. If shorted with resistance near zero ohms, replace the fuel injector.
- Clear DTCs.
- Observe whether P0262 is still Active.
  - If still active, further inspection and diagnostics will be required before returning vehicle to service.
  - If no longer active, return the vehicle to service.

## **Ignition Coil Primary Control Circuit Low (P2300)**

This DTC indicates a issue with the ignition coil circuitry where the ECU has detected low voltage. The following conditions are examples of what may occur causing this fault:

- Wiring to the ignition coil has become damaged and shorting to the chassis.
- The electrical connector at the ignition coil has become disconnected or damaged.
- The ignition coil has electrically failed and is no longer operational.

The following procedure should be followed to resolve this DTC.

- Check the electrical connector is positively fixed to the ignition coil.
- Inspect wiring to the ignition coil and the coil body for damage. Repair and replace as necessary.
- Using a multimeter, check the resistance of the coil. Nominal resistance is approximately 1/2 ohm. If open circuit, replace the fuel injector.
- Clear DTCs.
- Observe whether P2300 is still Active.
  - If still active, further inspection and diagnostics will be required before returning vehicle to service.

- If no longer active, return the vehicle to service.

### **Ignition Coil Primary Control Circuit High (P2301)**

This DTC indicates a issue with the ignition coil circuitry where the ECU has detected high voltage. The following conditions are examples of what may occur causing this fault:

- Wiring to the ignition coil has become damaged and shorting to a battery voltage source.
- The ignition coil has electrically failed and is no longer operational.

The following procedure should be followed to resolve this DTC.

- Check the electrical connector is positively fixed to the ignition coil.
- Inspect wiring to the ignition coil and coil body for damage. Repair and replace as necessary.
- Using a multimeter, check the resistance of the ignition coil. Nominal resistance is approximately 1/2 ohm. If shorted with resistance near zero ohms, replace the ignition coil.
- Clear DTCs.
- Observe whether P2301 is still Active.
  - If still active, further inspection and diagnostics will be required before returning vehicle to service.
  - If no longer active, return the vehicle to service.

### **System Voltage High (P0563)**

This DTC indicates battery voltage in the vehicle is above a safe threshold. This can occur due to the following conditions:

- The vehicle's voltage regulator has been damaged.
- The vehicle battery has been overcharged or is faulty.

The following procedures are recommended to solve this DTC.

- Measure the battery voltage with the vehicle off. Voltage should be approximately 12 volts.
- Start the vehicle and measure voltage at idle. Voltage should be approximately 12.8-13.2 volts.
- Elevate engine RPM and measure voltage. A voltage of 14.5 is normal.
- Follow Vehicle Manufacturer's guidelines to repairing vehicle electrical architecture. Replace faulty components as needed
- Clear DTCs
- Observe whether P0563 is still Active

- If P0563 is still active, the ECU is permanently damaged and the ECU must be replaced.
- If P0563 is no longer active, system voltage has returned to normal and the vehicle can resume normal operation.

### **System Voltage Low (P0562)**

This DTC indicates battery voltage in the vehicle is above a safe threshold. This can occur due to the following conditions:

- The vehicle's voltage regulator has been damaged.
- The vehicle battery has been discharged or is faulty.
- The alternator on the vehicle is failing to charge the battery.

The following procedures are recommended to solve this DTC.

- Measure the battery voltage with the vehicle off. Voltage should be approximately 12 volts.
- Start the vehicle and measure voltage at idle. Voltage should be approximately 12.8-13.2 volts.
- Elevate engine RPM and measure voltage. A voltage of 14.5 is normal.
- Follow Vehicle Manufacturer's guidelines to repairing vehicle electrical architecture. Replace faulty components as needed.
- Clear DTCs
- Observe whether P0562 is still Active
  - If P0562 is still active, the ECU is permanently damaged and the ECU must be replaced.
  - If P0562 is no longer active, the vehicle may return to normal operation.

### **O2 Sensor Circuit High Voltage (P0131)**

This DTC indicates a issue with the oxygen sensor circuitry where the ECU has detected high voltage. The following conditions are examples of what may occur causing this fault:

- Wiring to the oxygen sensor has become damaged and shorting to a battery voltage source.
- The oxygen sensor has electrically failed and is no longer operational.

The following procedure should be followed to resolve this DTC.

- Check the electrical connector is positively fixed to the oxygen sensor.
- Inspect wiring to the oxygen sensor and sensor body for damage. Repair and replace as necessary.
- Clear DTCs.
- Observe whether P0131 is still Active.

- If still active, further inspection and diagnostics will be required before returning vehicle to service.
- If no longer active, return the vehicle to service.

### **O2 Sensor Circuit Low Voltage (P0132)**

This DTC indicates a issue with the oxygen sensor circuitry where the ECU has detected low voltage. The following conditions are examples of what may occur causing this fault:

- Wiring to the oxygen sensor has become damaged and shorting to the chassis .
- The connector for the oxygen sensor has been disconnected
- The oxygen sensor has electrically failed and is no longer operational.

The following procedure should be followed to resolve this DTC.

- Check the electrical connector is positively fixed to the oxygen sensor.
- Inspect wiring to the oxygen sensor and sensor body for damage. Repair and replace as necessary.
- Clear DTCs.
- Observe whether P0132 is still Active.
  - If still active, further inspection and diagnostics will be required before returning vehicle to service.
  - If no longer active, return the vehicle to service.

### **Malfunction Indicator Lamp Control Circuit (P0650)**

This DTC indicates a problem with the wiring to and from the MIL on the vehicle dashboard. Under these conditions, the MIL will not illuminate due to a damaged connection to the lamp.

To identify this issue, inspect the vehicle for the MIL bulb check sequence by keying on and looking for the bulb to illuminate for 2.5 seconds. ECUs must be functional, as well as a charged battery and otherwise operational vehicle.

The following procedure should be followed to resolve this DTC.

- Check the electrical connections to the MIL.
- Inspect wiring to the lamp and test for +12v power
- Clear DTCs.
- Observe whether P0650 is still Active.
  - If still active, further inspection and diagnostics will be required before returning vehicle to service.
  - If no longer active, return the vehicle to service.

## **O2 Sensor Heater Control Circuit Low (P0031)**

This DTC indicates a issue with the oxygen sensor heater control circuitry where the ECU has detected low voltage. The following conditions are examples of what may occur causing this fault:

- Wiring to the oxygen sensor has become damaged and shorting to the chassis .
- The connector for the oxygen sensor has been disconnected
- The oxygen sensor has electrically failed and is no longer operational.

The following procedure should be followed to resolve this DTC.

- Check the electrical connector is positively fixed to the oxygen sensor.
- Inspect wiring to the oxygen sensor and sensor body for damage. Repair and replace as necessary.
- Clear DTCs.
- Observe whether P0031 is still Active.
  - If still active, further inspection and diagnostics will be required before returning vehicle to service.
  - If no longer active, return the vehicle to service.

## **O2 Sensor Heater Control Circuit High (P0032)**

This DTC indicates a issue with the oxygen sensor circuitry where the ECU has detected high voltage. The following conditions are examples of what may occur causing this fault:

- Wiring to the oxygen sensor has become damaged and shorting to a battery voltage source.
- The oxygen sensor has electrically failed and is no longer operational.

The following procedure should be followed to resolve this DTC.

- Check the electrical connector is positively fixed to the oxygen sensor.
- Inspect wiring to the oxygen sensor and sensor body for damage. Repair and replace as necessary.
- Using a multimeter, measure resistance across pins A and B of the oxygen sensor. A resistance of 16-25 ohms is typical for a sensor that has been allowed to stabilize at room temperature. If the sensor is outside this range, the heater has been damaged and the sensor needs to be replaced.
- Clear DTCs.
- Observe whether P0032 is still Active.
  - If still active, further inspection and diagnostics will be required before returning vehicle to service.
  - If no longer active, return the vehicle to service.

## **Vehicle Communication Bus (U0028)**

This DTC indicates a fault has occurred with the CAN communication bus on the Vehicle. This fault may occur under the following conditions.

- One ECU has been disconnected or damaged and is no longer functional.
- The vehicle harness has been damaged, either in harness or at the diagnostic connector
- A third party communication tool has been installed and is interfering with the normal ECU operation.

## **Lost Communication With Other ECU (U0100)**

This DTC indicates an error has occurred with communications between the two ECUs. When this occurs, the vehicle will lose functionality, but should continue to run if both ECUs are functional. Possible reasons of this fault are as follows.

- One ECU has been disconnected or damaged and is no longer functional.
- The vehicle harness has been damaged, either in harness or at the diagnostic connector.

The following procedures are recommended to solve this DTC.

- Measure the battery voltage with the vehicle off. Voltage should be approximately 12 volts.
- Start the vehicle and measure voltage at idle. Voltage should be approximately 12.8-13.2 volts.
- Observe whether U0100 is still Active
  - If U0100 is still active, the ECU is permanently damaged and the ECU must be replaced.
  - If U0100 is no longer active, the vehicle may return to normal operation.