Troubleshooting the Starter and Forklift Starting Circuit

Note: The following instructions listed below consist of general information for troubleshooting the starter and forklift starting circuit. Refer to the Original Equipment Manufacturer’s service manual for specific information pertaining to your forklift.

Many times starter operation or non-operation is a symptom of other system problems. Please use the troubleshooting and voltage drop tests below to pin point the problem before replacing the starter.

• If the starter is not performing, it is important to resolve any additional forklift side problem(s) in the starting circuit that may have effected the starter. Such as battery, start relays, switches and other components in the starter circuit.
• Identifying the customer’s true starting circuit problem is important to prevent unnecessary starter replacement.

Troubleshoot the system with the following questions and actions:

1. Does the starter turn the engine too slowly? If the starter turns the engine slowly, verify proper battery charge, battery cables, ignition timing, engine oil and engine rebuilds.
   • Is the battery fully charged and in good condition? Perform Step 1 as shown on next page.
   • Are the battery cables and terminals in good condition? Perform Step 2 & 3 as shown on next page. A small resistance in either the positive or ground circuit can reduce the cranking power significantly.
   • If the engine has been rebuilt, including increased compression ratio, it could effect the starter’s ability to turn the engine.
   • Improper engine timing (usually advanced) and excessive engine oil viscosity (usually higher) can also effect the starter’s performance.

2. Does the starter fail to crank the engine?
   • If the starter fails to crank the engine, check the battery and battery cables and terminals. Be sure both ends of the battery cables are checked for proper connection and are clean.
   • Is the battery fully charged and in good condition? Perform Step 1 as shown on next page.
   • Are the battery cables and terminals in good condition? Perform Step 2 & 3 as shown on next page.

3. Does the starter try to turn the engine and then spins free?
   • If the starter tries to turn the engine but just spins, check the flywheel ring gear or flex plate for excessive wear and missing or damaged teeth. A failed starter drive could produce similar symptoms.
   • The flywheel teeth can be inspected through the starter access or mounting opening. Check four cylinder engines, two positions, 180 degrees apart and six cylinder engines, three positions, 120 degrees apart. These are the areas to find excessive wear.

4. Does the starter click when trying to start the engine? Has the ground circuit between the battery and the engine been checked for high resistance?
   • If the solenoid or relay clicks and the starter does not turn, the problem could be a loose connection or damaged wires. Perform Step 4 as shown on next page.
   • Check the voltage drop of the battery cables for high resistance. Perform Step 2 & 3 as shown on next page.

5. Is there a clattering sound when trying to start the engine?
   • A clattering sound when trying to start the engine could be caused by a bad flywheel/ring gear, or an inoperable starter solenoid.
   • The flywheel teeth can be inspected through the starter access or mounting opening. Check four cylinder engines, two positions, 180 degrees apart and six cylinder engines, two positions, 120 degrees apart. These are the areas to find excessive wear.
   • Is the battery fully charged and in good condition? Perform Step 1 as shown on next page.
   • Are the battery cables and terminals in good condition? Perform Step 2 & 3 as shown on next page.
   • The problem could be a loose connection or damaged wires. Perform Step 4 as shown on next page.
Starter System Voltage Drop Steps

*** All steps must be done while cranking the engine. An Analog Voltmeter is recommended but a Digital Voltmeter will work ***

Step 1: Record voltage at the battery while cranking the engine.

   □ Volts

   Stop

   If the battery has less than 10 volts while cranking, the battery is bad.

Step 2: Record the voltage drop at the starter while cranking the engine.

   □ Volts

   Stop

   If the voltage reading is over .2 volts, Repair: the battery cable and all connections; connections must be cleaned and repaired.

Step 3: Record the voltage drop at the starter housing while cranking the engine.

   □ Volts

   Stop

   If the voltage reading is over .2 volts, Repair: ground cable and all connections; connections must be cleaned and repaired.

Step 4: Record the voltage drop at the starter switch circuit while cranking the engine.

   □ Volts

   Stop

   If the voltage reading is over .3 volts, Repair: switch circuit, related components and all connections must be cleaned and repaired.

When Testing at the battery, test on the battery post not on the battery cable end or connection.