

## John Deere Engine Safety Shutdown with “Black Box” (prior to Tier II ECU engines)

### Troubleshooting

- If the hydraulic oil or water level is low, but not low enough to cause the Shut Down to kill the engine, the “Slosh” on the sensors can cause the engine to act like the key is being turned off and on.
- Verify Water Temperature Gauge switch set: Max 220 degrees.
- Verify Hydraulic Oil Full.
- Verify Engine Oil Level.
- Verify Water in radiator and overflow bottle bolted in the engine compartment, opposite the driver’s side. Water level is very sensitive.

A probe tester with a light in the handle is a good tool, and a continuity meter.

Remove Fuel Injection Pump wire to prevent accidental starting.

### General Operation

When key is turned ON, the Murphy Relay 760-A-F 30 second timer starts. This is to allow time for oil pressure to build. If engine fails to start in 30 seconds, the Low Oil Pressure safety will not let it start at all. The key must be turned off, and back on to start the 30 second timer again.

#### **Murphy Relay 760-A-F (Tucker Part # 80575-17)**

- B +12v from key switch (battery)
- S Sensor switches. When S is grounded, the switch operates to shut off the engine
- NC provides +12v to Alternator and Fuel Injector Pump when key is turned on
- NO 0v during normal operation

When the Murphy Relay operates (ground from any sensor to the S terminal)

- NC 0v. Power is shut off to Alternator and Fuel Injector Pump
- NO +12v to Amperite Relay to turn Water Sensor Off (key Off/On resets Amperite also)

#### **Amperite Relay 120SPDT30SC (Tucker Part # 80575-171)**

- + To NO on Murphy Relay
- To ground
- C +12v from key switch (battery)
- NC +12v to Water Level Sensor

When the Murphy Relay operates (has a signal to S), the Amperite Relay:

- + Receives +12v from Murphy Relay and starts a 30 second timer in the Amperite. After 30 seconds, the NC contacts in the Amperite come open, shutting the +12v off to the Water Level sensor so it won’t burn up. It takes a key switch cycle (power Off/On) to reset the Amperite to normal operation.

**Murphy Diode** 65-01-0094 (Tucker Part # 80575-71)

This is a “Check Valve” to allow current to pass to the Alternator, but not back from the Alternator. If the Diode fails and allows current to back flow, the shut down system would not be able to shut power off to the Fuel Injector Pump. So the engine might stay running even if one of the sensors was trying to shut it down.

With the engine off, test the Diode with a continuity meter. There should be continuity one way and not the other.

Testing

Test #1 (Engine not running)

Be ready with volt meter to check for +12v on Terminals 8 and 4. 4 should turn off 30 seconds after key is turned on.

- If No Voltage on 8, check Key Switch and Wiring.
- If no voltage was on 4, check Murphy Relay. Remember 4 turns off 30 seconds after key is turned on.

Test #2 (Engine not running)

Remove and tape wire on oil pressure switch.

Turn on Key Switch, check for +12v on terminal 4, 4 should not turn off in 30 seconds. Turn off Key Switch.

- If test #1 and Test #2 were good, the system should be normal
- If test #2 fails, remove and tape wire from Murphy Switch (S). Test Terminal 2 for Ground. It must not test grounded. If grounded, separate wires and test Water Temperature, Oil Level, and Hydraulic Level. Replace any grounded Level Switch or Lead Wire.

For Water Level Switch Only: If the Level Switch will not shutdown on low water

- Turn on Key Switch. Check for +12v on terminal block position (1). The voltage will turn off in approximately 60 seconds. Turn Key Switch off.
- If no voltage, suspect Amperite Relay
- If voltage good, suspect Level Switch or Wiring

After repairs and testing, replace Fuel Wire.

**MONTHLY SAFETY SHUTDOWN TEST**

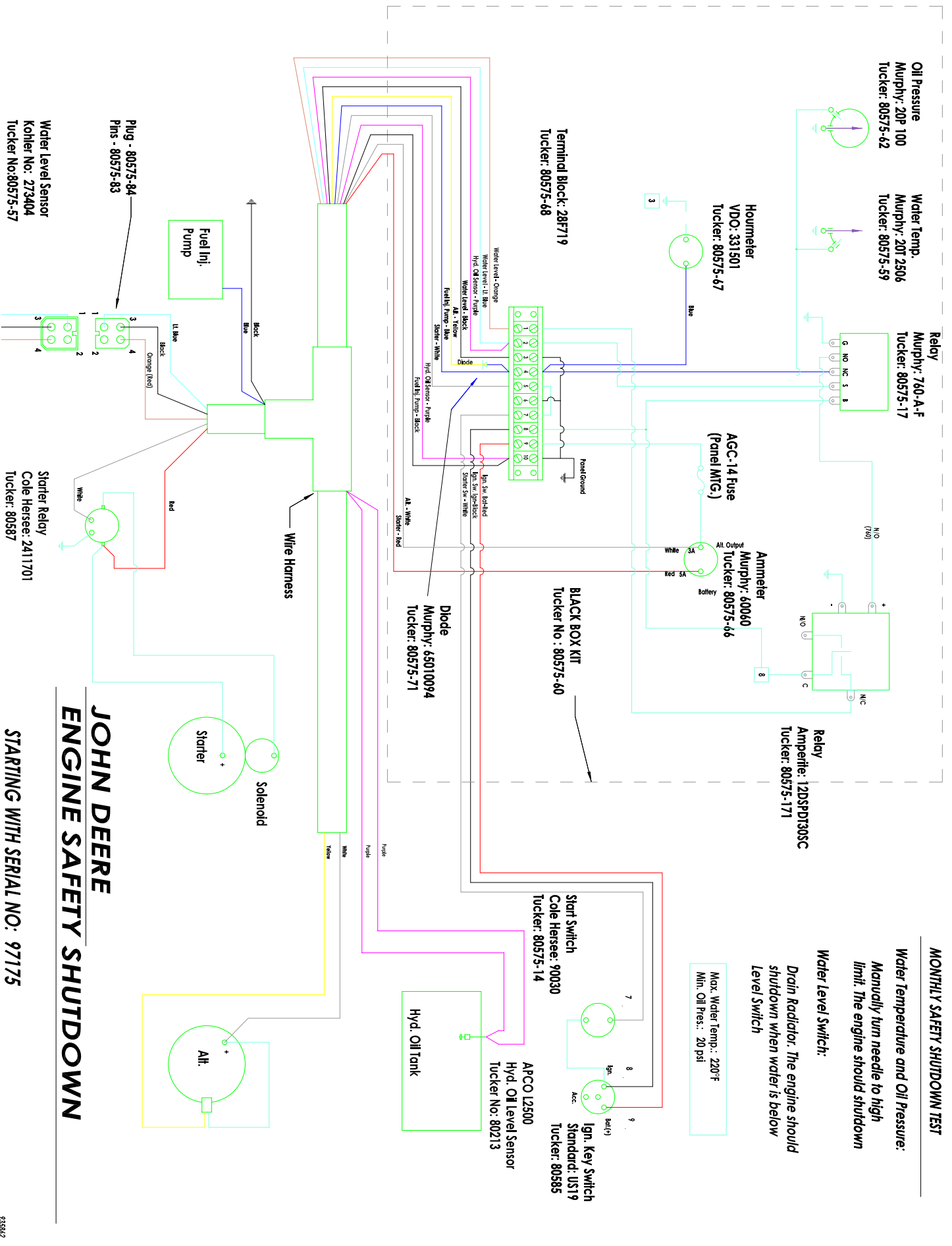
**Water Temperature and Oil Pressure:**

*Manually turn needle to high limit. The engine should shutdown*

**Water Level Switch:**

*Drain Radiator. The engine should shutdown when water is below Level Switch*

Max. Water Temp.: 220°F  
Min. Oil Pres.: 20 psi



**JOHN DEERE  
ENGINE SAFETY SHUTDOWN**

STARTING WITH SERIAL NO: 97175