# Troubleshooting Information for Stanadyne "D" Series Injection Pumps Equipped with Barber-Colman Integrated Actuator Assemblies

**— Note —**
**See Section I for using test stand and Section II for testing cover only.**



## I. Checking out and Calibrating a New or Rebuilt Stanadyne Injection Pump, using an Injection Pump Test Stand.

In this situation, the Barber-Colman Integrated Actuator will be used like an energize-to-run solenoid for the Stanadyne injection pump and mechanical governor. The last two digits in the part number on the nameplate for the Barber-Colman Integrated actuator indicate the proper voltage to be used.

The voltage polarity to the two terminals on the cover does not matter. It is recommended that one of the two following methods be used to apply and remove the voltage to the actuator terminals.

The actuator is a coil with inductance. When applied voltage is suddenly removed, there is a large transient voltage at the actuator. When used in the complete Barber-Colman governing system, arc suppression is supplied in the electronic governor control box. This permits polarity free wiring from the governor control box to the actuator. For production test fixtures it would be wise to put a freewheeling diode on the terminal strip used to wire the power supply to the actuator between the switch and actuator connected with polarity as shown. Repeated transients could damage the dielectric characteristics of the actuator causing early failures. *See Figure 1.*

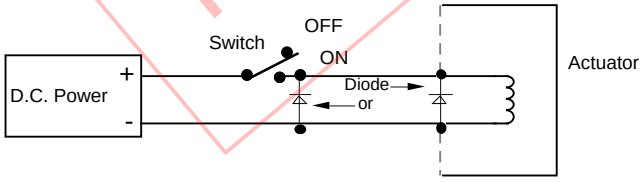


***Figure 1***

The diode, a Motorola MUR 810 or equivalent, could be used. It could be at the actuator terminal strip or at the switch.

Another method would be to slowly turn the DC voltage up and down.

As with the solenoid normally used, when the DC power is not applied to the actuator, the fuel is cut off from the engine. Use of the throttle lever and shut off lever have no effect.

When proper power is applied to the actuator, fuel is supplied to the engine as determined by the setting of the fuel shutoff lever and the combination of the throttle lever and input speed to the pump shaft. In this mode the throttle high and low speeds can be set as per the usual practice.

Checks to be made of the Integrated Actuator should be as follows:

1. Check the DC voltage shown on the integrated actuator cover for the specified DC voltage.

2. With all wires removed from the actuator terminals, use an ohmmeter to check for the proper resistance of the actuator coil. Measure between terminals of the terminal strip.

| DC Voltage | Resistance in OHMS at normal room temp. |
|---|---|
| 12 VDC | 2.05 ± 0.25 OHMS |
| 24 VDC | 7.20 ± 0.50 OHMS |

If easier, check the resistance of the coil by measuring current. The values would be as follows:

| DC Voltage Of Unit | DC Voltage Applied | Current In Amps |
|---|---|---|
| 12 VDC | 12 ± 0.5 VDC | 5.8 ± 0.5 Amps |
| 24 VDC | 24 ± 0.5 VDC | 3.3 ± 0.4 Amps |

3. With all wires removed, check the resistance between each of the two actuator terminals and case (ground). It must be 3 megohms or greater.

4. With the test stand operating on the mechanical governor, turn down the DC voltage to “0” and check that there is “0” fuel flow to the engine.

5. If the test stand was not operating, energize and de-energize the actuator and listen for a “click”.

It should be noted that if the Integrated Actuator had considerable use and was worn or had been damaged to cause stickiness, the above testing probably would not detect the defect. This could only be done by operating the actuator on a computerized checkout system or an X-Y plotter using position or flow checkout with a feedback loop control.

## II. Doing Basic Checkout of the Barber-Colman Integrated Actuator Cover when it has been removed from the Stanadyne Injection Pump

The Integrated Actuator Cover cannot be completely checked out unless performance checks are made. To do this requires a dedicated test fixture with a feedback control loop. This would check for stickiness and/or looseness detrimental for good governing performance.

Visual Checks *(See Figure 2)*

1. Check or replace the Cover Seal.

2. Check the terminal strip for breakage. If broken, unit must be returned to factory for repair.

3. Check the internal wiring visually for frayed strands of wires at the terminal strip.

4. Check that the actuator arm is tight to the actuator shaft, with no play.

5. Check the pivot point of the actuator arm and metering valve drive coupling to see that it has free movement.

Electrical Checks

1. Check the DC voltage shown on the integrated actuator cover for the specified DC voltage.

2. Use an ohmmeter to check for the proper resistance of the actuator coil. Measure between terminals of the terminal strip.

| DC Voltage | Resistance in OHMS at normal room temp. |
|---|---|
| 12 VDC | 2.05 ± 0.25 OHMS |
| 24 VDC | 7.20 ± 0.50 OHMS |

If easier, check the resistance of the coil by measuring current. The values would be as follows:

| DC Voltage Of Unit | DC Voltage Applied | Current In Amps |
|---|---|---|
| 12 VDC | 12 ± 0.5 VDC | 5.8 ± 0.5 Amps |
| 24 VDC | 24 ± 0.5 VDC | 3.3 ± 0.4 Amps |

3. Check the resistance between each of the two actuator terminals and case (ground). It must be three (3) megohms or greater.

4. Take care that the actuator arm is free to travel and the metering valve drive coupling will not bind. Energize the actuator with the proper voltage and note that the lever arm moves to maximum mechanical position. Slowly de-energize the actuator (or use a diode as per Par. I, Figure 1) and determine that the lever arm returns to minimum position.



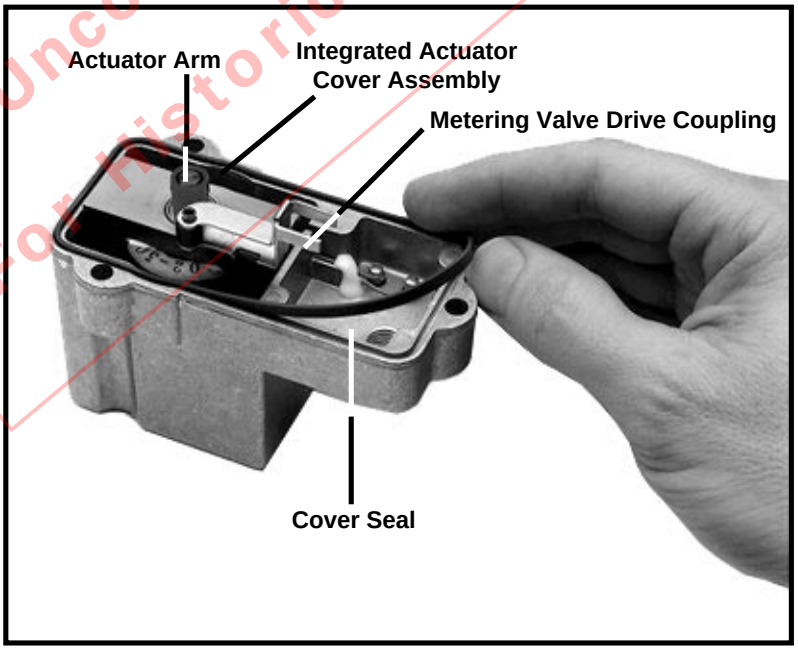


***Figure 2***

**CAUTION**

As a safety measure, the engine should be equipped with an independent overspeed shutdown device in the event of failure which may render the governor inoperative.

**NOTE**

Barber-Colman believes that all information provided herein is correct and reliable and reserves the right to update at any time. Barber-Colman does not assume any responsibility for its use unless otherwise expressly undertaken.

## III. Troubleshooting an Engine Fueled by a Stanadyne Injection Pump Equipped with a Barber-Colman Integrated Actuator

### 1. PROBLEM: Engine does not crank over when start switch operated.

| | Means of Detection | Corrective Action |
|---|---|---|
| 1.1 | Check proper battery connections and voltage. | Repair, change or replace as required. |
| 1.2 | Check wiring to start switch and solenoid. | Repair or replace as required. |
| 1.3 | Check starter in accordance with engine manual. | Repair or replace as required. |
| 1.4 | Check tripped overspeed switch. | Re-set speed switch. |

### 2. PROBLEM: Engine cranks but does not fire or start.

| | Means of Detection | Corrective Action |
|---|---|---|
| 2.1 | Check for fuel in tank. | Fill tank. |
| 2.2 | Carefully loosen nut at injector and crank engine, checking for fuel. | If fuel, check engine manual.<br>If no fuel, proceed to Step 3. |

### 3. PROBLEM: No fuel to injectors.

| | Means of Detection | Corrective Action |
|---|---|---|
| 3.1 | Loosen Return Fuel Line Connector and check for fuel while cranking. | If no fuel, check line to fuel pump and pressure supply, if any.<br>If fuel, proceed to Step 4. |

### 4. PROBLEM: No fuel to injectors, but fuel to pump.

| | Means of Detection | Corrective Action |
|---|---|---|
| 4.1 | While cranking engine, check for voltage at actuator terminals on fuel pump cover. Should be approximately 75% or greater of cranking voltage. | If have voltage, proceed to Step 5.<br>If do not have voltage, proceed to Step 6. |

### 5. PROBLEM: No fuel to injectors, have fuel to pump and ***have*** voltage to actuator terminals.

| | Means of Detection | Corrective Action |
|---|---|---|
| 5.1 | Place a low impedance 0-10 amp ammeter in one line to actuator. May need to check polarity first with voltmeter if polarized ammeter. Crank engine and check for 4.3 ± 1.5 amps for 12 VDC and 2.5 ± 1.3 amps for 24 VDC system. | If no current, internal wiring or coil open in cover assembly. Remove and replace.<br><br>If shows proper current, check cover per Section II, or replace fuel pump assembly. |

### 6. PROBLEM: No fuel to injectors, have fuel to pump and ***no*** voltage to actuator terminals.

| | Means of Detection | Corrective Action |
|---|---|---|
| 6.1 | Check for DC voltage at actuator output terminals of governor control box while cranking. Should be approximately 75% or greater of cranking voltage. | If have voltage, repair or replace wire from control box to actuator.<br><br>If no voltage at actuator terminals while cranking, proceed to Step 7. |

### 7. PROBLEM: No voltage at actuator terminal while cranking.

| Means of Detection | Corrective Action |
|---|---|
| 7.1 Check for proper DC supply voltage to governor control box while cranking. | If no voltage, check and repair wiring. |
| 7.2 Check for 2.5 VAC minimum at magnetic pickup input terminal to governor control box while cranking. | If no voltage or low voltage, check or replace magnetic pickup and/or wiring.<br><br>If voltage above 2.5 VAC, proceed to Step 8. |

### 8. PROBLEM: DC voltage & magnetic pickup voltage are ok, but no voltage out actuator terminals when cranking.

| Means of Detection | Corrective Action |
|---|---|
| 8.1 Remove all wires but DC input power and magnetic pickup. While cranking engine slowly turn SPEED potentiometer on box clockwise (CW) at least ten (10) turns, checking for DC voltage at actuator terminals of control box with actuator leads disconnected.<br>**— WARNING —**<br>Turn SPEED potentiometer counterclockwise (CCW) ten (10) turns before connecting other wires and starting engine. | If no voltage, replace governor control box.<br><br>If voltage present, check and correct wiring of disconnected wires. |

### 9. PROBLEM: Engine runs but will not produce maximum power.

| Means of Detection | Corrective Action |
|---|---|
| 9.1 Check to determine that throttle shaft lever and/or shutoff lever are at proper position. | Shutoff lever must be at maximum position and throttle shaft lever 12% above maximum operating speed. |
| 9.2 Check that DROOP is properly set. | Turn DROOP adjustment screw counterclockwise (CCW) until it stops. Turn the screw two full turns clockwise (CW). |
| 9.3 Check that "L" pot is properly set on controller. | Note position of "L" pot. Turn slowly clockwise (CW) to increase current to actuator. If engine still does not produce full power, return "L" pot to original position. |

### 10. PROBLEM: Engine speed erratic at high loads.

| Means of Detection | Corrective Action |
|---|---|
| 10.1 Make certain throttle shaft lever and DROOP are properly set. | Set per Step 9 above. |

### 11. PROBLEM: Engine speed surges, jitters or operates erratically at all or some speeds and loads.

| Means of Detection | Corrective Action |
|---|---|
| 11.1 Refer to calibration and troubleshooting for the appropriate controller. | Follow procedure. |



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