The governed speed set point is increased by clockwise rotation of the SPEED adjustment control. Remote speed adjustment can be obtained with an optional 5K Speed Trim Control.

Once the engine is running at operating speed and at no load, the following governor performance adjustments can be made to increase engine stability.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GAIN</td>
<td>1. Rotate the GAIN adjustment clockwise until instability develops.</td>
</tr>
<tr>
<td></td>
<td>2. Then, gradually move the adjustment counterclockwise until stability returns.</td>
</tr>
<tr>
<td></td>
<td>3. Finally, move the adjustment one division further counterclockwise to insure stable performance (2½° potentiometer).</td>
</tr>
<tr>
<td></td>
<td>4. If instability persists, adjust the next parameter.</td>
</tr>
<tr>
<td>B (STABILITY)</td>
<td>1. Follow the same adjustment procedure steps 1 - 3, as the GAIN parameter.</td>
</tr>
</tbody>
</table>

### NOTES
- Normally, adjustments made at no load achieve satisfactory performance. If further performance improvements are required, refer to Section 7 SYSTEM TROUBLESHOOTING.
- Wires must be twisted and/or shielded for their entire length.
- Gap between speed sensor and gear teeth should not be smaller than 0.02 in. (0.5 mm).
- Speed sensor output voltage should be at least 1V AC RMS during cranking.
- Battery dimension: 1.3 mm sq (0.062 in. sq) or larger wire.
- Connect battery to the ESD case. All shields, including the speed sensor shield, should be connected. Shielded cable should be used for all external connections to the ESD system.

### INSTALLATION
See Section 9 for more dimensions.

### WARNING
An overspeed shutdown device, independent of the governor system, should be provided to prevent loss of engine control, which may result in personal injury or equipment damage.

### GOVERNOR SPEED SETTING
See Section 9 for the Wiring Diagram.

### SPECIFICATIONS
- **PERFORMANCE**
  - Asynchronous Operation: ± 0.25% or better
  - Speed Range / Governor: 1 - 7.5 K RPM Continuous
  - Speed Drift with Temperature: ± 0.1% Maximum
  - Speed Trim Range: ±250 Hz, Typical
  - Terminal “A” Sensitivity: 130 Hz, ±15 Hz/Volt @ 5.1K Impedance

### INPUT POWER
- Supply: ±12 - 24 VDC ±30%
- Battery Systems: ±48 VDC ±30%
- Short CIRCUIT current: 30 A Continuous

### RELIABILITY
- Vibration: 5G @ 20-50 Hz
- Testing: 100% Functionally Tested

### ENVIRONMENTAL
- Ambient Temperature: -40°C to 85°C (-40 to 185°F)
- Relative Humidity: 95% Full Surface

### PHYSICAL
- Dimension: See Section 9
- Weight: 10 oz. (341 g)
- Mounting: Any position, Vertical Preferred

### SYSTEM TROUBLESHOOTING
If the engine governing system does not function, the fault may be determined by performing the voltage tests described in Steps 1 through 4. Positive (+) and negative (-) voltages are normal during engine cranking and off, and the fault may be with the actuator or the wire to the actuator. Tests are performed with battery power on the engine off, and except where noted. See actuator publication for testing procedure on the actuator.

### SYMPTOM
- **Engine Over-speeds**

### PROBABLE CAUSE OF ABNORMAL READING
1. After the governor goes to full fuel, disconnect the speed sensor at Terminals H (>>>) & E(+) on the speed control unit.
2. If the voltage reading is 1.0 to 1.5 VDC, then the voltage adjustment control set point is incorrect. Follow the instructions above for adjusting the voltage setting.
3. If the voltage reading is above 1.5 VDC, then check for:
   - Actuator binding
   - Linkage binding
   - Set point of overspeed shutdown is too low.
4. If the voltage reading is below 0.9 VDC, then the voltage adjustment control set point is incorrect. Follow the instructions above for adjusting the voltage setting.

### ADJUSTMENTS BEFORE ENGINE STARTUP
Make sure the following adjustments are set before starting the engine.

<table>
<thead>
<tr>
<th>STEP</th>
<th>WIRES</th>
<th>NORMAL READING</th>
<th>PROBABLE CAUSE OF ABNORMAL READING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E(+) &amp; F(+)</td>
<td>Battery Supply Voltage (12, 24, or 32 VDC)</td>
<td>1. DC battery power not connected. Check for blown fuse.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low battery voltage</td>
<td>2. Wiring error</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Speed trim shorted or miswired.</td>
<td>3. Defective unit.</td>
</tr>
<tr>
<td>2</td>
<td>A(+) &amp; B(-)</td>
<td>0.3-0.9 with speed further than 7.1-7.9 without speed trim.</td>
<td>1. Speed trim shorted or miswired. Defective unit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Speed trim shorted or miswired.</td>
<td>2. Speed trim shorted or miswired. Defective unit.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gap between speed sensor and gear teeth too great.</td>
<td>3. Improper or defective wiring to the speed sensor. Resistance should be 30 to 1200 ohms.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective speed sensor.</td>
<td>4. Defective speed sensor.</td>
</tr>
<tr>
<td>3</td>
<td>C(+) &amp; D(-)</td>
<td>1.0 VAC minimum while cranking</td>
<td>1. Gap between speed sensor and gear teeth too great.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gap between speed sensor and gear teeth too great.</td>
<td>3. Improper or defective wiring to the speed sensor. Resistance should be 30 to 1200 ohms.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Defective speed sensor.</td>
<td>4. Defective speed sensor.</td>
</tr>
<tr>
<td>4</td>
<td>H(+) &amp; E(-)</td>
<td>0.6-1.5 V while cranking</td>
<td>1. Wiring error to actuator.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wiring error to actuator.</td>
<td>3. Defective actuator.</td>
</tr>
</tbody>
</table>

### START THE ENGINE
The speed control unit governed speed setting is factory set at approximately engine idle speed (1000 Hz). Speed sensor signal or RPM RMS sensor will appear. Counter clockwise rotation of the GAIN control will increase engine speed control, and counter clockwise rotation of the B (STABILITY) control will decrease engine speed control. If the engine is unstable after starting, refer to Section 6 ADJUSTING FOR STABILITY.
ESD2200 Series Speed Control Unit

ESD2210- S/N:

CAUTION
ENGINE SPEED CONTROL COMPONENT. WHEN INSTALLING OR SERVICING REFER TO PRODUCT PUBLICATION.

OPTIONAL SPEED TRIM CONTROL

MAGNETIC SPEED PICK-UP

BATTERY

15A FUSE

S1

ACTUATOR

WD222B