Section 1.5

MECHANICAL ENGINE GOVERNORS

Introduction

Governor AC output frequency is directly proportional to the driven speed of the rotor. In order to maintain a specific AC output frequency, rotor speed must be precisely controlled. Rotor speed can be maintained by governing the operating speed of the driving engine.

Many spark ignited (gas fueled) engines employ a fixed speed, mechanical engine governor. Because proper generator operation is so dependent on a correctly adjusted and maintained governor, some of the adjustment procedures for mechanical governors will be discussed in this section.

How a Mechanical Governor Works

See Figure 1. Engine and governor speed will decrease if the load on the engine is increased even slightly. In response to the decrease in engine speed, governor flyweights (2) are forced inward by governor spring force. Flyweight (2) movement is transmitted through a sleeve (3) and a shaft (4) to a governor lever (5). The governor lever (5) then moves a link (6) which actuates the carburetor throttle valve to a more open position. Engine speed then increases.

As engine speed increases, flyweight (2) centrifugal force overcomes governor spring force and the flyweights move outward. Flyweight movement is then transmitted through a sleeve (3), a shaft (4) and to a governor lever (5). This actuates a link (6) to a reduced fuel flow position and engine speed decreases.

An equilibrium will be reached when flyweight centrifugal force becomes equal to governor spring force. This type of governor actually never reaches a state of equilibrium. That is, governing action consists of a series of very small and brief accelerations and decelerations.

Sudden dumping of a load will cause a rapid increase in engine speed. The governor must be able to recover very quickly, to prevent an overspeed condition.

Some Typical Mechanical Governors

Governors currently in use on spark ignited (gas) engines include (a) Part No. 65934 and (b)Part No. 68985. The latter (68985) is used on 1.0 and 1.2 liter gas/gasoline engines. Governor 65934 is used on most other spark ignited engines.

NOTE: Starting in September 1991, Generac began to replace the mechanical governor (65934) with the new Generac electronic governor. The 1.0, 1.2 and 2.3 liter engines will continue to use a mechanical governor. For information and instructions on the new electronic governor, refer to Section 1.6. Adjustment procedures on diesel engine governors are discussed in Section 1.7.

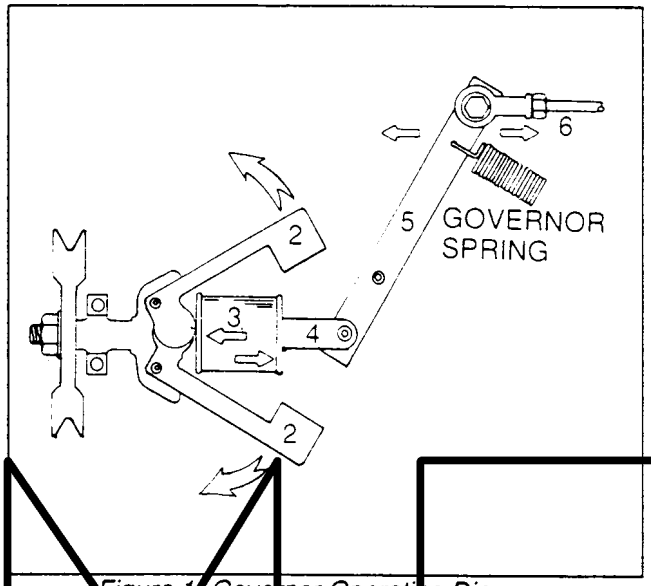

Figure 1. Governor Operating Diagram

Adjustment of 65934 Governor

GENERAL:

The following adjustment procedure applies to engines that are NOT equipped with a vacuum operated dashpot system.

Some 2.6 liter, 5.7 liter and 7.4 liter engines are equipped with a vacuum operated dashpot system. These systems were installed to alleviate rpm surges that might occur at mid-power ranges on the applicable engines. Kits were made available for field installation of the dashpot system on early production units. Adjustment procedures for units with dashpot system are not included in this manual, but may be found in the following manuals which are available from Generac:

- Instructions and Parts, "Vacuum Operated Governor Dashpot Kits for 5.7 & 7.4 Liter Gas Engines". Order Manual Part No. 78915.
- Instructions and Parts, "Vacuum Operated Governor Dashpot Kits for 2.6 Liter Gas Engines". Order Manual Part No. 78916.

INITIAL (PRESTART) ADJUSTMENTS:

1. Find the length of the throttle linkage rod by observing the position of the governor arm and the throttle plate arm.
   a. The governor arm should be in alignment with the spring tension arm.
   b. The throttle arm should be between one and two o'clock.
   c. With the relationship between (a) and (b) above established, no drag or binding should be present and full travel of the entire linkage assembly should be obtained.

Adjustment of 65934 Governor (Continued)

2. Adjust the DROOP ADJUSTMENT SCREW so that approximately 3/4 inch of thread is showing above the upper lock nut. Then, tighten the upper and lower DROOP ADJUSTMENT SCREW lock nuts.
3. Turn the BUMPER SCREW out (counterclockwise) until approximately 3 or 4 threads are engaged. Then, tighten the BUMPER SCREW lock nut.

CAUTION: The bumper screw locknut must be tightened before startup or oil will leak from the governor.

4. Turn the SPEED ADJUSTING SCREW in (clockwise) until a slight tension is felt on the governor spring. This should provide low speed operation on initial startup.

FINAL ADJUSTMENT (ENGINE RUNNING):

1. Connect an accurate AC frequency meter to the generator's AC output leads.
2. Start the engine and let it warm up at no-load.
3. Turn the SPEED ADJUSTING SCREW clockwise to increase speed and AC frequency. Slowly increase engine speed until the frequency meter reads 62 Hertz at no-load.

NOTE: At this point governing action may be somewhat unstable. You may wish to stabilize the governor by placing your hand on the GOVERNOR ARM as a dampener. This will help stabilize rpm and frequency and allow you to complete adjustments.

4. Loosen the lock nut on the BUMPER SCREW.
   a. Tap the governor arm to make it go into an unstable condition.
   b. Turn the BUMPER SCREW clockwise until the governor begins to stabilize.
   c. Continue to turn the BUMPER SCREW clockwise until frequency starts to increase. Then, turn the BUMPER SCREW counterclockwise until frequency reads 62 Hertz at no-load.
   d. Tighten the BUMPER SCREW lock nut.

CAUTION: If the BUMPER SCREW is turned clockwise too far, speed adjustment may be adversely affected. If any governor setting (speed, bumper, droop) is changed, the other settings must be rechecked.

5. When settings are complete, tighten all locknuts. Then, check to make sure settings have not changed.
6. Apply an electrical load equal to the unit's rated wattage/amperage capacity. Frequency should not droop more than four (4) Hertz.
   a. If excessive rpm and frequency droop occurs, increase tension on the DROOP SPRING.
   b. After changing DROOP SPRING tension, reset the SPEED ADJUSTING SCREW to 62 Hertz at no-load.

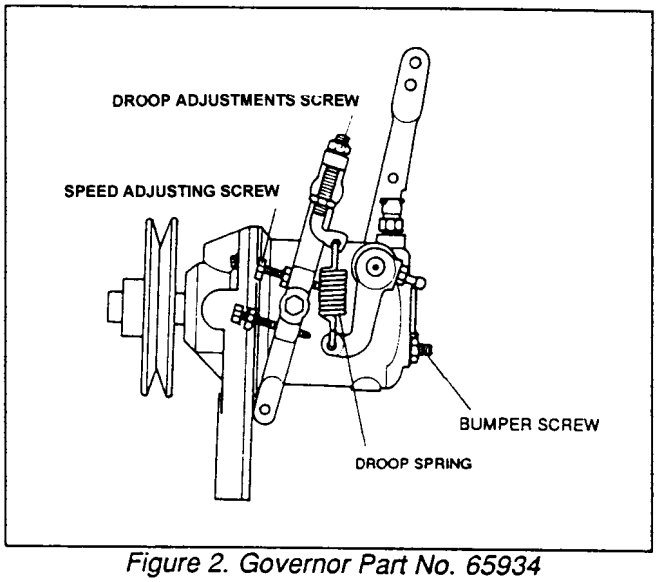

Figure 2. Governor Part No. 65934

Adjusting Governor 68985

GENERAL:

This governor is used on some 1.0 and 1.2 liter spark ignited, gas engines. It consists of (a) a fixed speed mechanical governor, and (b) a battery charge alternator. See Figure 4.

ADJUSTMENT PROCEDURE:

1. The length of the governor lever to carburetor link, as measured between ball joint centerlines, should be 4-3/8 inches.

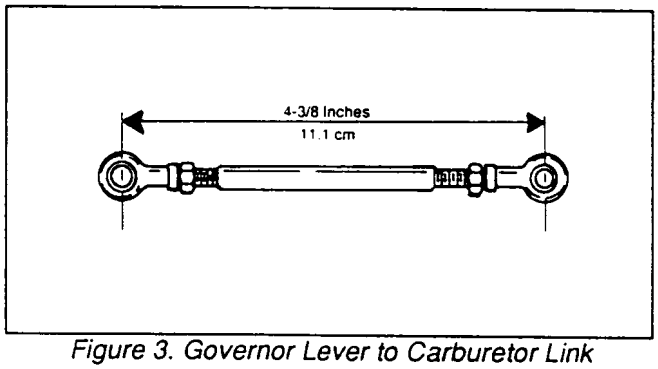

Figure 3. Governor Lever to Carburetor Link

2. Connect an accurate AC frequency meter to the generator's AC output leads.
3. Start the engine, let it warm up at no-load.
4. Adjust the NO-LOAD SPEED ADJUST SCREW to obtain a frequency reading as close as possible to 61.5 Hertz for 60 Hertz units; or 50 Hertz for 50 Hertz units.
5. Adjust the NO-LOAD BUMPER SCREW to obtain a no-load speed of 62 Hertz for 60 Hertz units (51 Hertz for 50 Hertz units).
6. Apply an electrical load to the generator as close as possible to the unit's rated wattage/amperage capacity.

Adjusting Governor 68985

a. Check the AC frequency with load applied.
b. If frequency droops below about 58 Hertz (60 Hertz units) or 49 Hertz (50 Hertz units), adjust the DROOP ADJUSTMENT downward.
c. Adjust the DROOP ADJUSTMENT until application of the load results in the smallest possible AC frequency droop.

NOTE: If surging occurs when electrical loads are removed, adjust the NO-LOAD BUMPER SCREW inward. If BUMPER SCREW adjustment changes the AC frequency, back the BUMPER SCREW out until no-load frequency returns to 62 Hertz (60 Hertz units) or to 51 Hertz (50 Hertz units).

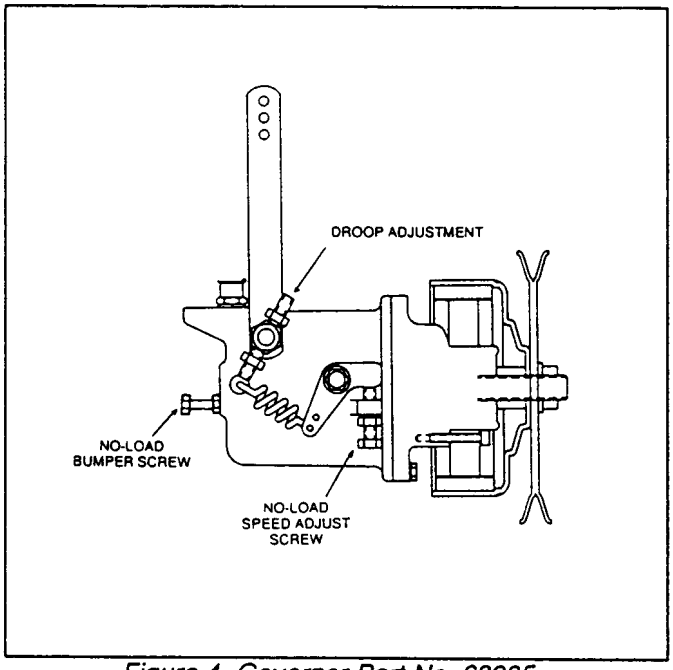

Figure 4. Governor Part No. 68985