Governors

Governor Purpose

- What purpose does the governor serve on a small engine?
- Have any of you ever unhooked the governor on a small engine such as a lawnmower?
- What affect did it have?

Governor Purpose cont'd

Governors serve three basic purposes:

- Maintain a speed selected by the operator which is within the range of the governor.
- Prevent over-speed which may cause engine damage.
- Limit both high and low speeds.

How does it work?

In General…

- When engine ‘load’ decreases, the governor immediately closes the throttle to counter then engine’s desire to speed up.
- When engine load is increased, the governor immediately opens the throttle to counter the engine’s desire to slow down.

Example #1

- The governor on your lawnmower maintains the set engine speed even when you mow through a clump of high grass or when you mow over no grass at all.

Example #2

- The governor on an electrical generator must maintain engine speed regardless of how many electrical loads are turned on or off.

Governor Types

Two types of governors commonly found on small engines:

- Pneumatic (air operated)
- Centrifugal (spining forces)

Pneumatic Governors (our governor)

Often called air-vane governors, they are operated by the stream of air flow created by the fins on the flywheel.

More on how our governor works later.

Centrifugal Governor (Honda go-karts)

Sometimes referred to as a mechanical governor, a centrifugal governor uses pivoted flyweights that are attached to a revolving shaft or gear driven by the engine.

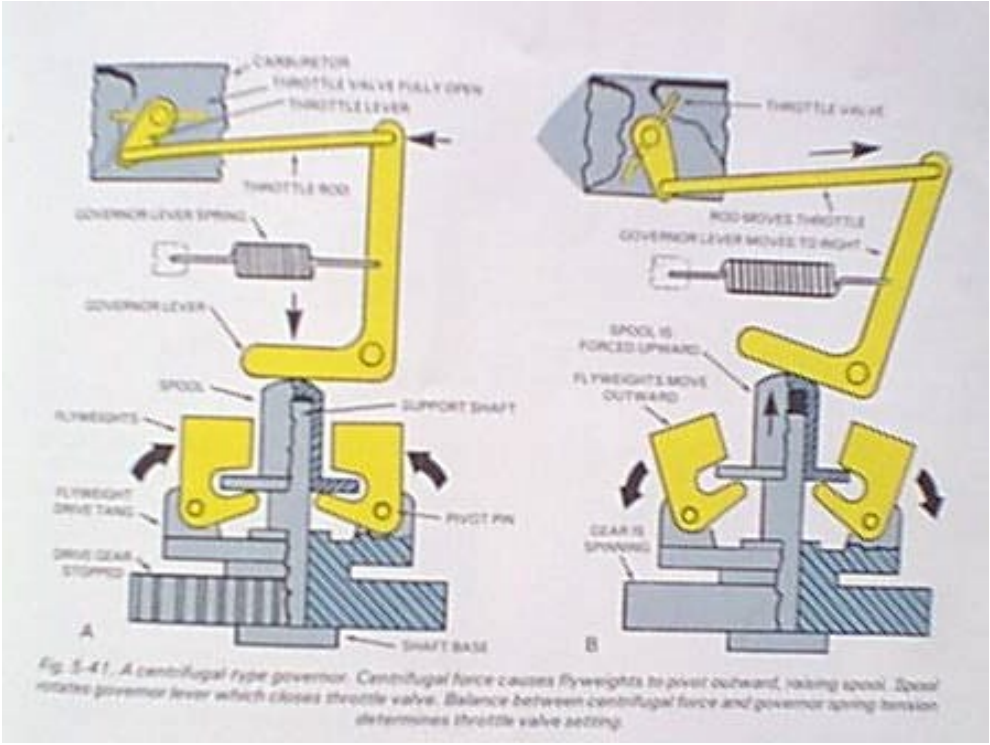
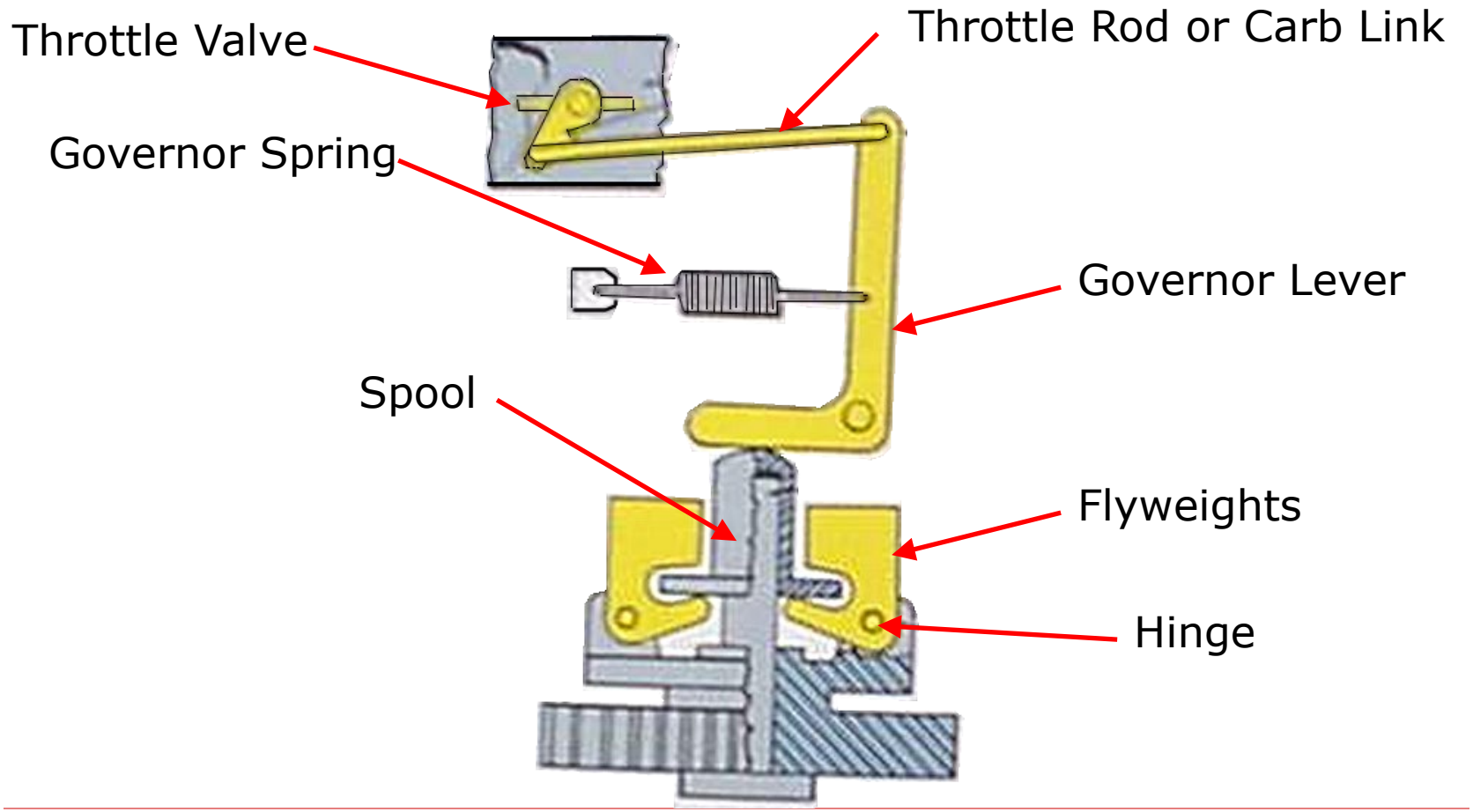


Fig. 5-41. A centrifugal type governor. Centrifugal force causes flyweights to pivot outward, raising spool. Spool rotates governor lever which closes throttle valve. Balance between centrifugal force and governor spring tension determines throttle valve setting.

Centrifugal Governor (Honda go-karts)

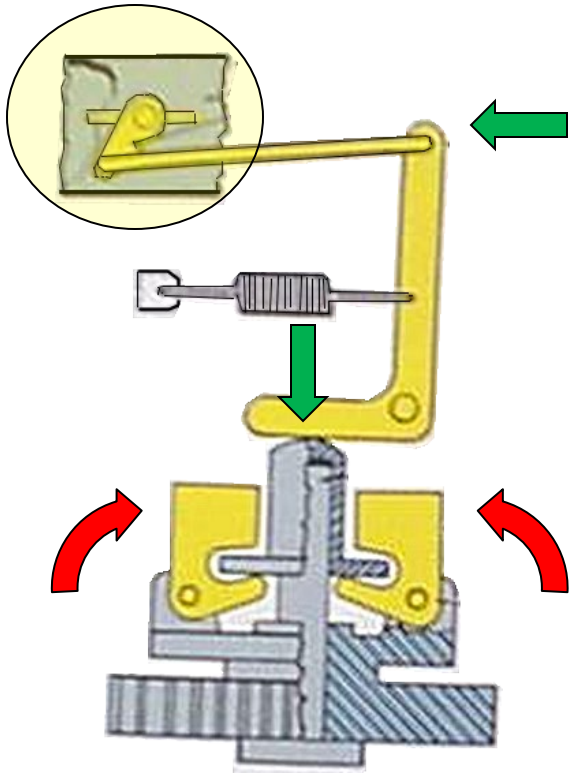


Centrifugal Governor (operation)

Scenario – load increase

When engine load increases, the resulting speed reduction lessens centrifugal force on the flyweights.

Springs pull the weights inward, lowering the spool and governor lever, opening the throttle to maintain engine speed.

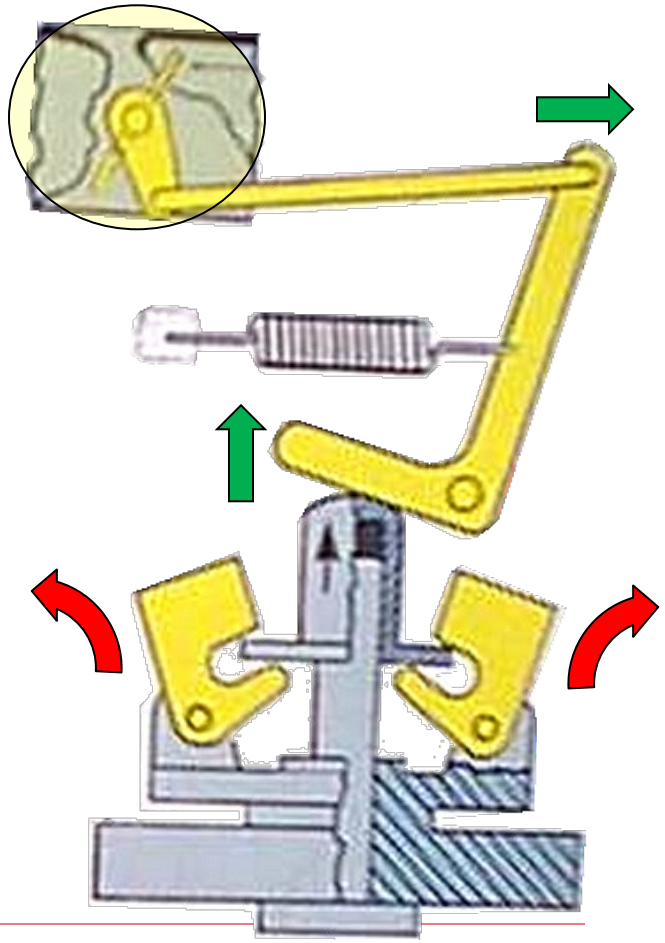


Centrifugal Governor (operation)

Scenario – load decreases

When engine load decreases, the resulting speed increase raises the centrifugal force on the flyweights

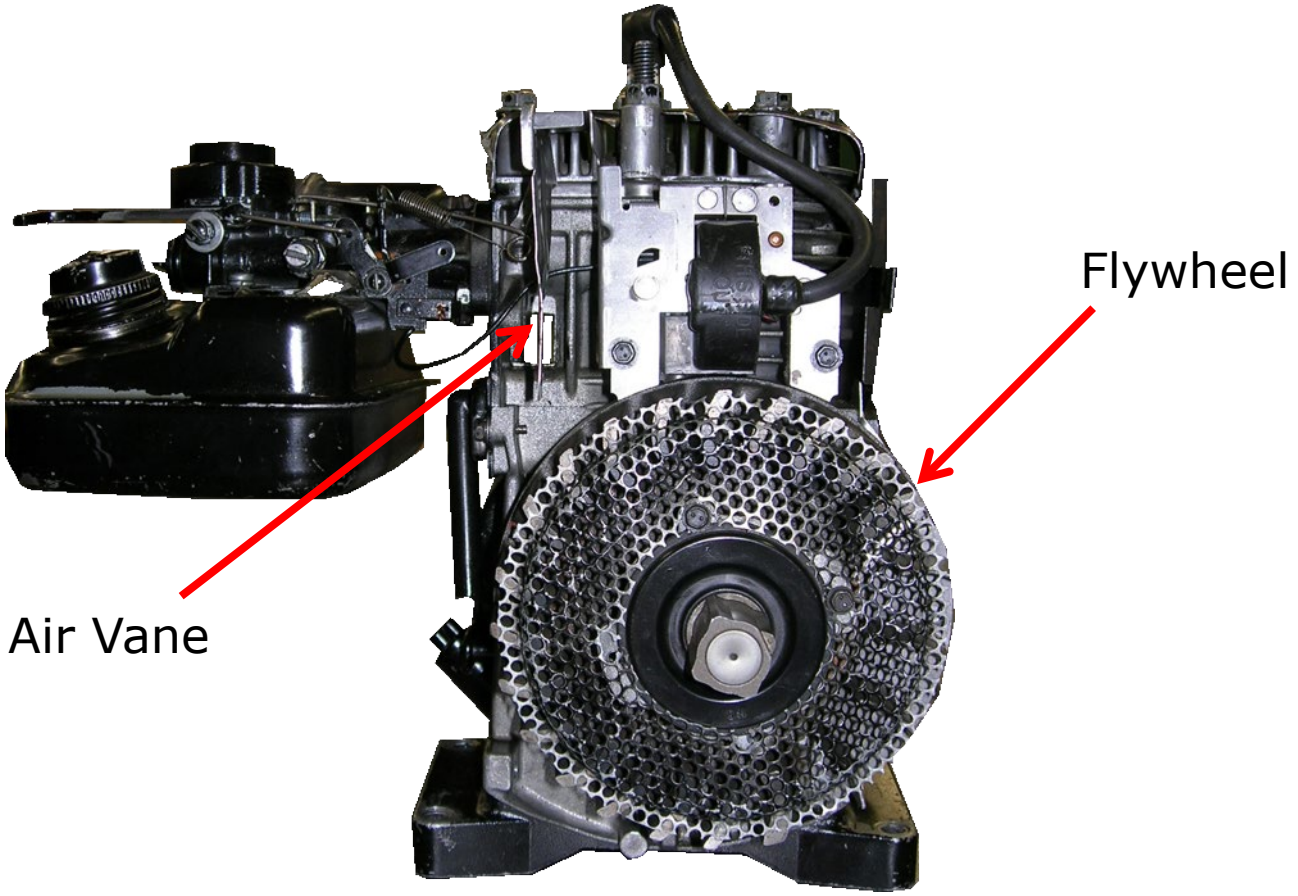
The weights move outward, raising the ‘spool’ and governor lever, closing the throttle to maintain engine speed.



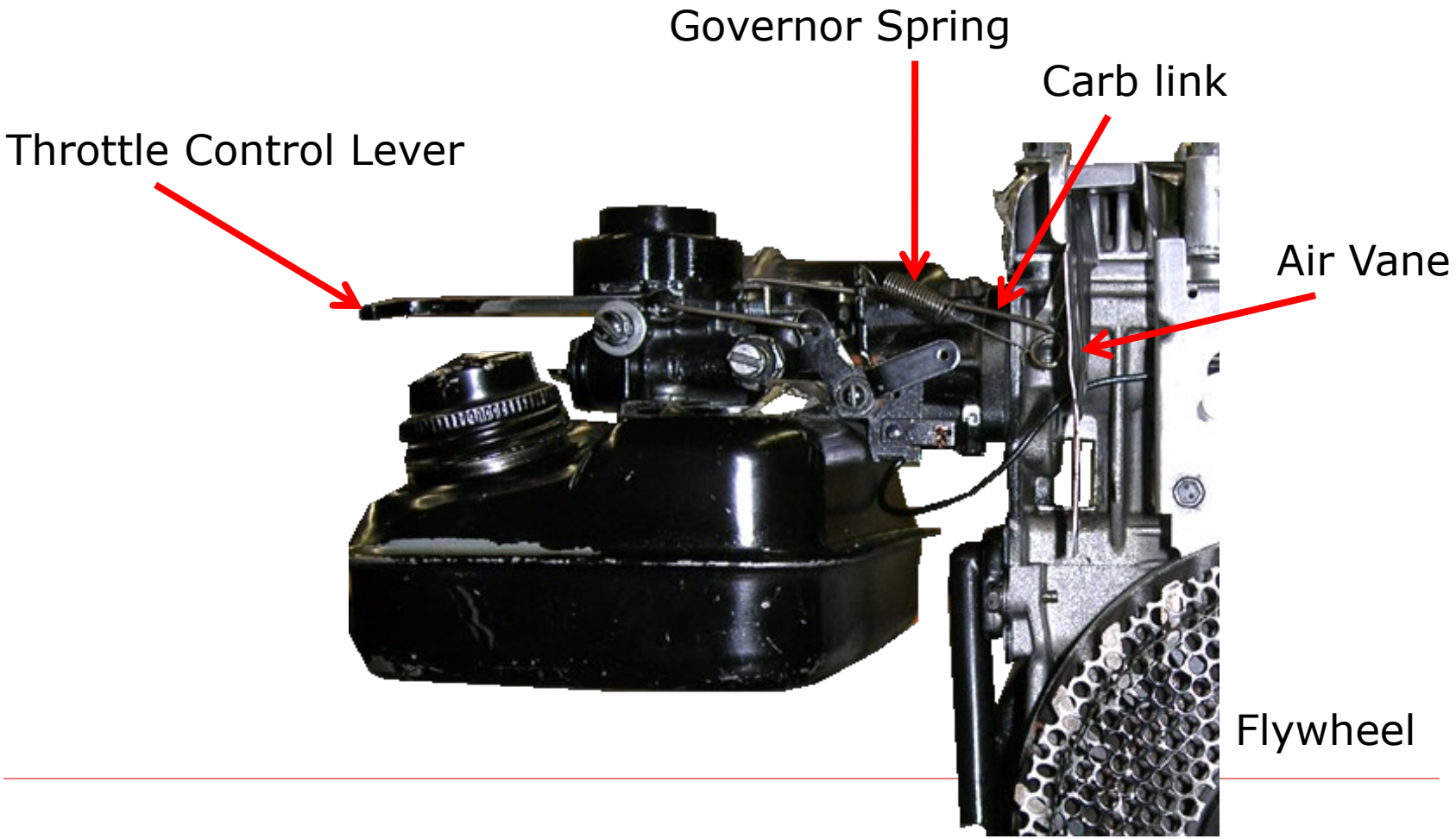
Governor ‘Hunting’

- Hunting is a condition whereby the engine speed fluctuates or is erratic usually when first started.
- The engine speeds up and slows down over and over as the governor tries to regulate the engine speed.
- This is usually caused by an improperly adjusted carburetor.

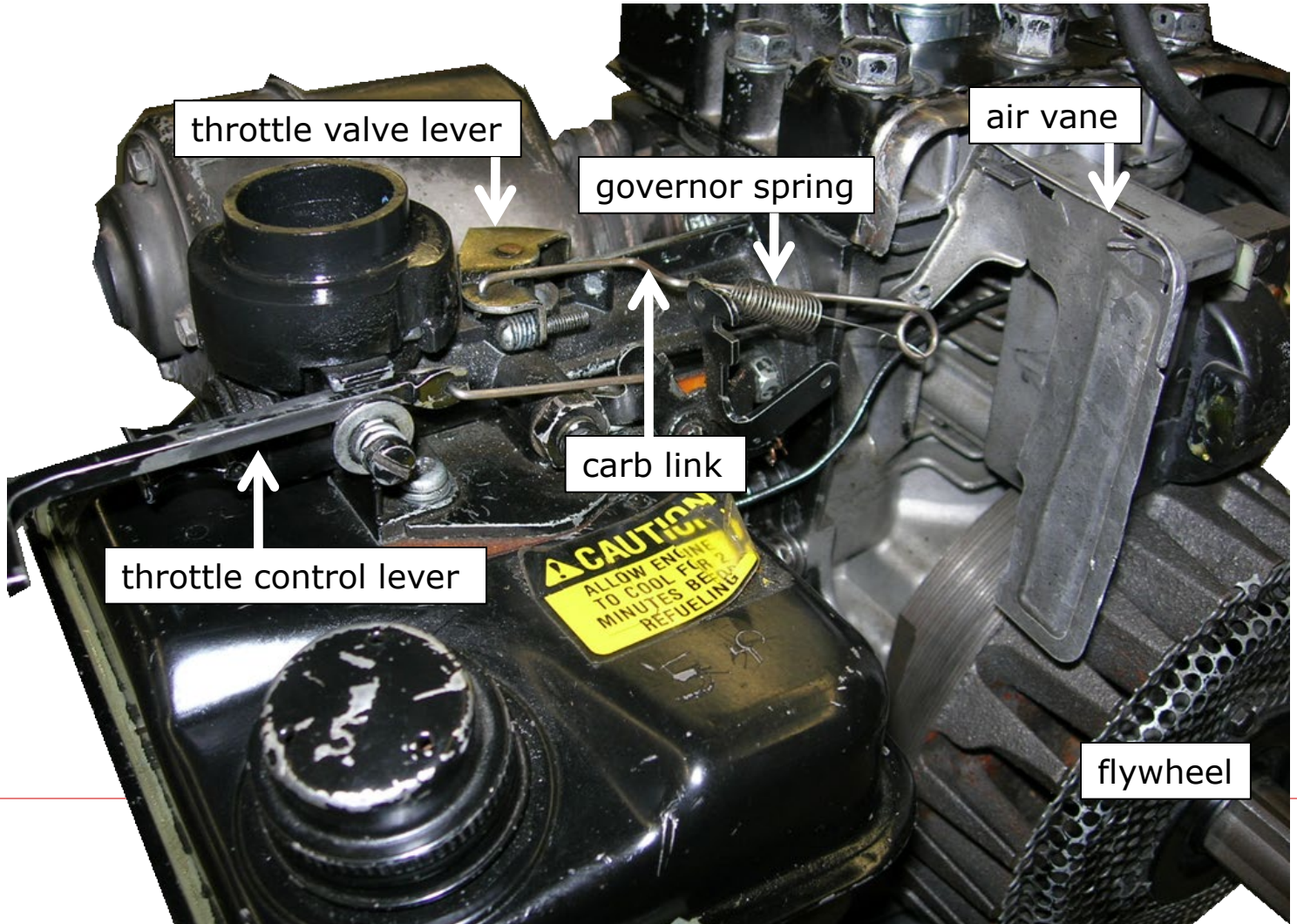
Air Vane Governor - components



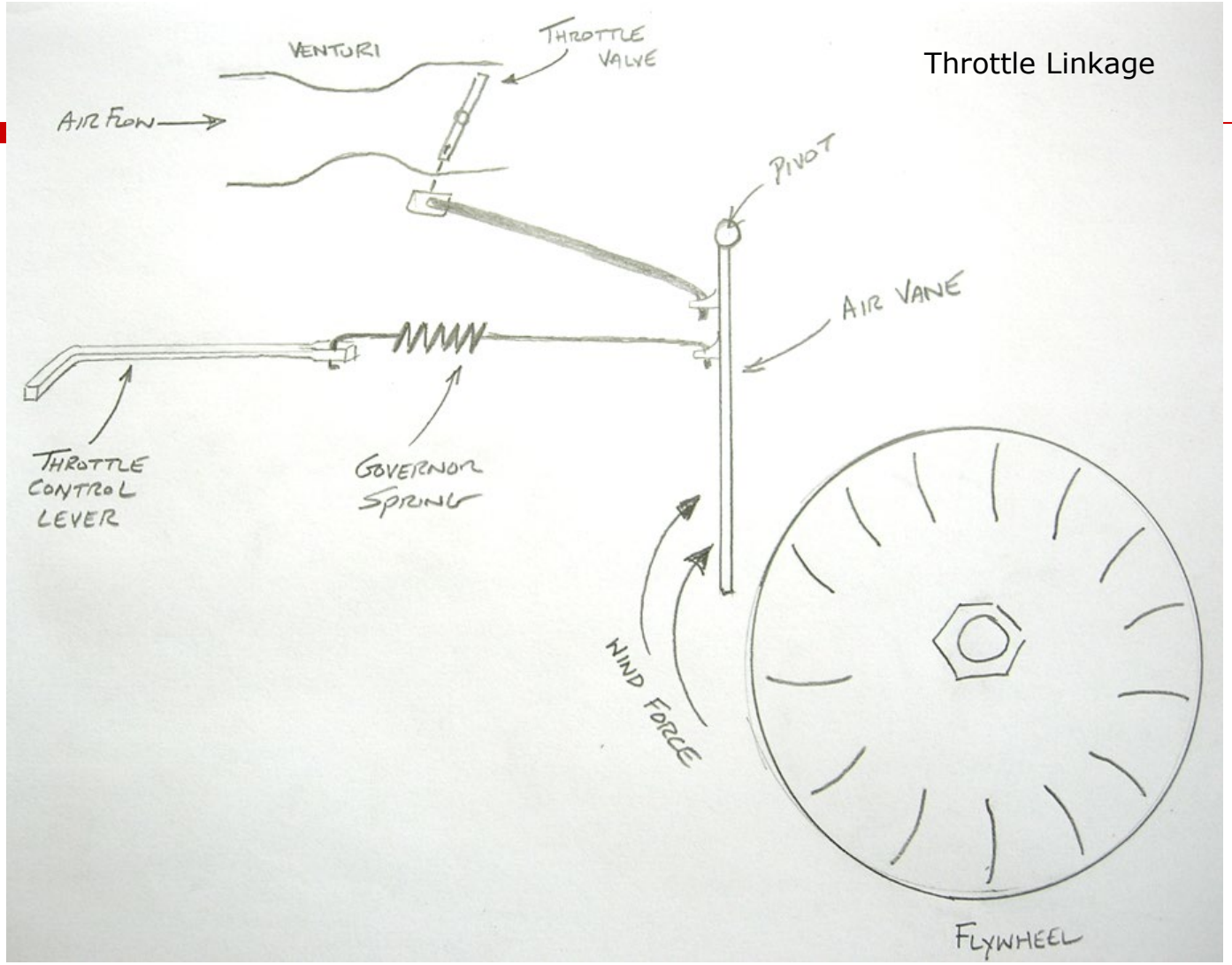
Air Vane Governor – components cont'd



Air Vane Governor – components cont'd



Air Vane Governor Operation



Drawing of <u>simplified</u> Air Vane Governor System

Air Vane Governor Operation cont'd.

Governor Operation – Scenario 1

Starting

Air Vane Governor Operation (starting)

1. Throttle control lever set by operator to fast position.
2. Governor spring tension pulls air vane and opens throttle valve via carb linkage.
3. Engine is started and engine speed increases
4. Wind force against governor air vane increases as speed increases
5. When engine speed achieves enough wind force to overcome gov. spring tension applied to air vane the air vane will move closing off throttle valve via carb link.
6. A balance is achieved between governor spring tension and wind force on air vane and throttle valve is now holding speed as originally set by operator.

Air Vane Governor Operation

Governor Operation – Scenario 2

Lawnmower is pushed from driveway into deep grass

Load Change = minimal to large

Air Vane Governor Operation (load increase)

1. Load increase causes engine speed to slow
2. Air force against air vane is reduced
3. Tension on governor spring pulls on air vane opening throttle valve via carb linkage.
4. Engine speed increases and with it air force on governor vane increases.
5. Governor air van moves until a balance is achieved between governor spring tension and air force on governor air vane.
6. Throttle valve is now positioned to maintain same speed as original, however is now open more to do so.

Air Vane Governor Operation

Governor Operation – Scenario 3

Lawnmower is pushed from deep grass onto driveway

Load Change = large to minimal

Air Vane Governor Operation (load decrease)

1. Load on engine decreases causing engine to speed up.
2. Air force against governor vane increases
3. Air vane overcomes governor spring tension and moves to close throttle valve via carb linkage.
4. Engine speed decreases and with it air force on governor air vane decreases.
5. Governor spring pulls air vane until balance is achieved between its tension and air force on air vane.
6. Throttle valve is now positioned to maintain same speed as original, however is now less open to do so.