Wing Flaps

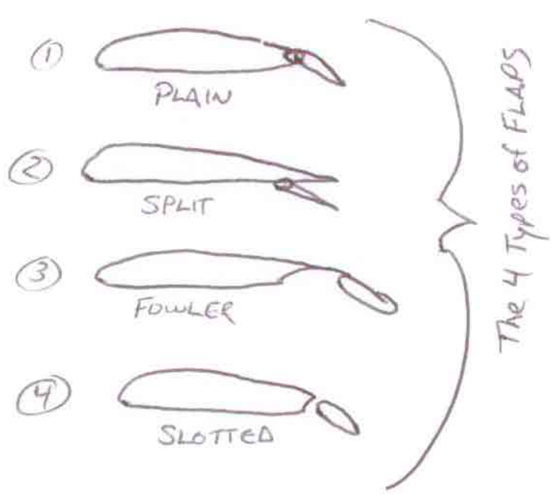
What are Flaps?
Flaps are a movable part of the wing normally hinged to the inboard trailing edge of each wing.

Why do we have Flaps?
Flaps allow the pilot to make steeper approaches to land without an increase in airspeed. (Permit slower approaches which decreases the distance of landing roll) Flaps also allow the pilot to become airborne in shorter distances and climb out over obstacles in a shorter distance.

Theory of Operation…
By extending the flaps you change the chord line and the camber of the wing producing more lift and increasing induced drag.

Four Types of Flaps:

1. **Plain:** Hinged pivot, moves downward. (Changes cord line, camber, and angle of attack)
2. **Split:** Hinged part of the BOTTOM of the wing. (Increases angle of attack by changing chord line)
3. **Fowler**: Tilts downward and rearward on track. (Increases angle of attack, wing camber, and wing area) More lift without much addition of drag.
4. **Slotted Flap**: (ARROW II) Changes wing camber and chord line, also lets a portion of high pressure air beneath the wing to travel through a slot. (increases velocity of air increasing lift)



Propellers

Two types of "props"…

Fixed Pitch propellers are designed to work best at one rotation speed and one cruise speed.

Constant Speed Adjustable Pitch propellers are pilot controlled for any situation. These propeller systems are hydraulically actuated and governor regulated.

How it works… Oil pressure acting on the piston twists the blades toward HIGH PITCH LOW RPM's, when oil pressure to the piston in the propeller hub is relieved, centrifugal force assisted by an internal spring twists the blades toward LOW PITCH HIGH RPM's.

Theory of Operation… A prop governor is needed that will detect minor changes in RPM's as they occur, the governor then sends a signal to the prop hub to hydraulically change the position of the blades to slow the prop (by increasing the pitch) or to speed it up. (by decreasing the pitch)

PARTS OF THE SYSTEM

Flyweights… Centrifugal force detects minor changes of RPM's before they ever appear on the tachometer.

Speeder Spring… The pilot sets the compression force in this spring by positioning the prop control. This sets the desired position of the flyweights. (i.e. the desired RPM)

Hydraulic System and Pilot Valve… Engine oil is used to apply hydraulic force to the prop blades through the selector valve. (the pilot valve)

(insert graphic)

FOR TAKEOFF AND LANDING…

1. High RPM
2. Low Oil Pressure
3. Low Pitch

FOR CRUISE FLIGHT…

1. Low RPM
2. High Oil Pressure
3. High Pitch

IF THE SPEEDERSPRING BREAKS??? overspeed — too much oil into piston

1. Throttle – to the Retard Position
2. Oil Pressure – Check
3. Prop Control – Full Back

4. Airspeed – Reduce
5. Throttle – Retard below 27"/2700 RPM

LOSS OF OIL PRESSURE

1. The big ^internal spring pushes prop forward. (High Pitch/Low RPM's)

FOR BEST GLIDE

1. Propeller Control – Pull Back

Pitch settings

High – 29 ± 2

Low – 14 ± .2

Overspeed

^

oil in

Underspeed

oil out.

F - Flaps
B - Boost Pump
C - cowl flaps

G - gas (set)
U - undercarriage (gear)
M - mixture
P - propellor
L - Landing Light
E - engine gauges (oil t, oil p, ammeter, vaccum)
S - seat belts

PROPS

FIXED PITCH propellers are designed to work best at one rotation speed and one cruise speed

CONTSANT SPEED ADJUSTABLE PITCH hydraulically actuated and governor-regulated

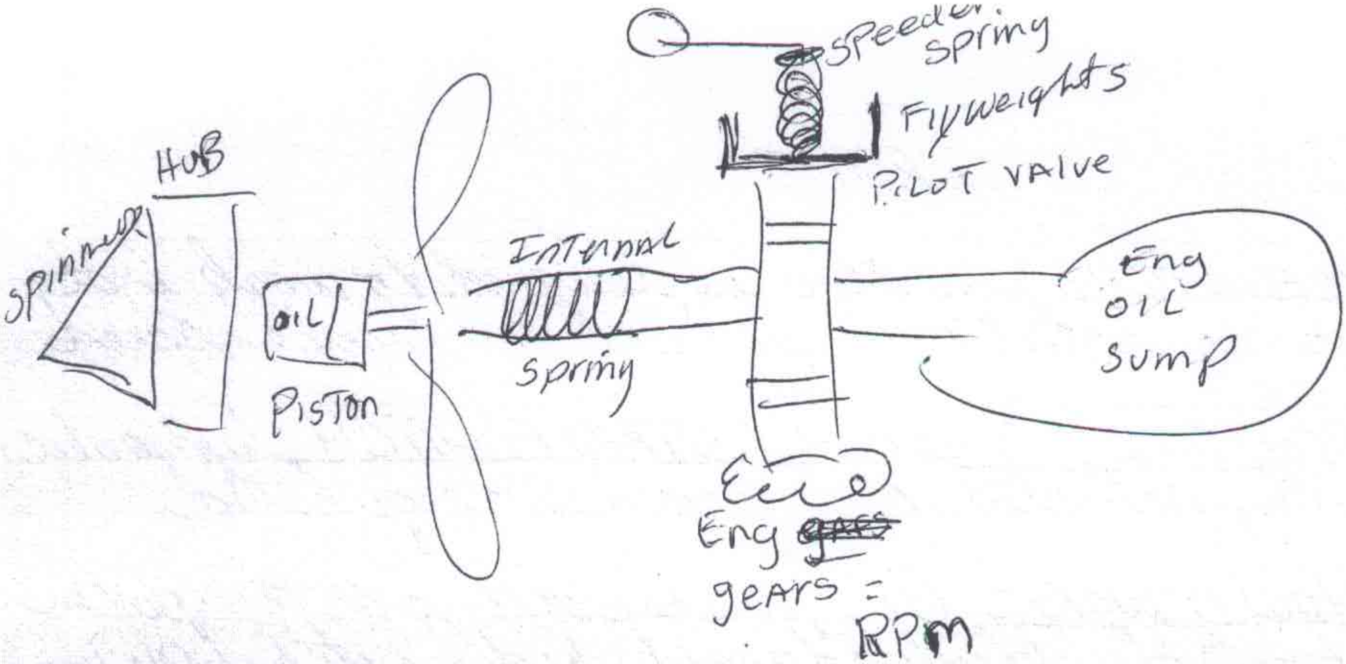
HOW IT WORKS Oil pressure acting on the piston twists the blades toward high pitch LOW RPM'S. When oil pressure to the piston in the propeller hub is relieved, centrifugal force, assisted by an internal spring, twists the blades toward low pitch HIGH RPM

THEORY OF OPERATION A prop governor is needed that will detect minor changes in RPMs as soon as they occure, The governor then sends a signal to the prop hub to hydraulically change the position of the blades to slow the prop (by increasing the pitch) or speed it up (decrease the pitch).

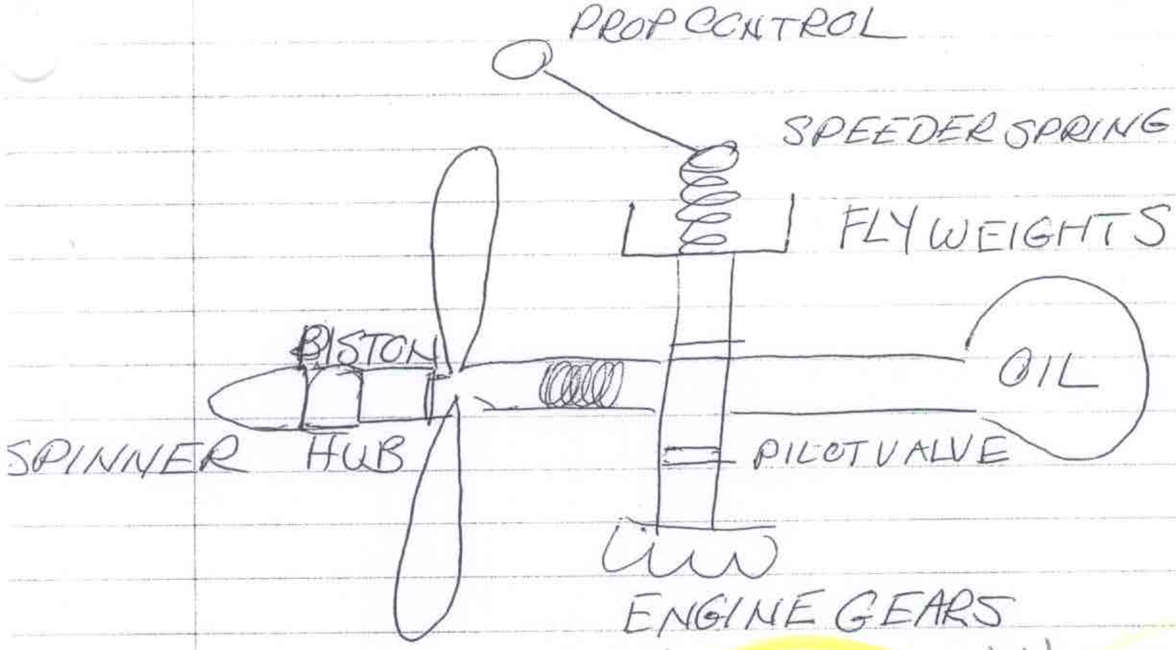
FLYWEIGHTS centrifugal force detects minor changes of RPM before they ever appear on the tachometer

SPEEDER SPRING pilot sets the compression force in this spring by positioning the prop control. This sets the desired position of the flyweights (the desired RPM)

HYDRALIC SYSTEM AND PILOT engine oil is used to apply hydraulic force to the prop blades through the selector valve (pilot valve)



Speeder spring
Flyweights
Pilot valve
HUB
Spinner
OIL
Piston
Internal
spring
Eng
OIL
sump
Eng ~~gears~~
gears =
RPM



PITCH SETTING
(FULL) HIGH 29 ± 2
(FULL) LOW 14 ± .2

what happens with
① OVERSPEED — lets OIL IN
② UNDERSPEED — lets OIL OUT
to maintain RPM's

T/O & LANDING
HIGH RPM
LOW OIL PRESS
LOW PITCH

CRUISE
LOW RPM
HIGH OIL PRESS
HIGH PITCH

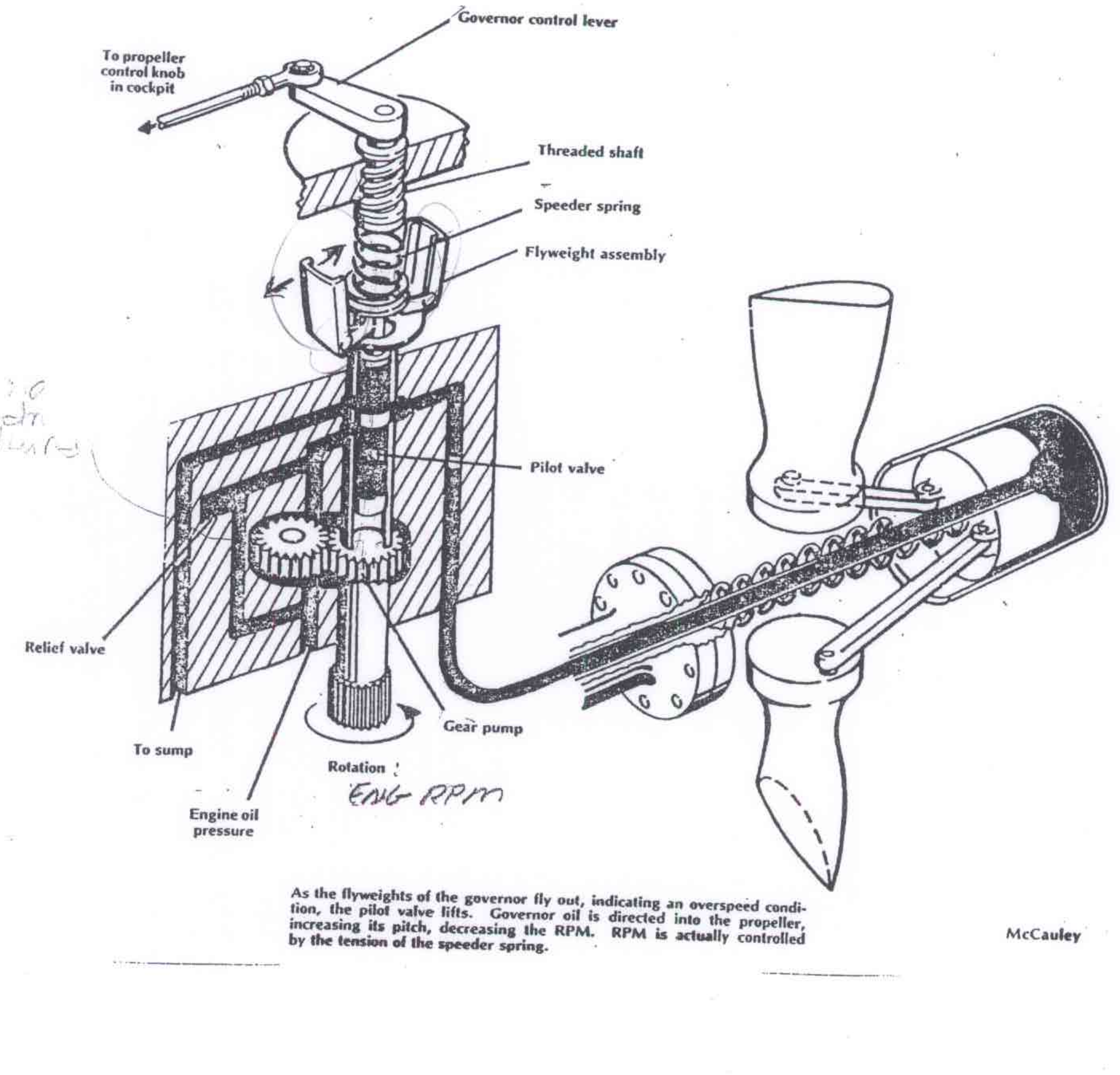
← up on board →

* SPEEDER SPRING BREAKS ? - OVERSPEED
1 THROTTLE - RETARD
2. OIL PRESSURE - CHECK
3. PROP CONTROL - FULL DECREASE
4) AIRSPEED REDUCE
5) THROTTLE BELOW 2700

* LOST OF PRESSURE (OIL)
BIG SPRING PUSHS PROP FORWARD
(then throttle controls

* BEST GLIDE
PULL PROP BACK

16



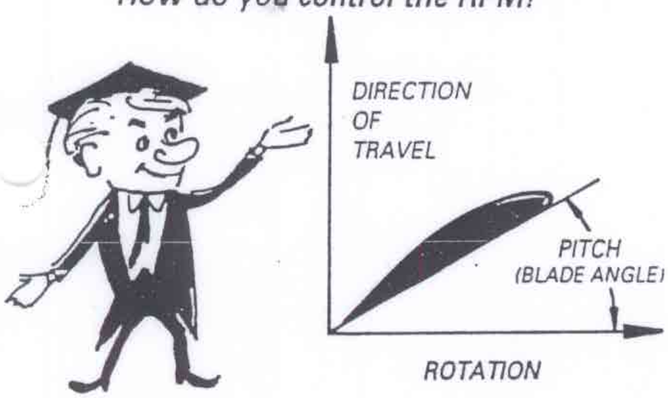
As the flyweights of the governor fly out, indicating an overspeed condition, the pilot valve lifts. Governor oil is directed into the propeller, increasing its pitch, decreasing the RPM. RPM is actually controlled by the tension of the speeder spring.

McCauley

Professor, what do you mean by a "constant speed" system?

We mean a constant RPM system that permits the pilot to select the propeller — and engine — speed he wants for any situation, and then automatically maintain that RPM under varying conditions of airspeed and power.

How do you control the RPM?



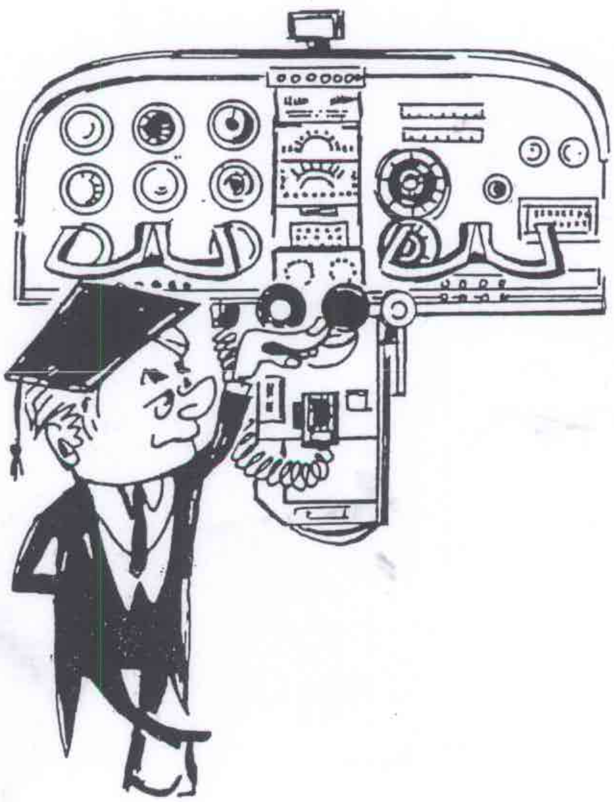
We do it by varying the pitch of the propeller blades. In the sense that we're talking about it, the pitch is the angle of the blades with relation to the plane of rotation. As the blade angle is reduced, the torque required to spin the propeller is reduced and, for any given power setting, the air speed and RPM of the engine will tend to increase. Conversely, if the blade angle increases, the required torque increases. Then the engine, and the propeller, will tend to slow down. Thus, by varying the blade angle or pitch of the propeller, we can control the RPM.

EDITOR'S NOTE: Don't let the professor's looks ol you. He knows his stuff.

Do you mean that the propeller operates at the same speed all of the time?

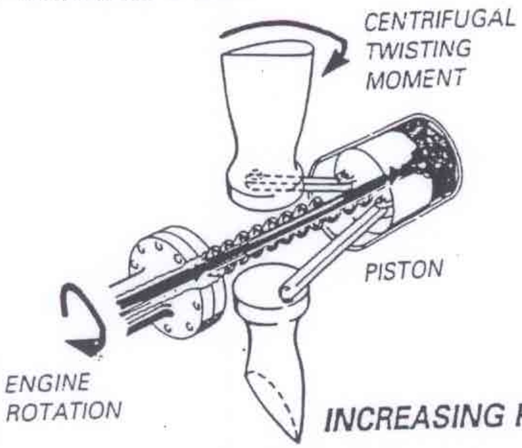
Heavens, no! That would never do.

Remember, we said that the system permits the pilot to select the RPM he wants. He has a control in the cockpit for this. When he wants maximum power at low air speed, such as for take-off, he pushes this control full forward. With full throttle, this gives him low pitch and maximum RPM. This is great for getting off the ground, but it's normally not desirable for cruising at high air speeds. So, for cruising, he can ease back on the throttle and the propeller control. This increases the pitch and the speed settles into the desired RPM for cruise conditions. The RPM automatically stays set until he moves the control.



How do you change the pitch of the blades?

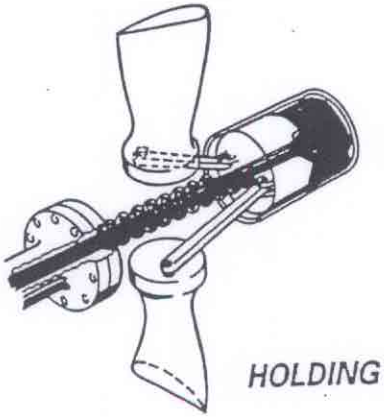
We do it hydraulically in a single acting system, using oil from the propeller governor to increase the pitch of the propeller blades.



INCREASING PITCH

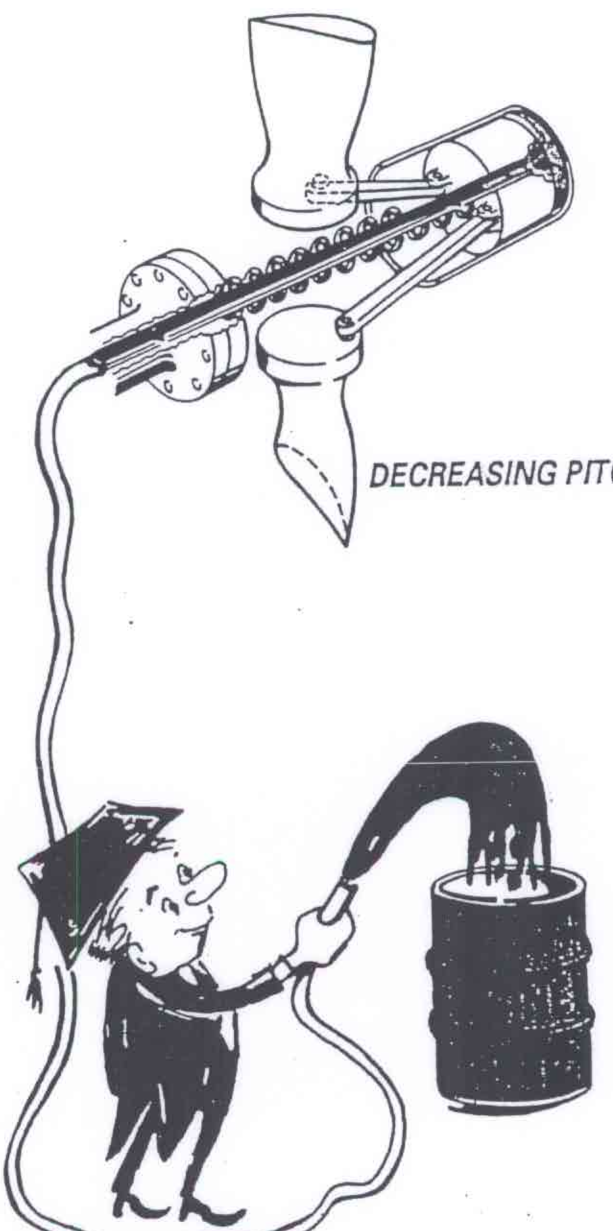
In the propeller, oil pressure acting on the piston produces a force that is opposed by the natural centrifugal twisting moment of the blades and a spring. To ncrease the pitch or blade angle, we direct high pressure oil to the propeller. This moves the piston back. Motion of the piston is transmitted to the blades through the actuating links and pins, moving the blades toward high pitch.

When the opposing forces are equal, oil flow to the propeller stops, and the piston will stop also. The piston will remain in this position, holding the pitch of the blades constant until oil flow to or from the propeller is established by the governor.



HOLDING PITCH

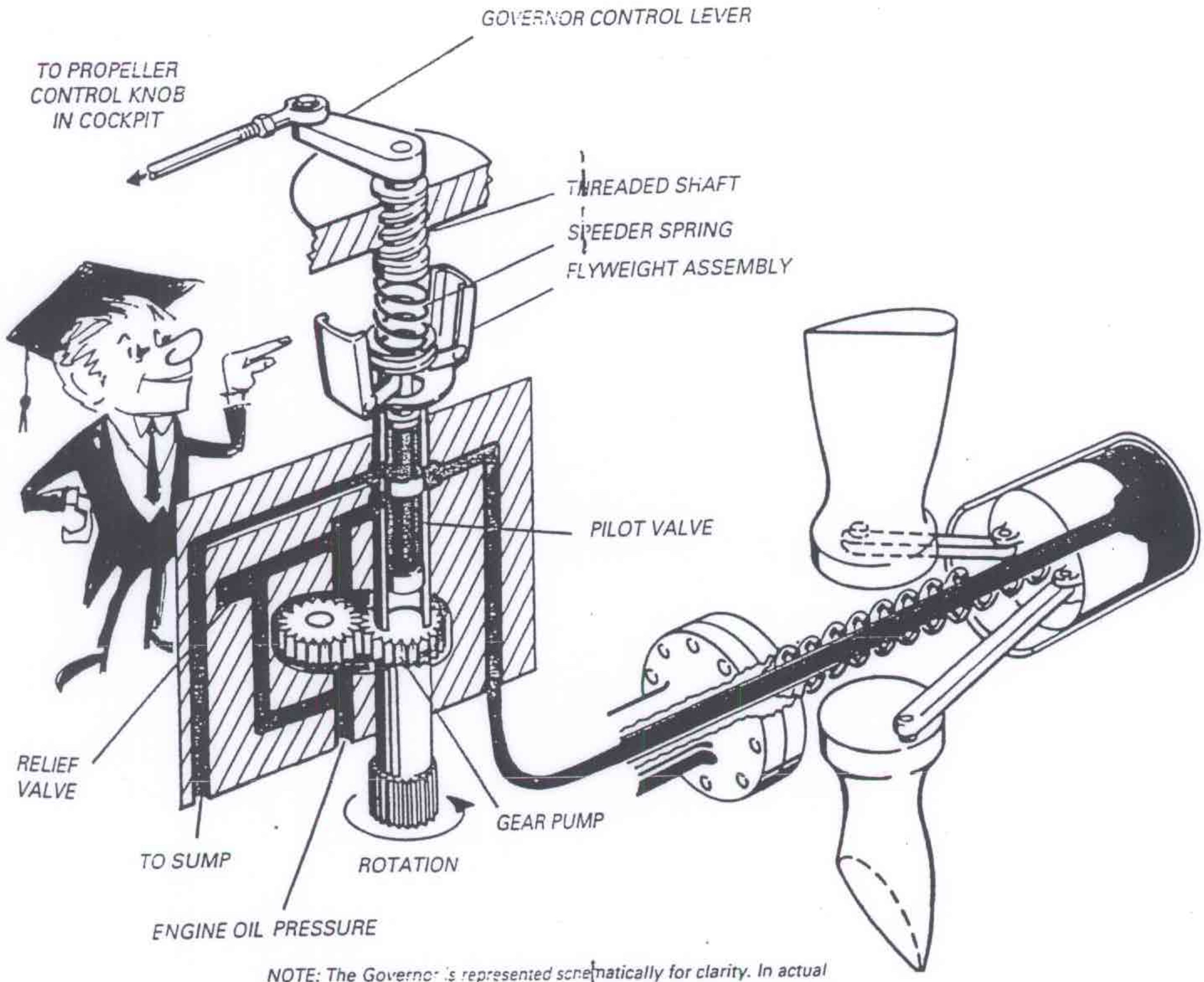
Pitch is decreased by allowing oil to flow out of the propeller and be returned to the engine sump. When the governor initiates this procedure, hydraulic pressure is decreased and the piston moves forward, moving the blades toward low pitch. The piston will continue to move forward until the opposing forces are again equal.



DECREASING PITCH

Although they aren't shown in our illustrations, mechanical stops are installed in the propeller to limit travel in both the high and low pitch directions.

So you do it with oil. How, Professor?



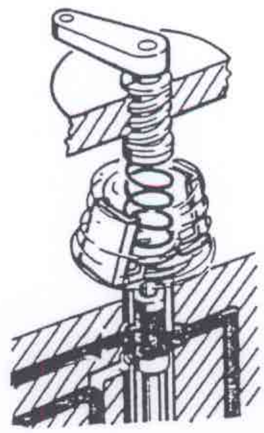
NOTE: The Governor is represented schematically for clarity. In actual construction, the sump return is down through the center of the pilot valve.

A look at the total system will help to explain this. Besides the propeller, the other major component of the system is the governor. The governor mounts on, and is geared to, the engine. This drives the governor gear pump and the flyweight assembly. The gear pump boosts engine oil pressure to provide quick and positive response by the propeller. The rotational speed of the flyweight assembly varies directly with

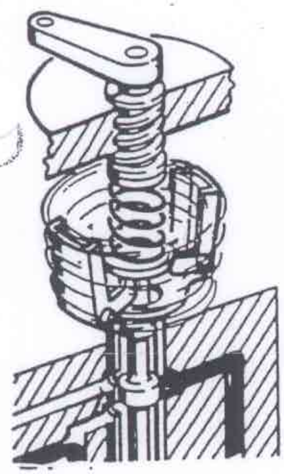
engine speed and controls the position of the pilot valve. Depending on its position, the pilot valve will direct oil flow to the propeller, allow oil to flow back from the propeller, or assume a neutral position with no oil flow. As we saw earlier, these oil flow conditions correspond to increasing pitch, decreasing pitch or constant pitch of the propeller blades.

How do the flyweights change the position of the pilot valve?

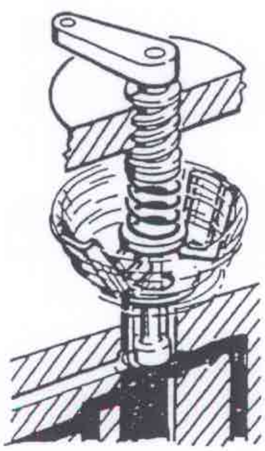
By utilizing centrifugal force.



The "L" shaped flyweights are installed with their lower legs projecting under a bearing on the pilot valve. When the engine RPM is lower than the propeller control setting, the speeder spring holds the pilot valve down and oil flows from the propeller.



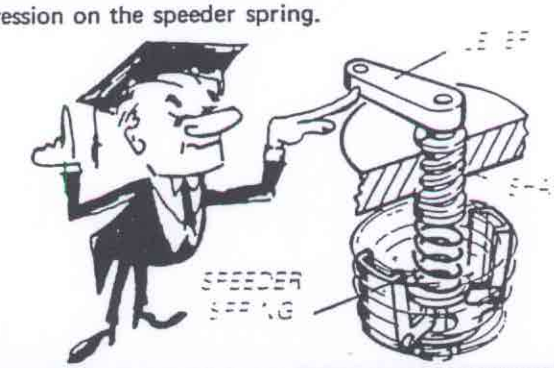
As engine RPM increases, the tops of the weights are thrown outward by centrifugal force. The lower legs then pivot up, raising the pilot valve against the force of the speeder spring, so there is no oil flow to or from the propeller.



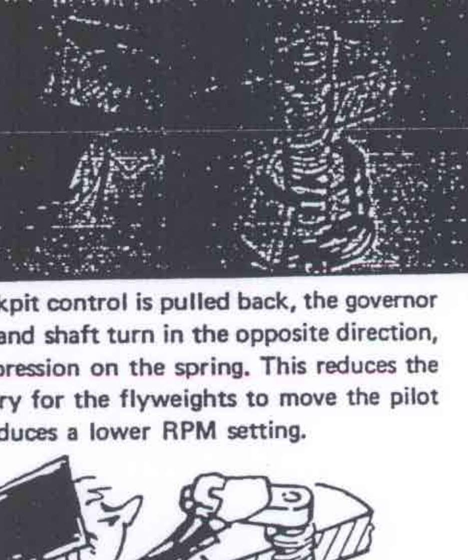
The faster the flyweights spin, the further out they are thrown, causing the pilot valve to be raised and allowing more oil to flow from the propeller.

How does the aircraft pilot control this governor action?

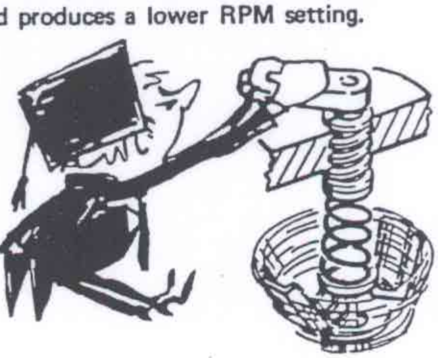
The cockpit control is connected to the governor control lever. The lever is attached to a threaded shaft. As the lever is moved, the threaded shaft turns and moves up or down to increase or decrease compression on the speeder spring.



When the cockpit [illegible] is moved [illegible] [illegible] screwed down [illegible] [illegible] This means [illegible] the pilot [illegible]



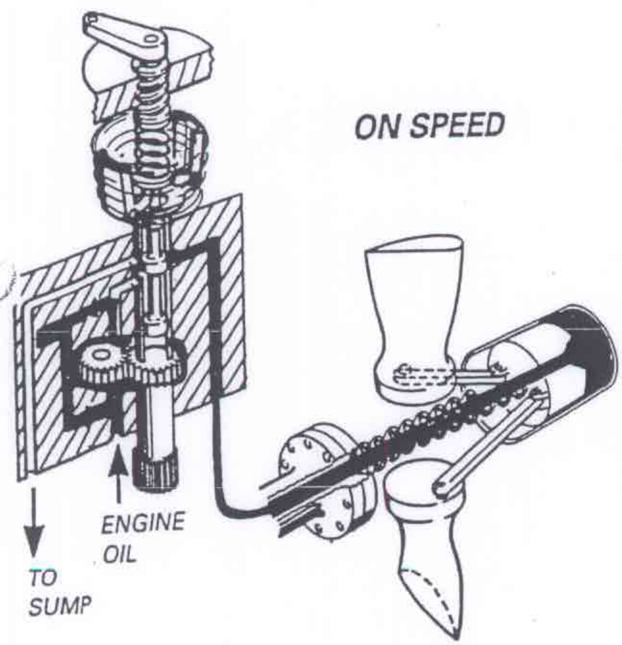
When the cockpit control is pulled back, the governor control lever and shaft turn in the opposite direction, relaxing compression on the spring. This reduces the speed necessary for the flyweights to move the pilot valve and produces a lower RPM setting.



Thus, with the cockpit control, the aircraft pilot can shift the range of governor operation from high RPM to low RPM or any area in between.

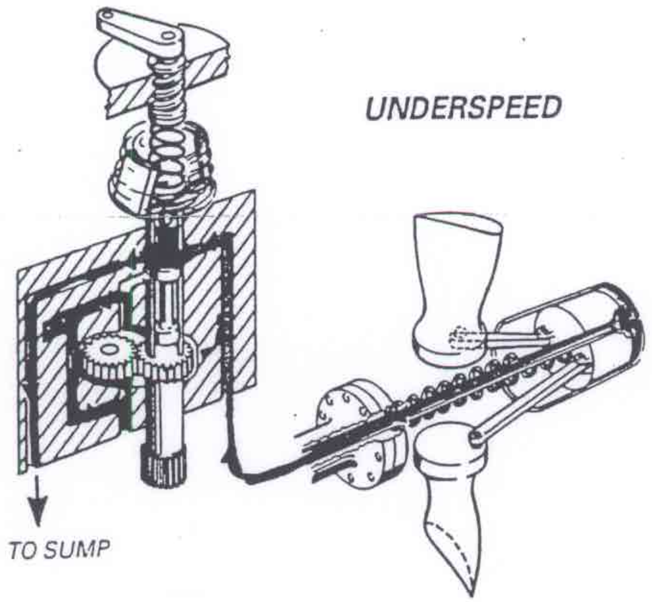
So how does all this result in constant speed?

By producing what is known as an ON SPEED condition. This exists when the RPM is constant. Movement of the cockpit control has set the speeder spring at the desired RPM. The flyweights have positioned the pilot valve to direct oil to or from the propeller. This, in turn, has positioned the propeller blades at a pitch that absorbs the engine power at the RPM selected. When the moment of RPM balance occurs, the force of the flyweights equals the speeder spring load. This positions the pilot valve in the constant RPM position, with no oil flowing to or from the propeller.



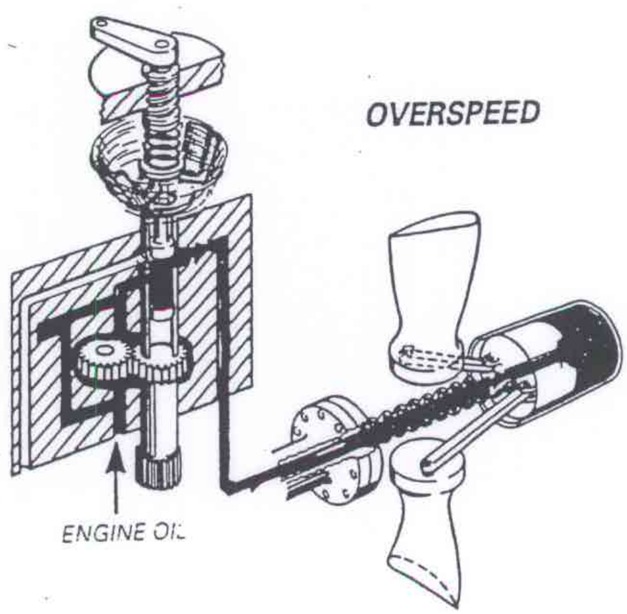
OK, so we're flying along at constant RPM. What happens if the airplane begins to climb of engine power is decreased?

This results in an UNDERSPEED condition. Airspeed is reduced and, since the pitch of the propeller blades is too high, the engine starts to slow down. However, the instant this happens the flyweights will droop, causing the pilot valve to move down. Then oil flows from the propeller, reducing the pitch of the blades. This automatically increases the speed of the engine to maintain the former RPM setting.



What happens if the airplane goes into a descent or engine power is increased?

This causes an OVERSPEED condition. Airspeed increases. Since the pitch of the propeller blades is too low to absorb engine power, the engine RPM begins to increase. But the instant this happens, the flyweights move out and raise the pilot valve. This, in turn, causes oil to flow to the propeller, increasing the pitch of the blades. Engine speed then slows down to maintain the original RPM setting.



Fixed-Pitch Propellers are designed to work best at One Rotation Speed and One Cruise Speed.

Our propeller is a Constant Speed, Hydraulically Actuated, and Governor-Regulated.

How it works:

Oil Pressure Acting on the Piston Twists the Blades Toward High Pitch (Low RPM).

When oil pressure to the piston in the propeller hub is relieved, centrifugal force, assisted by an internal spring, twists the blades toward low pitch (High RPM).

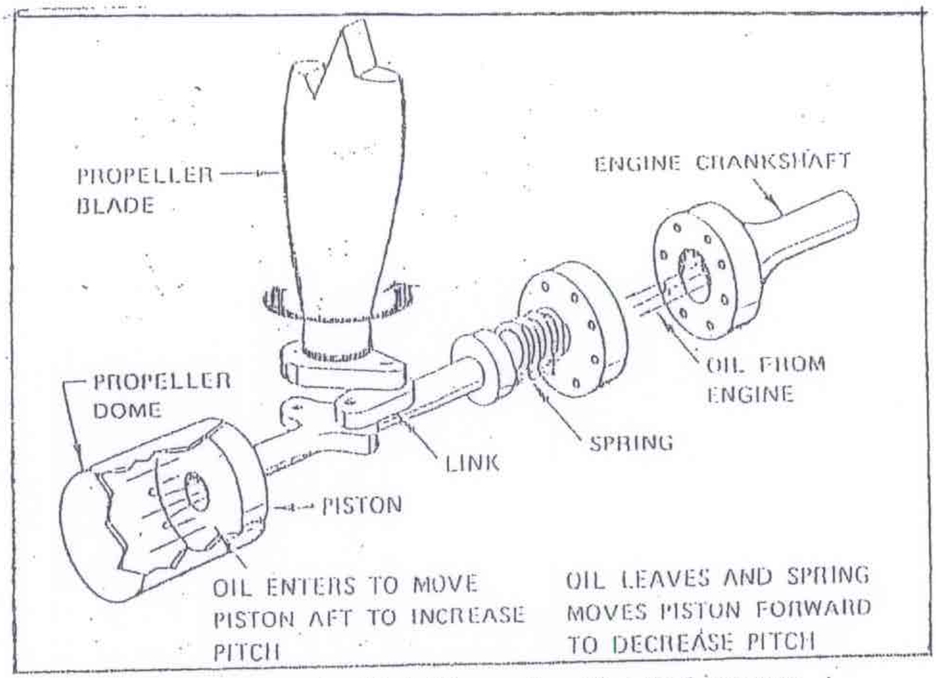


Fig. 2-62. Schematic of Typical Constant-Speed Propeller Components

~~High oil pressure = High RPM / Low Pitch => Takeoff and Landing~~

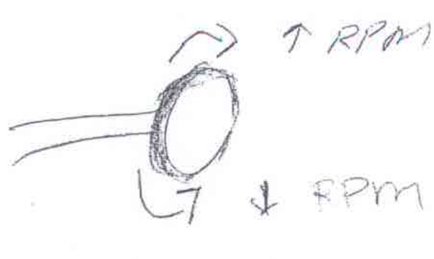
~~Low oil pressure = Low RPM / High Pitch => Cruise~~

~~Prop~~ ~~Forward~~

~~Cruise~~ High Pitch T-O / LDG

~~Prop Back~~ ~~T-O LDG~~ Low Pitch Cruise

~~Vernier Type Control = Fine Tuning the RPM~~



❑ CONSTANT SPEED PROPELLERS

- Blade angle (pitch) of the prop automatically adjusts for each flight situation for maximum efficiency, once the pilot presets the desired RPM.

- RPM is kept constant, once set by the pilot, by automatic pitch changes which changes the prop drag.

- Most efficient blade angles are achieved commensurate with the flight situation (e.g., takeoff, cruise).

- TAKEOFF
  - Maximum RPM is desired so that engine can develop its maximum power =>
  - Prop control is set to maximum RPM (Minimum Pitch) with minimum prop drag.

- CLIMB
  - Slight RPM decrease desired (to prolong engine life and decrease noise) =>
  - Prop control is set for slightly reduced RPM (Slightly increased pitch) and increased prop drag slows the prop RPM.

- CRUISE
  - Increased pitch is desired (for improved bite of the air) =>
  - Prop control is moved to a reduced RPM (increased pitch) setting.

❑ MORE ABOUT CONSTANT SPEED PROPELLERS

- THEORY OF OPERATION
  - A mechanism (prop governor) is needed that will detect minor changes in RPM as soon as they begin to occur
  - The governor then sends a signal to the prop hub to hydraulically change the position of the blades to slow the prop (by increasing the pitch) or speed it up (decrease the pitch).

❑ COMPONENTS OF PROP GOVERNOR

- FLYWEIGHTS
  - Centrifugal force detects minor changes of RPM before they even appear on the tachometer.

- SPEEDER SPRING
  - Pilot sets the compression fore in this spring by positioning the prop control
  - This sets the desired position of the flyweights (the desired RPM).

- HYDRAULIC SYSTEM AND PILOT VALVE
  - Engine oil is used to apply hydraulic force the prop blades through the selector valve ("pilot valve").

❑ CONSTANT SPEED PROP OPERATION

- Moving the throttle changes the manifold pressure (MP)
  - MP gauge register atmospheric pressure when the engine is not running

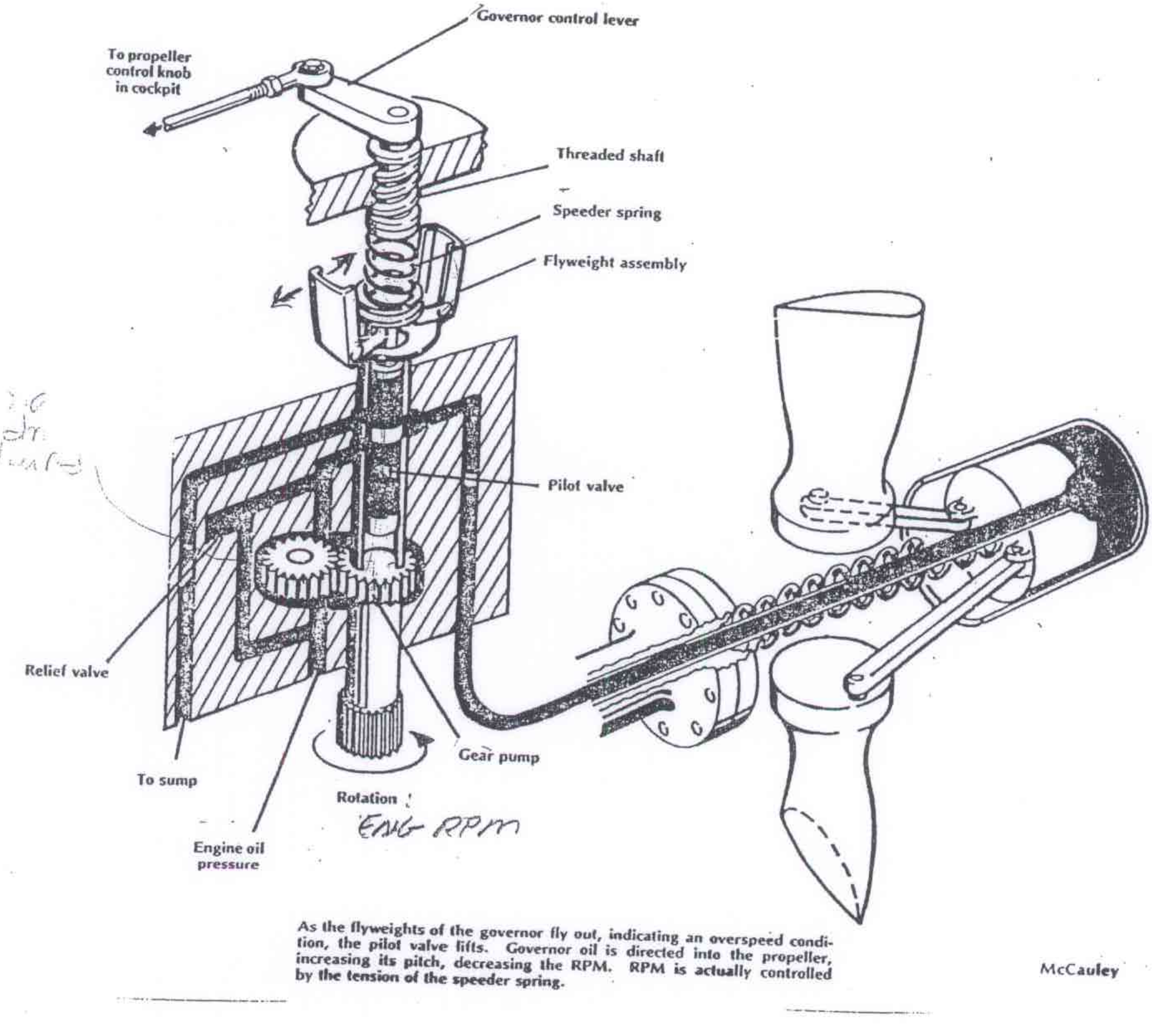
- Moving the prop control changes the RPM (blade angle).

- Power changes
  - Power increase => Prop control (RPM), then throttle (MP)
  - Power Reduction => Throttle (MP), then prop control (RPM)

- Avoid high MP with low RPM
  - This can lead to excessive cylinder pressures and detonation
  - e.g., climbing Kellog Hill in high gear

❑ GROUNDING OF MAGNETOS

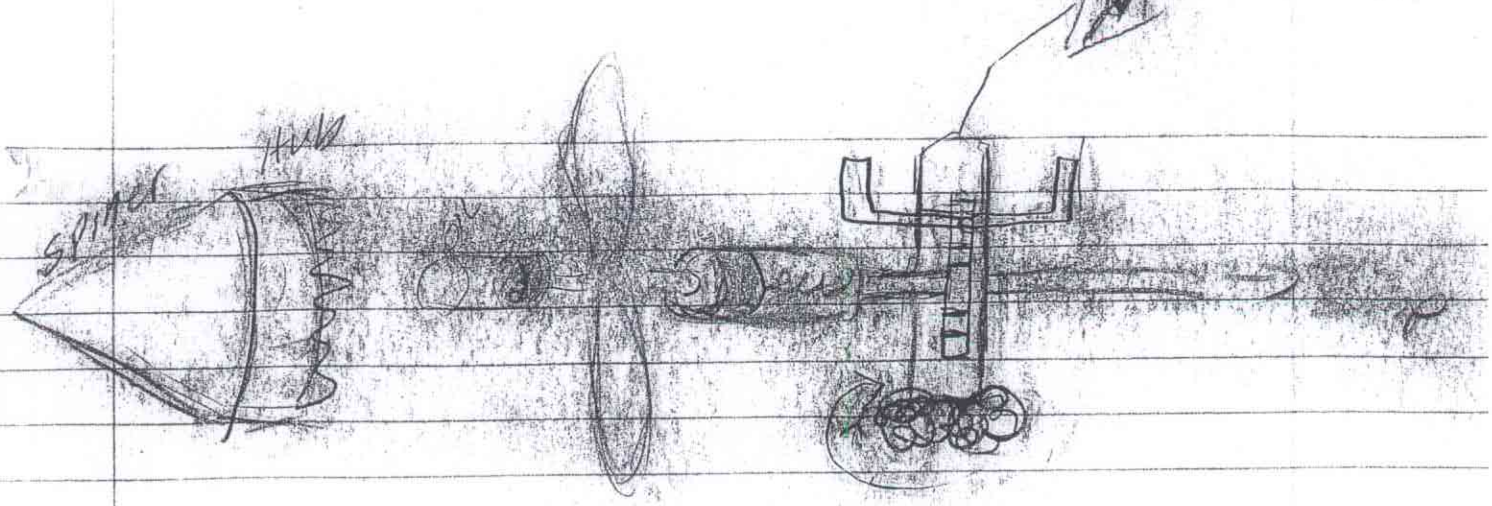
- Magnetos operate when The ground wire (P-Lead) is disconnected =>
  - This means that a broken ground-wire results in a "hot" mag even with mag switch in the "off" position.



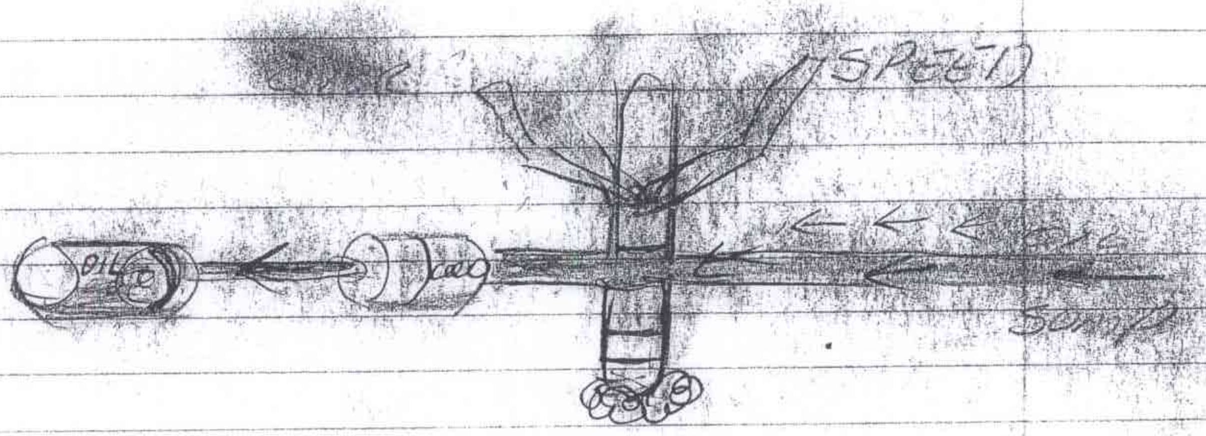
As the flyweights of the governor fly out, indicating an overspeed condition, the pilot valve lifts. Governor oil is directed into the propeller, increasing its pitch, decreasing the RPM. RPM is actually controlled by the tension of the speeder spring.

McCauley

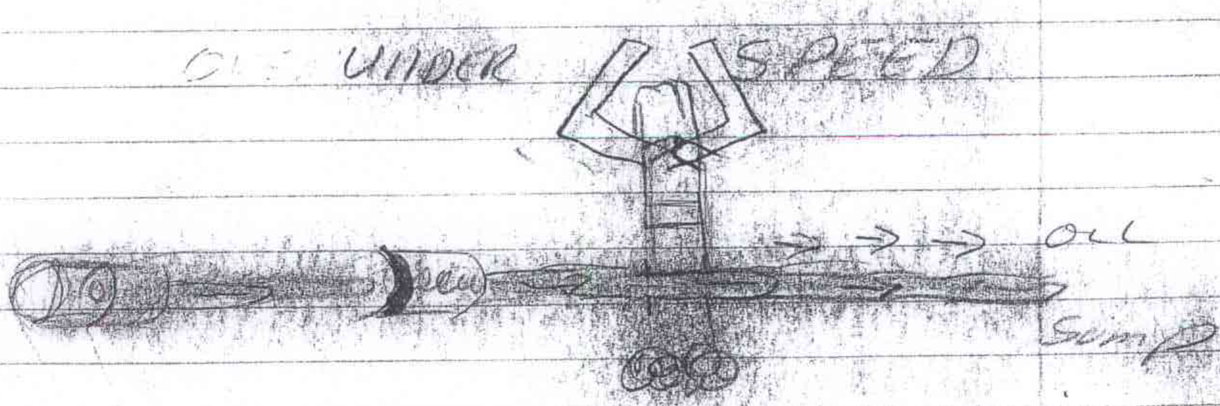
25/2500



Descent



Climb.

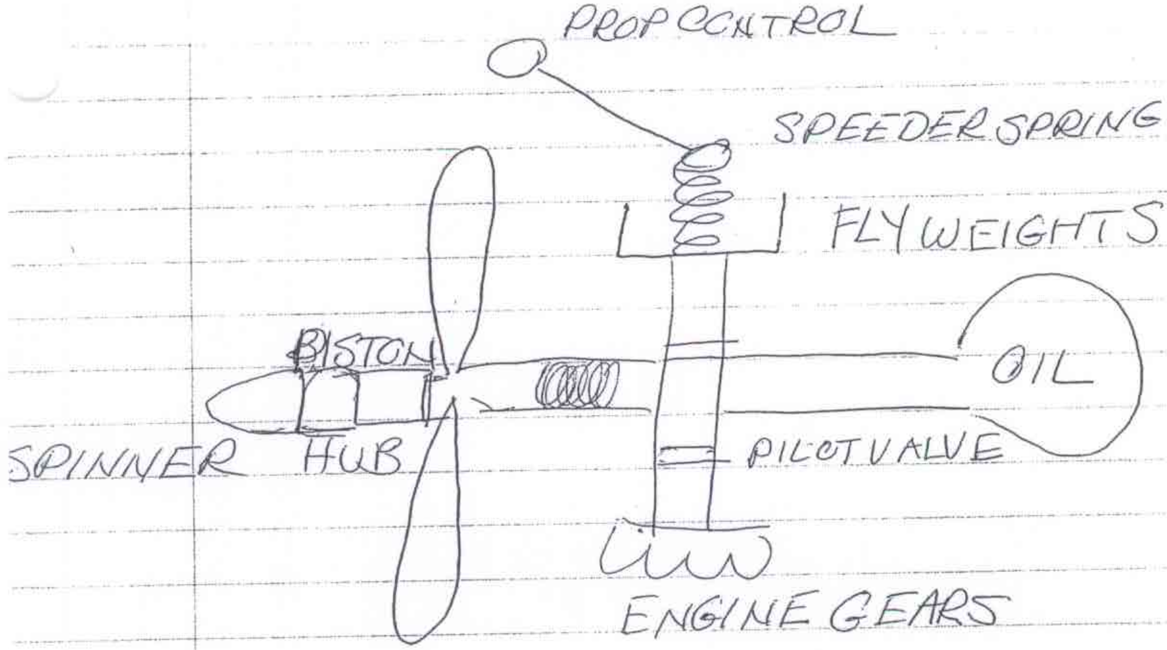


Low oil Press
High RPM / Low Pitch

T-O / LDG

High oil Pressure
Low RPM / High Pitch

Cruise



PITCH SETTING
(FULL) HIGH 29 ± .2
(FULL) LOW 14 ± .2

OVERSPEED | UNDERSPEED

OIL IN | OIL OUT

T/O & LANDING
HIGH RPM
LOW OIL PRESS
LOW PITCH

CRUISE
LOW RPM
HIGH OIL PRESS
HIGH PITCH

* SPEEDER SPRING BREAKS 2 - OVERSPEED
1 THROTTLE - RETARD
2. OIL PRESSURE - CHECK
3. PROP CONTROL - FULL DECREASE
4) AIRSPEED REDUCE
5) THROTTLE BELOW 2700

* LOST OF PRESSURE (OIL)
BIG SPRING PUSHS PROP FORWARD

* BEST GLIDE
PULL PROP BACK

PROPS

FIXED PITCH propellers are designed to work best at one rotation speed and one cruise speed

CONTSANT SPEED ADJUSTABLE PITCH hydraulically actuated and governor-regulated

HOW IT WORKS Oil pressure acting on the piston twists the blades toward high pitch LOW RPM'S. When oil pressure to the piston in the propeller hub is relieved, centrifugal force, assisted by an internal spring, twists the blades toward low pitch HIGH RPM

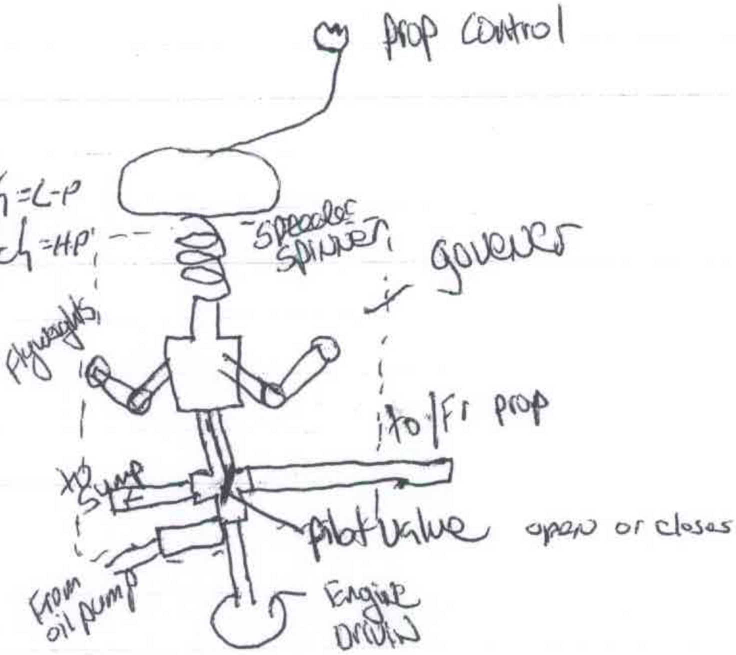
THEORY OF OPERATION A prop governor is needed that will detect minor changes in RPMs as soon as they occure. The governor then sends a signal to the prop hub to hydraulically change the position of the blades to slow the prop (by increasing the pitch) or speed it up (decrease the pitch). Hub

FLYWEIGHTS centrifugal force detects minor changes of RPM before they ever appear on the tachometer

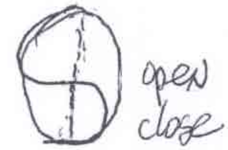
SPEEDER SPRING pilot sets the compression force in this spring by positioning the prop control. This sets the desired position of the flyweights (the desired RPM)

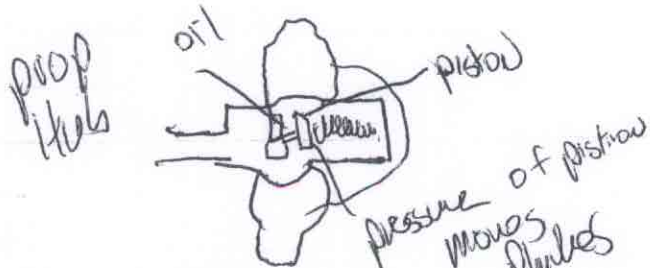
HYDRALIC SYSTEM AND PILOT engine oil is used to apply hydraulic force to the prop blades through the selector valve (pilot valve)

Constant Speed Prop

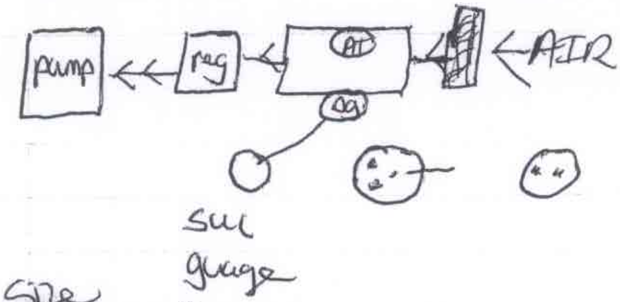


p Forward High RPM = Low pitch = L-P
p Back Low RPM = High pitch = HP

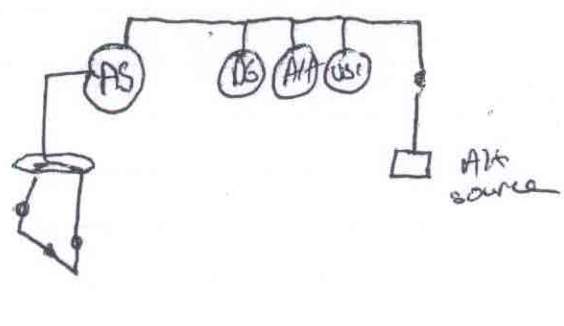




VAC pump



Pitot static source

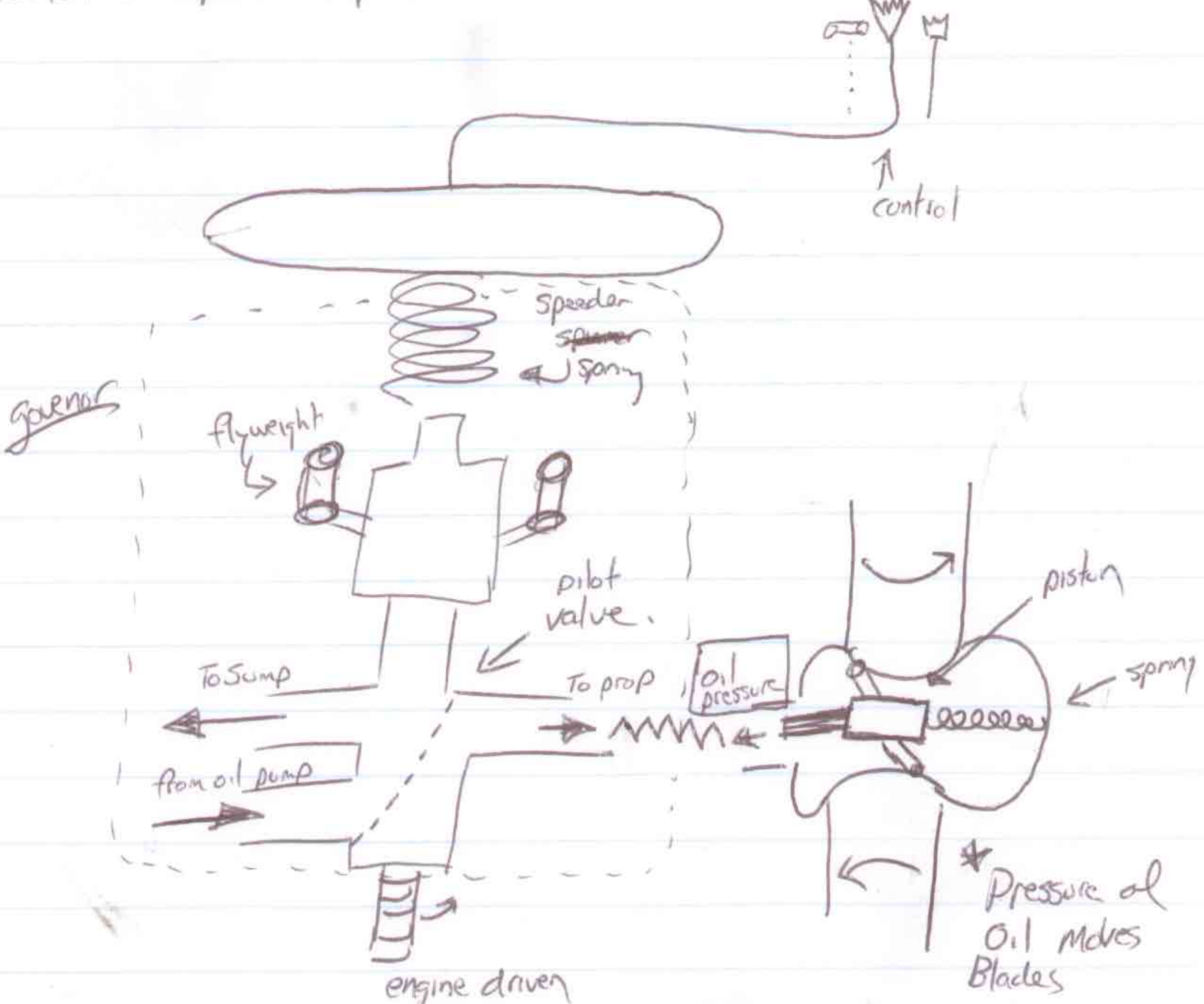


engine size

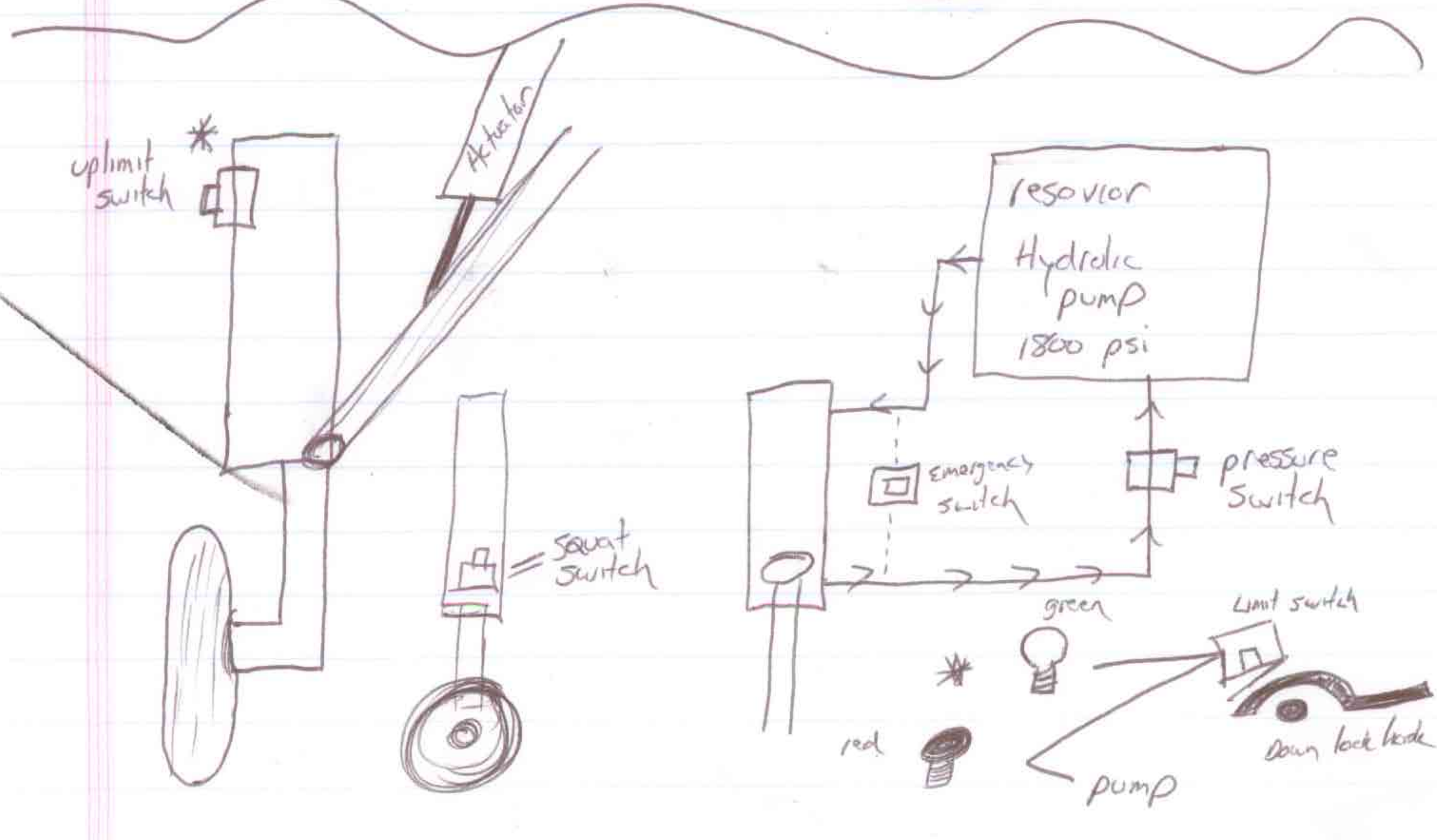
I O 360 cubic inches

I = injected
O = opposed

Constant Speed Prop



Retract Landing Gear System



Landing Gear System – Overview

A Retractable Landing Gear is…
an electrical motor driven – hydraulically actuated system.

WHY? Better Aircraft Performance – Significantlly less drag

THEORY OF THE SYSTEM…

1. Gear Switch (lever) controls the hydraulic pump which lowers and raises gear.
2. Sensors in the system detect the gear position.
3. The gear is mechanically and pressure locked in place.

HOW IT WORKS…

1.) Start with handle
2.) How does the gear come down?
3.) What HELPS the gear come down?
4.) What keeps the gear down?
5.) How do we know that the gear is down?
6.) What turns off the red light and the hydraulic pump?

pump = Behind Back Baggage area

Gear Limitations…

1. RETRACTED before 108 kts (125 mph)
2. EXTENDED at 130 kts or less (150 mph or less)

Gear EXTENSION or RETRACTION takes about **7 sec.**

The hydraulic pressure for the operation of the gear is furnished electrically – by a powered reversible pump.

It is inadvisable to reverse the direction of the gear while in transit because it may be harmful to the electric pump.

GEAR DOWN PROCEDURE:

Start with handle…

a. Select handle "down" position

How does the gear come down?

a. It make an electrical connection
b. It activates the hydraulic pump (turns on)
c. Hydraulic pump "pumps" the gear down

V_{LO} – velocity Landing Gear

V_{LE} – V Landing gear extension

What helps the gear come down?

a. Gear is helped by…
    1. Hydraulic Pressure
    2. Springs
    3. Gravity

What keeps the gear down?

a. Gear stays down and locked because of the **down lock hooks** and the **springs** help keep pressure on it.

How do we know it's down?

a. We know it is down because the **down lock hooks** make a connection with the **down limit switches**.

(Insert Graphic)

What turns off the red light and the hydraulic pump?

a. The **down limit switch** turns on the appropriate green light. When all three **down limit switches** make the connection, the red unsafe light and the hydraulic pump are turned off.

THE DOWN LIMIT SWITCH

1.) Turns on the green light
2.) Turns off the red light and the yellow transition light
3.) Turns off the pump

GEAR UP PROCEDURE:

Start with the handle…

a. Handle in the up position

How does the gear come up?

b. It activates the **pump**
c. Pump is pumping **hydraulic pressure** into the cylinder which is raising the gear

What helps the gear come up?

a. Hydraulic Pressure

What keeps the gear up?

a. Hydraulic Pressure

How do we know it's up?

a. When the gear makes contact with the **up limit switch**

What turns off the red light and the hydraulic pump?

a. the **up limit switch**

1. Turns off the red light and the yellow in transit light
2. Turns off the **pressure switch** which turns off the pump

PRESSURE SWITCH:

The pressure switch regulates hydraulic pressure (when the **gear is up**) at 1800psi.

1. If the pressure falls below 1800psi then the pressure will activate the hydraulic pump to pump up the hydraulic pressure to keep the gear up.
2. The pressure switch also turns off the hydraulic pump.

The **Micro Switch** turns on the red light and the warning horn when…

1. The gear **is up** and the manifold pressure **is below 14"**.
2. The gear is in transition
   A. i.e. all three gears are **not connected** with the down limit switches or the up limit switches.
3. The gear selector (gear lever) switch is in the up position **while on the ground**.

Warny Horn

SQUAWT SWITCH:

While on the ground, and the gear is in the up position, a safety switch that is located on the left main gear prevents the hydraulic pump from activating in the master switch (for the aircraft) is turned on.

Squat Switch on one side

EMERGENCY EXTENSION:

When you pull it…

1. It releases the hydraulic pressure.
2. Gravity and springs help the gear come down and lock hooks go into place.

Landing Gear

(1) • ARROW III Has Retractable tricycle Landing Gear which is Hydraulically actuated by an electrically powered Reversible pump. Extension & Retraction take about 7 seconds

• Gear down VLE ~~129 KTS~~ 150 mph (Speed Landing Gear extention)

(2)
1. Select Handle "down" position
2. How it Comes down:
   - It Makes an electrical Connection
   - It Activates the pump (turns it on)
   - Hydraulic pump "pumps" the gear down
3. What Helps the gear Come Down:
   1. Hydraulic pressure
   2. Springs
   3. gravity
4. What Keeps it down?
   - Down Lock Hooks
   - Springs Help Keep Pressure on it
5. How do we know its down:
   - down Lock Hooks Make Connection w/down Limit Switches Yellow in Tran's
6. What turns off the ~~B~~ V Light & Hydraulic pump:

-down Limit Switch turns on appropriate Green Light

-When all three down Limit Switches Make the Connection the ~~red~~ Yellow in TRANS ~~[illegible]~~ Light & Hydraulic pump are turned ~~on~~ off

- -Down Limit Switch:
  1. turns on the Green Light
  2. turns off the ~~Red~~ YELLOW IN TRANS Light
  3. turns Off the pump

(3) <u>Gear UP</u> VLO ~~100 KTS~~ 125 mph

- Handle In the UP position
- How does gear Come up
  - Makes an electrical Connection
  - activates the Pump
  - Pump IS pumping Hydraulic pressure Into the Cylinder Which IS Raising the gear
- What Helps the gear Come UP:
  Hydraulic pressure
- What Keeps the gear UP:
  Hydraulic pressure

- How do we know it's up:
  - When / The gear is up it makes Contact with All 3 up limit switchs
- What turns off the ~~red~~ Yellow in TRANS Light & Hydraulic Pump:
  - The up limit switchs
    1. turns off the ~~red~~ Yellow in TRANS. Light
  - the pressure Switch @ 1800 psi turns off the pump

(6) Pressure Switch

1. Regulates Hydraulic pressure (When gear Is up @ 1800 psi)
   - If pressure falls Below 1800 then the pressure switch will activate the pump to pump the Hydraulic pressure to keep the gear up

Emergency gear Extension

Prior to Emergency Extension procedure
- Master Switch on
- Circuit Breaker Check 2 - Motor - Warning
- Panel Lights Off (In daytime)
- Gear Indicator Bulbs Check

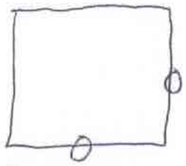
- If landing gear does not check down & locked → airspeed below ~~87 KIAS~~ 100 mph

Landing gear selector down
Emergency gear lever (on A/C equipped with backup gear extender) - override engaged (while fishtailing airplane)

- If landing gear does not check down & locked → Emergency gear lever (while fishtailing airplane)

[illegible]

Mast - all Lt. Side



AUTO

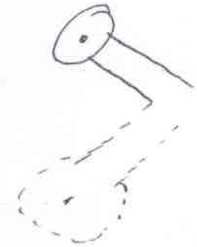
(5)

85-105 mph

Drop gear ~~95 75 Kts~~

prevent gear from Rising.

b/w ~~75 Kts~~ 85 mph



Big Spring in Nose Gear

push gear "over the hump" going against airspeed

(mode light)

[Y] on In manual / off In auto

[G] flash if Disabled / if AUTO IS →

[G] [G]

Unsafe & In trans.

[R] [Y]

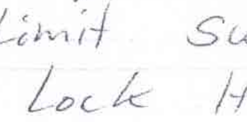
Horn

(4)

3 hooked up to Horn

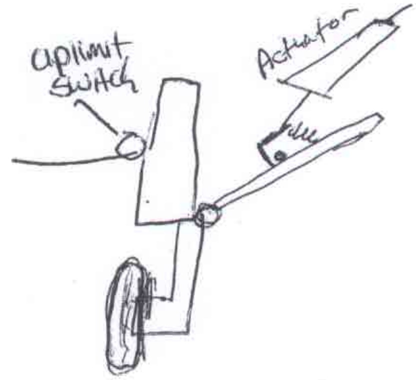
9 micro switches
- 3 up limit
- 3 down limit
- 1 squat
- 1 throttle below 14"
- 1 flap above 10°

Down Limit Switch



Spring Is for Centering & to Keep pressure on Down Limit Switch & down Lock Hook

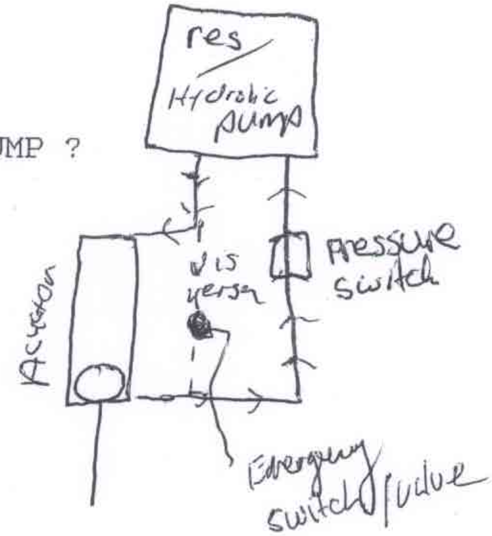
Down Lock Hook



LANDING GEAR SYSTEM

QUESTIONS

1. START WITH HANDLE
2. HOW DOES THE GEAR COME DOWN ?
3. WHAT HELPS THE GEAR COME DOWN ?
4. WHAT KEEPS THE GEAR DOWN ?
5. HOW DO WE KNOW IT´S DOWN ?
6. WHAT TURNS OFF THE RED LIGHT AND HYDRAULIC PUMP ?



GEAR DOWN

1. START WITH THE HANDLE

   -> Select handle " down " position

2. HOW DOES THE GEAR COME DOWN ?

   - It makes an electrical connection
   - It activates the pump (Turns it on)
   - Hydraulic pump " pumps " the gear down

3. WHAT HELPS THE GEAR COME DOWN ?

   - Gear is helped down by :

     1. HYDRAULIC PRESSURE
     2. SPRINGS
     3. GRAVITY

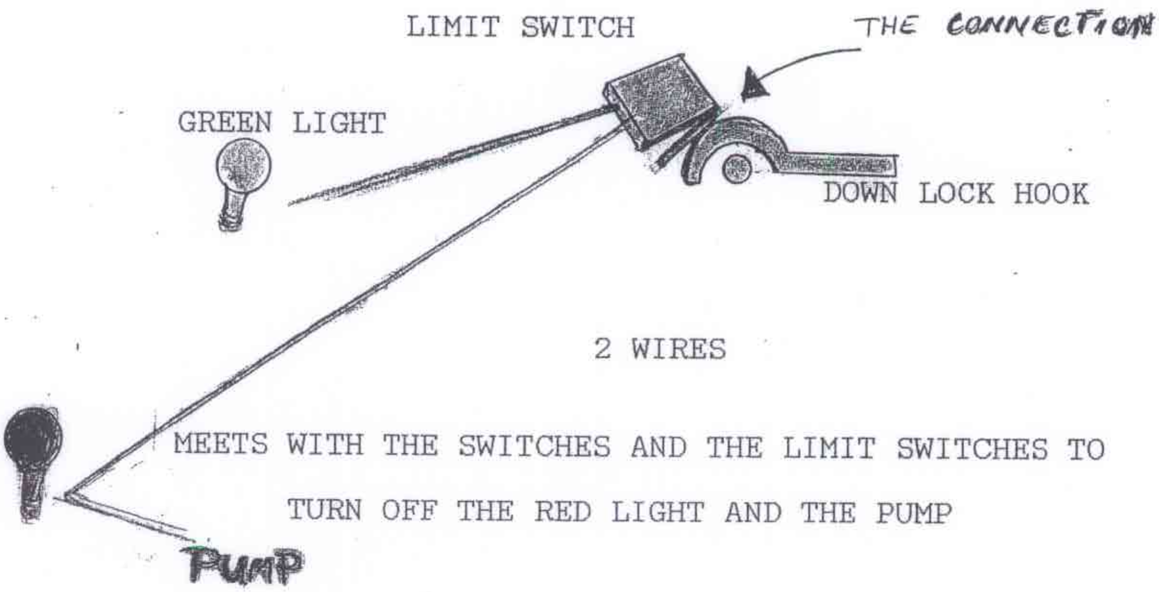
retriction takes about 7 sec

4. WHAT KEEPS IT DOWN ?

- Gear stays down and locked because of the <u>down lock hooks</u> and the <u>springs</u> help keep pressure on it.

5. HOW DO WE KNOW IT´S DOWN ?

- We know it´s down because the <u>down lock hooks</u> make a connection with the <u>down limit switches</u>



6. WHAT TURNS OFF THE RED LIGHT AND HYDRAULIC PUMP ?

- The <u>down limit switch</u> turns on the appropriate green light. When all Three <u>down limit switches</u> make the connection the red unsafe light and the hydraulic pump are turned off.

THE DOWN LIMIT SWITCH

1. Turns on the green light
2. Turns off the red light & yellow TRAN'S
3. Turns off the pump

GEAR UP

1. START WITH THE HANDLE?
   - Handle in <u>up</u> position

2. HOW DOES THE GEAR COME UP ?
   - It activates the <u>pump</u>
   - Pump is pumping <u>hydraulic pressure</u> into the cylinder which is raising the gear

3. WHAT HELPS THE GEAR COME UP ?
   - Hydraulic Pressure

4. WHAT KEEPS THE GEAR UP ?
   - Hydraulic pressure

5. HOW DO WE KNOW IT'S UP ?
   - When the gear is up it makes contact with the <u>up limit switch</u>

6. WHAT TURNS OFF THE RED LIGHT AND HYDRAULIC PUMP ?
   - The <u>up limit switch</u>

      1. Turns off the red light + Yellow in TRAN's
      2. Turns off the pump

Pressure switch

PRESSURE SWITCH

1. The pressure switch --- regulates hydraulic pressure. (when gear is up) at 1800 psi ~~+ / - 100~~

   - If pressure fall below 1800 then the pressure will activate the pump to pump up the hydraulic pressure to keep the gear up

   - The Pressure switch also turns off the pump

2. The MICRO SWITCH turns on the red & warning horn when
   1. gear is up and manifold pressure is below 14"
   2. Gear is in transition
      - ALL three gears are not connected with the down limit switches or with the up limit switches
   3. Gear selector switch is in the up position while on the ground

SQUAWT SWITCH ----> while on the ground, and the gear is in the up positiona safety switch that is located on the left main gear prevents the hydraulic pump from activating if the master switch should be turned on. ~~On takeoff, when the strut extends more than 8" The safety switch makes a connection so the gear can come up.~~

limitation
-> Retracted before 125 mph
-> Extended at 150 mph or less

A. If the hydraulic system develops a leak or if the pressure is relieved for any reason, then gravity will cause the gear to extend.

B. Hydraulic pressure for operation of the gear is Furnished by electrically - powered reversible pump

C. Inadvisable to reverse direction while in transition because it may be harmful to the electric pump

D. Extension or Retraction takes about [illegible] 7 sec.

EMERGENCY EXTENSION

1. When you pull it
   - it releases the hydraulic pressure
   - Gravity and Springs help gear come down and down lock hooks go into place