Without this check valve, oil would be vented over the side when the aircraft is inverted. After the aircraft is straight and level, the oil in the trap tank flows by gravity to the rear sump and is recirculated back into the oil supply. (See bottom illustration, figure 1.)

The _____-_____ _____ valve prevents loss of oil while the aircraft is inverted.

---

inverted-flight check

FRAME 13

RESTRICTION ON INVERTED FLIGHT IN THE T-28:

It is the function of both oil scavenge pumps to return the accumulated oil in the lower sections of the engine back to the reservoir via the rear sump pump. However, when the aircraft is inverted, no oil reaches the sumps since they are now on top of the engine, and no oil can be returned to the reservoir. The pressure pump will continue to pump oil from the reservoir as long as the pendulum is supplied with oil. Therefore, the restriction on inverted flight is based on the lack of oil being returned to the tank by the scavenge pumps for circulation, and not on the oil pickup capability within the reservoir. Inverted flight time restriction is 10 seconds.

No response required

FRAME 14

The oil cooler consists of a radiator and a thermostatic bypass valve. During normal operation, the oil flowing between the radiator tubes is cooled by ram air flow through the tubes. A warmup jacket partially surrounds the radiator core in such a manner as to allow the oil to bypass the core when oil temperature is low. The thermostatic valve directs the oil to either the warmup jacket or the radiator core to maintain the desired temperature. The valve begins to close and direct oil through the core at 54.4° C. and is fully closed at 71.0° C.

The _____ _____ valve directs the oil either to the warmup jacket or to the _____ _____, depending on the temperature of the oil. The valve begins to close at _____ and is fully closed at _____.

---

thermostatic bypass
radiator core
54.4° C.
71.0° C.

FRAME 15

The lower left portion of the engine cowling forms the air inlet scoop for the oil cooler. The forward end of the scoop is stationary; the aft end, which is in the fuselage, incorporates an adjustable flap. To control the flow of air through the oil cooler, the movable flap is electrically operated, motor driven, and manually controlled by a toggle switch on the left console in each cockpit. The oil cooler flap is controlled simultaneously with the cowl flaps by use of the same switch and actuating system.

To regulate the oil temperature, the pilot must have _____ _____. The oil cooler flap is controlled _____ by means of the _____ _____ switch.

---

electrical control
manually
cowl flap

FRAME 16

The sump pump warning system consists of two magnetic sump plugs constructed so that, if metal particles or water collects on either plug, they will bridge an insulated gap, completing an electrical circuit and illuminating a warning light in both cockpits. A sump plug warning light in the T-28 will always be treated as a pending engine failure, and an emergency landing at the nearest hard surfaced field will be executed. The mixture should always be placed rich in this situation to assist in cooling the engine. Power settings are predicted on the situation.

No response required

FRAME 17

OIL SYSTEM LIMITATIONS:
Limiting temperatures for the oil system are as follows:

Runup -	40° C. minimum
NATOPS operating range -	75°-90° C. normal with 95° as maximum

Limiting pressures for the oil system are as follows:

For start -	An indication within 10 seconds, 40 p.s.i. within 20 seconds after start
NATOPS operating pressures -	65-75 p.s.i. with a maximum of 90 p.s.i.

Excessive oil temperatures may cause a change in oil viscosity. Excessive oil pressures may cause leaks in the oil cooler or other components within the lubricating system.

No response required

FRAME 18

The T-28 uses a Hamilton Standard Hydromatic, constant-speed three-bladed propeller. The diameter of the propeller is 10 feet 1 inch on the T-28B and 9 feet 4 inches on the T-28C. The smaller propeller on the T-28C permits more deck clearance for carrier landings.

The propeller diameter of the T-28B is _____ feet _____ inch/inches.

10
1

FRAME 19

The propeller utilizes a double-capacity governor for constant-speed control. The propeller low-pitch stop is set at 19.5° on the T-28B and 20.5° on the T-28C. The high-pitch stop is set at 52.5° on both aircraft. The complete propeller assembly is composed of a dome assembly, engine shaft extension assembly, three identical blade assemblies, and a barrel assembly. The propeller turns at two-thirds of the engine RPM. This reduction is accomplished by the planetary gearing in the nose section of the engine. (See figure 4.)

If the engine RPM is 2400, what is the propeller RPM?

1600

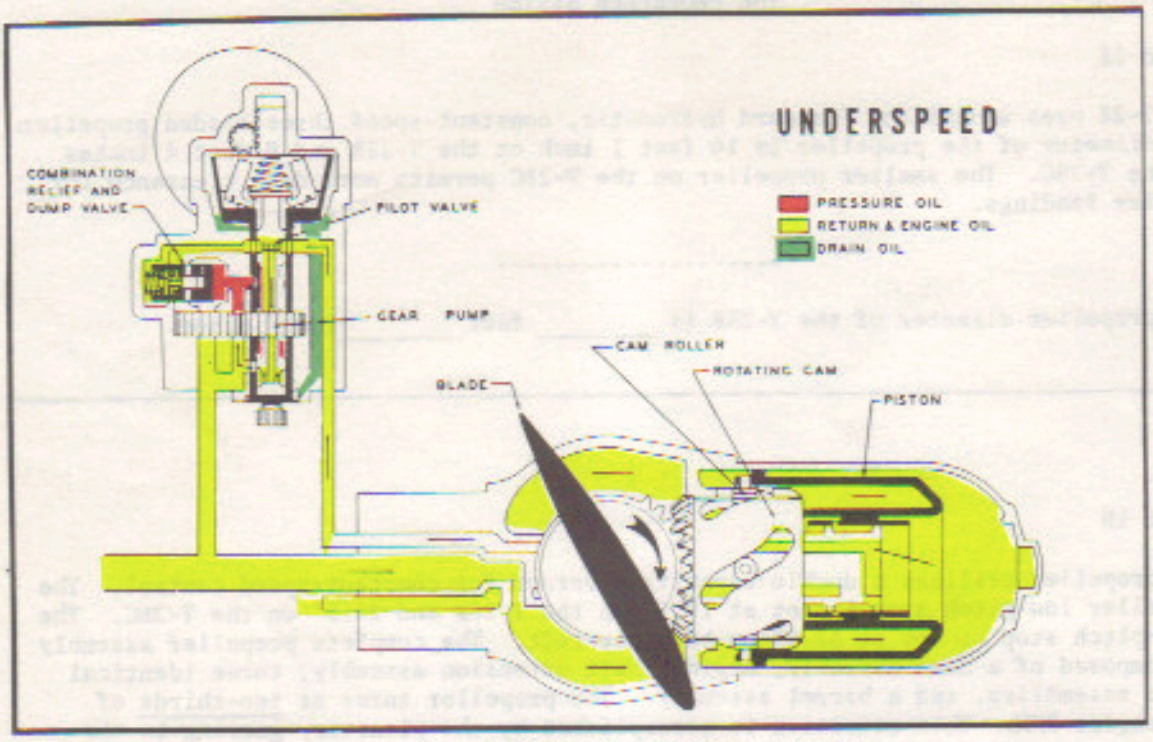
FRAME 20

Three forces act on the propeller to change the pitch angle. These are governor-boosted oil pressure, centrifugal twisting moment, and engine oil pressure. Governor-boosted oil pressure forces the propeller blades to a high-pitch angle, or low RPM. Centrifugal twisting moment and engine oil pressure are utilized to bring the propeller to a low-pitch angle, or high RPM.

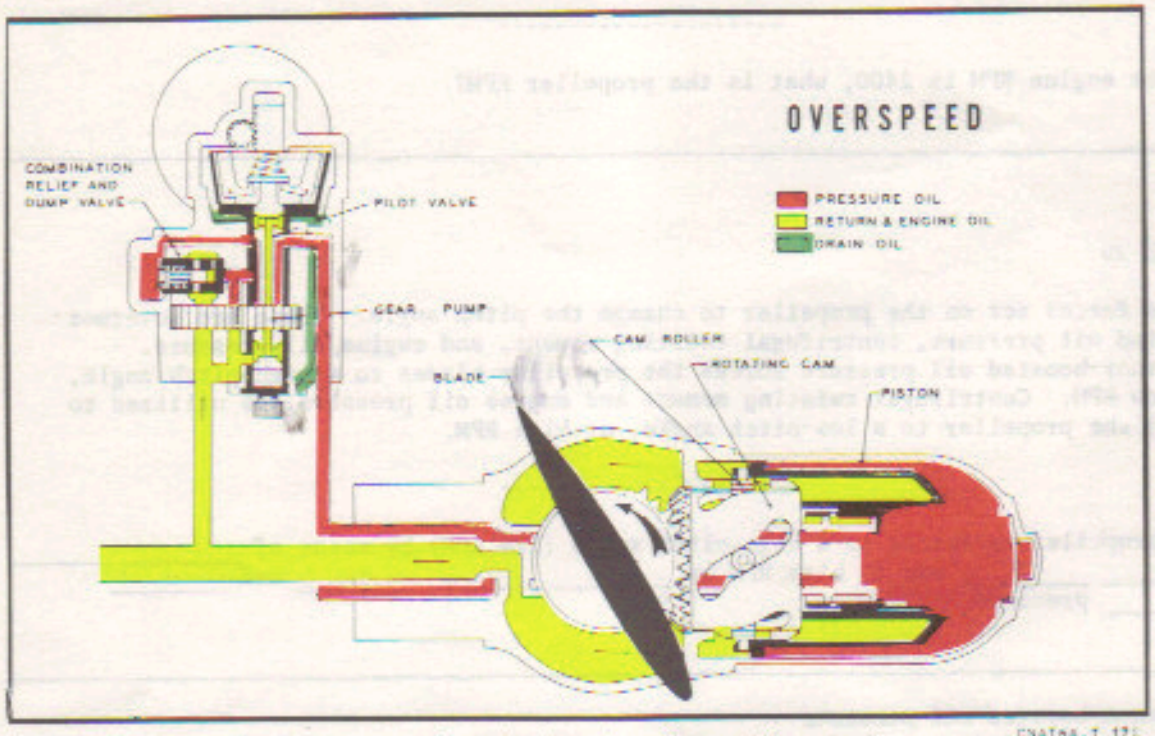
The propeller is forced to a high-pitch angle (low RPM) by means of _____-_____ _____ _____, and to high RPM by _____ _____ _____ and _____ _____ pressure.

---

governor-boosted oil pressure
centrifugal twisting moment
engine oil



Propeller Operating Diagram (Underspeed)



Propeller Operating Diagram (Overspeed)

FIGURE 4

FRAME 21

The propeller constant-speed control unit is an engine-driven governor of the centrifugal flyweight type. It incorporates a gear pump, which boosts engine oil to the pressure required for propeller operation, a pilot valve actuated by centrifically controlled flyweights, and a relief valve system which limits the governor operating pressure to 800 p.s.i. The centrifugal force of the flyweights is opposed by the force of a speeder spring.

The propeller governor boost pump boosts _____ _____ to _____p.s.i.

---

engine oil
800

FRAME 22

The propeller contains a piston actuated geared cam which is meshed to gears on the propeller blades. The required balance for the pitch angle forces is maintained by the propeller constant-speed control unit. In addition to boosting the engine oil pressure, the governor meters to or drains from the outboard side of the propeller piston the oil necessary to maintain the proper angle for constant-speed operation.

The _____ _____-_____ control unit is responsible for regulating oil pressure within the propeller dome, which in turn regulates _____ _____.

---

propeller constant-speed
engine RPM

FRAME 23

The engine RPM for propeller operation is adjusted by changing the position of the speeder-spring rack by the cockpit RPM control lever. When the control lever is moved forward, the rack is lowered, the speeder spring is compressed, and the engine RPM is increased. Conversely, when the rack is raised and the compression of the speeder spring is decreased, the on-speed condition of the governor is maintained at a lower engine RPM. See figure 4 and follow the oil flow as the speeder-spring rack repositions.

No response required

FRAME 24

During the on-speed condition, the centrifugal force of the flyweights is balanced by the force of the speeder spring. The propeller is held in a fixed position by a hydraulic lock. A pilot valve permits sufficient flow of high-pressure oil to the outboard side of the propeller piston to compensate for leakage. (See figure 4.)

During an on-speed condition, the propeller is held in a fixed position by a _____ _____.

---

hydraulic lock

FRAME 25

During the underspeed condition, the force of the speeder spring overcomes the centrifugal force of the flyweights. The pilot valve moves, permitting oil from the outboard side of the propeller piston to return to the governor. Centrifugal twisting moment reduces the blade angle to an on-speed condition. This is the action that occurs when the pilot selects a higher RPM in the cockpit. (See figure 4.)

When the pilot selects a higher RPM, the _____ _____ overcomes the _____ _____ of the flyweights, and centrifugal twisting moment causes the blade to assume an _____-_____ condition.

---

speeder spring
centrifugal force
on-speed

FRAME 26

During the overspeed condition, the centrifugal force of the flyweights overcomes the force of the speeder spring and the pilot valve moves, allowing governor-boosted oil to pass to the outboard side of the propeller piston. The piston moves inward, increasing the blade angle until the RPM drops sufficiently to return the governor to the on-speed condition. (See figure 4.) This action occurs when a lower RPM is selected in the cockpit. When the on-speed condition occurs, the centrifugal twisting moment on the blade is equally opposed by governor-boosted oil pressure, which produces a constant RPM.

When a lower RPM is selected, the pilot valve _____, and high-pressure oil is directed to the _____ side of the propeller piston causing the piston to move inward, which in turn, causes a _____ blade pitch angle.

---

raises
outboard
greater

FRAME 27

In the event of governor failure, the propeller will go to either full high pitch or full low pitch, depending upon the nature of the failure. With a loss of oil pressure in the dome, the propeller will go to high RPM, low pitch. Too much pressure in the dome will be discussed in Frame 28.

With a propeller governor failure, the propeller will go to either _____ _____ or _____ _____ pitch.

---

full high
full low

FRAME 28

In the event of propeller linkage failure, a governor balance spring is installed in the governor to maintain 2000 to 2200 RPM. The aircraft is capable of sustaining flight in this RPM range. In the event of a speeder spring failure, centrifugal force causes the pilot valve to move, venting high-pressure oil to the front of the propeller piston causing the blades to go to full high pitch (full low RPM -- 1175 to 1250).

With propeller linkage failure the RPM will go to _____ to _____, and with a speeder spring failure, the RPM will be _____ to _____.

2000 ... 2200
1175 ... 1250

FRAME 29

Both underspeed and overspeed constitute emergency conditions. During underspeed, the primary concern is to obtain enough power to effect a safe landing. At 1175 to 1250 RPM, 25" manifold pressure will just hold altitude at about 120 knots, at lower altitudes. At least this will permit some degree of transit to a suitable landing field. Overspeed, however, is even more critical. Of primary concern here is to hold the engine together long enough to arrive at least to a low key position. When an overspeed occurs, reduce power, raise the nose to put a load on the prop and slow the airspeed. Manipulate the prop control in an attempt to restore governing.

No response required

FRAME 30

LIMITATIONS: To be committed to memory.

1. 1175-1250 RPM, minimum RPM with control in full DECREASE position.
2. 1400 RPM, minimum RPM recommended for flight.
3. 2500 RPM, maximum continuous for normal rated power, 47" at MSL.
4. 2600 RPM, maximum allowable in high blower, 30-minute limit.
5. 2720 RPM, maximum allowable (5 minutes on takeoff or 30 minutes in flight).

No response required

FRAME 31

After an engine oil temperature of 40° C. and cylinder head temperature of 120° C. are reached, the propeller check should be performed. The propeller check ensures proper operation of the control linkage, desludges the propeller system, and places warm oil in the propeller dome assembly.

The purpose of the propeller check is to ensure operation of the _____ _____, desludge the system, and place _____ _____ in the propeller dome assembly.

---

control linkage
warm oil

FRAME 32

SUMMARY: Lubrication

1. The lubrication system in the T-28 is a constant-pressure, dry-sump system.
2. The heart of the lubrication system is one gear-type pressure pump, and two gear-type scavenge pumps.
3. The oil temperature is thermostatically controlled by means of a thermostatic bypass valve and oil cooler.
4. The usable oil quantity is 8.8 gallons.
5. The lubrication system uses both pressurized flow lubrication and splash and spray lubrication within the engine.

Propeller

1. The T-28 uses the Hamilton Standard Hydromatic constant-speed three-bladed propeller.
2. Centrifugal twisting moment and engine oil pressure are used to decrease the blade angle, or increase the RPM.

3. Governor-boosted oil pressure is used to increase the blade angle, or lower the engine RPM.
4. The propeller RPM is two-thirds of the engine RPM.
5. The selected RPM is maintained by means of a hydraulic lock.
6. The RPM will fluctuate momentarily when changed.

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