

**HELICOPTER CONVERSION BASIC COURSE**  
**( WEEKS 6 )**

<u>SUBJECTS</u>	<u>TRAINING HOURS</u>
<b><u>1-PRINCIPLES OF FLIGHT:</u></b>	<b>30</b>
a) Introduction.	
b) Aerodynamic principles. Relative wind – pitch angle – angle of attack -Lift drag – c.of.p. – Blade stalls.	
c) Effects Of Lift.	
d) Forces On the Rotor.	
e) Thrust. Collective pitch – gyroscopic precision – Torque – blade twist.	
f) Dissymetry of flight. Flapping hinge – seesaw – coriolis effect – Drag or lead – lag hinge – underling rotor.	
g) Rotor heads. Rigid rotor – fully Aridoulated rotor.	
h) Relative motors of rotor systems.	
i) Aerodynamic characteristics. Translating tendency – ground effect – Transnational lifh0	
J) Blade stall.	
k) Autorotation.	
l) Ground resonance.	
l) Stability. Static Stability – Dynamic Stability – Causes Of Instability – The Bell Method – The Effect Hinge.	
m) Flight Control. Collective – Anti – Torque Pedals – Cyclic Control.	
e) Vibrations.	
 2. Airframe Structure:	 30
a) Structural Principles :	
1. Tubular Construction.	
2. Shoot Metal Construction.	
3. Bonded Construction.	
4. Stress and loads. Landing – Vibration level – Tail Section.	
5. Wheel and skid gear.	
6. Visibility.	

7. Structural Components.  
(Body – Bottom – Cabin – Rear Section Tail Boom – Lower Vertical Fin-  
Horizontal Stabilizer – Skid Gear – Anti – Vibration Device – Windows  
And Fairing.
8. Typical structural examples.
9. Fuselage maintenance.  
Hard landings – sudden stoppage.
- b) Main rotor construction :**
  1. Rotor heads.
  2. Semi – rigid rotor heads ( bell 47 – hiller 12 – bell 206 ).
  3. Fully articulated heads (S-58) – hinges 500c & 500d – (s-76).
  4. Rotor blades ( wooden – metal – fiberglass or composite blades).
  5. Rotor head construction and maintenance – blade alignment –  
static main rotor balance – vibration - tracking – spanwise dynamic  
Balance – blade sweeping – electronic – balancing – dampener –  
maintenance – counter – weight adjustment – autorotation adjustments.
- c) Mast and flight controls :**
  1. The Mast.
  2. Stabilizer bar.
  3. Dampener.
  4. Swashplate.
  5. Flight control systems.  
The collective – the cyclic – push – pull tubes – torque tubes – bell cranks  
– mixer box – gradient unit – control boosts – maintenance and inspection  
– control rigging.
- d) Main rotor transmissions :**
  1. Transmissions. Driveshaft.
  2. Maintenance.
  3. Clutch.
  4. Freewheeling unit.
  5. Automatic clutches.
  6. Bolt tighteners.
  7. Hydro – mechanical clutch.
  8. Spring clutch.
  9. Roller unit.
  10. Torquemeter.
  11. Rotor Brake.
  12. Maintenance.
  13. Vibrations.
  14. Mounting Systems – Examples.
  15. Transmissions – Examples.
  16. Transmission Lubrication Systems.

- e) Tail rotors:
  - 1. Operation.
  - 2. Tail rotor system.
    - Drive shaft – gear box – blades – pitch – change mechanism.
  - 3. Bell 47 tail rotor system.
    - Forward shaft middle shaft – aft shaft – universal joint – extension tube – gear box – tail rotor ( construction – control system ).
  - 4. Examples.
  - 5. Servicing
    - Temperature – drive shaft inspection – couplings alignment – gear box – types of lubricant – 90 gear box – vibrations.
  - 6. Balancing.
  - 7. Tail rotor track
  - 8. Tail rotor system rigging.
- F) weight and balance:
  - 1. definitions and terms used.
  - 2. weight and balance records.
  - 3. effect of improper loading.
  - 4. examples to determine the net weight.
    - Calculations of true empty weight and c.g. location, weight shift.
  - 5. weighting equipment. Procedure and applications.
- 3. aircraft systems :
  - a) hydraulic system :
    - 1) Hydraulic fluids.
    - 2) Packing seals & gaskets.
    - 3) Hydraulic components.
  - b) Applications.
  - c) special purpose equipment :
    - 1) high skid gear
    - 2) Floats.
    - 3) Rescue hoist.
    - 4) Cargo hooks
    - 5) Litter installation
    - 6) Light installation.
    - 7) Spray equipment
    - 8) Stabilization devices
    - 9) Rotor brake.
    - 10) Air filter
    - 11) flap restraints.
  - d) fuel system
- 4. powerplants :
  - a) Fixed wing power plant changes.
  - b) Modifications.

- c) Radial and opposed engines.
  - d) Applications: bell 47 – hiller 12.
  - e) Turbo shaft engines :
    - 1.components.
    - 2.weight and power.
  - f) Operational procedures.
  - g) Applications: lycoming t 53 series – Allison 250 series.
5. Regulations: 20  
ECARs and EACs.
6. basic helicopter maintenance: 12
- 1.right and left of engine.
  - 2.colour codes.
  - 3.ground handling.
  - 4.mooring
  - 5.protection.
  - 6.lifting and leveling.
  - 7.special tools and hardware.
7. Sheet metal shop:
- 1.al-alloy sheets: cutting – marking out – drilling – forging – bonding allowances – shrinking – flushing.
  - 2.riveting : types of rivets – riveting with hand tools – rivet spacing – counter sinking and dimpling .
  - 3.use of pneumatic riveting hammer.
  - 4.inspection of rivets, removal of rivets.  
Use of over size rivets and rivet jackets.
  - 5.exercises on sheet metal patching and repair work.
- 8.engine shops:
- a) Reciprocating engines:
    - 1.opposed engines: construction – operation and trouble shooting.
    - 2.radial engines: construction – operation and trouble shooting.
  - c) jet engines:
    - 1.dismantling
    - 2.engine systems: ignition – fuel – lubrication and starting systems.