AVIATOR MAINTENANCE HANDBOOK

CH-34

JANUARY 1969

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

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DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1964-3

PERFORMANCE OBJECTIVES

INTRODUCTION AND GENERAL INFORMATION

1. KNOWLEDGES:

   a. When given a diagram of the aircraft, the student will be able to identify, from memory, the components of the aircraft as numbered on the diagram with eight out of nine correct.

   b. When given a list of capabilities of the aircraft, the student will be able to identify them, from memory and without error, by drawing lines from range, loads, and speed in knots to capabilities.

   c. When given a numbered diagram of the side view of the aircraft, the student will be able, from memory and without error, to match compartments of the forward fuselage with numbers on the diagram.

   d. When given a list of incomplete statements on the emergency exits, the student will be able to complete the statements with the aid of references and without error.

   e. When given a list of incomplete statements on emergency equipment, the student will be able to complete the statements from memory and without error.

   f. When given a list of incomplete statements on folding the pylon and main rotor blades, the student will be able to complete the statements from memory and without error.

2. SKILLS: None.

CABIN 13'5" LONG
5' WIDE
SEAT 18 TROOPS
OR
8 LITTERS

35 TIE DOWN RING
1,250 lb each

FLOOR 200 lb per sq ft

turning radius [illegible] 29'

tail rotor 41' from main landing gear

RANGE OF A/C
262 gal
cruise 90K
300 NM
3 hours

LOADS
INTERNAL 5,000 lb.
EXTERNAL 4,000
SOME [illegible] 5,000 lb if

Gross weight
12,068 normal.
12,950 ~~ob~~ combat load.
13,600 ~~max~~ max, max

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File No. 1964-3

STUDENT OUTLINE

INTRODUCTION AND GENERAL INFORMATION

1. Introduction to the course.

WEATHER LIMITED DUE TO ICE & TURBULENCE.

2. Description (general). CH-34C

LIGHT CARGO CLASS II

UP TO 5000 LB

COST 376,000

eight tool

R1820-84C

rated horse power

1525

3. Capabilities.

cabin

tail

pilot station

A/S forward 30-128K 125-150K CAUTION

" LATERAL 45K

" REAR 20K

4. Structure (airframe group) - three main sections.

a. Forward fuselage section - nine compartments.

total length of A/C 65' 9.32"

min diam 37'.

blades rotor 9' 2.44"

height 15' 10"

tail rotor clearance 6' 6"

min height 14' 3.45"

width 56'

min 13'

blades folded

tail rotor diameter 9' 4"

A 3 SEMI MONO COT
FOWARD OR CABIN SECTION.
ENGINE

b. Aft fuselage (tail cone) section.
FOR BALENCE OF A/C

c. Pylon section.
INTERMEDIATE GEAR BOX & 90° BOX ETC. & longitudinal
TAIL ROTOR DRIVE & HOLDS TAIL ROTOR, TAIL ROTOR
FLIGHT CONTROLS.
FOWARD CABIN BOLCUHEAD MADE OF
TINTRINUM AS FIRE SHIELD

5. Emergency exits. sliding windows cargo 4 windows
in cabin with 2 non jettison type
red X if jettison not safety wired
5 jetison type except 2 non jetison

6. Emergency equipment. crew all on belt
2 AFT OF CARGO COMP
1 BETWEEN seats
2 hoses only are required.
FIRE EXTINGER CF3BO at the cargo door

7. Pylon and main rotor blade folding.
leading edge toward the ground when
folded.

3 sections 9 components,

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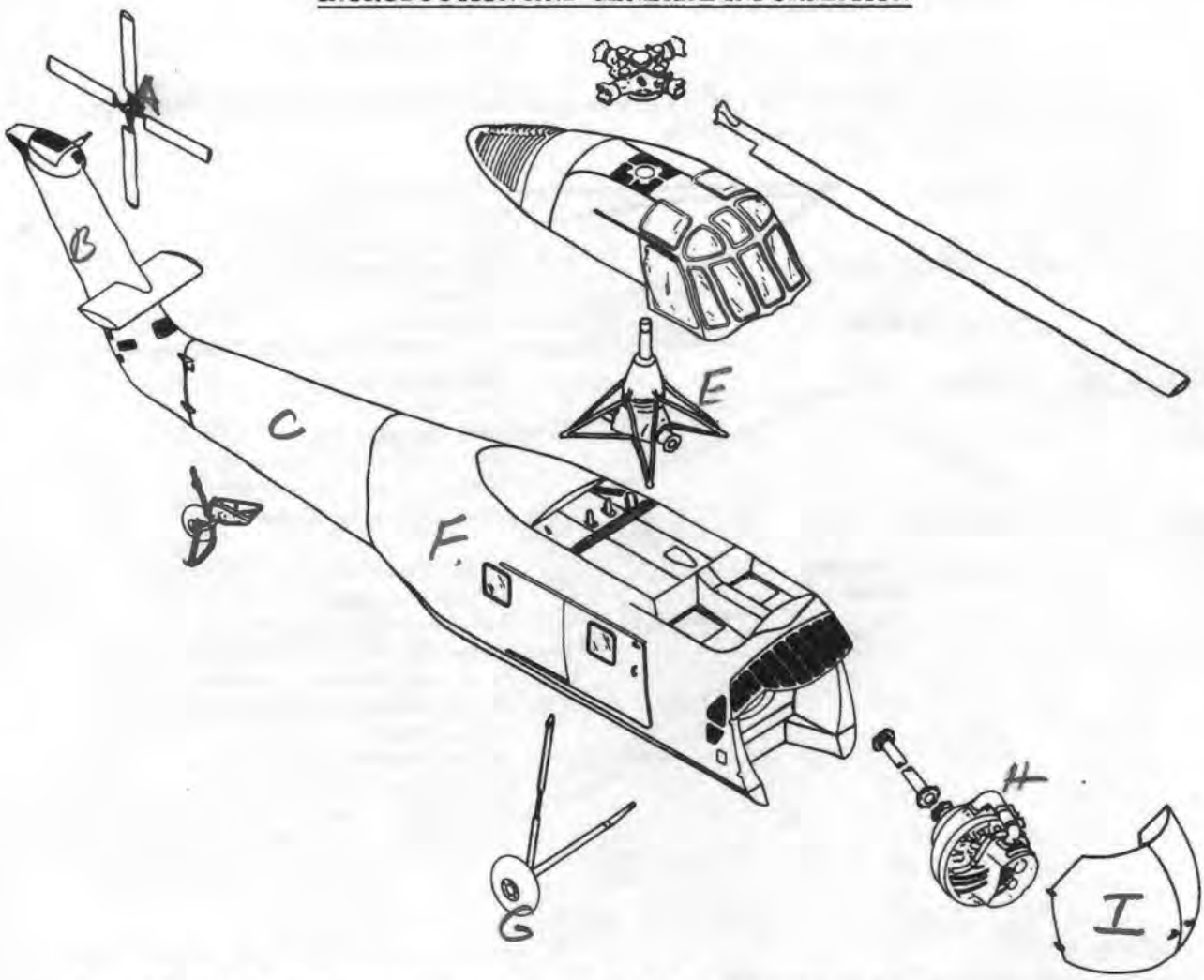
PERFORMANCE CHECK

INTRODUCTION AND GENERAL INFORMATION



1. Identify the following components of the CH-34, as numbered on the exploded view above, by placing the correct numbers in the blank spaces below:

   a. Vertical antitorque tail rotor. ____

   b. Pylon section. ____

   c. Aft fuselage. ____

d. Tailwheel. _____

e. Transmission compartment. _____

f. Forward fuselage section. _____

g. Main landing gear. _____

h. Powerplant. _____

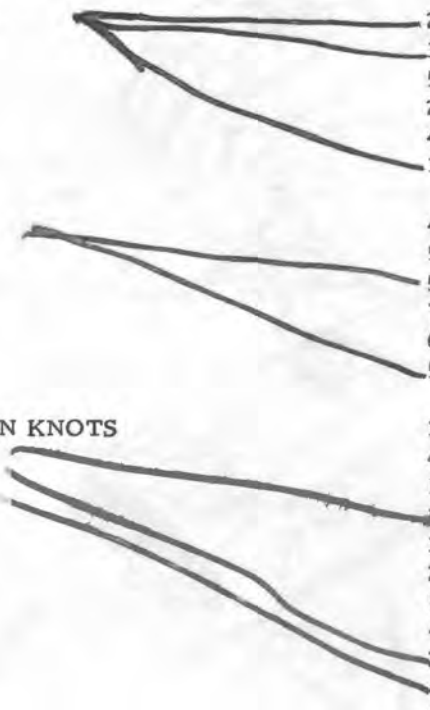
i. Clamshell doors. _____

2. Match the correct series of CH-34 capabilities below by drawing lines from range, loads, and speed to the capabilities.

a. RANGE

b. LOADS

c. SPEED IN KNOTS



262 usable gallons.
300 nautical miles.
500 nautical miles.
272 usable gallons.
4 hours.
3 hours.

4500 internal.
5500 internal.
5000 internal.
7000 external - A-model.
6000 external - C-model.
5000 external - C-model.

35 to 129 forward - desired.
48 lateral - maximum.
150 forward - redlined.
10 to 128 forward - desired.
35 to 128 forward - desired.
25 rearward - maximum.
148 forward - redlined.
40 rearward - maximum.
20 rearward - maximum.
45 lateral - maximum.
20 lateral - maximum.

3. Match compartments of fuselage with numbers on compartments by placing the correct numbers in the blank spaces below.

a. Engine compartment. 1

b. Clutch compartment. 2

c. Oil cell compartment. 3

d. Cockpit compartment. 4

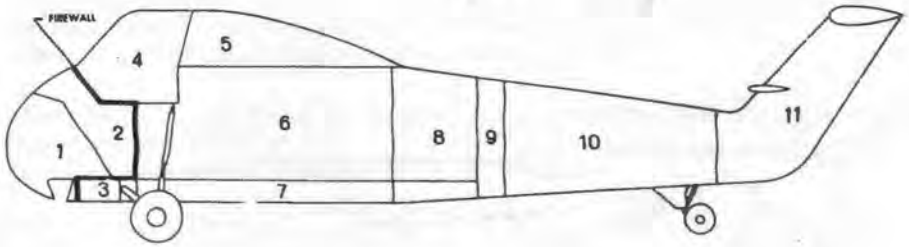
e. Transmission compartment. 5

f. Cabin compartment. 6

g. Fuel cell compartment. 7

h. Electronic compartment. 8

i. Heater compartment. 9



4. Complete statements on emergency exits by filling in the blanks.

a. The cockpit window is the only jettisonable exit on the right side of the aircraft.

b. The right aft cabin window is a non jettisonable push out-type exit.

c. The left side cabin exits are jettisonable or push out -type exits.

d. There are 7 emergency exits.

e. The cabin door window is a cut out emerg.-type exit.

5. Complete statements on emergency equipment by filling in the blanks.

a. The fire extinguisher is located above cabin door in cabin

b. The first aid kits are located 2 on aft bulkhead 7 and in the cabin on the cargo below pilot

c. The crew alarm bell is located aft bulkhead.

6. Complete statements on pylon and main rotor blade folding by filling in the blank spaces.

   a. When folding pylon, check position of _____ _____ _____ to clear fuselage section.

   b. Swing pylon around and secure with _____ pin.

   c. Position main rotor blades to _____-degree angle with the _____ axis of the helicopter.

50,000 BTO heater.

OIL 10.5 gal MPX

FUEL 3 TANKS WITH 11 CELLS

262 GAL USEABLE.

115/145 fuel.

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PERFORMANCE OBJECTIVES

FUEL AND OIL SYSTEMS

1. KNOWLEDGES:

   a. Fuel system.

      (1) Match components of the fuel system with statements of their description, location, and operation.

      (2) Worksheet and TM's 55-1520-202-10 and -20.

      (3) In accordance with TM's 55-1520-202-10 and -20.

   b. Oil system.

      (1) Complete statements on description, location, and operation of the oil system and its components.

      (2) Worksheet and TM's 55-1520-202-10 and -20.

      (3) In accordance with TM's 55-1520-202-10 and -20.

2. SKILLS: None.

NOTES

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STUDENT OUTLINE

FUEL AND OIL SYSTEMS

1. General description of fuel system.
3 multi cell tanks open vent transfer type

2. Fuel tanks.

a. Location.

b. Description. 115/145 FUEL found 5 cells self sealing
under cargo comp. floor center 3 cells
aft 6

c. Usable capacity.
100 gal — fwd
70 gal — center
92 gal — aft
TOTAL 263 gal usable 262

d. Venting.
all tanks are vented all center tanks
have fuel drain comps.

e. Sumps.
all cells interconnected to fuel drain comps

3. Normal system.

a. Transfer pumps. 3 transfer pumps in center cell; centrifugal electrical pumps. 28 V. DC 100 gal per hour at 5 PSI pump speed

b. No-transfer warning light system. light comes on could be tank is empty, fuel selector valve not turned on,

c. Check valves. located on each side of all center cells to allow fuel flow,

d. Level control valve. forward right fuel cell keeps fuel level. Pump in aft cell has pressure switch will cut pump off if below 5 PSI prevents transfer pump pumping fuel overside when level control valve fails.

e. Fuel overflow safety system. keeps from pumping fuel on tank when level control valve fails.

Consists of 4 units
fuel detectors
one flow safety switch

f. Booster pump. forward cent. forward tank. electrical driven 28 V. DC; pressure system for carburetor for starting. Supplies the fuel when engine driven pump fails. 185 gal per hr 19 - 25 PSI

g. Selector valve control system. seventh control & for cent. controls fuel from tanks to engine. 3 position switch FF, RR, emergency.

h. Fuel system strainer.

i. Defueling valve. bottom of selector valve. used to drain the A/C when tanks need draining.

4. Emergency fuel system. emergency system left side of A/C; primary right side of A/C fly near low altitude to insure gravity feed in emergency system.

5. Engine fuel system.

a. Engine-driven fuel pump. left side of engine, rotary vane positive displacement. Use by pass valve for starting. Fuel pumps will fuel engine if engine driven pump fails. 23-25PSI

b. Pressure indicating system.

c. Carburetor. fuel & air to each cylinder under all conditions.
Pressure injected altitude compensating carburetor. electrical operated primer.

6. Fuel quantity system. idle cut off position
normal position

7. Fuel low-level warning system.

no oil change required just keep adding oil.

8. Oil system.

a. Oil cells. 2 cells flutter interconnected by inlet & vent line. 10.5 gal capacity vented to nose of engine
MIL-L-22851 - 1100 oil or 50 weight oil.
for 5 gal expansion space in system.

b. Y-fitting. connects engine oil pump to oil system.
drain valve
oil dilution valve
swing check valve. stops oil from draining into cooler when engine is static.

c. Temperature indicating system.

d. Oil pumps. on supercharger rear cover.
gear type pump with scavenge.
4 oil pumps in system. 3 scavenger + 1 engine drive pump.
65-75 PSI

e. Relief valve.

f. Pressure indicating system.

pressure transmitter, gives reading on panel.

g. Oil cooler.

forward tube section below the engine thermostatic operated. fan in clutch compt. blows down on cooler.

h. Oil dilution system. used in cold weather, temp'td should be below 50°C

i. Spectrometric oil analysis program. send off sample oil every intermediate AR 750-13

9. Common malfunctions and corrective actions.

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File No. 1967-2

PERFORMANCE CHECK

FUEL AND OIL SYSTEMS

1. In the blank by each numbered statement, place the letter of the component to which the statement applies.

a.	Fuel system.	___ (1)	Tells pilot that level control valve has failed.
b.	Forward fuel tank.	___ (2)	Has three cells and holds 92 US gallons of usable fuel.
c.	Center fuel tank.		
d.	Aft fuel tank.	___ (3)	Removes foreign matter from fuel going to the engine from either normal or emergency system.
e.	Transfer pumps.		
f.	No-transfer warning light.	___ (4)	Operates microswitch which controls circuit from transfer pump switches to pumps.
g.	Check valve.		
h.	Level control valve.	___ (5)	Could be described as open-vent, transfer-type.
i.	Fuel overflow safety system.	___ (6)	Allows fuel to flow out of a tank but not into a tank.
j.	Fuel overflow warning light.		
k.	Booster pump.	___ (7)	Supplies the proper mixture of fuel and air to the engine at all power settings and altitudes.
l.	Selector valve control system.		
m.	Selector valve control.	___ (8)	Prevents loss of fuel overboard if lever control valve fails.
n.	Fuel system strainer.	___ (9)	Pressurized fuel to carburetor for starting.
o.	Defueling valve.		
p.	Emergency fuel system.	___ (10)	Tells pilot when 22 gallons or 132 pounds of fuel remain in forward tank.
q.	Engine-driven fuel pump.		
r.	Carburetor.	___ (11)	Is self-sealing and holds 100 usable gallons.
s.	Fuel quantity system.	___ (12)	Allows fuel to be drained from all tanks when fuel is contaminated.
t.	Low-level warning system.		

___ (13) Controls lever of fuel in forward tank.

___ (14) Gives the pilot remote control of the selector valve.

___ (15) Gives the pilot a continuous indication of fuel remaining in either tank or total of all tanks.

___ (16) Supplies fuel for engine operation when the normal fuel system is inoperative.

___ (17) Contains the pressure relief valve for the fuel system.

___ (18) Pump fuel to the forward tank for engine consumption.

___ (19) Is not self-sealing and has a usable capacity of 70 gallons.

___ (20) Tells pilot when fuel is not being transferred.

___ (21) If ruptured, will allow all fuel to drain from all tanks.

2. In the blanks in the statements below, pertaining to the engine oil system, place the word or words which will make the statements correct.

a. The oil cells are _____-type and are interconnected by inlet, return, and _____ lines.

b. The oil tanks are vented to the atmosphere through the _____ ___ _____ in the nose section of the engine.

c. The Y-fitting contains a _____ valve and a _____ _____ valve as well as the manual _____ _____ shutoff valve.

d. The oil temperature bulb is located in the oil _____ housing on the _____ _____ section.

e. Oil pressure is adjusted by adjusting the _____ _____ in the oil pump housing.

f. The purpose of the _____ _____ valve is to prevent oil from draining from the engine back into the cells.

g. The oil pressure indicator receives its electrical indication of pressure from the _____ _____ located above the right oil cell.

h. Cooling air for the oil cooler comes from the _____ _____ fan.

i. Flow of oil and air through the oil cooler is _____ controlled.

j. _____ _____ is used to aid starting in cold climates.

k. _____ _____ _____ is used to prevent sludge buildup inside the engine.

l. Normal engine oil pressure should be _____ to _____ psi.

NOTES

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File No. 1973-1

PERFORMANCE OBJECTIVES

FLIGHT CONTROLS

1. KNOWLEDGES:

   a. Cyclic pitch control system.

      (1) Match cyclic control system components with statements giving description, location, and operation.

      (2) Worksheet and TM 55-1520-202-20.

      (3) As prescribed in TM 55-1520-202-20.

   b. Collective pitch control system.

      (1) Match collective pitch control system components with statements giving description, location, and operation.

      (2) Worksheet and TM 55-1520-202-20.

      (3) As prescribed in TM 55-1520-202-20.

   c. Antitorque control system.

      (1) Label components of antitorque control system.

      (2) Schematic.

      (3) As prescribed in TM 55-1520-202-20.

   d. Flight controls general information.

      (1) Complete statements pertaining to flight controls.

      (2) Worksheet and TM 55-1520-202-20.

      (3) As prescribed in TM 55-1520-202-20.

   e. Horizontal stabilizer.

      (1) Select the statement which best describes the horizontal stabilizer.

      (2) Worksheet and TM 55-1520-202-20.

(3) As prescribed by TM 55-1520-202-20.

2. SKILLS: None.

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File No. 1973-1

STUDENT OUTLINE

FLIGHT CONTROLS

1. Cyclic pitch control system. provides directional control.

a. Description. sticks are interconnected

b. Components.

(1) Cyclic pitch sticks.

stick trim provides artificial feel.

(2) Socket and yoke assemblies. allows free movement of cyclic.

(3) Auxiliary servo assembly. between pilot & copilot
1 unit for lateral
1 for fore & aft control. connected to
mixing unites

(4) Mixing unit. fore part of transmission deck. mixes collective & cyclic together.

(5) Primary servos.

1. Have 3
2. right lateral
3. left lateral
4. fore & aft.

set at 45° to fore & aft. move A/C about ± 1 gyroscopic precession

(6) Star assembly. on main trans. mast. transforms push pull motion to rotary motion.

(7) Stick trim system.

provide artificial feel
provide with rated position
connected to steel on left side of A/C under floor.
power from secondary Buses.

2. Collective pitch control system.

a. Description.

provides vertical control
changes pitch of all blades equally.
1 cylinder is auxiliary servo.
some leakage from mixing lever on up to the head.

b. Components.

(1) Control sticks. motor cycle type throttle with friction lock.

(2) Collective pitch torque tube. collective full down + throttle to indent.

(3) Auxiliary servo assembly.

1 cylinder.

(4) Mixing unit. some linkage from mixing levers to the blades

3. Tail rotor control system.

a. Description.

b. Components.

(1) Pedals.

(2) Pedal adjusters.

(3) Forward quadrant.

(4) Pedal damper.

(5) Tail rotor servo.

(6) Aft quadrant and bellcrank.

(7) Tail rotor gearbox.

4. Horizontal stabilizer.

5. Common malfunctions and remedial actions.

NOTES

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PERFORMANCE CHECK

FLIGHT CONTROLS

1. Cyclic pitch control system. Place letter which appears by each component in the blank by statement which applies to it.

COLUMN A

a. Cyclic pitch sticks.
b. Socket and yoke assemblies.
c. Auxiliary servo assembly.
d. Mixing unit.
e. Primary servos.
f. Star assembly.
g. Stick trim assembly.
h. Force gradient assemblies.
i. Magnetic brakes.

COLUMN B

___ Gives artificial feel to controls.

___ Transforms push-pull motion to rotary push-pull motion.

___ One each for pilot and copilot attached at bottom to socket and yoke assemblies.

___ Attached to stationary star and gives pilot a power assist.

___ Has 60:1 gear ratio between disc and arm.

___ Point where ASE pitch and roll control enters system.

___ Has double-acting springs and is connected to control linkage under copilot's floor.

___ Permit universal movement of sticks in a horizontal plane.

___ Mixes cyclic and collective pitch.

___ Acts as another link in controls when hydraulic pressure if off.

2. Collective pitch control system. Place letter which appears by each component in the blank by statements which apply to it. One statement may apply to more than one component.

COLUMN A

a. Pilot's stick.

b. Copilot's stick.

c. Torque tube.

d. Auxiliary servo assembly.

e. Mixing unit.

COLUMN B

___ Operates on compound bellcrank principle.

___ Incorporates collective pitch balance spring.

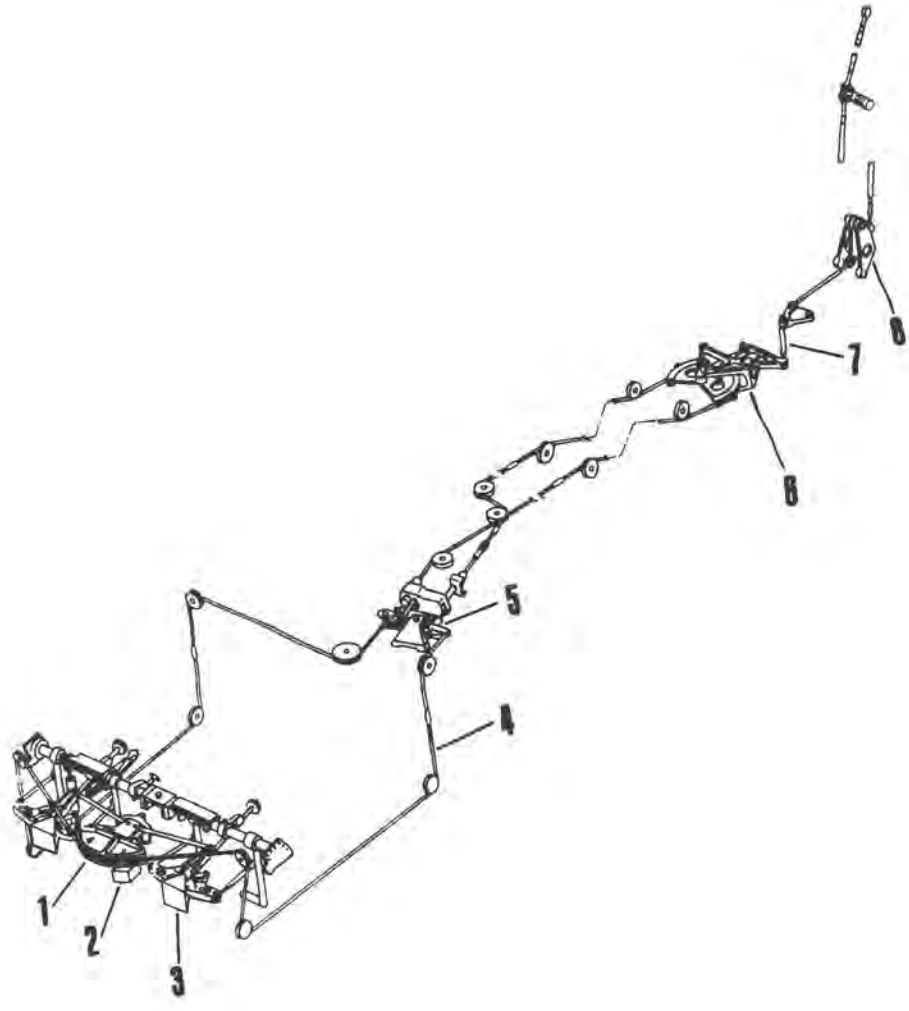
___ Has collective pitch lock.

___ Contains throttle limit switch.

___ Has throttle friction lock.

___ Point where ASE altitude control enters system.

3. Antitorque control system. Write names of numbered components in blanks provided.



1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

4. Flight controls general information. Put the proper word or words in the statements to make them correct.

   a. The cyclic pitch system provides _____ control.

   b. The portion of the flight controls common to both cyclic and collective pitch control systems is from the _____ _____ to the star assembly.

   c. The stick trim provides a movable _____ stick position.

   d. Collective control is in the _____ direction.

   e. The stick trim controls are a master switch on the _____ _____ panel and release switches on the _____ _____.

   f. The tail rotor controls give the pilot directional control at _____.

5. Horizontal stabilizer. Draw a ring around the letter of the statement which best describes the horizontal stabilizer.

   a. The horizontal stabilizer is an airfoil which is raised or lowered to compensate for out-of-balance load.

   b. The horizontal stabilizer is an adjustable airfoil mounted on the forward spar of the pylon to increase longitudinal stability in forward flight.

   c. The horizontal stabilizer is an aluminum and magnesium structure mounted on the pylon as a work platform for maintenance personnel.

   d. The horizontal stabilizer is an adjustable airfoil contructed of aluminum and magnesium which is synchronized to cyclic pitch controls to increase stability in forward flight.

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File No. 1966-2

PERFORMANCE OBJECTIVES

POWER PLANT

1. KNOWLEDGES:

   a. Engine description, mounting, and capabilities.

      (1) Fill in blanks in statements concerning engine description, mounting, and capabilities.

      (2) Worksheet and TM 55-1520-202-20.

      (3) In accordance with TM 55-1520-202-20.

   b. Engine accessories.

      (1) Match nomenclature of accessories with statement of description and operation.

      (2) Worksheet and TM 55-1520-202-20.

      (3) In accordance with TM 55-1520-202-20.

   c. Engine cooling system.

      (1) Answer questions on the description and operation of the engine cooling system.

      (2) Worksheet and TM 55-1520-202-20.

      (3) In accordance with TM 55-1520-202-20.

   d. Ignition system.

      (1) Match components on ignition schematic with the correct item description.

      (2) Schematic and worksheet.

      (3) In accordance with TM 55-1520-202-20.

2. SKILLS: None.

NOTES

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STUDENT OUTLINE

POWER PLANT

1. Engine, R-1820-84C, Curtiss-Wright.

   a. Description. radial single row of 9 cylinder air cooled single, single speed supercharger.

   b. Mounted. mounted on 35° tilt front of engine pointed up

   c. Sections. (5 SECTIONS) crank case front section, power section, supercharger front housing, supercharger rear housing, supercharger rear cover.

2. Rating (brake horsepower). continuous operation 1275 HP 2500 RPM 47.5 MAP
   30 MIN. 1425 2700 RPM, 52.0 MAP
   5 MIN, 1525 2800 RPM, 56.5 MAP

3. Limitations.
   2,900 RPM - 3000 RPM special inspection
   3,200 & ABOVE ENGINE CHANGE REQUIRED
   3000 - 3,200 10 times special inspection then engine change
   OVER BOOST CHECK CHART

4. Cooling system.

   a. cooling fan 24 blades. cools engine, acts as fly wheel, cools oil cooler, supplies direct air for air induction

2500 47.5 operate by 2" special inspection during held for 15 seconds when above 2" special inspection required

contra vane puts air through cylinders for cooling
72 rower straighten the air & cools engine & accessories
b.

18 spark plugs.

5. Engine accessories. magneto type, dual low, tension

a. Ignition system.
low tension voltage for ignition system
tow tension produces less rubbing parts
mag fires #1 cylinder 25° left type carbon, B.T.C.
5° FIRE OF MAG ON STARTING, starter has end start

b. Starter. 24 V direct cranking. slip clutch 450 ft lb of torque
over ride on throttle for starting
30 sec but cool 1 minute 2 times then 30 sec after
cooling of 30 minutes

c. Carburetor.
Stromberg, down draft, tower bowle pressure injected
type of accessory section
supplies correct fuel + air mixture for all power settings

d. Tachometer generator.
8 o'clock for gen. AC operated run the engine
tac,

e. Oil pumps. 3 oil pumps.
gear pressure gear pump 70+-5 PSI
scavage pumps take oil from rear of engine back
to oil storage tank.

f. Fuel pump. Front pump all on front of engine back to carburetor
rotor vain pump fuel to carb at 23-25 PSI

g. Auxiliary hydraulic pump.

one on engine one on trans.
engine 90 clock of starter pressure the hydraulic system,
at 1,500 PSI to aux system. contact pressure, variable
delivery piston type.

h. Cylinder head temperature thermocouple - No. 7 cylinder

6. Common malfunctions.

1. spark plug fouling; oppertg engine low speed low RPM
produces loss of RPM or MAG DROP.
2. engine wont stop if ign cut off from adjustment

7. DA Form 2408-13. - record the mal functions of
engine & A/C

NOTES

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Fort Rucker, Alabama

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PERFORMANCE CHECK

POWER PLANT

1. Fill in the blanks in the following statements:

   a. The engine used in the CH-34 is the Curtiss-Wright 13-69.

   b. The front of the engine is facing transmission.

   c. It is mounted 35° ∠ above horizontal.

   d. The engine has 9 cylinders in a radial row.

   e. The engine is rated at 1275 horsepower, at 2500 rpm with 47.5 inches MAP.

   f. At this power setting, the engine can operate for ever.

   g. The engine has 5 sections.

   h. The fan acts as a flywheel and provides cooling air.

   i. The engine can produce 1525 horsepower for a 5-minute period when engine rpm is 2800 with 56.5 inches MAP.

   j. An special inspection of the engine at 2900 to 3000 rpm calls for a special inspection of the engine.

2. Match the engine accessories in column A with their description in column B.

Column A		Column B
a. Starter.	G	Provides low-tension spark to the booster coil, located upper right side of the accessory section.
b. Carburetor.	B	Classified as a two-barrel, downdraft, pressure-injected altitude and idle-compensated.
c. Fuel pump.	D	Provides a pressure lubrication system on engine and a means of returning oil to the cells.
d. Oil pumps.	___	Generates current to an indicator to read the engine rpm.
e. Hydraulic pump.	___	Located in center of the accessory section.
f. Tachometer generator.	___	Located on right side of accessory section.
g. Magneto.	___	Puts out 1500 psi to the auxiliary servo system.
	___	Classified as dual.
	___	Supplies correct fuel-air mixture.
	___	Located left bottom of accessory section and bottom of front crankcase section.
	___	Located next to the oil pump.
	___	Provides direct cranking.
	___	Provides pressurized fuel to carburetor.
	___	28-volt with a slip clutch.

3. Answer the following questions:

a. What is the purpose of the cooling fan?

b. What changes the direction of the cool air after the fan pushes it toward the engine? contra vane assembly.

c. How is the magneto cooled? air from engine cooling fan.

d. How many blades are on the fan assembly? 24

e. How many vanes has the contravane assembly? 72

4. Match numbered components on the schematic to the correct component listed below.

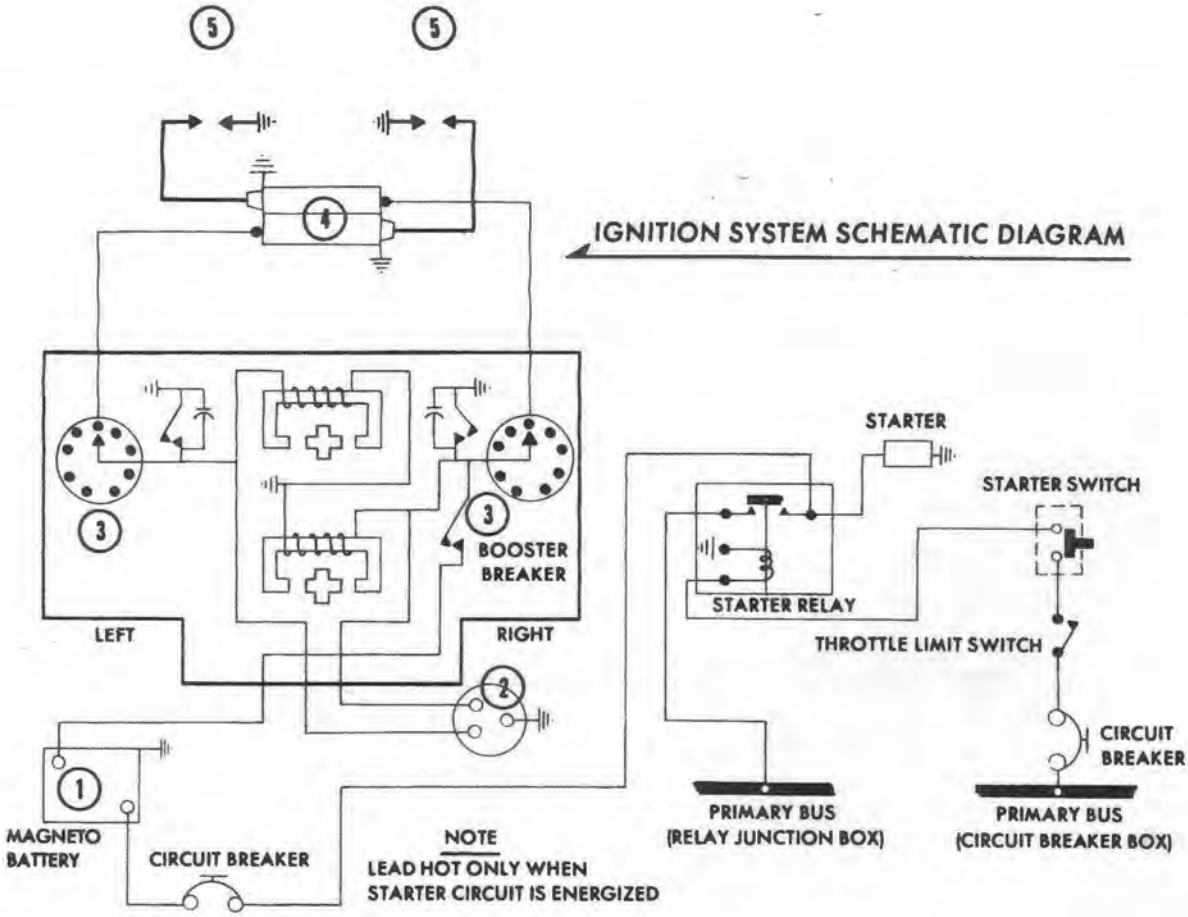
____ Spark plug.

____ Booster coil.

____ Magneto.

____ Ignition switch.

____ Induction vibrator.



DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1970-1

PERFORMANCE OBJECTIVES

TRACKING AND VIBRATIONS

1. KNOWLEDGES:

   a. Vibrations.

      (1) Complete statements on the two major types of vibrations.

      (2) Worksheet.

      (3) In accordance with TM 55-1520-202-10 and -20.

   b. Adnormal vibrations.

      (1) Match the statements on the three types of abnormal vibrations.

      (2) Worksheet.

      (3) In accordance with TM 55-1520-202-10 and -20.

   c. Blade tracking.

      (1) Complete the statements on methods and purpose of blade tracking.

      (2) Worksheet.

      (3) In accordance with TM 55-1520-10 and -20.

   d. Engine and servos.

      (1) Complete the statements on the engine power settings and servo switch position for blade tracking.

      (2) Worksheet.

      (3) In accordance with TM 55-1520-202-10 and -20.

2. SKILLS: None.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1970-1

STUDENT OUTLINE

TRACKING AND VIBRATIONS

1. 2 Types of vibrations.

test question

a. normal during low rotor R.P.M.

b. abnormal excessive buzz in seat, bluing int, peddle post feet to shoe.

2. Abnormal vibrations.

a. Low frequency. 100 - 400 RPM. from main rotor felt through air frame of A/C or in seat. blade out of track or damaged. dampers. low hydraulic fluid. dirty hydraulic fluid.

b. Medium frequency. 1000, 2000 RPM. from tail rotor felt in peddles out of balance, blades damaged, out of alignment, etc.

c. High frequency. 3000 + above. engine only for drive shafts. felt as tingling sensation. damaged engine mounts, tail blade damaged. clutch system. misaligned drive shafts or worn drive shafts.

3. Causes.

a.

b.

c.

d.

e.

f.

4. Blade tracking. to check the tip path course.
blades allowed $\frac{1}{2}$" apart.

a. gear box replaced.

b. ~~major~~ main rotor blades lagged.

c. at normal rotation

d. Equipment required. 2 people qualified pilot & one on ground.

(1) ground man at your 2 o'clock position.

(2) tracing device & blade rotation.

(3) tracking flag
mark end of blade with grease pencil.

e. Tracking procedures.

(1) 2 people ground man pilot

(2) tracking flag.

(3) mark with grease pencil

(4) 1 flat rotate $\frac{1}{2}$" differs at end of blade.

(5) rotate adjustment of 1 flat at a time

(6)

(7)

Total
$\frac{1}{2}$" plateau between all blades.

f. Perform track.

(1) face A/C into the wind.

(2) 2,200 RPM MAN PRESS A/C LIGHT OUT GEAR SERVO SWITCH TO ON POSSITION,

g. Adjustments.

(1) one flight a time. on upper end of pitch control rod,

(2) lengthen the rod raise the end & tighten both plane.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1970-1

PERFORMANCE CHECK

TRACKING AND VIBRATIONS

1. The two major types of vibrations which are found in the CH-34 helicopter are _____ and _____.

2. Match the statements on types of abnormal vibrations with their locations.

   a. Low frequency — 2000 engine rpm or higher _____.

   b. High frequency — Tail rotor assembly _____.

   c. Medium frequency — Main rotor assembly _____.

3. The purpose of tracking main rotor blades is to _____
   _____.

4. Listed below are the normal steps of tracking the main rotor. List the order in which they are accomplished. _ _ _ _ _

   (1) Make adjustments.
   (2) Engine operations.
   (3) Mark blades.
   (4) Perform track.
   (5) Check aircraft position.

5. The correct engine rpm and manifold pressure for tracking blades is?

   Low track: _____rpm _____ manifold pressure.

   High track: _____rpm _____ manifold pressure.

6. During tracking operations the servo switch should be in the _____ position.

7. The correct spread allowed when tracking the main rotor blades is _____.

   a. 1/4 inch.
   b. 3/4 inch.
   c. 1 inch.
   d. 1/2 inch.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1968-3

PERFORMANCE OBJECTIVES

TRANSMISSION SYSTEM

1. KNOWLEDGES:

   a. Hydromechanical clutch.

      (1) Complete statements on the hydromechanical clutch, fluid engagement, and mechanical engagement.

      (2) Worksheet and TM's 55-1520-202-10 and -20.

      (3) In accordance with TM's 55-1520-202-10 and -20.

   b. Main gearbox and accessories.

      (1) Complete statements on the purpose and components of the main gearbox and accessories.

      (2) Worksheet and TM's 55-1520-202-10 and -20.

      (3) In accordance with TM's 55-1520-10 and -20.

   c. Tail rotor drive shaft, intermediate gearbox, and tail rotor gearbox.

      (1) Complete statements on the description, location, and function of the tail rotor drive shaft, intermediate gearbox, and tail rotor gearbox.

      (2) Worksheet and TM's 55-1520-202-10 and -20.

      (3) In accordance with TM's 55-1520-202-10 and -20.

   d. Main rotor brake assembly.

      (1) Match statements on the main rotor brake and its components.

      (2) Worksheet and TM's 55-1520-202-10 and -20.

      (3) In accordance with TM's 55-1520-202-10 and -20.

2. SKILLS: None.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1968-3

STUDENT OUTLINE

TRANSMISSION SYSTEM

1. Hydromechanical clutch.

a. Description. clutch that operates by fluid + mechanical hydro-mechanical Type

5 seconds b. Purpose. 1. allows operation of engine without rotor movement, 2. for smooth rotor engagement, 3. Provides positive mechanical engagement, 4. for auto-rotative feature, 5. allows disengagement of rotor without stopping engine

c. Location.

d. Diverter valve. located upper right oil cell.

e. Components. 2 circuit breaker if clutch purge diverter valve one circuit breaker

(1) clutch housing

(2) driving ENGINE RPM, gears 20 rain #20 18 rain driven rotor RPM gears to prevent hydro-static lock.

(3) free wheeling cam runs on engine RPM.

(4) roller retainer with 12 rollers in it

What prevents mechanical engagement?

Clock plate

(5) actuate with fly weights
applied to cam.

(6) blocker plate connected to
actuator,

(7) actuator type applied to cam

f. Function. low fluid engagement & mechanical
engagement.
free wheeling unit has own oil supply
check oil in free wheeling daily

2. Main drive shaft.

a. Description. transmits torque from clutch
to gear transmission.
shaft made of tubular metal

b. Location.

c. Function.

d. Components.

has rubber coupling at one end.
serrated more than 10,000" shaft assembly
shims will always remain with A/C

Trans for 3° forward tilt

3. Main gearbox and accessories.

a. Function.

1. trans. changes ∠ of drive 58°
2. reduces engine RPM to rotor RPM.
3. Provides a drive for tail rotor.
4. drives gear box accessories
5 supports rotor head.

b. Mounting.

c. Gear reduction. 11.293 to 1
engine to rotor.
eight stage planetary type gears.

d. Lubrication.
pressure & splash feed.
ON PUMP WIFFER FILTER
BYPASS & RELIEF VALVE
trans holds 20 quarts of oil. MIL-O-21260 Grade 2
A/C BUMP STATIC for OIL CHECK.

e. Accessories.

(1) Generator. drive by main gear box is 30 VOLT 200 AMP
3,000-8,000 generator RPM should produce proper voltage

(2) Blower. to cool the generator

(3) Primary hydraulic pump. to left of generator.
constant pressure, variable delivery, piston pump.
1,500 PSI pre set factory.

(4) Hoist pump. 7 piston pump 1,250 PSI produced by
Vickers, a constant displacement pump.

gear box input shaft turns right to left

A/C Pressure into 26 VOLT AC current.

(5) Rotor tach. under generator
rotor tach & engine tach with dongle.

OIL PUMP IS AN ACCESSORY
(6) ~~Oil pump.~~ OIL COOLER 71°C STARTS TO OPERATE
IF OIL BELOW 71°C WILL BY PASS COOLER

(7) Tail rotor drive. SHAFT, turns 1 to engine RPM.

4. Tail rotor drive shaft. some type of material as ~~engine~~ transmission drive shaft. 4 sections leading to intermediate drive shaft, 1ST section for rotor brake 7 support bearings. 2nd section has oil cooler.

5. Intermediate gearbox.
to change the ∠ of drive 60° lubricated by splashing of gears. (holds 1 qt.) oil cone or main trans.

6. Pylon drive shaft..
1 shaft.

7. Tail rotor gearbox. ① changes ∠ of drive 90° oil cone or main trans 3 qt.
② by mesh of magnesium gear reduction of 2 to 1 ③ hose fitted change for boil rotor

8. Main rotor brake system.
hydraulically operated with right desk
4 stop or pucks will stop rotor in 15 sec.
270 PSI pressure in rotor brake. MIL H 5606H stated
ACCUMULATER WITH 275 PSI according to area of work.
pressure switch Pressure of 10 PSI puts warning
light on instrument panel & stops clutch for engagement.
Relief valve pressure in excess of 400 PSI open valve

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1968-3

PERFORMANCE CHECK

TRANSMISSION SYSTEM

1. Complete statements on the hydromechanical clutch, fluid engagement, and mechanical engagement.

   a. The hydromechanical ~~clutch~~ allows the pilot to ~~engage~~ start the engine without engaging the rotor.

   b. The freewheeling unit allows for auto rotation.

   c. The maximum rpm at which the engine is operated during warmup is 1400 to prevent overheating of during coupling drive coupling

   d. _____ rotor brake must be in the DETENT position to complete the circuit to the clutch pump or diverter when engaging the main rotor.

   e. The fluid coupling starts the rotor turning smoothly during rotor engagement.

   f. Oil from the engine is used for operation and engagement of the hydromechanical clutch.

   g. When the engine rpm is increased 2000 to 2400 rpm, the main rotor will accelerate to approximately 220 rpm.

   h. When the blocker plate moves to the neutral position and the actuator sleeve slides down, the rollers move to the right side of the freewheeling cam.

   i. After the mechanic engagement has taken place, the throttle is decreased to 1700 rpm for 2 minutes to allow the oil to drain from the clutch.

   j. When engine rpm drops below 1250 rpm, the spring moves the actuator up.

   k. The main rotor drive shaft transmits torque from the clutch to the main gearbox.

2. Complete statements on the function and components of the main gearbox and accessories.

   a. The main gearbox is mounted with a 3° forward tilt.

   b. The oil level for the main transmission can be checked by a sight gauge on the left side of the transmission.

c. The oil cooler will bypass oil below 71°C through the bottom of the oil cooler.

d. The low oil pressure warning light receives pressure from the upper thrust bearing

e. The heat stripe indicates when the transmission has been not used any more

f. The main gearbox drives 7 accessories.

g. The generator is cooled by a axial flow fan driven by the accessory section of the main rotor gearbox.

h. The primary hydraulic pump is driven by the main gearbox accessory section.

i. The rotor tachometer indicates ROTOR rpm.

3. Complete statements on the description, location, and function of the tail rotor drive shaft, intermediate gearbox, and tail rotor gearbox.

a. The 2nd section of the tail rotor drive shaft drives the oil cooler and rotor brake disc.

b. The disconnect coupling allows for the pylon to be folded.

c. The tail rotor blades are prevented from turning when the pylon is folded by a locking pin on the tail rotor drive shaft coupling.

d. The intermediate gearbox changes the angle of drive 60°.

e. The oil level in the intermediate gearbox can be checked by a sight gage on the right side of the gearbox.

f. The tail rotor gearbox changes the angle of drive 90°.

g. A 2 to 1 gear reduction is received from the tail rotor gearbox.

h. The oil level for the tail rotor gearbox can be checked by dipstick on sightgage and dipstick.

i. The tail rotor gearbox houses the pitch change mechanism.

4. Match the statements on the main rotor brake and its components.

a. 3 Brake handle

b. 5 Accumulator

c. 6 Master brake cylinder

d. 4 Pressure switch

~~(1)~~ Prevents excessive pressure in system.

(2) Four bleed screws for bleeding system.

~~(3)~~ Located between the pilot and copilot overhead the cockpit.

e. 2 Rotor brake assembly

f. 1 Relief valve

(4) Prevents operation of the clutch when the rotor brake is on.

~~(5)~~ Compensates for thermal expansion and assists in applying the brake.

~~(6)~~ Has a self-contained reservoir on it.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1969-2

PERFORMANCE OBJECTIVES

ROTOR SYSTEMS

1. KNOWLEDGES:

   a. Given a schematic, the student will identify seven major components of the rotor system with six of seven correct.

   b. With the aid of references, the student will be able to complete incomplete statements on the rotor systems without error.

2. SKILLS: None.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1969-2

STUDENT OUTLINE

ROTOR SYSTEMS

1. Description of main rotor system. fully articulated rotor head. magnesium & steel. rotor head transmits control to the blades. torque 2000-2500 ft lbs on nut. " checked every 200 hours. 2 sets of split cones upper steel lower bronze used to center the rotor head.

2. Components.

   a. Main rotor hub.

   b. Cone assemblies center hub to shaft.

c. Upper and lower plates. made of magnesium
upper plate thinner than lower

d. Spacers. 4 spacers between hub & hinge point
separates the upper & lower plates.

e. Dampers and damper reservoir.
4 dampers 1 for each hydraulic type self bleeding
MIL H-5606 used
dampers help the landing of the blade.
replace dampers with dampers of same series

f. Hinge assemblies.
4 hinge assemblies 1 for each blade
vertical pin with Longitudinal pin through the
vertical pin
vertical & land & lage
Longitudinal pin flapping.

g. Sleeve and spindle assembly. attached to horizontal pin. allows for folding of the blades.

h. Star assembly. rotating star & stationary star. ~~rotating~~ 4 rectangular longer ~~blades~~ linear motion in rotating linear motion & transmits flight control movement to the pitch horn.

i. Control rod assemblies.

stab ball ring mount assembly. causes stationary star to move the moving star. pitch control rods from blade horn to rotating star.

j. Antiflap and droop restrainers.

Centrifical force-over the fly weights out.
go out at 125-150 RPM, come in at 75-80 RPM.
droop restrainers hold out 60
flap restrainers out at 85 RPM in at 85-50 RPM.

k. Main rotor blade.

all blades balanced + ready to use
yellow blades with blades / core series
blades have 7° negative twist built in blade
blade has 23 pockets loaded to the gun
type cap fairing can be replaced
with pockets between all blade caps.

3. Maintenance.

Types points not to be dropped Torqued at 60 lb.
only use mild soap to clean blades.

4. Description of tail rotor system.

tail rotor master splined
tail rotor gear directional control.
steel rotor hub
blades allowed to flap 10° and direction ±20° total
pitch change links. counter weights limits the feed back
line on tail rotor dust distributes balance washers.

5. Components.

pitch beam held by a tapered pin.
Blade repair check - 20 check all
drop sections on blades.

6. Maintenance.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1969-2

PERFORMANCE CHECK

ROTOR SYSTEMS

1. Using schematic, identify and list below seven main rotor head components with a minimum of six of seven correct.

   a.

   b.

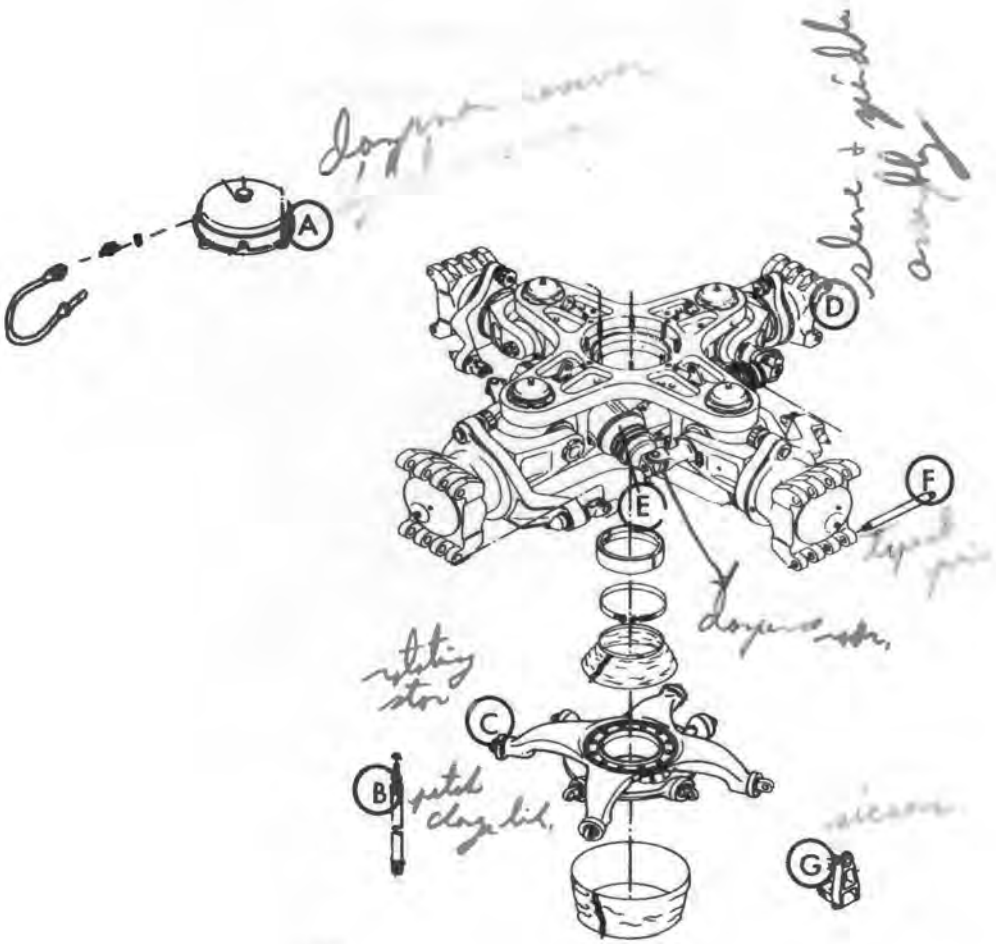
   c.

   d.

   e.

   f.

   g.



2. Fill in blanks on general description, location, and operation of the main rotor assembly and tail rotor assembly.

a. In describing the main rotor system, we say it is fully articulated outer system.

b. The purpose of the cone assemblies is to allow a lead the hub to the shaft.

c. The damper assemblies provide rotating stops and flapping stops.

d. The vertical pin allows lead & lag movement of the blades.

e. There are 23 pockets in each main rotor blade.

f. The pitch-change beam is held in place on the actuator shaft by a tapered pin.

g. The damper reservoir uses H 5606 hydraulic fluid.

h. The No. 1 pocket located on the tip of the main rotor blade is protected by tip cap fairing.

i. The tail rotor hub has nylon flapping stops.

DEPARTMENT OF MAINTENANCE TRAINING
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Fort Rucker, Alabama

File No. 1980-1

PERFORMANCE OBJECTIVES

TEST FLIGHT REQUIREMENTS

1. KNOWLEDGES: Without the aid of notes or references and—

   a. Given a list of incomplete statements pertaining to test flight requirements, the student will be able to select, from a list provided, the correct words or phrases needed to complete at least seven of the eight statements.

   b. When given a list of conditions, the student will be able to correctly select all of the conditions for which a test flight is mandatory.

   c. When given a list of conditions, the student will be able to correctly select all of the conditions which require a maintenance operational check.

2. SKILLS: None.

MUST BE TEST FLOWN

NOTES

1. A/C removed from extended storage
2. A/C must be test flown to complete periodic insp.
3. when engine has been replaced.
4. when cylinder assemblies removed & replaced.
5. when helicopter rotor or blades removed & replaced.
6. when items or components removed & replaced.
7. when fixed or rotable flight controls removed, replaced, or adjusted
8. cont duplicate start flight by check.
9. installed equipment to check good performance.
10. when picking up an A/C
11. major repair or structural change of A/C
12. determined by unit commander.
13. clutch, drive shaft, cargo hoist, etc.

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1980-1

STUDENT OUTLINE

TEST FLIGHT REQUIREMENTS

1. Purpose. of test flight: any flight which the primary mission is to determine the airworthiness of an A/C; or the functional condition of various systems of the helicopter

TBAVN 23-67

2. Mandatory conditions requiring a test flight..

1 flight readyness inspection
2 daily inspection — a sign must be every 72 hours or low a gas oil
3 intermediate inspection verify inspection between daily & periodic.
4 periodic inspection thrust & sampling inspection.
5 special inspection is a unscheduled inspection told about in the -20
6 calinder inspection [weight & balance] etc.
7 test flight

3. Accomplishment.

operational checks are accomplished on the ground to see that system was satisfactory

4. Publications.

TBAVN 23-67

TBAVN 23-16 test flight check for any a/c

55-15202-20

inspection check on a/c

test pilot signoff a/c

5. Recording test flights.

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1980-1

PERFORMANCE CHECK

TEST FLIGHT REQUIREMENTS

1. Place a checkmark in space(s) below for publications governing test flight and maintenance operational checks for the CH-34C.

   a. ___ TM 55-1520-202-10.

   b. √ TB AVN 23-67.

   c. ___ TB AVN 23-16.

   d. √ TM 55-1520-202-20.

2. From the following list of conditions, select those for which a maintenance operational check is required by placing a checkmark in spaces provided by the letter.

   a. √ An inverter has been replaced.

   b. ___ A rotor blade has been replaced.

   c. ___ Throttle correlation has been adjusted.

   d. √ Fuel boost pump has been replaced.

   e. ___ Generator has been replaced.

   f. ___ Tail rotor has been rerigged.

   g. √ Aft fuel transfer pump replaced.

3. From the following list of conditions, select those for which a test flight is mandatory by placing a checkmark in spaces provided by the letter:

   a. √ The generator has been replaced.

   b. √ Tail rotor pitch-change links replaced.

   c. √ A periodic inspection has been completed and signed off on the -13.

   d. ___ Engine-driven fuel pump replacement.

   e. ___ Marker beacon set replaced.

   f. √ An engine has been removed and reinstalled.

g. ___V___ You are accepting a CH-34C for a ferry mission.

h. ___V___ The main transmission has been replaced.

i. _____ Fuel boost pump has been replaced.

j. ___V___ The -13 has an entry of an unusual vibration.

4. Complete the following statements by selecting the correct words or phrases from the list provided in 5 below:

a. When performing a test flight, ___A___ are prohibited.

b. The duration of a test flight will be at least ___F___.

c. A waiver is needed to perform a test flight during hours of darkness signed by _____.

d. The purpose of a test flight is to ___G___.

e. The status symbol denoting a test flight is due is a _____.

f. Maintenance operational checks that have been completed are indicated on the _____.

g. The test flight checksheet used on test flights must be filed with _____.

5. Complete the statements in 4 above by selecting the correct words or phrases from the following list:

a. Passengers and cargo.

b. One hour.

c. The DA Form 2408-13.

d. Red dash.

e. Technical inspector.

f. Sufficient length to assure the airworthiness of the aircraft.

g. Determine the airworthiness of the aircraft.

h. Red diagonal.

i. AR 95-16.

j. The commanding officer.

k. The DA Form 2408-12.

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1979-4

PERFORMANCE OBJECTIVES

AUTOMATIC STABILIZATION EQUIPMENT

1. KNOWLEDGES:

   a. Control authority.

      (1) Identify the control authority of all four ASE channels.

      (2) Worksheet, TM 55-1520-202-10, and notes.

      (3) In accordance with TM 55-1520-202-10 and TM 11-6615-202-35.

   b. Stick trim system.

      (1) Select the statement that best describes and correctly explains the operation of the stick trim system.

      (2) Schematic drawing, worksheet, and ASE DOMT Notices.

      (3) In accordance with ASE DOMT Notices.

   c. Control panel.

      (1) Identify and match the operating switches and meter on the control panel.

      (2) Worksheet, notes, and ASE DOMT Notices.

      (3) In accordance with TM 11-6615-202-35 and ASE DOMT Notices.

   d. Motor box assembly (period two of four periods).

      (1) Identify and match the operating switches and electrical adjustments on the motor box assembly.

      (2) Worksheet and notes.

      (3) In accordance with TM 11-6615-202-35.

   e. Control gyro and amplifier box.

      (1) Identify and match the purpose and operation of the control gyro and amplifier box.

      (2) Diagram, worksheet, notes, and ASE DOMT Notices.

(3) In accordance with TM 11-6615-202-35 and ASE DOMT Notices.

f. Sensors.

(1) Identify and match the purpose, location, and operation of the sensors.

(2) Worksheet, notes, and ASE DOMT Notices.

(3) In accordance with TM 11-6615-202-35 and ASE DOMT Notices.

g. Servomotor assembly.

(1) Identify and match the purpose and operation of the four components of the servomotor assembly.

(2) Diagram, worksheet, and ASE DOMT Notices.

(3) In accordance with TM 11-6615-202-35 and ASE DOMT Notices.

h. Stick cancelers.

(1) Match the purpose and location of the stick cancelers.

(2) Worksheet, notes, and ASE DOMT Notices.

(3) In accordance with TM 11-6615-202-35 and ASE DOMT Notices.

i. Major and minor loops.

(1) Identify and trace with arrows the signals and control movement of the four major and minor loops.

(2) Diagrams, worksheet, notes, and ASE DOMT Notices.

(3) In accordance with TM 11-6615-202-35 and ASE DOMT Notices.

2. SKILLS: Operational check.

a. Perform operational check of ASE.

b. CH-34 trainer, TM 55-1520-202-10CL, ASE DOMT Notices, and TM 11-6615-202-12.

c. In accordance with ASE DOMT Notices and TM 11-6615-202-12.

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

6 functions.

File No. 1979-4

new altitude changes will be retained by ASE

STUDENT OUTLINE

altitude may be changed with wheel, by using flight controls.

AUTOMATIC STABILIZATION EQUIPMENT

1. Purpose and use. improve handling of A/C under all conditions provide absolute static & dynamic stability of A/C provide auto control of cruise flying may be engaged at all times except altitude hold.

2. Control authority.
   20% of all controls
   your trim 100%. you hyd spring allows extra 80% of your trim.

3. Fixed-stick concept. 4 channels. pitch, roll, ACT, your controls remain fixed

4. Hydraulic servo.
   operate pilot valve at amplify servo system.

5. ASE components.

   a. Control panel.

      (1) Engage button. pitch roll & yaw on with the button

      (2) Standby button. puts all channels in standby.

      (3) "Bar Alt" button. will set the altitude

required to operate ASE
separate servo system OFF,
115 volt AC in main line voltage
28 volts DC

(4) OFF button. auto Pilot standby for altitude

(5) C.G. trim. compensates for C.G changes in roll changes. no pitch change due to cyclic.

(6) Null indicator. to monitor position of the motors while in flight or on the ground.

(7) Yaw trim. can change up to 7° in normal flight with yaw trim. at a time 360° lock tick mark = 10

b. Motor box.

(1) Channel disengage switches. upper left of control box governor switch not connected. for Navy

(2) Override check switch. dont use in flight
over-ride check in all channels.

(3) Motor position switch. used by maintenance

(4) Null indicator control switch. only in the pitch position

adj. made by engr. only.

(5) FU null adjustments. must have ASE in standby

(6) Tachometer generator adjustments.

adjust from 4-6 other than that replace ASE must be ignored before adjusting.

4 SENSORS

(7) Magnetic amplifiers. part of panel
gyro 2 sensors.
5-2 compass is tied in to master heading.
Magnetic control

c. Control gyro and amplifier box.

(1) Vertical gyro assembly. called contains gives roll & pitch signal
double gimble gyro for roll & pitch

(2) 12-signal adjustment panel.
so system may be used on various A/C
adjust according to decal.

(3) Five-signal adjustment panel.
make course adjustment, the bottom 2 disks.
for centering null indicator.

d. Sensors.
changes mechanical motion into a proportional electrical
output
used to detect the error of the correction

e. Servomotor assembly.

will tell 3 things
1. amount of error
2. direction
3. duration

(1) Motor. introduces the ASE signal into flight control system
motor changes electrical energy into rotating mechanical motion

(2) Leadscrew and link assembly.
transfers rotating motion to linear motion
ten turns on thread shaft 5 turns each way.

(3) Transducer.
changes linear motion to an electrical signal.
electrical signal is = but opposite from received signal

(4) Tachometer generator.
1 dampens motor movement
2 acts as electrical brake for motor
3. prevents motor from over shooting
4 prevents motor from accelerating
motor over 4,400 RPM
start & stop at 4400 RPM
with max travel of 5 turns.

6. Major loop. a term / meter starting at one place / finishing at the starting place

a. Sensor. detect error in flight path.

b. C.G. and A box. $2\frac{1}{2}$ - 3 min to get system warmed up. gyro take 28 volts DC 115 AC current

c. Motor box.

d. Servomotor assembly.

e. Hydraulic servo.

7. Minor loop. recenters the ASE meter, by nulling - bit opposite signal to oya.

a. Transducer.

b. Tachometer generator.

8. Pitch channel.

a. Vertical gyro.

b. Amplifier.

c. Magnetic amplifier.

d. Cancelers. STICK located under floor below cyclic is the reference for CG BOX to work from

ASE cost 30,000 for equipment not costing installation.

e. C.G. trim. monitors servo on moving cyclic to maintain attitude of A/C

f. Flight controls.

9. ~~Roll channel~~. ROLL LAGUE INTERGRATER, lags the signal from 6-8 seconds to oppose ground resonance.

10. Altitude channel. barometric altitude controller.

a. ~~Controller~~. pressure sensing device, bellows sealed at sea level pressure, and changes with altitude bellows. range from -1000' thru 50,000' some electrical range should keep a/c within ± 25' of altitude +250 - -250

b. ENGAGE button.

c. OFF button.

11. Yaw channel. use standby button to change altitude collective has no counter action

a. Directional gyro.

b. Control authority.

c. Pedal switches.

d. Yaw trim.

e. Yaw turn loop motor.

12. Automatic stabilization release switches.

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1979-4

PERFORMANCE CHECK

AUTOMATIC STABILIZATION EQUIPMENT

1. From the list below, identify the control authority of all four ASE channels.

   a. 10 percent each side of neutral.
   b. 20 percent each side of neutral.
   c. 20 percent each side of neutral during open-loop operation.
   d. 100 percent during closed-loop operation.
   e. 20 percent during closed-loop and 100 percent during open-loop operation.

   B Pitch.
   B Roll.
   B Altitude.
   E Yaw.

2. Circle the letter of the statements listed below that best describe and correctly explain the operation of the stick trim system.

   a. Operates from the 115-volt A.C. system and provides the helicopter with a fixed-stick concept. When the master switch is in the ON position, the magnetic brake is energized, and the cyclic stick will maintain this position.

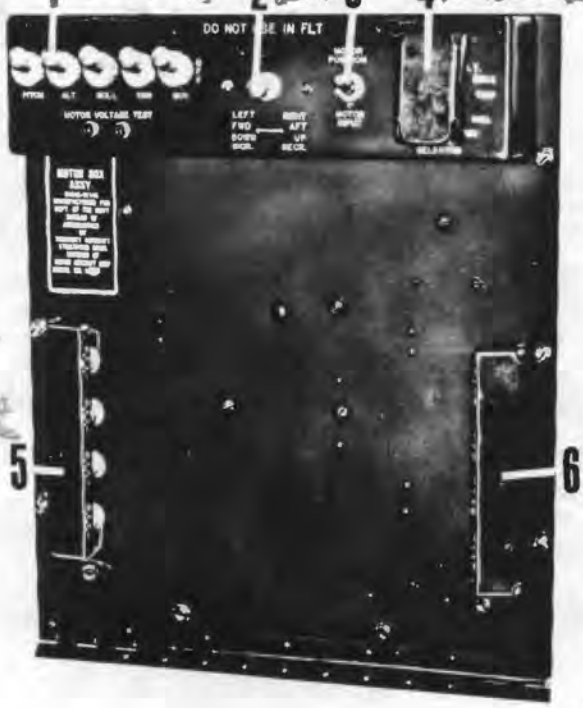
   (b.) Operates from the 28-volt D.C. system and provides the helicopter with a fixed-stick concept. When the master switch is in the STICK TRIM position, the magnetic brake is not energized, and the cyclic stick will maintain the position the aviator has selected.

   c. Operates from the 28-volt D.C. system and provides the helicopter with a fixed-stick concept. When the master switch is in the strick trim ON position, the aviator must depress the trim button on the cyclic control stick to energize the magnetic brake to reposition the cyclic control and set up a new attitude.

3. Using the control panel shown on page 24, identify the numbered operating switches and meter with the blank provided and the function of each.

Switches		Functions	
5	C.G. trim	3 & 4	Disconnects sensors from major loop.
6	Null indicator	2	Engages altitude controller.
1	Engage button	5	Used to compensate for fuel consumption.
3-4	Standby button	6	Monitors motor position.
2	"Bar Alt" button	1	Connects sensors to major loop (pitch, yaw, roll).
3	"Bar Alt OFF" button	3	Nulls out altitude controller signal.
7	Yaw trim	1 & 2	Connects all four channels to major loop.
		3	Cannot be engaged on ground.
		upper 4	Not used on Army helicopters.
		7	Used for small heading corrections.

4. Using the motor box assembly below, identify and match the numbered operating switches and electrical adjustments with the blanks provided and the function of each.



Switches

2 Override check.

4 Null indicator control.

3 Motor position.

1 Channel disengage.

6 FU null.

5 Tachometer generator.

Functions

2 Sends maximum signal to all four servomotors.

1 Disconnects power to individual servomotors.

4 Selects servomotor to be monitored on null indicator.

6 Used to electrically center servomotors.

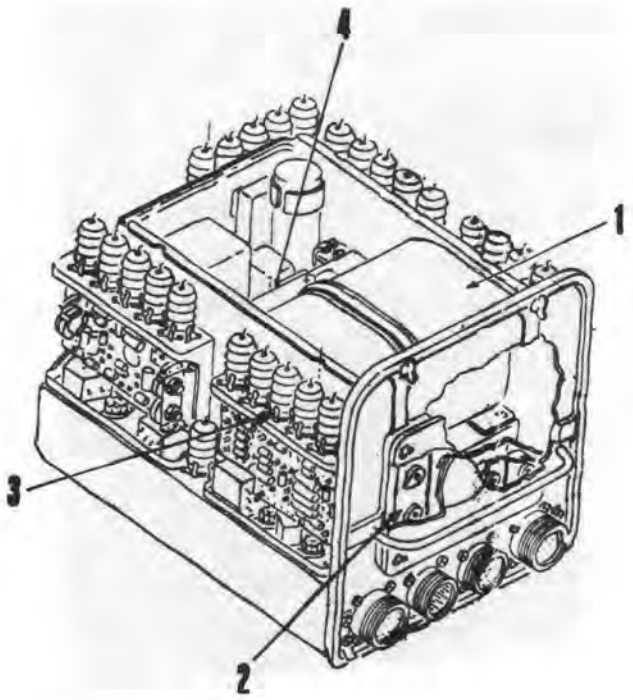
5 Used to adjust voltage to tachometer generators.

NONE Senses error signal for pitch-and-roll channels.

NONE Allows aviator to monitor servomotor.

NONE Adjusts null indicator for sensitivity.

5. Using the control gyro and amplifier box shown below, identify and match the purpose and operation of the numbered components with the blanks provided.



Components	Purpose
3 Amplifiers.	4 Adjust null indicator centering and sensitivity.
1 Vertical gyro.	2 Allows C.G. and A box to be used on many different versions of helicopters.
4 Five-signal adjustment panel.	1 Senses error signals for the pitch-and-roll channels.
2 12-signal adjustment panel.	3 Receives error signal from sensors.
	NONE J-2 COMPAS Senses error signals for yaw channel.

6. From the list below, identify and match the purpose and operation of the sensors.

a. Vertical gyro.

b. Barometric altitude controller.

c. J-2 compass.

B Sensor for altitude channel.

A Sensor for pitch-and-roll channel.

C Sensor for yaw channel.

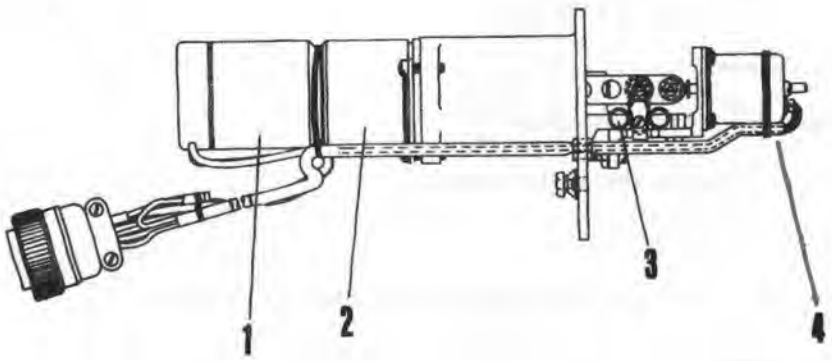
A Requires a 2 1/2- to 3-minute warmup period to engage.

B Only engaged at a zero rate of climb or descent.

A, B & C Changes mechanical motion into proportioned electrical signal.

A Two-gimbal gyro.

7. Using the servomotor assembly below, identify and match the purpose and operation of the four numbered components with the blanks provided.



Components

___ Motor.

___ Tachometer generator.

___ Leadscrew and link assembly.

___ Transducer.

Purpose

___ Change mechanical motion into electrical signal.

___ Sends signals to recenter motor.

___ Dampens motor movement.

___ Acts as electrical brake on servomotor.

___ Changes electrical energy into rotating mechanical motion.

___ Limits ASE to 20 percent authority of flight control range.

___ Signal is proportional but opposite phase to signal that displaced motor.

___ Prevents overshoot.

___ Operates only in standby condition.

___ Adjusted by FU null potentiometer.

___ Provides aviator with artificial feel in cyclic controls.

8. Select the correct statement below that describes the purpose and function of stick cancelers.

   a. The stick canceler will develop a signal proportional to cyclic stick position from neutral. Whenever the aviator desires an attitude other than true level, the stick must be displaced which, in turn, develops a signal equal in amplitude but effectively opposite in phase to gyro signal.

   b. The stick canceler will develop a signal proportional to cyclic stick position of 20 percent of the entire pitch-and-roll flight control range. Whenever the aviator desires an attitude change, the stick must be displaced which, in turn, develops a signal equal in amplitude and opposite phase to the gyro signal.

   c. The stick canceler will develop a signal proportional to cyclic stick position from neutral. Whenever the aviator desires an attitude other than true level, the stick must be displaced which, in turn, develops a signal equal in amplitude in phase to the gyro signal. The stick canceler also allows the aviator to change attitude without disengaging the ASE.

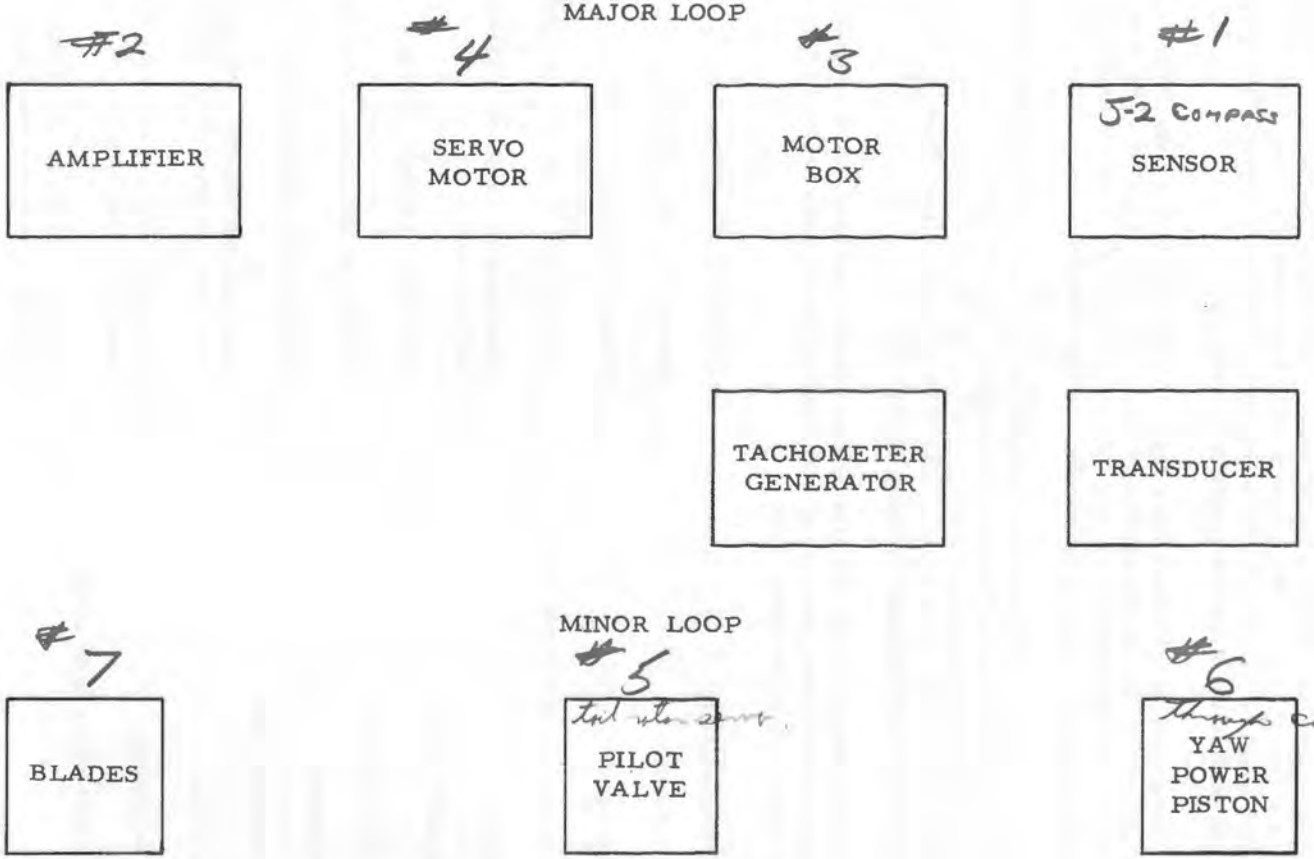
9. Major and minor loops. From the list below, identify and match the components and components' functions; also trace with arrows the signals and control movement of the four major and minor loops.

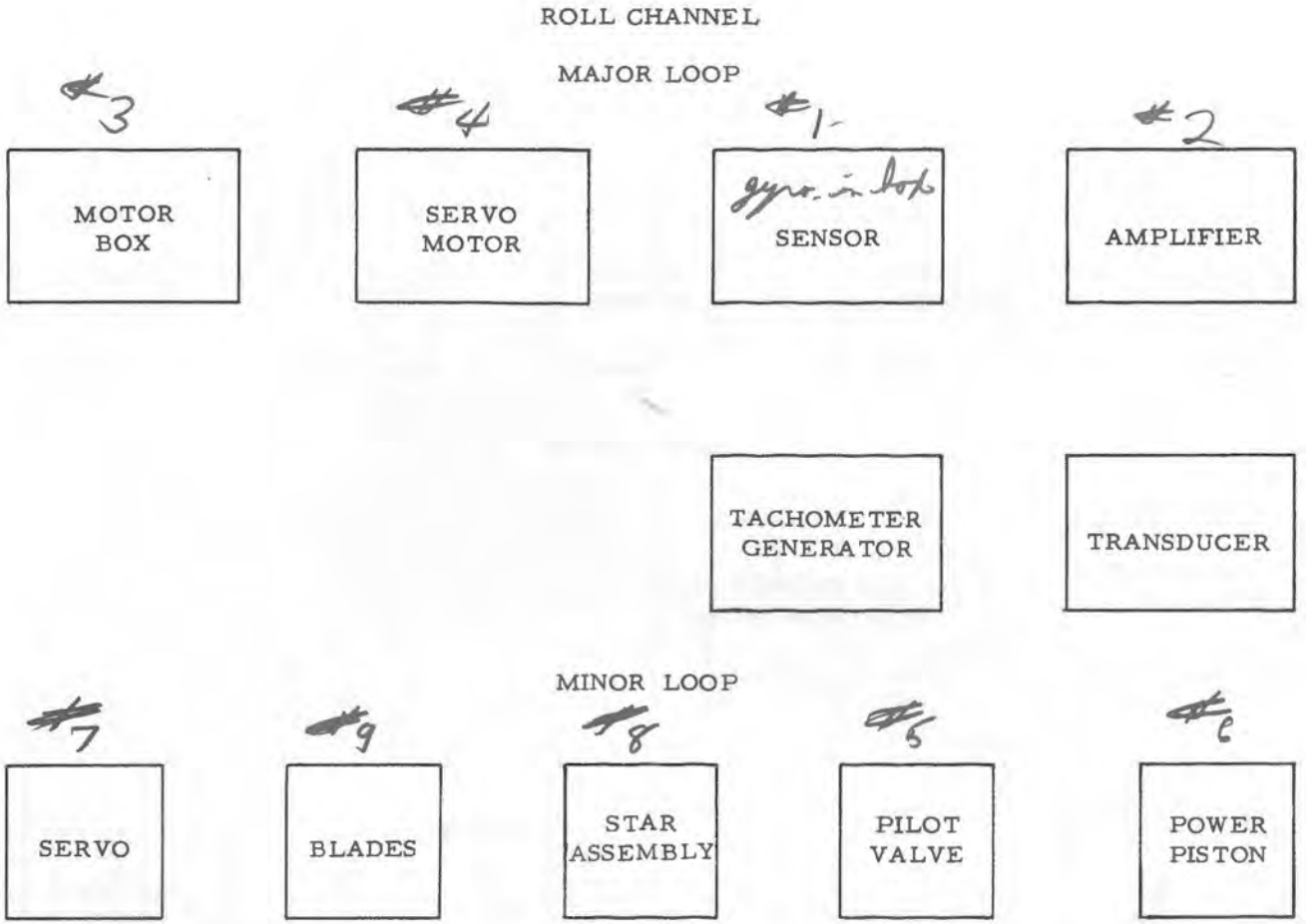
Components	Component Functions
a. Vertical gyro.	____ Sensor for yaw channel.
b. J-2 compass.	____ Two-gimbal gyro.
c. Barometric altitude controller.	____ Limits ASE to 20 percent authority.
d. Amplifier.	____ Disconnects power to individual servomotor.
e. C.G. and A box.	____ Sensor for altitude channel.
f. Servomotor assembly.	____ Sensor for pitch-and-roll channel.
g. Transducer.	____ Directs flow of hydraulic fluid.
h. Tachometer generator.	____ Changes mechanical motion into proportional electrical signal.
i. Motor box.	____ Dampens motor movement and prevents overshoot.
j. Star assembly.	____ Contains magnetic amplifiers and channel disengage switches.
k. Hydraulic servo pilot valve.	

SENSOR J-2 COMPAS your chart

YAW CHANNEL

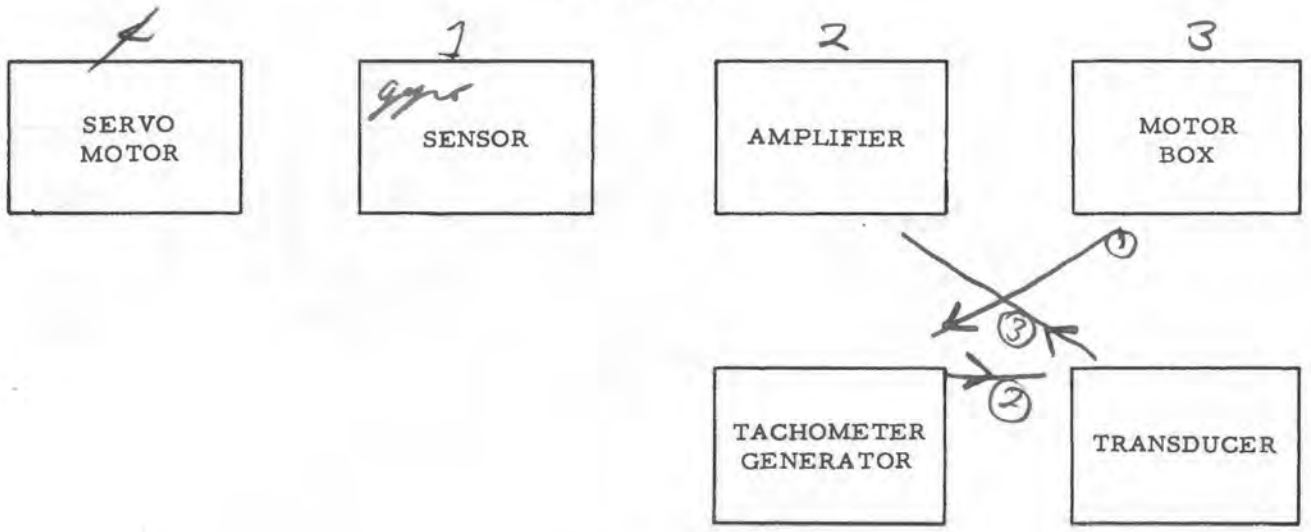
MAJOR LOOP



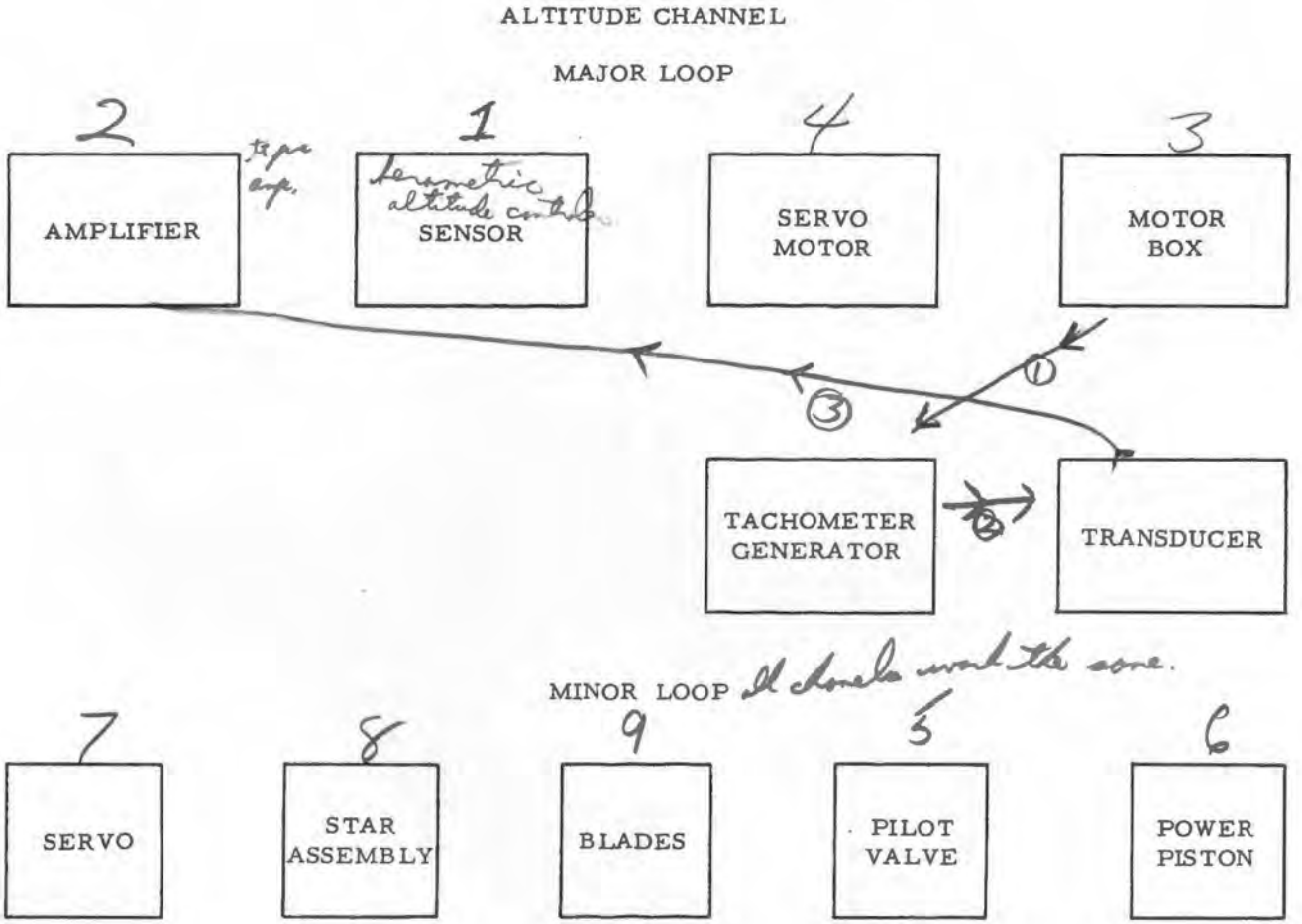

ROLL CHANNEL
MAJOR LOOP
#3
MOTOR BOX
#4
SERVO MOTOR
#1
gyro in box
SENSOR
#2
AMPLIFIER
TACHOMETER GENERATOR
TRANSDUCER
MINOR LOOP
#7
SERVO
#9
BLADES
#8
STAR ASSEMBLY
#5
PILOT VALVE
#6
POWER PISTON

PITCH CHANNEL

MAJOR LOOP



MINOR LOOP


ALTITUDE CHANNEL
MAJOR LOOP
2
AMPLIFIER
1
SENSOR
4
SERVO MOTOR
3
MOTOR BOX
TACHOMETER GENERATOR
TRANSDUCER
MINOR LOOP
7
SERVO
8
STAR ASSEMBLY
9
BLADES
5
PILOT VALVE
6
POWER PISTON

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1971-2

PERFORMANCE OBJECTIVES

ELECTRICAL SYSTEM

1. KNOWLEDGES:

   a. With the aid of references, the student will be able to complete statements on the description, operation, and location of the generator and its protective circuit, without error.

   b. With the aid of references, the student will be able to select from a group of statements on the electrical system, those statements which are true or false, without error.

   c. Given a list of the three bus bars, the student, from memory, will be able to write the names of the power sources of each bus bar, without error.

   d. When given a list of electrical components, the student, from memory, will be able to select those components which are powered by each bus bar with eight of 10 correct.

2. SKILLS: None.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1971-2

STUDENT OUTLINE

ELECTRICAL SYSTEM

1. General description.

28 Volts DC

115 & 26 VOLTS AC

DC system protected by circuit breakers.

AC protected by fuses. except glide scope has a circuit breaker

both system single wire negative ground.

2. Components of the D.C. system.

a. Battery. used as an emergency power system when generator fails in flight.
24 VOLTS 26 AMP LEAD ACID BATTERY

b. Generator. driven by main trans. generator →
produces 30 volts 200 AMPS between 3,000 - 5,000 RPM

c. Voltage regulator. carbon pile
adjust to 28 VOLTS output.

d. Overvoltage relay. senses over voltage condition
operates a trip coil in field control
relay will kick out the generator
reset field control relay to restart generator

e. Field control relay.
protects the generator from putting
out too much voltage & kicks the generator off.

f. Reverse-current cutout relay.
cuts the generator into the system
when the battery voltage gets below its output.

g. Generator failure warning light relay.
light comes on when generator goes off

3. Distribution of the D.C. power system.

1 Battery bus cabin lights inspection lights & level gauges.

2. primary bus supplies power to start & ffg apply

3 secondary bus power to equipment that are not necessary for flight.

battery will not carry all ~~and~~ secondary bus & ffg to secondary bus for expendable

4. Bus bars. + three power sources.

connect battery bus, quick disconnect [preflight & inspection]

Primary bus

1. battery
2. generator
3 A.P.U. or external power.

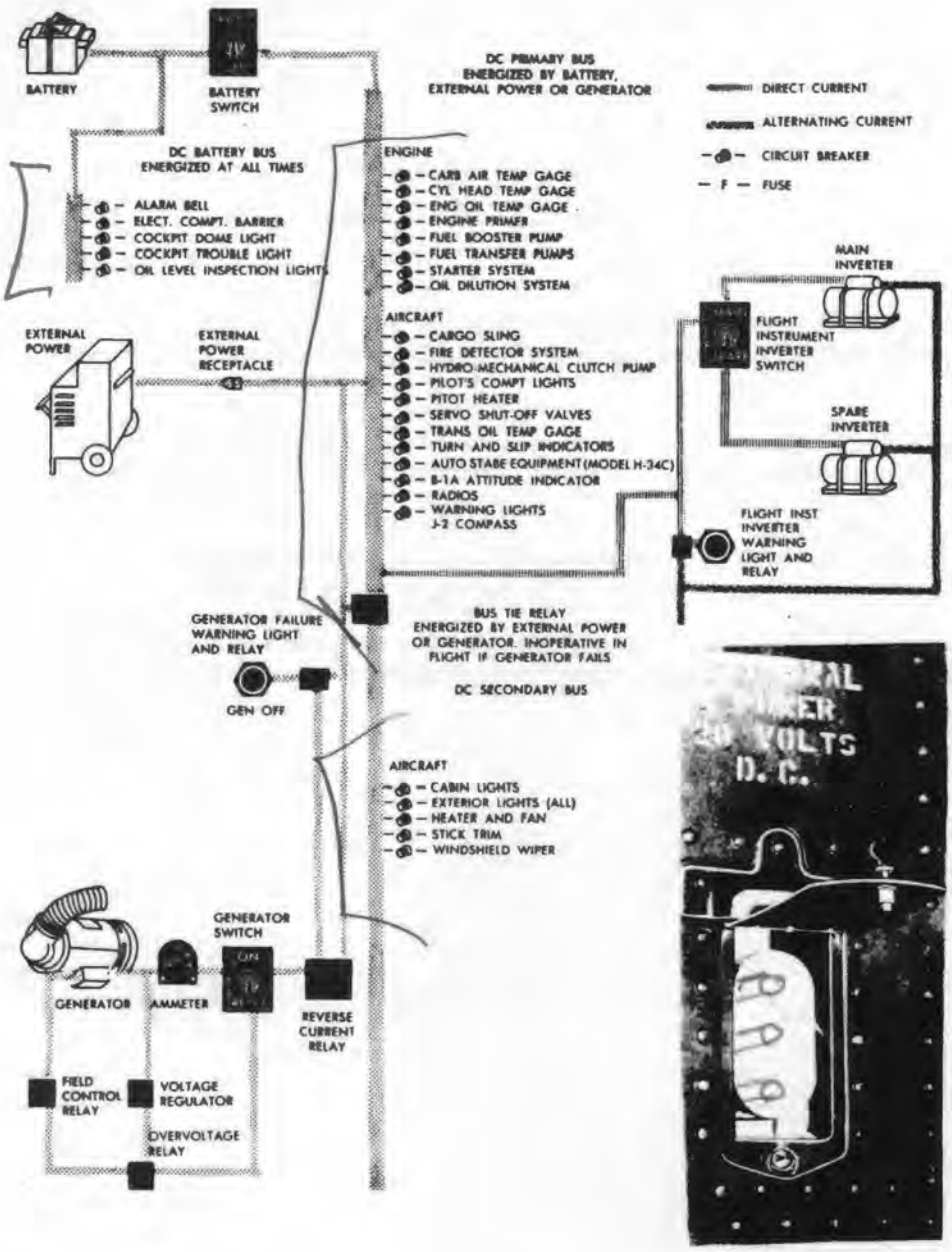
secondary bus

1. generator. has the relay for primary & secondary battery
2. A.P.U.

5. A.C. power system. two 2 inverters ① main ② spare
powered by 28 volts DC from
primary bus.
they are a DC motor turning an AC
generator, producing 115 AC

26 volt AC <u>auto transformer</u> steps
down 115 AC down to 26 volt AC
located on right side of battery bus
cluter compartment.

AC system on fuses.
DC circuit breakers.


BATTERY
BATTERY SWITCH
DC PRIMARY BUS ENERGIZED BY BATTERY, EXTERNAL POWER OR GENERATOR
DIRECT CURRENT
ALTERNATING CURRENT
CIRCUIT BREAKER
F — FUSE
DC BATTERY BUS ENERGIZED AT ALL TIMES
ALARM BELL
ELECT. COMPT. BARRIER
COCKPIT DOME LIGHT
COCKPIT TROUBLE LIGHT
OIL LEVEL INSPECTION LIGHTS
ENGINE
CARB AIR TEMP GAGE
CYL HEAD TEMP GAGE
ENG OIL TEMP GAGE
ENGINE PRIMER
FUEL BOOSTER PUMP
FUEL TRANSFER PUMPS
STARTER SYSTEM
OIL DILUTION SYSTEM
MAIN INVERTER
FLIGHT INSTRUMENT INVERTER SWITCH
SPARE INVERTER
EXTERNAL POWER
EXTERNAL POWER RECEPTACLE
AIRCRAFT
CARGO SLING
FIRE DETECTOR SYSTEM
HYDRO-MECHANICAL CLUTCH PUMP
PILOT'S COMPT LIGHTS
PITOT HEATER
SERVO SHUT-OFF VALVES
TRANS OIL TEMP GAGE
TURN AND SLIP INDICATORS
AUTO STABE EQUIPMENT (MODEL H-34C)
B-1A ATTITUDE INDICATOR
RADIOS
WARNING LIGHTS
J-2 COMPASS
FLIGHT INST INVERTER WARNING LIGHT AND RELAY
BUS TIE RELAY ENERGIZED BY EXTERNAL POWER OR GENERATOR. INOPERATIVE IN FLIGHT IF GENERATOR FAILS
GENERATOR FAILURE WARNING LIGHT AND RELAY
GEN OFF
DC SECONDARY BUS
AIRCRAFT
CABIN LIGHTS
EXTERIOR LIGHTS (ALL)
HEATER AND FAN
STICK TRIM
WINDSHIELD WIPER
GENERATOR SWITCH
GENERATOR
AMMETER
REVERSE CURRENT RELAY
FIELD CONTROL RELAY
VOLTAGE REGULATOR
OVERVOLTAGE RELAY

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1971-2

PERFORMANCE CHECK

ELECTRICAL SYSTEM

1. Complete the following statements on the description, operation, and location of the generator and its protective circuit:

   a. The generator on the CH-34 helicopter is described as a 30 volt 200 ampere hour.

   b. The generator is mounted on the accessory carrier of the transmission.

   c. The generator is cooled by a gimbal blower mounted on the accessory case of the transmission.

   d. The generator current enters the primary bus through the voltage regulator.

   e. The reverse-current relay protects the generator from being _____ when battery voltage exceeds generator output voltage.

2. Answer the following statements as true or false by entering "T" or "F" in the blank spaces below:

   a. F The battery is a 28-volt, 36-ampere-hour, lead-acid.

   b. T The voltage regulator is adjusted to 28 volts.

   c. T The overvoltage relay cuts the generator out of the system.

   d. T The generator reset switch is located in main instrument panel.

   e. F Both main and spare inverters are on during flight.

   f. T All items necessary for flight are energized by the secondary bus.

   g. T Whenever starting and running up aircraft, an APU should be used.

   h. T The inverters are rated at 115 volts, 500 amperes.

3. Complete the following statements:

   a. The battery bus is energized by battery _____.

b. The primary bus is energized by battery APU generator.

c. The secondary bus can be energized by the generator or APU only.

4. Indicate the power source for each component listed below. Write Battery, Primary, or Secondary by each component in the blank spaces below.

a. primary Engine oil temperature gage.

b. secondary Cockpit dome light.

c. _____ Starter.

d. secondary Heater.

e. battery Crew alarm.

f. primary Fuel pumps.

g. secondary Stick trim.

h. battery Inspection lights.

i. secondary Windshield wiper.

j. primary Oil dilution valve.

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1974-1

PERFORMANCE OBJECTIVES

LANDING GEAR AND BRAKE SYSTEM, CH-34

1. KNOWLEDGES:

   a. Landing gear.

      (1) Match landing gear components with their description, location, and operation.

      (2) Worksheet and TM 55-1520-202-20.

      (3) In accordance with TM 55-1520-202-20.

   b. Brake system.

      (1) Match brake system components with their description, location, and operation.

      (2) Worksheet and TM 55-1520-202-20.

      (3) In accordance with TM 55-1520-202-20.

   c. Malfunctions.

      (1) Match malfunctions with corrective action required.

      (2) Worksheet and TM 55-1520-202-20.

      (3) In accordance with TM 55-1520-202-20.

2. SKILLS: None.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1974-1

STUDENT OUTLINE

LANDING GEAR AND BRAKE SYSTEM, CH-34

1. Main gear. fixed gear.

   a. Shock strut.
   air oil type strut.
   cussion the crash.

   b. Leg and axle assembly.
   raise leg up 45° + pull it out
   pod behind wheel 6 pod pods on A/C
   2 on each gear.

   c. Wheel and tire assembly.
   MIL-H-5606 hydraulic is stored
   hydraulically operated brakes.
   split rim type wheel
   8.00 x 12 inflate so tire rides on center 6 ply tire.

2. Tailwheel assembly.

   a. Shock strut.

   b. Yoke and fork assembly.
   caster tail wheel

   c. Tire.
   6.00 x 6 6 ply ~~flat~~ inflate to
   fully radius.

3. Tailwheel lock control assembly.

   a. Handle.

   b. Cable.

   c. Locking pin.

   d. Indicator flag.

4. Brake system.

   a. Type. single disk triple spot self adjusting independent

   b. Components.

5. Common malfunctions and corrective action required.

6. DA Form 2408-13 entries.

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1974-1

PERFORMANCE CHECK

LANDING GEAR AND BRAKE SYSTEM, CH-34

Match landing gear components in column A with the maximum number of items in column B that best describes the components, location, and operation.

Column A		Column B	
1.	Shock strut.	3	Has split-rim mounting on two roller bearings.
2.	Leg and axle assembly.	5	Is spring-loaded with a shear section.
3.	Wheel and tire assembly.	___	Is attachment point for shock strut.
4.	Yoke and fork assembly.	___	1100x12, nylon, 6-ply.
5.	Tailwheel locking device.	___	Activated by handle in cockpit and attaching cables.
6.	Brake master cylinder.	___	Has a tiedown ring and jacking point mounted on it.
7.	Parking brake valve.	___	Has a self-centering device.
8.	Brake assembly.	___	Mounted to the leg and axle assembly and operates hydraulically.
		___	Is a shock absorber.
		___	Works on air and hydraulic oil.
		___	Provides attaching points for shock strut and tailwheel.
		___	Has indicator flag.
		___	Prevents tailwheel from oscillating in flight.
		6	Located on pilot's directional pedals and creates pressure.
		1	Can be used to level helicopter.

___ Mounts to tail cone section of helicopter.

___ Has three movable and three stationary pucks.

___ Has self-adjusting pins to show wear.

Match malfunctions in column A with corrective action required in column B.

Column A	Column B
1. Shock strut bottomed out.	___ Replace pucks.
2. Tire does not have proper rolling radius.	___ Replace master cylinder.
	___ Bleed brake system.
3. Static ground wire not touching ground.	___ Clean and lubricate bearings.
4. Water or mud in wheel assembly.	___ Replace or lenghten wire.
5. Brakes are spongy.	___ Inflate to proper air pressure.
6. Brakes hold but bleed down.	___ Recharge.
7. Adjustment pin flush with housing.	

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1976-4

PERFORMANCE OBJECTIVES

WEIGHT AND BALANCE

1. KNOWLEDGES:

   a. Theory and terms used in weight and balance.

      (1) Complete statements on the theory and terms used in weight and balance.

      (2) Worksheet.

      (3) In accordance with TF 46-2339, TM 55-1520-202-10, and TM 55-405-9, with at least 80 percent correct.

   b. Weight and balance forms and publications.

      (1) Match weight and balance forms and publications with statements of their description and uses.

      (2) Worksheet.

      (3) In accordance with TM 55-1520-202-20, TM 55-405-9, and AR 95-16, with at least 80 percent correct.

2. SKILLS: Completion of DA Form 365F.

   a. Make proper entries on DD Form 365F.

   b. DD Form 365F, TM 55-1520-202-10, and problem sheet.

   c. In accordance with TM 55-1520-202-10 and TM 55-405-9, with 100 percent correct.

weight × arm = moment, computed in inch pounds.

moment ÷ weight = CG

basic moment + basic weight ~~total moment~~

* CG center of gravity total moments ÷ by total weight

138.7 for a 3% ideal CG

130.7 forward limit

146.7 AFT LIMIT

now add weight to moment.

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1976-4

STUDENT OUTLINE

WEIGHT AND BALANCE

1. **Definitions.**

a. Basic weight A/c structure with fixed equipment with trapped fuel & oil.
Basic weight, constt, ferry, med evacuation, thru type.

b. Operating weight: variable weight items which will remain constant for type of mission eg. crew etc.

c. Total A/c weight. total operating weight with fuel & munitions

d. Gross weight total weight of A/c with everything in it. A/c & cargo.

e. Gross take off weight 13,600 lb.

f. Gross landing weight.

g. maximum gross weight.

ADVERSE ARM total weight x total arms divide
all mounts all weight will give you adverage arm of A/C
give CG

h. reference datum line. line on a 34 right in front of the A/C

i. ARM distance from RDL measured in inches arm station one.
MOMENT is basic weight x length of ARM.

2. TM's and AR's pertaining to weight and balance.

a.

b. covers all army A/C
TM 55-405-9 with aircraft serial number. any aviation station must have

(1) DD Form 365.
record of weight & balance personal for the crew

(2) DD Form 365A.
basic weight check list
anything that as an assigned location in the a/c must if mounted or not on them.

(3) DD Form 365B.
a/c actual weight after weighing.
provides basic weight.
field maintance the weight A/C must be weighed / a year

(4) DD Form 365C.
continuous history of weight & mount of A/C

(5) DD Form 365F.
weight & balance clearance form.
if no previous valid form F is not on record.
gross weight moment & CG

c. TM 55-1520-202-10.
loading data compl 365F.

Test questions

d. AR 95-16.
governs all weight & balance.

Class I A/C can weigh one A/C to figure weight & balance from the 1 weighed.
use of form F under alternate load is used.

Class II
CG can be readily recorded if loaded wrong.
365F necessary if no form on record for type of load and A/C must be weighed once each year

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1976-4

PERFORMANCE CHECK

WEIGHT AND BALANCE

1. Theory and terms used in weight and balance. In the blanks, in the statements below, place the word or words which will make the statements true.

Weight	Reference datum line
Balance	Basic weight
Moment	Operating weight
Arm	Total aircraft weight
Center of gravity	Gross weight
Center-of-gravity range	Gross landing weight
Class I aircraft	Class II aircraft

a. The Reference datum line is that point from which the arm is measured.

b. The weight times the arm equals the moment.

c. _____ is the force exerted by the earth's magnetic field on an object.

d. Fixed equipment, trapped fuel and oil, and the aircraft structure make up the basic weight aircraft weight.

e. The _____ _____ _____ is that amount a load can be shifted and still be in the center-of-gravity limits.

f. The _____ is the gross weight minus items expended during flight.

g. A _____ _____ aircraft is an aircraft whose weight and balance limits can sometimes be exceeded by alternate loading arrangements.

h. The ARM is the distance from the RDL to a component and is measured in inches.

i. Station 138.7 is the ideal center of gravity for the CH-34.

j. The operating weight is the operating weight plus the fuel and ammunition.

k. The class II aircraft requires a DD Form 365F for each flight for which no previous valid form is available.

l. takeoff weight includes the basic operating and total aircraft weight plus troops and cargo.

m. The point at which an aircraft will balance, if it were possible to support the aircraft at that point, is known as the center of gravity.

n. The arm multiplied by the weight of an object is known as the moment.

o. Balance is that condition which exists when the center of lift is directly over the center of gravity.

2. Weight and balance forms and publications. In the blanks beside the statements below, place the letter of the form or publication to which the statement applies.

a. DD Form 365.
b. DD Form 365A.
c. DD Form 365B.
d. DD Form 365C.
e. DD Form 365F.
f. Chart E.
g. TM 55-1520-202-10.
h. TM 55-405-9.
i. AR 95-16.

(1) _____ Is used as a worksheet when weighing an aircraft.

(2) _____ Prescribes the intervals at which aircraft are weighed.

(3) _____ Is used to inventory the aircraft prior to weighing.

(4) G Can be used for computing the fuel and oil when making out the DD Form 365F.

(5) A Is a record of weight and balance personnel.

(6) _____ Contains a sample copy of all weight and balance forms and is assigned to the aircraft by a serial number.

(7) _____ Must be filled out prior to takeoff for which no previous valid form is available.

(8) B Contains the most current basic weight for the aircraft.

(9) C Contains Chart E and information on weight and balance definitions.

(10) E Is a form on which the pilot can change the takeoff center of gravity and the landing center of gravity.

(11) D Originated by the manufacturer and contains all equipment that is on or can be installed on the aircraft.

(12) _____ Is a form that is used to list all equipment that is part of the basic weight, but is not on the aircraft when it is being weighed.

(13) _____ List all structural modifications which have been completed on the aircraft.

(14) _____ Explains what class I and class II aircraft are, and who is responsible for weight and balance data.

(15) H Explains how an aircraft is weighed and what equipment is required.

(16) _____ Contains a center-of-gravity table for computing weight and balance when filling out a DD Form 365F.

(17) _____ List the weight, moment, arm, and station of each component on the aircraft.

(18) _____ Contains a column which is checked by the manufacturer before delivery of the aircraft.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1976-4

PROBLEM SHEET - PERIOD THREE

WEIGHT AND BALANCE

Date: Current date.

Type aircraft: CH-34C.

From: Hanchey AAF.

Mission: Service.

Aircraft Serial No: 57-1770.

To: Macon, Georgia.

Pilot: You.

Basic Weight: 8,149.

Basic Moment: 11,166.1

Oil: 10.5 gallons.

Crew: 3 @ 200 pounds each.

Crew Chief: Station C-15.

Takeoff Fuel: 263 gallons.

Passengers: 5 @ 200 pounds each.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1976-4

SOLUTION SHEET - PERIOD THREE

WEIGHT AND BALANCE

NOTE: See solution sheet on following page.

WEIGHT AND BALANCE CLEARANCE FORM F
TRANSPORT
(USE REVERSE FOR TACTICAL MISSIONS)

Cross Reference RAF Form 2870 RCAF Form F. 115 C 40M 6-61 (6757)

FOR USE IN T.O. 1-1B-40 AN 01-1B-40 & TM 55-405-9

DATE	AIRCRAFT TYPE	FROM	HOME STATION
Current	CH-34C	Hanchey AAF	Hanchey AAF
MISSION/TRIP/FLIGHT/NO.	**SERIAL NO.**	**TO**	**PILOT**
Service	57-1770	Macon, Ga.	You

LIMITATIONS			
CONDITION	TAKEOFF	LANDING	LIMITING WING FUEL
[1] ALLOWABLE GROSS WEIGHT	13600	13600	
TOTAL AIRCRAFT WEIGHT (*Ref. 11*)	10405		
OPERATING WEIGHT PLUS ESTIMATED LANDING FUEL WEIGHT		9607	
OPERATING WEIGHT (*Ref. 8*)			
ALLOWABLE LOAD (*Ref. 12*) (use *SMALLEST figure*)	3195	4533	
[4] PERMISSIBLE C. G. TAKEOFF	FROM 130.7	TO (% *M.A.C. or IN.*) 146.7	
[4] PERMISSIBLE C. G. LANDING	FROM 130.7	TO (% *M.A.C. or IN.*) 146.7	
[5] LANDING FUEL WEIGHT	240		

REF	ITEM	WEIGHT	[1] INDEX OR MOM/
1	BASIC AIRCRAFT (*From Chart C*)	81490	111661
2	OIL (10.5 *Gal.*)	7880	500
3	CREW (*No.*)		
4	CREW'S BAGGAGE 3	6000	6300
5	STEWARD'S EQUIPMENT		
6	EMERGENCY EQUIPMENT		
7	EXTRA EQUIPMENT		
8	OPERATING WEIGHT	88278	118461
9	TAKEOFF FUEL (263 *Gal.*)	15780	27100
10	WATER INJ. FLUID (*Gal.*)		
11	TOTAL AIRCRAFT WEIGHT	104058	145561

12 DISTRIBUTION OF ALLOWABLE LOAD (PAYLOAD)

COMPT	UPPER COMPARTMENTS PASSENGERS NO.	PASSENGERS WEIGHT	CARGO	COMPT	LOWER COMPARTMENTS PASSENGERS NO.	PASSENGERS WEIGHT	CARGO		[1] INDEX OR MOM/
A				C-14	1	200		2000	22500
B				C-15	1	200		2000	26000
C				C-16	1	200		2000	29500
D				C-17	1	200		2000	33000
E				C-18	1	200		2000	36500
F				CC			2500		38500
G									
H									
I									
J									
K									
L									
M									
N									
O									
P									
FWD	BELLY								
AFT	BELLY								

REMARKS

Use 92.3 gals aft tank
Use 70.7 gals center tank
Use 60 gals fwd tank

Removed 2 pass. from C-17 and C-18

TOTAL FREIGHT	2500
TOTAL MAIL	
COMPUTER PLATE NUMBER (*If used*)	

[1] *Enter constant used.*
[2] *Enter values from current applicable T.O./TM*
[3] *Applicable to gross weight (Ref. 15).*
[4] *Applicable to gross weight (Ref. 16).*
[5] *Ref. 9 minus Ref. 17.*

CORRECTIONS (*Ref. 14*)

COMPT	ITEM	CHANGES (+ or −) WEIGHT	[1] INDEX OR MOM/
C18	1 pass.	200	365
C17	1 pass.	200	330
TOTAL WEIGHT REMOVED		− 400	−695
TOTAL WEIGHT ADDED		+	+
NET DIFFERENCE (*Ref. 14*)			

REF		WEIGHT	[1] INDEX OR MOM/
13	TAKEOFF CONDITION (*Uncorrected*)	139058	198811
14	CORRECTIONS (*If required*)	4000	6950
15	TAKEOFF CONDITION (*Corrected*)	135058	191861
16	TAKEOFF C. G. IN % M. A. C. OR IN.	142	
17	LESS FUEL	13380	24320
18	LESS AIR SUPPLY LOAD DROPPED		
19	MISC. VARIABLES		
20	ESTIMATED LANDING CONDITION	121678	167541
21	ESTIMATED LANDING C. G. IN % M. A. C. OR IN.	138	

COMPUTED BY
Your signature
SIGNATURE

WEIGHT AND BALANCE AUTHORITY
SIGNATURE

PILOT
SIGNATURE

SAMPLE

NOTE.—THIS TRANSPORT CLEARANCE FORM HAS RESULTED FROM TRIPARTITE AGREEMENT AND NO FURTHER CHANGES MAY BE MADE TO IT WITHOUT PRIOR CONSIDERATION BY TRIPARTITE AUTHORITIES.

DD FORM 1 SEPT 54 365F

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1976-4

PROBLEM SHEET - PERIOD FOUR

WEIGHT AND BALANCE

Date: Current.

Type: CH-34C.

From: Hanchey AAF.

Home Station: Hanchey AAF.

To: Atlanta, Georgia.

Mission: Service.

Aircraft Serial Number: 57-1770.

Pilot: You.

Basic Weight: 8,149.

Basic Moment: 11,166.1.

Oil: 10.5 gallons.

Crew: Pilot and copilot, 200 pounds each.

Takeoff Fuel: 263 gallons.

ETE: 2+00.

Fuel Used: Aft tank 92.3 gallons.
Center tank 70.7 gallons.
Forward tank 40.0 gallons.

Cargo and Passenger Compartment: C-18, 2 passengers 200 pounds each.
C-19, 2 passengers 200 pounds each.
C-20, 2 passengers 200 pounds each.
C-21, 2 passengers 200 pounds each.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1976-4

SOLUTION SHEET - PERIOD FOUR

WEIGHT AND BALANCE

NOTE: See solution sheet on following page.

WEIGHT AND BALANCE CLEARANCE FORM F

TRANSPORT

(USE REVERSE FOR TACTICAL MISSIONS)

Cross Reference
RAF Form 2870
RCAF Form F. 118 C
RNM S-61 (8/52)

FOR USE IN
T.O. 1-1B-40
AN 01-1B-40 &
TM 55-405-9

DATE	AIRCRAFT TYPE	FROM	HOME STATION
Current	CH-34C	Hanchey AAF	Hanchey AAF
MISSION/TRIP/FLIGHT/NO.	**SERIAL NO.**	**TO**	**PILOT**
Service	57-1770	Atlanta, Ga.	You

LIMITATIONS			
CONDITION	TAKEOFF	LANDING	LIMITING WING FUEL
[1] ALLOWABLE GROSS WEIGHT	13600	13600	
TOTAL AIRCRAFT WEIGHT (*Ref. 11*)	10205		
OPERATING WEIGHT PLUS ESTIMATED LANDING FUEL WEIGHT		8987	
OPERATING WEIGHT (*Ref. 8*)			
ALLOWABLE LOAD (*Ref. 18*) (use *SMALLEST figure*)	3395	4612	
[2] PERMISSIBLE C. G. TAKEOFF	FROM 132	TO (% *M.A.C. or IN.*) 146	
[3] PERMISSIBLE C. G. LANDING	FROM 132	TO (% *M.A.C. or IN.*) 146	
[4] LANDING FUEL WEIGHT			

REF.	ITEM	WEIGHT	[1] INDEX OR MOM/
1	BASIC AIRCRAFT (*From Chart C*)	81490	1116611
2	OIL (10.5 *Gal.*)	7880	5000
3	CREW (*No.*) 2	4000	3700
4	CREW'S BAGGAGE		
5	STEWARD'S EQUIPMENT		
6	EMERGENCY EQUIPMENT		
7	EXTRA EQUIPMENT		
8	OPERATING WEIGHT	86278	1158861
9	TAKEOFF FUEL (263 *Gal.*)	15780	2710100
10	WATER INJ. FLUID (*Gal.*)		
11	TOTAL AIRCRAFT WEIGHT	1020581	1429611

REMARKS

Use 92.3 gals aft tank

Use 70.7 gals center tank

Use 40 gals fwd tank

Moved 2 troops from C-21 to C-16

12 DISTRIBUTION OF ALLOWABLE LOAD (PAYLOAD)

COMPT	UPPER COMPARTMENTS PASSENGERS NO.	PASSENGERS WEIGHT	CARGO	COMPT	LOWER COMPARTMENTS PASSENGERS NO.	PASSENGERS WEIGHT	CARGO	WEIGHT	[1] INDEX OR MOM/
A				C18	2	400		4000	7310
B				C19	2	400		4000	8010
C				C20	2	400		4000	8710
D				C21	2	400		4000	9410
E									
F									
G									
H									
I									
J									
K									
L									
M									
N									
O									
P									
FWD	BELLY								
AFT	BELLY								

TOTAL FREIGHT

TOTAL MAIL

COMPUTER PLATE NUMBER (*If used*)

[1] *Enter constant used.*
[2] *Enter values from current applicable T.O./TM*
[3] *Applicable to gross weight (Ref. 13).*
[4] *Applicable to gross weight (Ref. 18).*
[5] *Ref. 9 minus Ref. 17.*

CORRECTIONS (*Ref. 14*)			
COMPT	ITEM	CHANGES (+ or −) WEIGHT	[1] INDEX OR MOM/
C21	2 troops	400	941
C16	2 troops	400	591
TOTAL WEIGHT REMOVED		− 0	− 350
TOTAL WEIGHT ADDED		+	+
NET DIFFERENCE (*Ref. 14*)		− 0	− 350

13	TAKEOFF CONDITION (*Uncorrected*)	1180581	1764011
14	CORRECTIONS (*If required*)		3500
15	TAKEOFF CONDITION (*Corrected*)	1180581	1729011
16	TAKEOFF C. G. IN % M. A. C. OR IN.	146.7	
17	LESS FUEL	121800	2290 1
18	LESS AIR SUPPLY LOAD DROPPED		
19	MISC. VARIABLES		
20	ESTIMATED LANDING CONDITION	1058781	4997 1
21	ESTIMATED LANDING C. G. IN % M. A. C. OR IN.	141.5	

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Your signature

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WEIGHT AND BALANCE AUTHORITY

SIGNATURE

PILOT

SIGNATURE

NOTE.—THIS TRANSPORT CLEARANCE FORM HAS RESULTED FROM TRIPARTITE AGREEMENT AND NO FURTHER CHANGES MAY BE MADE TO IT WITHOUT PRIOR CONSIDERATION BY TRIPARTITE AUTHORITIES.

DD FORM 1 SEPT 54 365F

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1975-2

PERFORMANCE OBJECTIVES

UTILITY SYSTEMS

1. KNOWLEDGES:

a. Fire detector system.

(1) Complete a statement on the fire detector system.

(2) Worksheet and TM 55-1520-202-20.

(3) In accordance with TM 55-1520-202-20.

b. Heater, defrosting and ventilation systems.

(1) From a list of components of the heat, defrosting, and ventilation systems, match them with a list of their description, location, function, purpose, and operation.

(2) Worksheet and TM 55-1520-202-20.

(3) In accordance with TM 55-1520-202-20.

c. Pitot heater.

(1) Complete the statement concerning the pitot heater.

(2) Worksheet and TM's 55-1520-202-10 and -20.

(3) In accordance with TM's 55-1520-202-10 and -20.

d. Windshield wiper.

(1) Complete the statements on the description, location, and function of the windshield wiper.

(2) Worksheet and TM 55-1520-202-20.

(3) In accordance with TM 55-1520-202-20.

e. Rescue hoist.

(1) Match the components in column A with those in column B which lists their description, location, and operation.

(2) Worksheet and TM 55-1520-202-20.

(3) In accordance with TM 55-1520-202-20.

f. Cargo sling.

(1) When given a list of sentences, fill in the blank spaces concerning cargo sling.

(2) Worksheet and TM 55-1520-202-20.

(3) In accordance with TM 55-1520-202-20.

g. Troop and casualty capabilities.

(1) Fill in the correct numbers of seats and litters the CH-34C can accommodate.

(2) Worksheet and TM's 55-1520-202-20 and -10.

(3) In accordance with TM's 55-1520-202-10 and -20.

150
288
350° switch shut fuel off of
stop rise stove,
recycle cabin switch to
start the heater again.
cabin vent switch to close

blower rear of combustion chamber turns 13,000 RPM
24 V DC

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1975-2

30 sec warm up. 277°C light comes on.

STUDENT OUTLINE

UTILITY SYSTEMS

1. Fire detector system. detect & indicate excessive heat in engine compt.
   a. continuous resetting
   b. sensing elements 3 elements one in front of oil cooler & on each engine cover door.
   c. control units in electronics compt on right side.
   115 volts phase A+C from inverter
   not AC is A+C
   wheatstone bridge monitors resisting elements.
2. Heat and ventilation system.
   a. Description and location. internal combustion 50,000 BTU uses 115/145 FUEL hot air electrical blown. High & Low range
   b. Components. TEST QUESTION
      cabin heat switch
      duct system ~~of~~ made of fiberglass ANEMOSTATS 8 openings for heat escape
      heater has forward fuel shut off valve located forward of forward fuel cell,
      fuel filter left side of electronics compt. throw away filter
      electrical pump above the filter produces 25 PSI has pressure relief valve opens at 12 PSI.
      aft fuel shut off valve located above relief valve electrical operated.
      ignition units on left side of heater. coil assembly + 2 radio noise shields.
      spark plug in the heater.
      air pressure switch plenum duct

.133

3. Pitot heater. DC provides two prevents ice formation in head of pitot tube are only in flight are necessary

4. Windshield wiper. 120° operation 24 VDC motor converts with flexible cable 5 positions

5. Rescue hoist. hydraulically operated electrically controlled
   a. 600 LB max
   b. hoist pumps. lift struts of main gear to Vickers 7 piston, 1250 PSI constant displacement
   filter:
   relief valve set at 1,250 PSI
   4 way solenoid valve controlled electrically
   hoist motor located on the hoist
   100' 3/16 cable. hook and up & down limit switches.
   hoist has 3 position switch. pilot, auto, off. pilot switch on top of cyclic

6. Cargo sling.
   a. 4 cable suspended to support plate.
   b. Cargo hook. directly below main rotor mast
   4,000 lbs or 5,000 lbs also under section.
   electrically released DC for pairing two
   ground mechanical
   cockpit floor control release.

cargo sling master switch & warning light.
safe position in flight on, engine switch to release.
c. warning light indicates hook in open.

7. **Troop and casualty carrying equipment.**

18 troops in seats.
8 litters
4 high 4 in left front
4 in right rear.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1975-2

PERFORMANCE CHECK

UTILITY SYSTEMS

1. KNOWLEDGES:

a. Complete the following statement on the fire detector system:

The fire detector warning light comes on when the temperature reaches 277°.

b. Match the components of the heat, defroster, and ventilation system in list A with their correct description and operation in list B.

LIST A

(1) Cabin heater switch.

(2) Ducts.

(3) Aft and forward fuel valves.

(4) Fuel pump.

(5) Fuel filter.

(6) Pressure relief valve.

(7) Ignition unit.

(8) Combustion unit.

(9) Air pressure switch.

(10) Plenum duct and thermal switches.

LIST B

4 Located on heater fuel panel; explosion proof, electric; produces 25 psi pressure.

___ Controls flow of fuel; turned on and off by two methods; each electrically operated.

9 Safety device; keeps aft shutoff valve closed till sufficient air has entered combustion chamber.

LIST B (continued)

___ Provides pulsating current to spark plug; has a coil and a vibrator.

___ Has a double chamber, one for heating and one for combustion; has 12,000 rpm blower, 28-volt D.C. current operates this item; provides air for heating and cooling.

___ This is where the heated air divides into two different tubes to enter cabin; four heater switches, two safety and two for the temperature range.

5 Removes any particles of trash that might be in the fuel line or fuel tanks, paper throwaway type; located on heater fuel panel.

2 Is a means of distributing air to the cabin and pilot's compartment and to the defrosters; has eight anemostats, can also hook a preheat hose to it; made out of fiberglass.

1 Three-position - low, off, high; two-position - off, fan on; located on overhead switch panel.

___ Located on heater fuel panel; opens at 12 psi; sends fuel to aft shutoff valve and back to fuel filter.

c. Complete the following statement:

The purpose of the pitot heater is to gold ice in head of tube and is to be used in flight only.

d. Complete the statement on the windshield wiper.

(1) The motor changes the rotating motion to lateral motion.

(2) The windshield wiper operates off 28-volt D.C. current.

(3) Never operate wiper on DRY glass.

e. Match item description, location, and function in list B with the correct component in list A.

LIST A

(1) Hoist pump.

(2) Filter.

(3) Relief valve.

(4) Four-way solenoid valve.

(5) Hoist motor.

LIST A (continued)

(6) Winch assembly.

(7) Hoist master switch.

(8) Emergency hoist cable cutoff switches.

(9) Hoist shear circuit test panel.

LIST B

___ Located above cabin door; test operation of guillotine circuit; has to be in FIRE position prior to flight.

___ This allows either pilot or crew chief to cut cable in an emergency; pilot's located on overhead switch panel, crew's located above cabin door.

___ Located on main overhead control panel, three-position (pilot, crew, and off).

___ Located right side of helicopter outside cabin door, holds 100 feet of cable, has a level wind mechanism, two limit switches.

___ Located in hoist housing, operated by pressurized hydraulic fluid, drives winch assembly, direction controlled by the four-way valve.

___ Located on hoist hydraulic panel, controls direction of rotation of winch, can be controlled by either pilot and/or crew chief, also allows fluid to bypass back to reservoir when not energized.

___ Located on hydraulic hoist panel; set to open at 1250 psi; controls amount that hoist will lift.

___ Has a micronic element, separates impurities, has a 50 psi differential bypass valve.

___ Located left side of main gearbox accessory section, uses hydraulic oil from primary hydraulic reservoir, seven-piston, constant-displacement.

f. Complete the following statements:

(1) The CH-34C has a sling load capacity of 4,000 pounds or 5,000 pounds.

(2) The sling load can be released electrically or manually.

g. Fill in the blank spaces.

The CH-34C can carry 8 litters or 18 passengers.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1972-3

PERFORMANCE OBJECTIVES

HYDRAULIC SYSTEMS

1. KNOWLEDGES: Hydraulic systems and components.

   a. Match statements on description, location, and operation of the hydraulic systems or components to systems or components to which they apply.

   b. Worksheet and TM's 55-1520-202-10 and -20.

   c. In accordance with TM 55-1520-202-20.

2. SKILLS: None.

NOTES

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1972-3

STUDENT OUTLINE

HYDRAULIC SYSTEMS

1. Principles of hydraulics. pressure applied thru confined fluid. mechanical advantage equal to cylinder displacement

2. Description of primary and auxiliary servo hydraulic systems.
pressurized at 1500 PSI MIL-H-5606
primary & auxiliary are indepdt of each other.
only one system may be turned off at one time.
each system made up of same components.

3. Primary servosystem.

   a. General location. left side of trans deck.

   b. Purpose. provide power assist to main rotor control only.
surge & filter .45 gal.

   c. Components.

System operates 1,500 PSI

(1) Reservoir. 45 US gal. 3 filters

(2) Hydraulic pump. located lower left to generator. primary and aux pumps interchangable positive displacement variable delivery, constant pressure piston pumps factory set at 1500 PSI on each system

(3) Line filter. 2 by pass valves set at 50 PSI drop.

(4) Pressure relief valve. hydraulic panel on left of trans. regulates system pressure if pump regulator allows system to reach 1750 PSI

(5) Three-way solenoid valve. left of trans. provides a way to turn off primary system if over system has 1000 PSI or more.

(6) Pressure switch. left of trans. controls position of 3-way solenoid switch hydraulic pressure overcomes spring tension at 1,000 PSI.

all switch going loaded are electrical operated.

(7) Snubber and restrictor.

prevent sudden surges of fluid.

(8) Pressure transmitter.

(9) Pressure indicator.

trans pressure to instrument pressure to electrical indication.

(10) Primary servo unit.

introduces hydraulic assist to main controls.

pilot valve route hydraulic fluid thru servo during normal operation. .2000 ± on "displacement" valve sliding types.

4. Auxiliary servosystem.

a. General location.

accessory section of engine. engine mounted pump. right side the accessory.

b. Purpose.

paddle damper.

c. Components.

(1) Reservoir. right of trans rear on pump.

(2) Hydraulic pump. engine drive. rear on pump

(3) Line filter. in clutch cont. rear on the also 50 PSI by flow valve

(4) Pressure relief valve. right of trans rear on pump.

(5) Three-way solenoid valve. right of trans provides a means of turning off accy when pressure is above 1,000 PSI

(6) Pressure switch. rear right of trans.

(7) Snubber and restrictor. rear R trans.

(8) Pressure transmitter. right front trans deck.

(9) Pressure indicator.

(10) Actuating cylinder. operate the torque shift of accy units; must have 1,000 PSI to operate. is spring extended with under 1,000 PSI oscists in use of selective

(11) Auxiliary servo unit.

where the rigging action takes place.

(12) Tail rotor servo. left-rear & left-rear of trans deck, relieve control forces in mid tail rotor controles.
introduces hydraulic assist to tail rotor control

(13) Pedal damper. puts a little feeling in the pedals.

prevents rapid movement of tail rotor pedals.

(14) Hydraulic fuse.

Clutch cupt or typ, prevents a complete loss of fluid if leak develops in anysystem between paddle dropper and reservoir.

5. Common malfunctions and their remedial actions.

DEPARTMENT OF MAINTENANCE TRAINING
UNITED STATES ARMY AVIATION SCHOOL
Fort Rucker, Alabama

File No. 1972-3

PERFORMANCE CHECK

HYDRAULIC SYSTEMS

1. Match the numbered items to the statement to which they apply by placing number in blank by each statement. One statement may apply to more than one numbered item.

a. General information on hydraulic systems.

(1) Primary hydraulic system.

(2) Auxiliary hydraulic system.

2 Contains tail rotor servo and pedal damper.

1 Gives power assist to main rotor controls only.

1 Is located principally on left transmission deck.

1&2 Has right lateral, left lateral, and fore-and-aft servos.

1&2 Is pressurized system.

2 Has lateral, fore-and-aft, and collective servos.

2 Should not be turned off in flight except in emergencies.

2 Is pressurized by pump on engine accessory section.

b. Primary servo hydraulic system.

(1) Reservoir.

(2) Pump.

(3) Line filter.

(4) Pressure relief valve.

(5) Three-way solenoid valve.

3 Has bypass valve which operates at 50 psi differential pressure.

___ Controls flow of fluid through servo.

2 Is described as constant-pressure, variable-delivery.

(6) Pressure switch

(7) Snubber and restrictor.

(8) Pressure transmitter.

(9) Pressure indicator.

(10) Servo.

(a) Pilot valve.

(b) Piston.

(c) Cylinder.

1 Has capacity of 0.45 US gallons.

4 Operates at 1750 psi.

8 Converts hydraulic pressure to an electrical impulse.

___ Contains bypass valve which opens when pressure drops below 500 psi.

5 Provides means of turning off system.

9 Located on instrument panel and indicates pressure in system.

10 Connected to stationary star and actually does the moving when pilot valve is displaced.

7 Smooths out pressure surges.

10A Requires .002-inch displacement for proper operation.

1 Is checked for fluid level daily.

___ Connected at bottom to lug on main transmission and remain stationary when servo is in operation.

___ Closes when pressure reaches 1000 psi.

___ Operates only when pump regulator malfunctions.

___ Catches feedback from main rotor.

___ May be operated only when there is more than 1000 psi in auxiliary system.

c. Auxiliary servo hydraulic system.

(1) Three-way solenoid valve.

(2) Pressure switch.

___ Prevents loss of fluid should a leak develop in the pedal damper or lines leading to it.

___ Is merely a link of flight controls when pressure is below 1000 psi.

(3) Pedal damper.

(4) Hydraulic fuse.

(5) Actuating cylinder.

(6) Tail rotor servo.

(7) Auxiliary servo assembly.

(a) Pilot valve.

(b) Power piston.

(c) Cylinders.

(d) Cam and roller.

____ Will operate only when there is more than 1000 psi in primary system.

____ Retracts when there is more than 1000 psi in system.

____ Is located between the pilot's and copilot's seats under cowling.

____ Limits tail rotor control pedal full travel movement to 18 plus or minus 3 seconds with 50 pounds force applied.

____ Absorbs feedback from tail rotor and assists pilot in moving control pedals.

____ Completes circuit from servo switch to primary three-way solenoid valve when pressure rises to 1000 psi.

____ Remains stationary when servo is in operation.

____ Is located above and to the left of pilot's left foot.

____ Prevents the pilot valve from being displaced when servo is in bypass position.

____ Allows 12cc flow before closing.

____ Is displaced by movement of controls when pressure is above 1000 psi.

____ Controls the position of the bypass valves, cams, and rollers.

____ Requires 500 psi to close bypass valve.

____ Controls flow of fluid through servo.

____ Does the moving as opposed to the cylinder in the primary system.

NOTES