CHAPTER 2

COURSE INTRODUCTION/PROCEDURES

SECTION A - GENERAL INFORMATION

2-1. SYNOPSIS. This chapter serves two purposes. First, it introduces you to the course and second, to the normal and emergency procedures a pilot requires to safely operate the H-3. The importance of complete mastery of procedures cannot be overemphasized. It will be to your advantage to learn each procedure thoroughly and as quickly as possible. You will practice each procedure in the cockpit procedures trainer as well as the simulator prior to your performing the operation in the aircraft. Your participation in this "system" approach to a learning experience will help you transition into the H-3 quickly and will provide the background for a professional flying career.

SECTION B - ACADEMIC LESSONS

2-2. SCHOOL ORIENTATION AND IN-PROCESSING. (4.0 HOURS)

a. Objective (Standard - A):

(1) The Wing Commander or Vice Commander will welcome the students.

(2) The following topics will be briefed by the 1550 TTS:

(a) 1550 TTS student operating procedures.

(b) Officer Club rules.

(c) Per Diem/Finance policies.

(d) Flight equipment/clothing.

(e) Transportation/parking policies.

(f) Dress requirements.

(g) Critique procedures.

(h) New Mexico drinking laws.

(i) AFR 30-1.

(j) Safety briefing/lessons learned (to include prevention of dropped objects).

(k) TTS Tech Training Library.

(l) Operations Security (OPSEC).

(3) Formal in-processing will be conducted.

b. Student Requirements and Tips. Students will hand-carry records.

2-3. COURSE INTRODUCTION. (3.0 Hours)

a. Objective:

(1) Instructor and students introduce themselves.

(2) The instructor will outline the course to include (Standard A):

(a) The curriculum/student schedules.

(b) ISD methods of course development and presentation.

(3) Personal publication (Standard - B). Each student will:

(a) Describe the manuals to be carried on rescue missions.

(b) Insure the currency of his publications.

(4) The instructor will explain the worldwide mission of the H-3 (Standard - A).

(5) Aircraft Familiarization. The student will be briefed on the following areas of the H-3 aircraft (Standard - B):

(a) Dimensions.

(b) Compartments and configurations.

(c) Overview of major systems.

(d) Capabilities and limitations.

(e) Emergency exits and equipment.

(f) Egress procedures.

(6) Use of the learning center (Standard - 3).

b. Student Requirements and Tips:

(1) Prerequisite Training. School orientation and in-processing.

(2) This will be a classroom lecture.

c. Required Materials/Equipment. All student publications.

d. Source Reference. TO 1H-3(C)E-1, Flight Manual.

NOTES, SKETCHES, ETC

2-4. AIRCRAFT AND FACILITIES TOUR. (2.0 Hours)

a. Objective:

(1) An aircraft tour will be conducted to include the following areas (Standard - B):

(a) Compartments and configurations.

(b) Major systems locations.

(c) Emergency exits and equipment.

(d) Egress procedures.

(2) Tour of the training facilities (Standard - A):

(a) Cockpit Procedures Trainer (CPT).

(b) Simulator.

(c) Flight briefing rooms.

b. Student Requirements and Tips:

(1) Prerequisite Training. Course Introduction.

(2) Assignment. Review TO 1H-3(C)E-1, Section III, Bailout and Emergency Entrances.

(3) During the tour of the aircraft, each student will be required to locate the emergency exits and perform the egress procedures from his crew position.

2-5. MODULE P-1, Weight and Balance. (2.0 Hours)

a. Objective (Standard - 2). Use typical mission information and an H-3 load adjuster to complete a DD Form 365F IAW TO 1-1B-40. Understand the items to be checked by the pilot before signing the form, to include:

(1) Use of the H-3 Load Adjuster.

(2) Computation of a basic index using the basic weight and moment of the aircraft.

(3) Computation of weights and indexes for references 1-21 on the DD Form 365F.

(4) Completion of the "Limitations and Remarks" block of DD Form 365F.

b. Student Requirements and Tips:

(1) Read TO 1H-3(C)E-1, Flight Manual, Section IV, Cargo Compartment, Troop Carrying Equipment, Casualty Carrying Equipment, and Load Adjuster Sections.

(2) Supplemental Information.

(3) Complete the exercise for this lesson.

c. Source References:

(1) TO 1H-3(C)E-1, Flight Manual.

(2) TO 1H-3(C)E-5, Basic Weight Checklist and Loading Data.

(3) TO 1H-3(C)C-9, Cargo Loading Manual.

(4) TO 1-1B-40, Weight and Balance.

(5) TO 1-1B-50, Weight and Balance.

d. Supplemental Information. The original design function of the H-3 was troop and cargo transport. Although the aircraft has proven its versatility in becoming an effective rescue vehicle, its primary role remains transport. The H-3 has a large CG range allowing it to carry various types of cargo loads without exceeding CG limits. The load adjuster provides quick computation of CG position and aids in computing the DD Form 365F.

(1) Weight terms applied to aircraft:

(a) Weighing, Records and Loading. There are many factors which lead to the efficient and safe operation of the aircraft. Among these vital factors are proper weight and balance. The Air Force system of weight and balance can be divided into three equally important parts:

1. Weighing of the aircraft.

2. Maintaining accurate records.

3. Proper loading of the aircraft.

A weakness or inaccuracy in any one part of the system nullifies the purpose of the system as a whole. The loading calculations will be meaningless if either the weighing or the records are in error. Improper loading can cause abnormal stresses upon the aircraft structure and also change the flying characteristics of the aircraft. This can result in loss of life and/or valuable equipment.

(b) Basic Weight. Weight of aircraft and all its fixed equipment actually present at time of weighing (also trapped fuel and oil). The basic weight is the last total weight entry in the 365C chart.

(c) Basic Moment. The sum of the moments of all items making up the basic weight of the aircraft. The basic moment is also the last total moment entry in the 365C chart.

(d) Center of Gravity (CG). The point about which an aircraft would balance if suspended. For the H-3 helicopter this point is expressed in inches from the reference datum line. The CG at 267.0 would be the perfect CG location in the H-3.

(e) Basic Index. The basic index is a number representing the basic moment. With a known basic weight and known basic moment, the load adjuster is used to convert the basic moment to basic index of the aircraft. The basic index is used as the starting point when using the aircraft load adjuster.

(2) Charts and Forms:

(a) There are two parts to the weight and balance problems. First, one must have correct information for the basic weight and basic moment. Second, gross weight and balance must be maintained within weight and CG limits with the addition of a load. The first part is controlled by charts A and C after the basic weight and balance have been determined by weighing the aircraft. The second part is carried out on the Form F (365F) with the aid of a balance computer (load adjuster) or the chart E. The Form F will be filled out, using the load adjuster, by the flight mechanic for every flight in this school.

(b) Form 365F - Weight and Balance Clearance Form. This form is a summary of the actual disposition of the load in the aircraft. It records the balance status of the aircraft step by step. It serves as a worksheet on which the weight and balance technician records the calculations to insure that the aircraft will be within CG limits. A load adjuster is used to determine CG condition of the helicopter. If the load adjuster shows the helicopter to be in the critical (yellow shaded) load condition, a Form 365F must be filed.

(3) Completed Form F. Figure 2-1 shows a Form F filled out for a typical training lesson. The following explanations are to familiarize you with the various items that must be entered in a Form F:

(a) Basic weight and index are taken from the aircraft Chart C. Index is entered to the nearest 10th, e.g., 61.2 (Ref - 1).

(b) Oil (Ref - 2). The oil on all H-3s will be six gallons, weighing 44.0 pounds.

(c) Crew Members (Ref - 3). Enter the number of crew members as three; this is only minimum crew and any additional crew members will be logged as passengers and assigned seat numbers for weight and balance purposes.

(d) Crew Baggage (Ref - 4). If there is crew baggage, it will be entered using "@" denoting "at," then station number, and weight in the proper column.

(e) Emergency Equipment (Ref - 6). Will be entered in the same manner as crew baggage. The emergency equipment normally carried on all H-3s in this school consists of a metal box attached to the aircraft between stations 340-360 and weighing 105 pounds.

(f) Extra Equipment (Ref - 7). At station 300 is 200 pounds of equipment which is normally on the aircraft. This includes all equipment the crew chief carries aboard his aircraft.

(g) Operating Weight (Ref - 8). This is the sum of Ref 1 through Ref 7, a total weight of aircraft including items that will remain stable from takeoff to final landing.

(h) Takeoff Fuel (Ref - 9). The fuel is figured at 6.5 pounds per gallon, and is entered in gallons and in pounds. This is a combination of all fuel aboard the aircraft.

1. If external auxiliary fuel tanks are used, a note will be made in the remarks block of the 365F. All external auxiliary fuel will be computed on the cargo scale on the load adjuster at Station 300 as this is the center of the bomb rack that holds the auxiliary tank to the sponsons.

2. The fuel in the main fuel tanks has its own scale located on the slide of the load adjuster. Both auxiliary and main fuel will be slipped on the load adjuster before making an entry on the Form 365F.

3. The auxiliary tank scale on the load adjuster slide will only be used for the internal auxiliary fuel tank system.

4. Notice how at certain points, the sum of weight is entered. Reference 8 gives you the sum of operating weight; then the fuel is added, and this results in the total aircraft weight. With this weight, the aircraft is now prepared to fly.

(i) Payload. Passengers, cargo/baggage, litters, and attendants are considered as payload. Passengers are assigned seats, such as D-6 or D-12, cargo and baggage are computed at assigned station numbers from the cargo scale on your load adjuster slide. Litters have a scale of their own (D-31, D-32, and D-33). Attendants also have their own scale (D-29 and D-30).

(j) Less Fuel. Block 17 is used to compute the amount of fuel that may be burned off during the flight.

NOTE. Notice that the Form F is just a record or summary of the loading of the aircraft.

e. Exercise:

(1) It is possible to exceed the center of gravity limits of the helicopter if it is not properly loaded.

True_____ False_____

(2) The center of gravity limitations vary with the gross weight of the helicopter.

True_____ False_____

(3) The colored top strip of the load adjuster insures safe loading as the red sections show the limits of the loading range.

True_____ False_____

(4) The index scale of the load adjuster is merely a simple reference that is mathematically related to the center of gravity grid or balance diagram (which appears on the inner recess of the load adjuster).

True_____ False_____

(5) Define basic weight. _____

_____

(6) Define operating weight. _____

_____

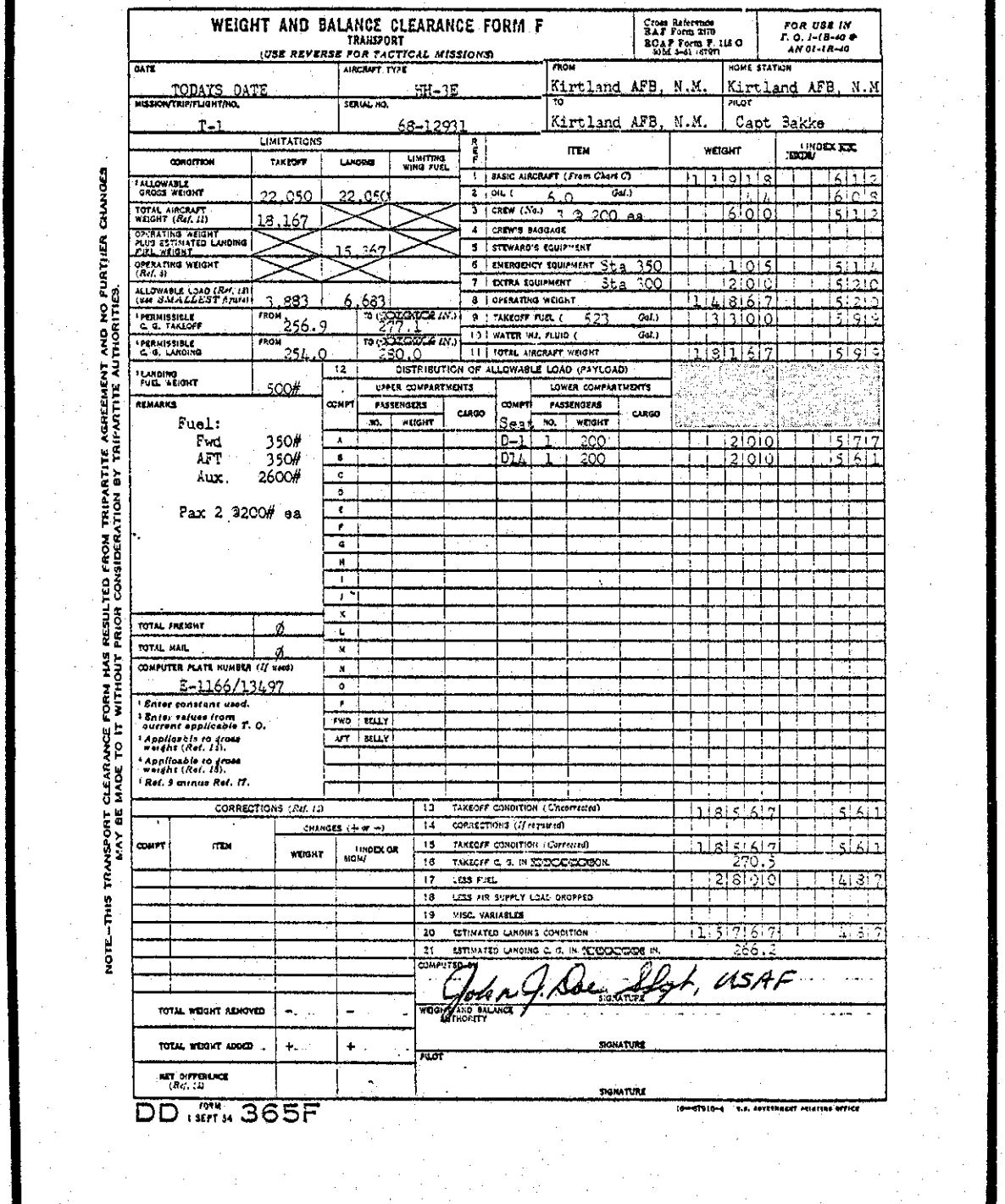
(7) What is the maximum allowable gross weight for the H-3? _____

_____

(8) What is the H-3 CG range for takeoff and landing? _____

_____

(9) Figure 2-1 is a completed DD 365F ready for the pilot's signature. However, this Form F has two errors which in turn make at least eight (8) other entries on this form incorrect. See if you can find six of these errors. This exercise should serve as a reminder of your responsibility as a pilot to check each Form F before you sign and file this record of aircraft loading.



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

Cross References: AAF Form 2178; AGAF Forms F, 15 C (AGM 3-61 (15701))

FOR USE IN: F. O. 1-(B-40 & AN 01-1A-40

DATE	AIRCRAFT TYPE	FROM	HOME STATION
TODAYS DATE	UH-1F	Kirtland AFB, N.M.	Kirtland AFB, N.M
MISSION/TRIP/FLIGHT/NO.	SERIAL NO.	TO	PILOT
T-1	68-12931	Kirtland AFB, N.M.	Capt Bakke

CONDITION	TAKEOFF	LANDING	LIMITING WING FUEL
[1] ALLOWABLE GROSS WEIGHT	22,050	22,050	
TOTAL AIRCRAFT WEIGHT (Ref. 11)	18,167		
OPERATING WEIGHT PLUS ESTIMATED LANDING FUEL WEIGHT		15,367	
OPERATING WEIGHT (Ref. 8)			
ALLOWABLE LOAD (Ref. 12) (use SMALLEST figure)	3,883	6,683	
[2] PERMISSIBLE C. G. TAKEOFF	FROM 256.9	TO (FORWARD IN.) 277.1	
[2] PERMISSIBLE C. G. LANDING	FROM 254.0	TO (FORWARD IN.) 280.0	
[3] LANDING FUEL WEIGHT	500#		

ITEM		WEIGHT	INDEX [4] (DIV/10)
1	BASIC AIRCRAFT (From Chart C)	11,018	612
2	OIL (6.0 Gal.)	44	6.8
3	CREW (No.) 2 @ 200 ea	400	51.2
4	CREW'S BAGGAGE		
5	STEWARD'S EQUIPMENT		
6	EMERGENCY EQUIPMENT Sta 350	105	51.4
7	EXTRA EQUIPMENT Sta 300	210	52.0
8	OPERATING WEIGHT	14,867	52.0
9	TAKEOFF FUEL (523 Gal.)	3,300	51.9
10	WATER INJ. FLUID (Gal.)		
11	TOTAL AIRCRAFT WEIGHT	18,167	51.9

12 DISTRIBUTION OF ALLOWABLE LOAD (PAYLOAD)

UPPER COMPARTMENTS				LOWER COMPARTMENTS					
COMPT	PASSENGERS NO.	PASSENGERS WEIGHT	CARGO	COMPT	Seat	PASSENGERS NO.	PASSENGERS WEIGHT	CARGO	
A				D-1	1	200	210	57.7	
B				D1A	1	200	210	56.1	
C									
D									
E									
F									
G									
H									
I									
J									
K									
L									
M									
N									
O									
P									
FWD	BELLY								
AFT	BELLY								

REMARKS

Fuel:
Fwd 350#
AFT 350#
Aux. 2600#

Pax 2 3200# ea

TOTAL FREIGHT	Ø
TOTAL MAIL	Ø
COMPUTER PLATE NUMBER (If used)	E-1166/13497

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

CORRECTIONS (Ref. 12)

COMPT	ITEM	CHANGES (+ or −) WEIGHT	CHANGES (+ or −) INDEX OR MOM/
TOTAL WEIGHT REMOVED		−	−
TOTAL WEIGHT ADDED		+	+
NET DIFFERENCE (Ref. 13)			

13	TAKEOFF CONDITION (Uncorrected)	18,167	56.1
14	CORRECTIONS (If required)		
15	TAKEOFF CONDITION (Corrected)	18,167	56.1
16	TAKEOFF C. G. IN [illegible] IN.	270.5	
17	LESS FUEL	2,800	43.7
18	LESS AIR SUPPLY LOAD DROPPED		
19	MISC. VARIABLES		
20	ESTIMATED LANDING CONDITION	15,367	43.7
21	ESTIMATED LANDING C. G. IN [illegible] IN.	266.2	

COMPUTED BY: John J. Doe, Sgt, USAF
SIGNATURE

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

(0—57910—4 U.S. GOVERNMENT PRINTING OFFICE)

Figure 2-1. Completed DD Form 365F

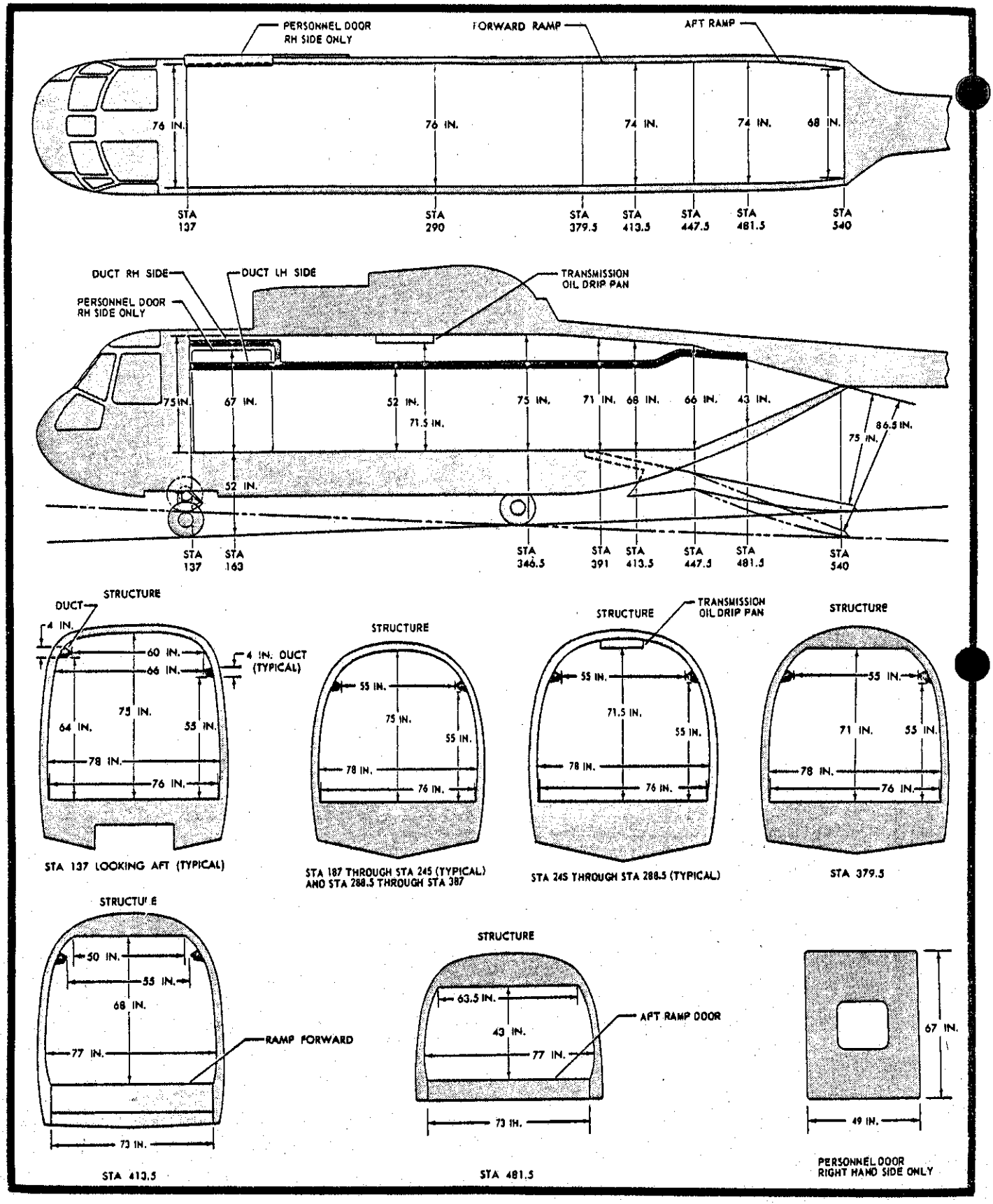
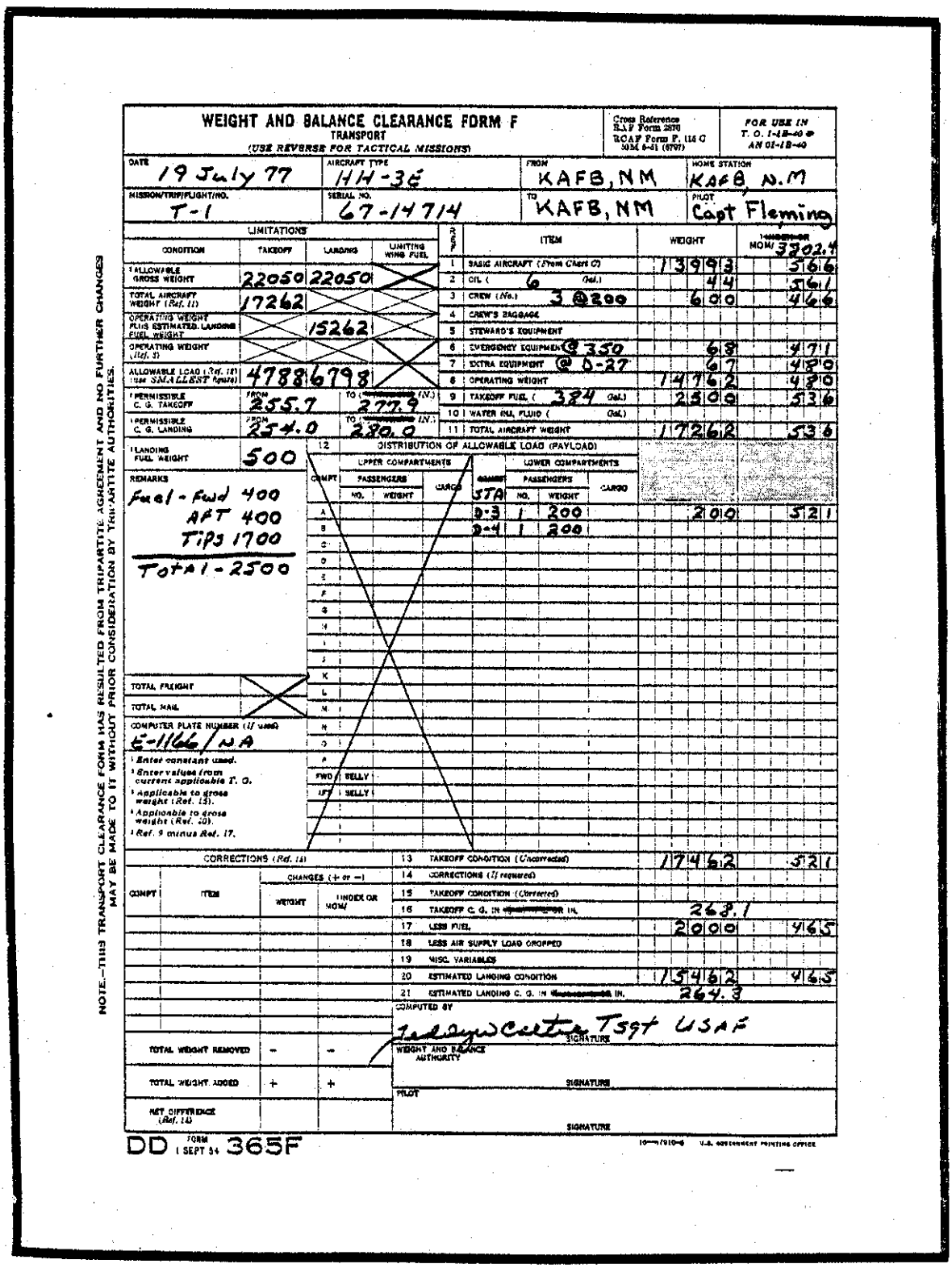


Figure 2-2. Cargo Compartment



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

Cross Reference: AF Form 2870, ROAF Form F, 114 C 5034 6-61 (5797)

FOR USE IN T. O. 1-1B-40 & AN 01-1B-40

DATE: 19 July 77	AIRCRAFT TYPE: HH-3E	FROM: KAFB, NM	HOME STATION: KAFB N.M
MISSION/TRIP/FLIGHT/NO.: T-1	SERIAL NO.: 67-14714	TO: KAFB, NM	PILOT: Capt Fleming

LIMITATIONS

CONDITION	TAKEOFF	LANDING	LIMITING WING FUEL
1 ALLOWABLE GROSS WEIGHT	22050	22050	
TOTAL AIRCRAFT WEIGHT (Ref. 11)	17262		
OPERATING WEIGHT PLUS ESTIMATED LANDING FUEL WEIGHT		15262	
OPERATING WEIGHT (Ref. 3)			
ALLOWABLE LOAD (Ref. 12) (Use SMALLEST figure)	4788 6798		
2 PERMISSIBLE C. G. TAKEOFF	FROM 255.7	TO (FWD LIMIT) 277.9	
2 PERMISSIBLE C. G. LANDING	FROM 254.0	TO (FWD LIMIT) 280.0	
3 LANDING FUEL WEIGHT	500		

REMARKS: Fuel - Fwd 400, AFT 400, Tips 1700, Total - 2500

ITEM		WEIGHT	MOM/1000 3202.4
1	BASIC AIRCRAFT (From Chart C)	13993	5166
2	OIL (6 Gal.)	44	161
3	CREW (No.) 3 @200	600	466
4	CREW'S BAGGAGE		
5	STEWARD'S EQUIPMENT		
6	EMERGENCY EQUIPMENT @ 350	68	471
7	EXTRA EQUIPMENT @ 0-27	67	480
8	OPERATING WEIGHT	14762	4810
9	TAKEOFF FUEL (384 Gal.)	2500	536
10	WATER INJ. FLUID (Gal.)		
11	TOTAL AIRCRAFT WEIGHT	17262	536

12 DISTRIBUTION OF ALLOWABLE LOAD (PAYLOAD)

COMPT	UPPER COMPARTMENTS PASSENGERS NO.	UPPER COMPARTMENTS PASSENGERS WEIGHT	UPPER COMPARTMENTS CARGO	LOWER COMPARTMENTS (STA) PASSENGERS NO.	LOWER COMPARTMENTS (STA) PASSENGERS WEIGHT	LOWER COMPARTMENTS CARGO	WEIGHT	MOM/1000
A				D-3 1	200		200	521
B				D-4 1	200			
C								
D								
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) E-1166/NA

[1] Enter constant used.
[2] Enter values from current applicable T. O.
[3] Applicable to gross weight (Ref. 13).
[4] Applicable to gross weight (Ref. 20).
[5] Ref. 9 minus Ref. 17.

CORRECTIONS (Ref. 18)

COMPT	ITEM	CHANGES (+ or −) WEIGHT	CHANGES (+ or −) INDEX OR MOM/
TOTAL WEIGHT REMOVED		−	−
TOTAL WEIGHT ADDED		+	+
NET DIFFERENCE (Ref. 14)			

13	TAKEOFF CONDITION (Uncorrected)	17462	521
14	CORRECTIONS (If required)		
15	TAKEOFF CONDITION (Corrected)		
16	TAKEOFF C. G. IN [FWD] LIMIT IN.	268.1	
17	LESS FUEL	2000	465
18	LESS AIR SUPPLY LOAD DROPPED		
19	MISC. VARIABLES		
20	ESTIMATED LANDING CONDITION	15462	465
21	ESTIMATED LANDING C. G. IN [FWD] LIMIT IN.	264.3	

COMPUTED BY: Jerry W Carter, TSgt USAF
SIGNATURE

WEIGHT AND BALANCE AUTHORITY
SIGNATURE

PILOT
SIGNATURE

DD FORM 1 SEPT 54 365F

10—7010-6 U.S. GOVERNMENT PRINTING OFFICE

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Figure 2-3. DD Form 365F, Academic Exercise

2-6. MODULE P-2, Takeoff and Landing Data. (2.0 Hours)

a. Objective (Standard - 3). Use TO 1H-3(C)E-1 and typical mission information to complete a TOLD card.

(1) Obtain and list TOLD weather, operating weight and field elevation.

(2) Compute:

(a) Density Altitude.

(b) Maximum gross weight.

(c) Power available.

(d) Power required.

(e) Power reserve.

(f) Maximum airspeed.

(g) Topping limits.

b. Student Requirements and Tips. Assignment: Read Supplemental Information.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual, Performance Data.

d. Required Materials/Equipment:

(1) TOLD Card.

(2) TO 1H-3(C)E-1, Flight Manual.

e. Supplemental Information. The Takeoff and Landing Data (TOLD) card must be completed for each flight. The flight manual states that if conditions at the landing site are more favorable than for takeoff, use of the landing data is optional. For student training, the landing data will be completed for all remote area, hoist, sling, water, and night unprepared area training. To assist you in completing the takeoff and landing data, the following information is provided. Takeoff Column:

(1) Field elevation. 5352 at Kirtland AFB.

(2) Pressure altitude from weather briefing.

(3) Free air temperature from weather briefing.

(4) Wind from weather briefing. Wind data, considered to be accurate, such as that supplied by an airfield tower or weather station, will be applied when computing TOLD data.

(5) Density altitude. Computed.

(6) Operating Weight. This includes basic weight of the aircraft, plus 44 lbs of engine oil, 600 lbs for three primary crewmembers; 118 lbs for miscellaneous storage box, which contains seven LPUs, seven sleeping bags (seasonal), one survival vest, one flight mechanics tool kit, two pair of gloves, two ten-foot flare lanyards, and 67 lbs of extra equipment at station D-67 (fwd ramp) which consists of one liter, chocks, engine plugs, and blade socks.

(7) Extra crew and equipment, as applicable.

(8) Fuel as scheduled.

(9) Payload, if applicable.

(10) Mission Gross Weight - total of items (6), (7), (8), and (9).

(11) Wheel Height for Hover - five feet.

(12) Power available - computed using 100 percent N_r.

NOTE. If power available exceeds 103% Q, this figure will be inserted followed by 103% Q, e.g., 109%/103% Q. This higher figure (up to 123% Q) can be used for checking individual engine performance while the 103% indicates the maximum amount of torque which can be applied to the transmission with both engines operating properly.

(13) Maximum gross weight - computed using 100% N_r.

(14) Power required - computed using 100% N_r.

(15) Power reserve - this figure is derived by subtracting item (14) (Power Required) from item (12) (Power Available). If power available is above 103% Q, subtract power required from 103% since 103% Q is the maximum torque permitted with both engines operating properly.

(16) Maximum airspeed - this figure should be obtained by entering the chart with the maximum density altitude at which the aircraft will be operating during the initial phase offli ght. Airspeed limitations due to blade stall may be obtained from the Maximum Airspeed Chart.

NOTE. Although it is not listed as a required computation item on the TOLD card, single engine capability is very important and should be computed for every flight. To compute this information, refer to the appendix section of your flight manual.

f. Exercises:

(1) Define compressibility effects. _____

_____

_____

_____

(2) Define pressure altitude. _____

_____

_____

_____

(3) Define density altitude. _____

_____

_____

_____

(4) The power output capability of the engine can exceed the structural limit of the transmission under certain conditions. What should you do if this occurs? _____

_____

_____

_____

(5) Maximum gross weight for hovering and the Torque Required to Hover Charts are based on zero wind.

True _____

False _____

(6) Complete the TOLD data in figure 2-4 for an average winter flying day at Kirtland AFB.

(7) Complete the TOLD data in figure 2-5 for an average summer flying day at Kirtland AFB.

T.O. 1H-3(C)C-1CL-1

TAKE-OFF AND LANDING DATA CARD

DATA	TAKE-OFF	LANDING	
FIELD ELEVATION	5352		FT
PRESSURE ALTITUDE	5060		FT
FREE AIR TEMPERATURE	-5°C		°C
WIND	090/10		KT/DEG
DENSITY ALTITUDE			FT
OPERATING WEIGHT	14772		LB
EXTRA CREW & EQUIPMENT	200		LB
FUEL	3200		LB
PAYLOAD	—		LB
MISSION GROSS WEIGHT	18172		LB
POWER AVAILABLE			% Q
MAXIMUM GROSS WEIGHT			LB
WHEEL HEIGHT FOR HOVER	5		FT
POWER REQUIRED			% Q
POWER RESERVE			% Q
MAXIMUM AIRSPEED			KT
TOPPING LIMITS			% Ng
			°C T_5
single eng	—		G/W
R/D	—		FPM

N-25

Figure 2-4. TOLD Card Academic Exercise-1

TAKE-OFF AND LANDING DATA CARD

DATA	TAKE-OFF	LANDING	
FIELD ELEVATION	5352		FT
PRESSURE ALTITUDE	5180		FT
FREE AIR TEMPERATURE	33°C		°C
WIND	270/05		KT/DEG
DENSITY ALTITUDE			FT
OPERATING WEIGHT	14772		LB
EXTRA CREW & EQUIPMENT	400		LB
FUEL	2500		LB
PAYLOAD	—		LB
MISSION GROSS WEIGHT	17672		LB
POWER AVAILABLE			% Q
MAXIMUM GROSS WEIGHT			LB
WHEEL HEIGHT FOR HOVER	5		FT
POWER REQUIRED			% Q
POWER RESERVE			% Q
MAXIMUM AIRSPEED			KT
TOPPING LIMITS			% Ng
			°C T_5
single ENG. R/D			G/W FPM N-25

Figure 2-5. TOLD Card Academic Exercise-2

2-7. MODULE P-3, Departure Briefing. (0.5 Hour)

a. Objective (Standard - 3). Present a departure briefing.

b. Student Requirements and Tips:

(1) Assignment. Study ARRSP 55-5 (located in back of checklist).

(2) Read Supplemental Information.

c. Source Reference. ARRSP 55-5.

d. Required Materials/Equipment:

(1) TO 1H-3(C)E-1CL-1.

(2) ARRSP 55-5.

e. Supplemental Information. The departure briefing will include, but is not limited to, all items in ARRSP 55-5, Departure Briefing. The following is a suggested format:

(1) Review of TOLD data. 5' ft HOVER POWER

(2) Brief type of takeoff, departure intentions, departure restrictions, hazards, and any deviations from normal procedures, as required.

(3) Brief emergency procedures for takeoff, in flight, and landing, e.g., land back on runway, closed pattern; if instrument or IFR, brief type instrument approach, etc.

(4) Brief fuel jettison/dump procedures and designate who will accomplish them.

(5) Brief change of control procedures if an emergency occurs during takeoff, e.g., the pilot flying will not release the controls until the pilot taking the controls verbally acknowledges "I have the aircraft."

(6) Brief copilot/pilot not flying to monitor power during takeoff and landings and keep torques matched at 100% N_r or as briefed.

(7) Brief flight mechanic to monitor power instruments, call any malfunctions and call approaching engine limits, e.g., torque, N_g or T_5.

(8) Insure external lighting is "ON" to comply with AFR 60-16 increased visibility requirements.

2-8. MODULE P-4, Preflight Inspection. (3.0 Hours)

a. Objective (Standard - 3). Use TO 1H-3(C)E-1CL-1 to perform the preflight inspection IAW TO 1H-3(C)E-1.

(1) Interior inspection.

(2) Exterior inspection.

b. Student Requirements and Tips:

(1) Assignment. Read TO 1H-3(C)E-1, Section II, Preflight Check.

(2) This audio visual module is in three parts.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual, Section II.

d. Required Materials/Equipment. TO 1H-3(C)E-1CL-1.

e. Supplemental Information. Anytime an aircrew departs the immediate vicinity of the aircraft, another walk around inspection will be performed prior to operating the aircraft.

2-9. MODULE P-5, Before Starting Engines Checklist. (1.0 Hour)

a. Objective (Standard - 3). Use TO 1H-3(C)E-1CL-1 and the H-3 cockpit procedures trainer to complete the Before Starting Engines Checklist IAW TO 1H-3(C)E-1.

b. Student Requirements and Tips:

(1) Assignment. Read TO 1H-3(C)E-1, Flight Manual, Section II, Before Starting Engines Checklist.

(2) At the completion of all checklist modules, the student will be required to perform the checklist in the cockpit procedures trainer.

(3) This audio visual module is in two parts.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual, Section II.

d. Required Materials/Equipment. TO 1H-3(C)E-1CL-1.

2-10. MODULE P-6, Engine Start and Rotor Engagement. (0.5 Hour)

a. Objective (Standard - 3). Use TO 1H-3(C)E-1CL-1 and an H-3 cockpit procedures trainer to complete the Engine Start and Rotor Engagement Checklist IAW TO 1H-3(C)E-1.

b. Student Requirements and Tips:

(1) Prerequisite Training. Complete Academic Module P-5.

(2) Assignment. Read TO 1H-3(C)E-1, Flight Manual, Section II, Engine Start and Rotor Engagement Checklist.

(3) At the completion of the audiovisual portion of the module, the student will be required to perform the checklist in the cockpit procedures trainer.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual, Section II.

d. Required Materials/Equipment. TO 1H-3(C)E-1CL-1.

2-11. MODULE P-7, Before Taxi and Taxi Procedures. (0.4 Hour)

a. Objective. Use TO 1H-3(C)E-1CL-1 and an H-3 cockpit procedures trainer to perform Before Taxi and Taxi Procedures IAW TO 1H-3(C)E-1:

(1) Complete the Before Taxi Checklist (Standard - 3).

(2) Understand taxi procedures (Standard - C).

b. Student Requirements and Tips:

(1) Prerequisite Training. Complete Academic Module P-6.

(2) Assignment. Read:

(a) TO 1H-3(C)E-1, Flight Manual, Section II, Before Taxi and Taxi Procedures.

(b) Supplemental Information.

(3) After completing this module, the student will be required to perform the Before Taxi Checklist in the cockpit procedures trainer.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual, Section II.

d. Required Materials/Equipment. TO 1H-3(C)E-1CL-1.

e. Supplemental Information:

(1) Taxiing:

(a) Required - N_r 102%.

(b) Analysis. Once the rotors are engaged, be constantly on the alert for unusual circumstances. Remember, there is no excuse for a taxi accident. Clear the area before taxiing. If the helicopter is to be taxied within 25 feet of an obstacle, use wing walkers. If obstacles are within 10 feet, the aircraft will not be taxied. To start the aircraft rolling, increase the collective slightly and use a small amount of forward cyclic if required. Left rudder will be required to prevent the nose of the aircraft from swinging to the right as collective is applied. After the aircraft starts to roll, check both pilot's and copilot's brakes by firmly pressing down on both brake pedals simultaneously. Do not make extreme application of cyclic with low collective or the blades may strike the droop stops. Simultaneous application of down collective and fore or aft cyclic may cause blade-to-fuselage contact. Always monitor the tip path plane of the blades and do not allow them to go below the horizon.

CAUTION. Anytime brakes are applied, the collective must first be reduced to minimum pitch to prevent skidding and excessive tire wear.

NOTE. The flight instruments should be observed for proper operation during any turns while taxiing. Checklists will not be accomplished during taxi maneuvers.

(2) Kneeling. The H-3 has the capability to kneel, thereby increasing the tail-to-ground clearance. If it becomes necessary to load outsized cargo, kneel the aircraft by moving the nose gear switch (located on the overload switch panel) to the kneel position.

NOTE. Electrical and hydraulic power must be available.

2-12. MODULE P-8, Before and After Takeoff Checklists. (0.5 Hour)

a. Objective (Standard - 3). Use TO 1H-3(C)E-1CL-1 and an H-3 cockpit procedures trainer to perform the Before and After Takeoff Checklists IAW TO 1H-3(C)E-1.

b. Student Requirements and Tips:

(1) Prerequisite Training. Complete Academic Module P-7.

(2) Assignment. Read TO 1H-3(C)E-1, Flight Manual, Section II, Before and After Takeoff Procedures.

(3) After completing this module, the student will be required to perform the Before and After Takeoff Checklists in the cockpit procedures trainer.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual, Section II.

d. Required Materials/Equipment. TO 1H-3(C)E-1CL-1.

2-13. MODULE P-9, Descent, Before Landing Checks. (0.3 Hour)

a. Objective (Standard - 3). Use TO 1H-3(C)E-1CL-1 and an H-3 cockpit procedures trainer to perform descent, before landing and landing checks IAW TO 1H-3(C)E-1.

b. Student Requirements and Tips:

(1) Prerequisite Training. Complete Academic Module P-8.

(2) Assignment. Read TO 1H-3(C)E-1, Section II, Descent, Before Landing and Landing Procedures.

(3) After completing this module, the student will be required to perform the Descent and Before Landing Checklists in the cockpit procedures trainer.

(4) During the final approach phase, recheck the landing gear and beep the speed selectors to maximum N_r, if operational requirements dictate.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual, Section II.

d. Required Materials/Equipment. TO 1H-3(C)E-1CL-1.

2-14. MODULE P-10, Post Flight Procedures. (0.5 Hour)

a. Objective (Standard - 3). Use TO 1H-3(C)E-1CL-1 and an H-3 cockpit procedures trainer to perform post flight procedures IAW TO 1H-3(C)E-1.

(1) Complete the After Landing Checklist.

(2) Understand parking procedures.

(3) Complete the Engine Shutdown Checklist.

b. Student Requirements and Tips:

(1) Prerequisite Training. Complete Academic Module P-9.

(2) Assignment. Read TO 1H-3(C)E-1, Flight Manual, Section II, After Landing and Engine Shutdown Procedures.

(3) After completing this module, the student will be required to perform the After Landing and Engine Shutdown Checklists in the cockpit procedures trainer.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual, Section II.

d. Required Materials/Equipment. TO 1H-3(C)E-1CL-1.

2-15. CPT-1 and CPT-2. Cockpit Procedures Trainer. (2.0 Hours Each)

a. Objective. Perform academic objectives P-3 and P-5 through P-10 in the cockpit procedures trainer. (See figure 2-6.)

b. Student Requirements and Tips:

(1) Prerequisite Training:

(a) CPT-1. Complete Academic Modules P-3 and P-5 through P-10.

(b) CPT-2. Complete CPT-1.

(2) On CPT-1, an instructor will demonstrate and explain the correct procedures.

(3) CPT-2. An instructor will insure that his students have attained the required proficiency for simulator lesson SP-1.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual.

2-16. MODULE P-11, Abnormal APU and Engine Checks. (0.5 Hours)

a. Objective (Standard - C). Recognize the indication(s) and understand the corrective action(s) for abnormal situations that could occur during APU, engine start, and engine checks IAW TO 1H-3(C)E-1.

PRACTICAL EXERCISE/GROUND TRAINING RECORD

NAME

RANK

SSAN

COURSE H3P1

CLASS NUMBER

PHASE COCKPIT PROCEDURES TRAINING

CCD USED | VERSION DATE

LESSON NUMBER AND/OR

OPERATIONS/JOB ELEMENTS	CPT-1 (2.0 Hours)	CPT-2 (2.0 Hours)
PREPARATION	1	2
BEFORE STARTING ENGINES:	1	2
APU Starting	1	2
Flight Control Check	1	2
Servo Check	1	2
ENGINE START & ROTOR ENGAGEMENT:	1	2
Starting Engines	1	2
Rotor Engagement	1	2
BEFORE TAXIING:	1	2
Anti-ice Check	1	2
BEFORE TAKEOFF:	1	2
Accel/Decel Check	1	2
Navigation Equipment	1	2
Power Required Check	1	2
Power Available Check	1	2
Topping Check	1	2
AFTER TAKEOFF CHECK	1	2
DESCENT CHECK	1	2
BEFORE LANDING CHECK	1	2
AFTER LANDING CHECK	1	2
ENGINE SHUTDOWN	1	2

Figure 2-6. Form 9, Cockpit Procedures Training

(1) No APU tachometer indication.

(2) Low APU oil pressure.

(3) Prime pump failure.

(4) APU clutch late engagement or hang up.

(5) Use of external power to start APU.

(6) Abnormal engine N_g tachometer indications.

(7) Abnormal engine fuel flow indications.

(8) Abnormal N_r indications.

(9) Abnormal N_f indications.

(10) Low Engine oil pressure.

b. Student Requirements and Tips:

(1) Read TO 1H-3(C)E-1, Flight Manual, Section II, Before Starting Engines (APU Start).

(2) Read TO 1H-3(C)E-1, Flight Manual, Section IV, Auxiliary Power Unit.

(3) Read TO 1H-3(C)E-1, Flight Manual, Section I, Engines (Major Heading) and Engine Oil System.

c. Source Reference. TO 1H-3(C)E-1.

2-17. MODULE P-12, In-flight Malfunctions. (0.5 Hour)

a. Objective (Standard - C). Recognize the indication(s) and understand the corrective action(s) for in-flight malfunctions IAW TO 1H-3(C)E-1.

(1) Main gear box oil system failure.

(2) Chip lights for intermediate/tail rotor gear box.

(3) Generator failure.

(4) Engine compressor stall.

(5) Abnormal engine oil indications.

(6) Communication system malfunctions.

b. Student Requirements and Tips:

(1) Read TO 1H-3(C)E-1:

(a) Section I, Transmission System (through Transmission Chip Detector Lights) and Oil Supply Systems (Transmission Oil System).

(b) Section III, Main Gearbox Failure.

(c) Section I, Electrical Power Supply System.

(d) Section III, Electrical System Failures.

(e) Section III, Engine Failure (Compressor Stall).

(f) Section VII, Engine Compressor Stall.

(g) Section III, Engine Oil System Malfunctions.

(h) Section I, Fuel Supply System (through Auxiliary Fuel Tank Manual Release Handle).

(i) Section III, Fuel Supply System Failure.

(j) Section I, Rotor Systems (Main Rotor Systems).

(k) Section III, Main Rotor Damper Malfunctions.

(l) Section III, Bailout.

(2) Supplemental Information.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual.

d. Supplemental Information:

(1) Main Transmission and Lubrication System. The main transmission has a magnesium case. The rotor mast has a built in thrust angle of 4° (forward tilt) to permit the fuselage to remain in level pitch attitude at high speeds. The front section of the transmission houses two torque meter sensing systems and the engine inputs. The transmission accessories are mounted on the rear of the transmission.

(a) Accessory Section. Accessories mounted on the aft section of the transmission and driven by the transmission on the APU include two generators, 3 hydraulic pumps, the torque meter pump, and the two transmission lube pumps. A free wheeling unit is incorporated in the accessory section to allow the APU to drive the accessories before the main rotor is engaged.

The primary transmission oil pump and the torque meter oil pump are driven by a common shaft. Should a decrease in transmission oil pressure be noted along with the loss of both torque meters, a broken drive shaft to the primary oil pump would be suspected. Similarly, the secondary oil pump and the utility hydraulic pump are driven by a common shaft. A decrease in oil pressure and loss of utility hydraulic system pressure would indicate possible loss of the secondary oil pump drive shaft. Under normal conditions, one oil pump is capable of providing sufficient pressure to allow the helicopter to continue flight if no other malfunction of the transmission exists.

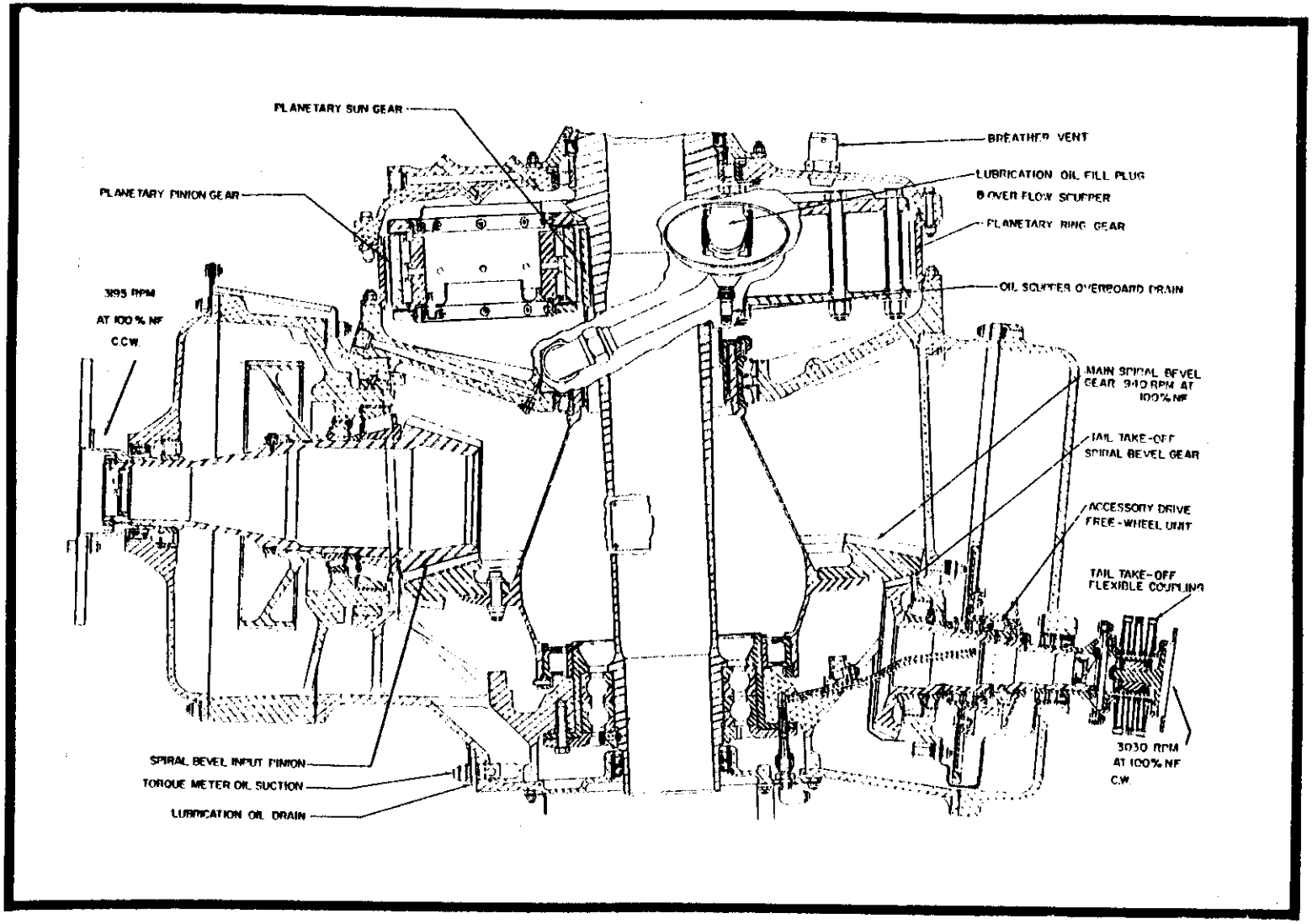


Figure 2-7. Main Gearbox Cutaway

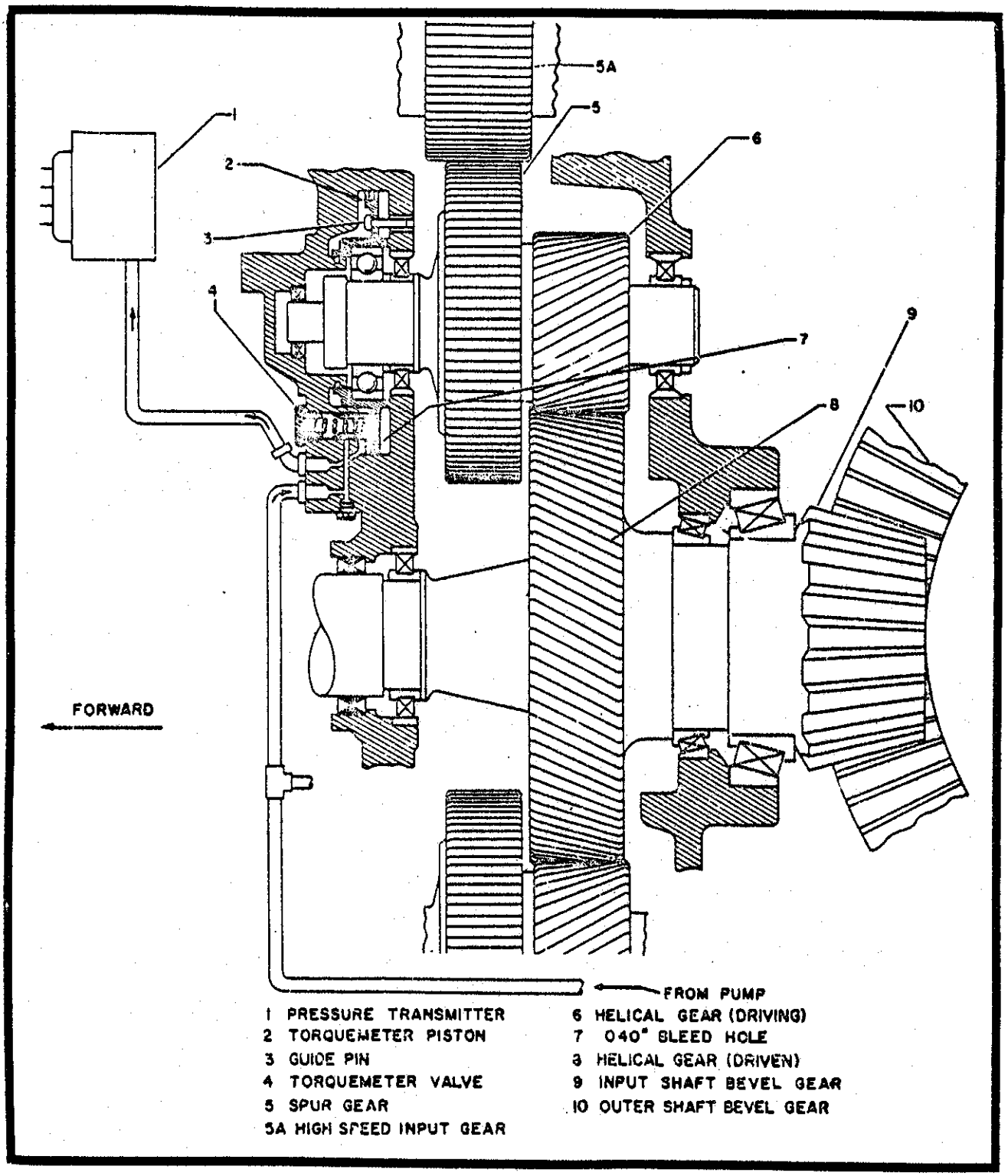


Figure 2-8. Torquemeter Schematic

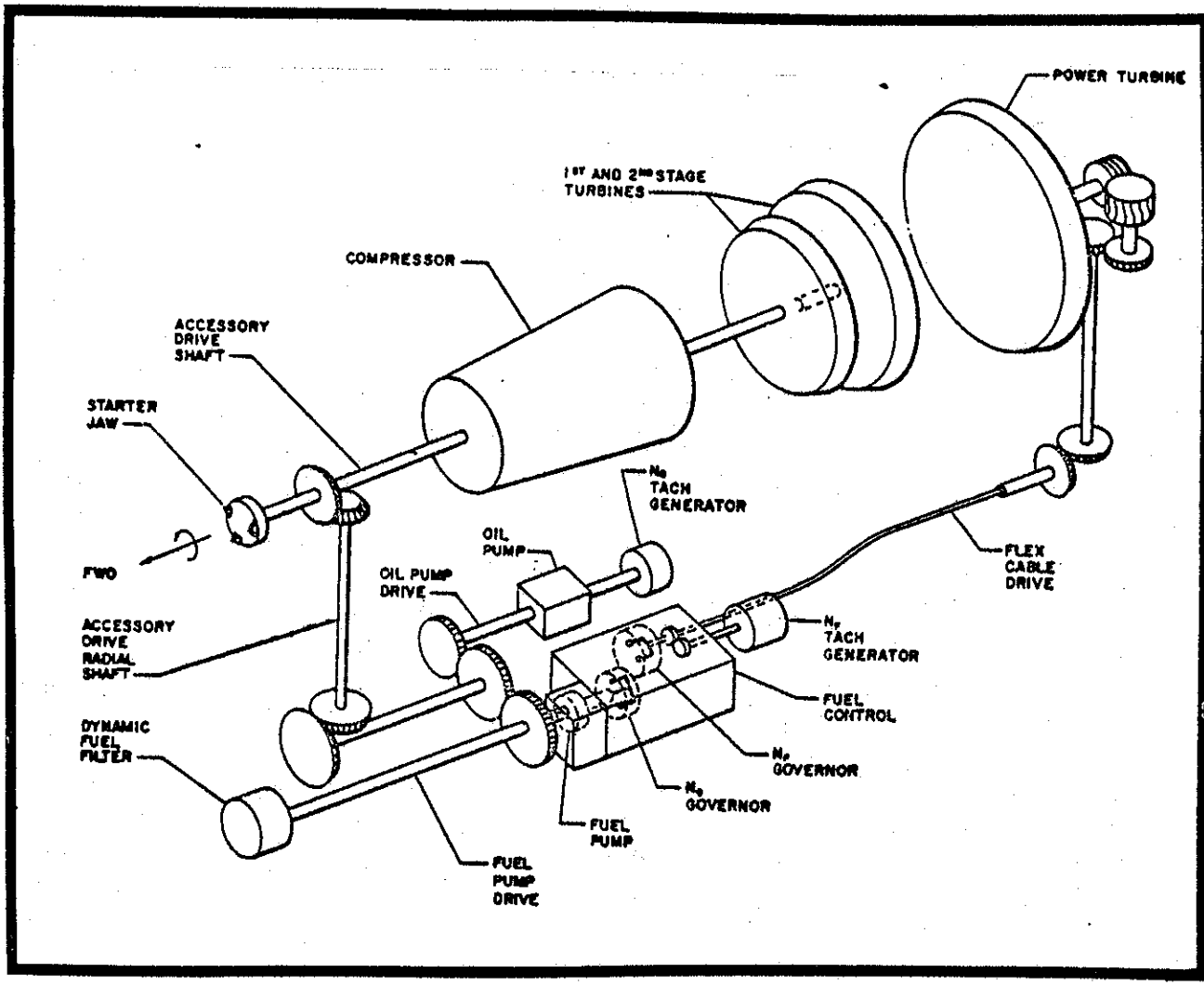


Figure 2-9. Engine Accessory Gear Train Schematic

(b) Main Gearbox Oil System. The temperature bulb for the oil temperature gage is located in the transmission oil sump. It measures the temperature of the oil after it has passed over the transmission gear. The temperature sensor for the transmission oil hot caution light is located at the main transmission oil input. This is after the oil has passed through the oil cooler. The transmission oil hot light illuminates at 120°C; therefore, if the temperature gage reads approximately 120°C when the oil hot light comes on, the transmission oil cooler is not operating. This is the only indication you will have of oil cooler failure, since high temperature can also result from other transmission malfunctions. On hot days, it is fairly common for the transmission temperature gage to read above 120°C without the caution light coming on as the cooler is normally capable of maintaining the oil temperature below 120°C at the oil input.

The transmission oil sight gage is located on the left side of the transmission. Allowable oil leakage is measured at the gearbox sight gage. Total leakage from all sources during a period of ten flight hours must not exceed 1/2 the distance from the full to the refill line. (This allowable leakage is the same for all three gearboxes.)

(c) Augmented Splash Lubrication System (TO-603). This system is a modification to the original transmission. It can be recognized by the additional sump mounted on the bottom of the main transmission. Its purpose is to allow up to 30 minutes of emergency flight in the event of loss of the main transmission lubricating system. The augmented system utilizes the additional oil sump and the torque meter pump to provide emergency lubrication to the high speed input bearings when the main transmission oil pressure drops below effective lubricating pressure.

(2) Electrical Power:

(a) AC Power. The supervisory panels provide overvoltage, undervoltage, underfrequency, and feeder fault protection. When the rotor speed drops to 92 to 97% N_r, the underfrequency protection circuit will disconnect the generators from the AC buses to prevent damage to frequency sensitive equipment. The underfrequency protection occurs only when the helicopter is on the ground with weight on the landing gear. In this condition, the squat switches on the main landing gear are actuated to activate the underfrequency protection circuitry. The AC system incorporates two buses, the essential and the nonessential. The nonessential bus provides power for the less important AC equipment. It is automatically dropped from the line if either generator should fail, relieving the pilot from having to turn off the unnecessary equipment. The remaining generator then powers the essential bus.

(b) DC Power. The number one TR is powered by the AC essential bus, while the number two TR is powered by the AC nonessential bus. The system has a DC essential bus, a DC nonessential bus and a battery bus. Should one TR fail, either TR will power the DC essential bus and the nonessential bus will be dropped. A voltmeter is incorporated

which allows voltage checking of the number one and number two transformer rectifiers, the DC essential bus and the battery bus. The voltmeter selector should not be left in the battery bus position when the helicopter is shut down. If left in this position, current lost over a long period of time may discharge the battery.

(3) Rotor System. The main rotor head is fully articulated and weights approximately 1000 pounds. It is self lubricated by a reservoir located above each vertical hinge pin. The reservoir located on top of the rotor mast contains hydraulic fluid for the dampers. Control inputs are transferred to the rotor blades by the rotating swashplate and the pitch links. Autorotation RPM adjustments are accomplished by adjusting all of the pitch links the same amount.

2-18. MODULE P-13, APU Fire. (0.3 Hour)

a. Objective (Standard - C). Recognize the indications(s) and understand the corrective action(s) for APU fire IAW TO 1H-3(C)E-1CL-1 and TO 1H-3(C)E-1.

b. Student Requirements and Tips. Read TO 1H-3(C)E-1, Section IV, Auxiliary Power Unit and Section III, Fire in APU Compartment.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual.

2-19. MODULE P-14, Engine Start Emergencies. (0.5 Hour)

a. Objective (Standard - C). Recognize the indication(s) and understand the corrective action(s) for engine start emergencies IAW TO 1H-3(C) E-1CL-1 and TO 1H-3(C)E-1.

(1) Battery start.

(2) Hot start.

(3) Cold hangup start.

b. Student Requirements and Tips. Read TO 1H-3(C)E-1:

(1) Section III, Emergency Battery Start.

(2) Section II, Engine Start and Rotor Engagement (Engine Starting).

(3) Section VII, Engine (Cold Hang-up).

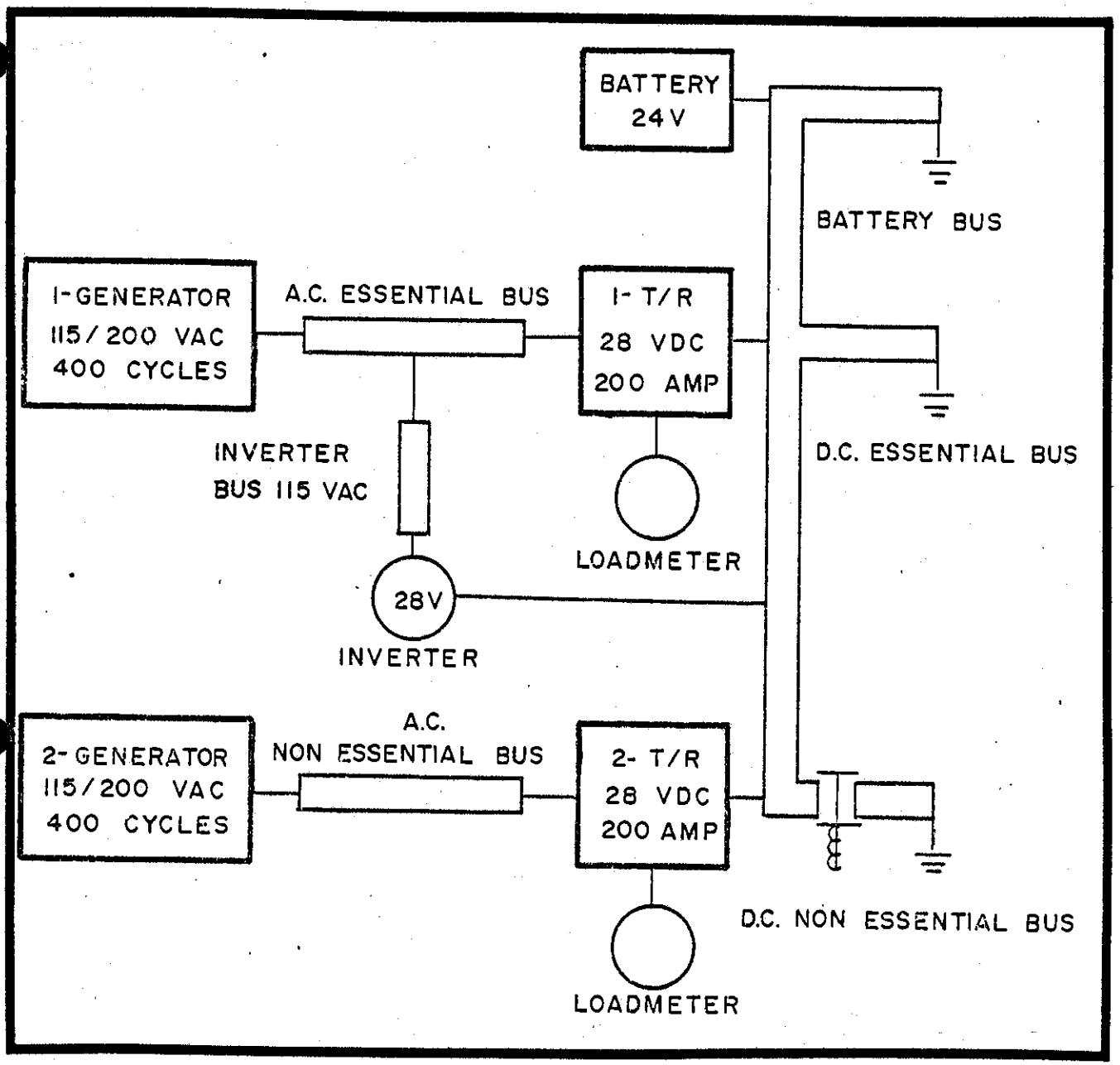


Figure 2-10. Simplified H-3 Electrical System

NOTE. For a detailed schematic of the H-3 electrical system showing switches, relays and crossovers, refer to TO 1H-3(C)E-1.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual.

2-20. MODULE P-15, Blade Stall and Settling with Power. (0.3 Hour)

a. Objective (Standard - C). Recognize the indication(s) and understand the recovery procedures for blade stall and settling with power.

b. Student Requirements and Tips:

Assignment. Read:

(a) TO 1H-3(C)E-1, Section VI, Blade Stall and Power Settling.

(b) Supplemental Information.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual.

d. Supplemental Information:

Settling with Power:

Analysis. Normally, a rate of descent of at least 700 FPM with airspeed below translational lift must be attained to initiate power settling. Roughness of the controls and ineffective rudder pedals normally are indications of power settling. Under actual power settling conditions, merely adding collective pitch will only aggravate the situation. Recovery will be accomplished by lowering the collective and easing the cyclic forward.

NOTE. Avoid nose high attitudes during power settling conditions. Conditions have been experienced where the aircraft began descending backwards with an excessive nose up attitude. Forward cyclic alone was ineffective and tail rotor inputs were required to recover. When the tail rotor came into clear air, the aircraft abruptly pitched 30-40 degrees nose low. The normal tendency would be to rapidly apply aft cyclic. This procedure might result in blade to fuselage contact.

CAUTION. Should an extreme nose low situation be encountered, initially keep the cyclic in the neutral position. Then slowly and smoothly apply collective as necessary with aft cyclic to effect a gradual recovery. Do not over-control.

2-21. MODULE P-16, Single Engine Failure. (0.5 Hour)

a. Objective (Standard - C). Recognize the indication(s) and understand the corrective actions for a single engine failure IAW TO 1H-3(C)E-1CL-1.

(1) In-flight shutdown and restart.

(2) Auxiliary tank release.

(3) Approach and landing.

(4) Single engine go-around.

b. Student Requirements and Tips:

Assignment:

(1) Read TO 1H-3(C)E-1:

(a) Section I, Fuel Supply System (Crossfeed).

(b) Section III, Engine Failure (Single Engine Failure).

(c) Section III, Landing (Single Engine Landings).

(2) Read Supplemental Information.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual.

d. Supplemental Information. Single Engine Operations:

(1) Required:

(a) N_r 100% minimum.

(b) Airspeed 70 KIAS minimum until interception of the desired approach angle.

(c) Single Engine Failure Checklist.

(d) Engine shutdown or engine restart in-flight.

(2) Analysis:

(a) If an engine should malfunction and fail, it will be necessary for the pilot to decide whether to continue flight to a suitable airfield or to land as soon as possible. Some of the conditions to be considered are airspeed, gross weight, altitude, mission requirements

and power available. The normal indications of an engine failure are:

1 Torque meter reading zero on affected engine.

2 N_f zero on affected engine.

3 N_g, T_5, fuel flow and oil pressure approaching or at zero.

(b) Single engine training will be initiated by the instructor pilot retarding one speed selector to 96-98% N_f during flight. Reduce collective pitch as necessary to maintain a minimum of 100% N_r. Apply cyclic control to maintain altitude and start slowing the aircraft to an airspeed that is compatible with power required for the gross weight and density altitude or to a minimum of 70 KIAS while accomplishing Single Engine Failure Checklist. As soon as aircraft control has been established, simulate accomplishing the Engine Shutdown In-Flight Checklist. Closely monitor the T_5 and N_g on the operating engine to insure that they remain within operating limitations. If altitude cannot be maintained while operating the engine within limits at a minimum of 100% N_r and 70 KIAS, maintain 70 KIAS and descend to an altitude at which level flight can be maintained. Normally, if it becomes apparant that a safe altitude could not be maintained, a single engine landing would be accomplished in the immediate area. However, for training purposes, if a safe altitude cannot be maintained, the simulation will be discontinued. In some instances, depending on gross weight, density altitude and power available, it may be possible to maintain altitude with one engine at airspeeds in excess of 70 KIAS. If an airspeed in excess of 70 KIAS is maintained, reduce the airspeed to 70 KIAS as the selected landing site is approached and complete the Before Landing Checklist. Maintain 500 feet AGL (minimum) and 70 KIAS (minimum) until reaching the desired approach angle. Reduce speed so that touchdown will be made in a level attitude with minimum practicable rate of descent. Ground speed should be below 40 knots and above translational lift for landing on prepared surfaces. On simulated unprepared surfaces the ground speed should be as slow as possible. Upon ground contact, smoothly reduce the collective pitch and use cyclic control to maintain a level attitude. Reduce the collective pitch to minimum and apply wheel

NOTE. Time permitting in the traffic pattern, check the power available on the good engine by increasing collective until rotor is drooped but not below 100% N_r. Note the torque available. This is the maximum power available for flying the landing approach without drooping below 100% N_r.

brakes to minimize the ground roll. Extreme caution must be used to avoid excessive nose high attitudes near the surface due to the possibility of the tail pylon striking the ground.

(c) For single engine go-around, increase collective pitch to obtain maximum single engine torque up to 123%. Do not droop below 98% N_r. Ease the nose forward if airspeed is below 70 KIAS to obtain and climb at 70 to 80 KIAS. In extreme conditions, a go-around may not be possible.

2-22. MODULE P-17, Two Engine Failure/Autorotation. (0.5 Hour)

a. Objective (Standard - C). Recognize the indications(s) and understand the corrective action(s) for two engine failure (actual autorotation) and understand the procedures for a practice autorotation.

b. Student Requirements and Tips:

Assignment. Read:

(a) TO 1H-3(C)E-1, Section III, Engine Failure (Failure of both Engines), Autorotative Landings.

(b) Supplemental Information.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual.

d. Supplemental Information:

Autorotations:

(a) Required:

1 Before Landing Checklist.

2 Minimum altitude:

a Straight ahead and 90° turning - 500 feet.

b 180° turning - 800 feet.

3 Two Engine Failure During Flight Checklist.

4 N_f 96-98%.

5 N_r 98-104%.

(b) Analysis:

1 In the event of a two-engine failure during flight, a safe autorotative landing can be accomplished provided the helicopter is being flown at a safe altitude/airspeed combination to permit-selection of a suitable landing area.

2 The instructor will demonstrate and the student will practice this maneuver. Prior to commencing practice autorotations, the instructor will insure that the crew is briefed on the maneuver and that each pilot is aware of his responsibilities and duties. The pilot will accomplish the "BEFORE LANDING CHECKLIST" and the "TWO ENGINE FAILURE DURING FLIGHT CHECKLIST" prior to initiating the autorotation. The autorotation will be initiated at a minimum altitude of 500' AGL for a straight ahead and 90° turning autorotations and 800' AGL for 180° turning autorotations. The pilot flying the aircraft will decrease the collective to minimum and the pilot not flying will retard the speed selectors to 96-98% N_f and keep his hand on the speed selectors throughout the autorotation. Maintain an airspeed of 70-110 KIAS and an N_r of approximately 104% prior to the flare. At approximately 150 feet, initiate a gradual flare. Maintain N_r within limits (Max 112% N_r) while applying aft cyclic to reduce forward speed to less than 30 knots ground speed. While in the flare, advance speed selectors to maximum, then apply forward cyclic to establish a level attitude. As aircraft begins to settle, increase collective pitch and recover at approximately 15 feet.

WARNING. Until the level attitude is established to effect the recovery, avoid low airspeed/vertical descent while accomplishing practice autorotations. Engine power/rotor inertia may not be sufficient to safely recover the aircraft under the above conditions.

NOTE. A slight amount of collective may be required to maintain rotor RPM within limits especially at heavy gross weights during turning autorotations and during the flare.

2-23. MODULE P-18, Fires and Bailout. (0.5 Hour)

a. Objective (Standard - C). Recognize the indication(s) and understand the corrective action(s) for fire and any emergency necessitating bailout IAW TO 1H-3(C)E-1.

(1) Engine compartment fire.

(2) Fuselage fire.

(3) Smoke, fume, and odor elimination.

(4) Bailout.

b. Student Requirements and Tips:

Assignment. Read TO 1H-3(C)E-1:

(a) Section I, Fire Detection System and Fire Extinguisher System.

(b) Section III, Fire During Ground Operations (Engine Compartment Fire), Fire In-Flight, Bailout.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual.

2-24. MODULE P-19, Tail Rotor Failure. (0.4 Hour)

a. Objective (Standard - C). Recognize the indication(s) and understand the corrective action(s) for tail rotor failures IAW TO 1H-3(C)E-1.

(1) Control failure.

(2) Drive failure.

b. Student Requirements and Tips:

Assignment. Read TO 1H-3(C)E-1, Section III, Tail Rotor System Failures, Impending Tail Rotor Drive System Failure.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual.

2-25. MODULE P-20, Landing Gear Failure. (0.4 Hour)

a. Objective (Standard - C). Recognize the indication(s) and understand the corrective action(s) for landing gear failure IAW TO 1H-3(C)E-1.

(1) Nose gear failure.

(2) Main gear failure.

b. Student Requirements and Tips:

(1) Read TO 1H-3(C)E-1, Section I, Landing Gear System.

(2) Read TO 1H-3(C)E-1, Section III, Landing Gear Emergencies.

(3) Read Supplemental Information.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual.

d. Supplemental Information:

(1) Landing Gear. The gear warning light in the gear handle is activated by individual gear limit switches and remains on while the gear is in an intermediate position, i.e., not up or down and locked. A gear warning horn will sound anytime the airspeed is below approximately 60 knots and the gear is not down and locked.

(2) The nose gear has an added feature which allows the helicopter to kneel by retracting the nose gear while on the ground. With the aircraft in the kneeled position, the clearance under the tail is increased to allow a fork lift to drive under the tail and load cargo directly onto the aft ramp. Do not allow personnel to walk under the forward tip path plane when the rotors are turning as the blades come much closer to the ground when the aircraft is kneeled.

CAUTION. Taxiing with the nose gear retracted is not recommended. Be aware and watchful of the lower position of the main rotor tip path plane.

When all DC power is lost, the nose gear will extend and lock in the extended position. This feature is caused by the control valve being held closed by electrical current. With loss of current, the valve opens allowing the nose gear to extend. (See figure 2-2.)

2-26. MODULE P-21, Fuel Control Malfunctions. (0.4 Hour)

a. Objective (Standard - C). Recognize the indication(s) and understand the corrective action(s) for fuel control malfunctions IAW TO 1H-3(C)E-1.

(1) Loss of P-3 indication.

(2) Flex shaft failure.

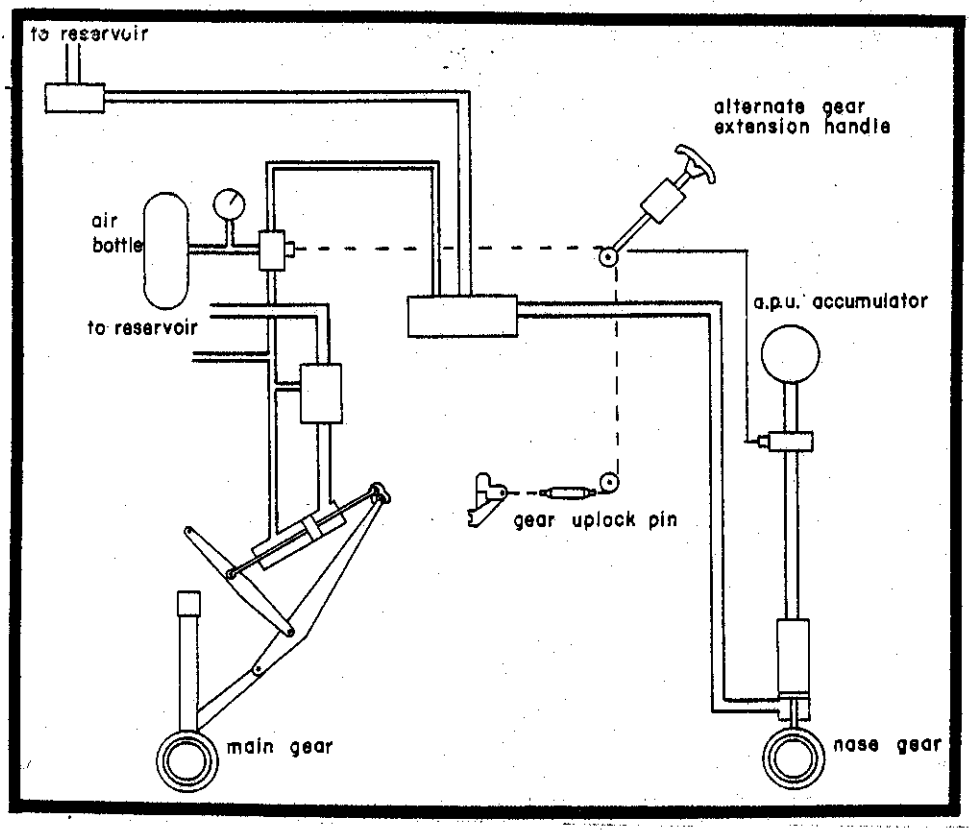


Figure 2-11. H-3 Alternate Gear Extension System (Simplified)

b. Student Requirements and Tips: Read TO 1H-3(C)E-1, Section III, System Failures (Fuel Control System Failure).

c. Source Reference. TO 1H-3(C)E-1, Flight Manual

2-27. MODULE P-22, Primary and Auxiliary Servo Failure. (0.4 Hour)

a. Objective (Standard - C). Recognize the indication(s) and understand the corrective action(s) for primary and auxiliary servo failures IAW TO 1H-3(C)E-1.

b. Student Requirements and Tips:

Assignment. Read:

(a) TO 1H-3(C)E-1, Section I, Flight Control System, (Flight Control Hydraulic Power Supply System).

(b) TO 1H-3(C)E-1, Section III, Flight Control Hydraulic Servo System Failure.

(c) Supplemental Information.

c. Source Reference. TO 1H-3(C)E-1, Flight Manual.

d. Supplemental Information:

(1) Primary and Auxiliary Systems. The primary and auxiliary hydraulic systems on the H-3 can be compared to a power steering system of an automobile. The hydraulic servos are connected in series in the flight controls. A control movement by the pilot activates the auxiliary and primary systems which provide hydraulic boost to move the flight controls. Should either of the hydraulic systems fail, the pilot retains positive control of the aircraft. The pilot has a tendency to over-control the helicopter under this condition, but with practice, is able to control the aircraft with little difficulty. Both systems operate on 1300-1600 PSI hydraulic pressure. Each system has a separate reservoir, pump, manifold and associated plumbing. The systems are totally independent of each other hydraulically. An interlock circuit prevents either system being turned off if hydraulic pressure in the other system is below 1000 PSI. When either system is turned off, the fluid is rerouted back to the reservoir through the manifold. The servo shutoff valves are fail safe. DC power is required to turn the system off. Should electrical power fail, both systems will be restored regardless of switch position.

(2) Control of the helicopter can be maintained through either the primary or the auxiliary flight control system if one or the other should fail. However, prolonged operation on one servo system is not recommended. When one servo system fails, it should be shut off, airspeed reduced to approximately 70 KIAS and flight terminated as soon as possible.

(3) A primary servo malfunction can be broken down into three basic problems:

(a) System pressure loss or blocked pressure line. This can be recognized by a small amount of slop in the cyclic and collective.

(b) Hydraulic hardover. This can be identified by a vibratory load which will be felt in the fuselage and pilot's controls. This may be felt in cyclic and collective or in the cyclic only.

(c) Blocked return line. This can be identified by the racheting of the cyclic (motion is possible in only one direction and irrecoverable in the other).

(4) The aux servo malfunction can be broken down into the same three basic problems:

(a) System pressure loss or blocked pressure line. This can be recognized by the slightly heavier force required to move the cyclic, collective and pedals, plus a loss of AFCS effectiveness.

(b) Hydraulic hardover. Identified by extreme control forces being felt in a single channel (pitch, roll, collective or yaw).

(c) Blocked return line. This can be recognized by the cyclic locking in place, with only a 2½ - 3 inch displacement possible. This displacement will not send an input to the rotor head.

(5) Your instructor will simulate servo failure by turning off either the auxiliary or primary servo. Little, if any control difficulty will be encountered with the primary servo off. However, with the auxiliary servo off, you will experience stiffness of the flight controls. Accomplish the Servo Hydraulic Pressure Failure Checklist while reducing the airspeed to approximately 70 KIAS and perform the Before Landing Checklist. Use caution when approaching the landing to maintain proper aircraft attitude. Do not over control. It is recommended that a normal to shallow approach to a running landing or to a touchdown be made (either of these approaches will minimize control inputs). Most students have the tendency to make the approach too steep and/or too fast.

CAUTION. If, during the last portion of the approach, control of the aircraft is difficult to maintain, do not hesitate to bring the aircraft into a hover prior to landing.

NOTE. Approaches with servo off will be accomplished to a hard surface landing area.

PITCH ROLL COLL YAW

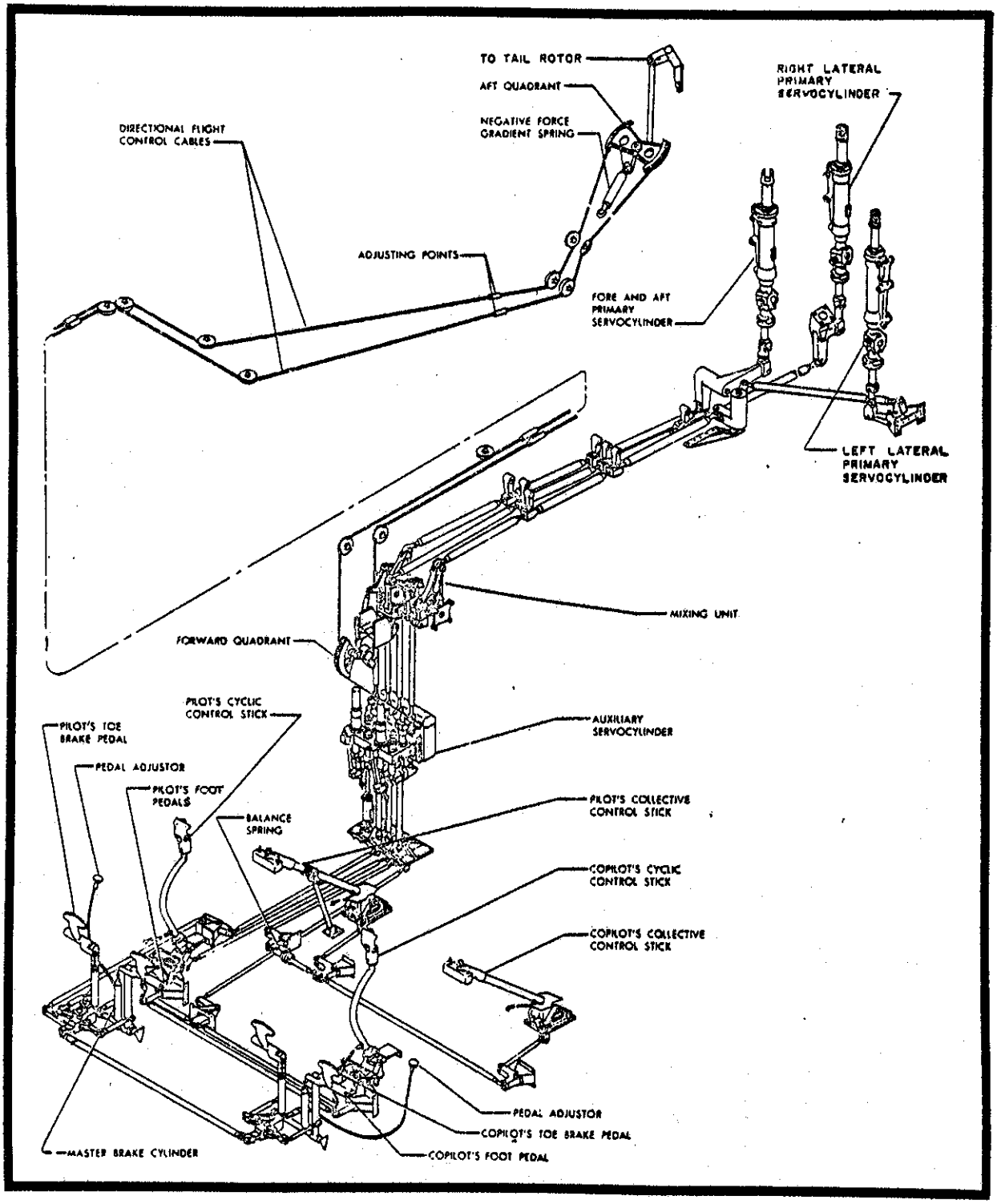


Figure 2-12. Flight Control General Layout

2-28. MODULE P-23, AFCS Malfunctions. (0.4 Hour)

a. Objective (Standard - C). Recognize the indication(s) and understand the corrective actions for AFCS malfunctions IAW TO 1H-3(C)E-1.

b. Student Requirements and Tips:

Assignment:

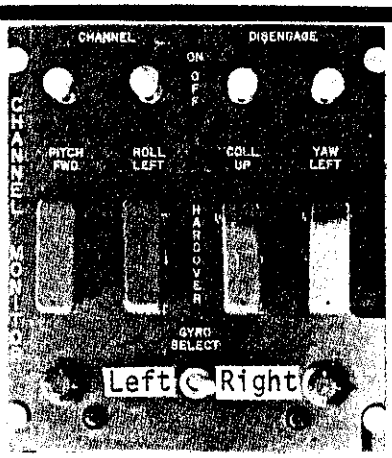
(a) Read TO 1H-3(C)E-1, Section I, Automatic Flight Control System (AFCS) and Section III, Automatic Flight Control System (AFCS).

(b) Study Supplemental Information.

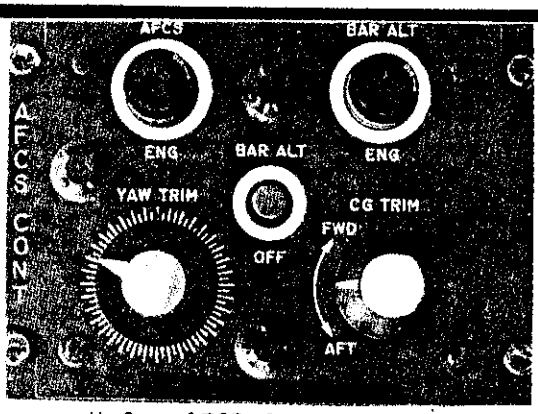
c. Source Reference. TO 1H-3(C)E-1, Flight Manual.

d. Supplemental Information. Operation with the AFCS system inoperative is not desirable, particularly for extended flight. To acquaint you with the flight characteristics of the aircraft without the assistance of the AFCS, the instructor will occasionally disengage the system. Smooth, but positive control movements will be necessary to avoid over controlling the aircraft. With practice, you will be able to perform hovering, takeoffs, approaches, and landings with the AFCS disengaged. (See figure 2-13.)

NOTE. The normal warmup time for the AFCS is approximately three minutes. Operational requirements (scrambles, emergency rescues, etc.) may require takeoffs being made prior to expiration of the warmup period.

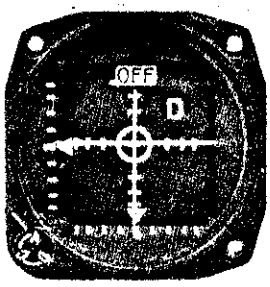


H-3 AFCS Channel Monitor Panel



H-3 AFCS Control Panel

H-3 Cyclic Stick Grip



AFCS Indicator

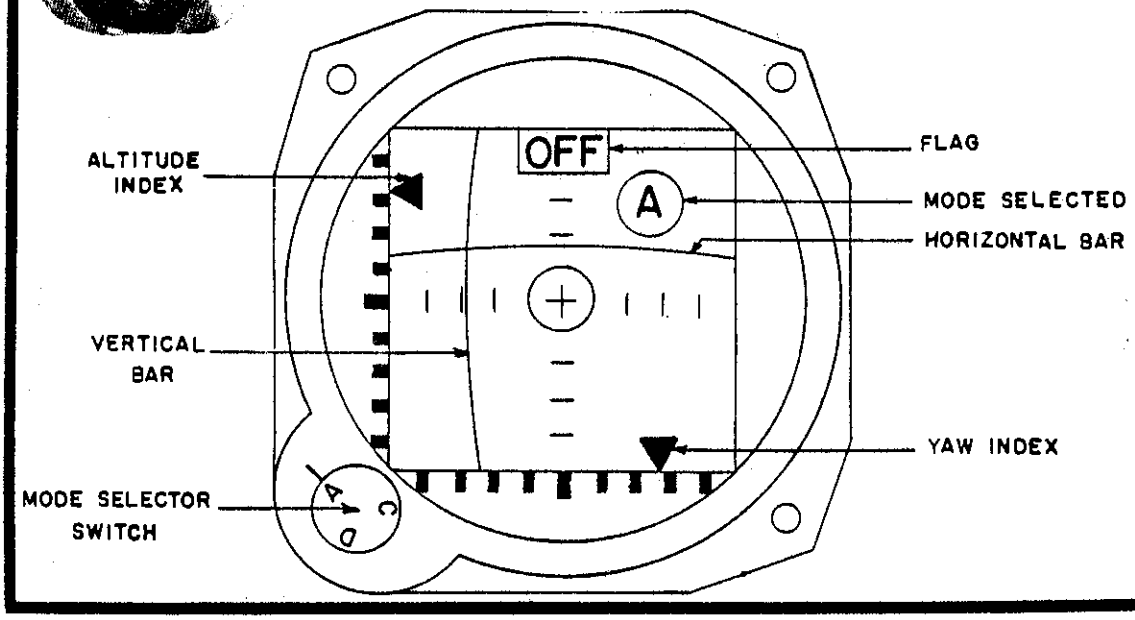


Figure 2-13. H-3 AFCS System Components

SECTION C - SIMULATOR LESSONS

2-29. SIMULATOR LESSON, SP-1. (2.0 Hours)

a. Objectives. See figure 2-14.

b. Student Requirements and Tips:

(1) Prerequisite Training. Academic modules P-3, P-5 through P-10, I-1 through I-3, and CPT-2.

(2) Assignment. Review TO 1H-3(C)E-1, Section II, Before Starting Engines through Landing, Engine Shutdown, and Before Leaving the Helicopter Checklists.

(3) The IP will demonstrate the hover check and each student will perform at least one hover check.

c. Source References:

(1) TO 1H-3(C)E-1, Flight Manual.

(2) AFM 51-37, Instrument Flying.

2-30. SIMULATOR LESSON, SP-2. (2.0 Hours)

a. Objectives. See figure 2-14.

b. Student Requirements and Tips:

(1) Prerequisite Training. Academic modules P-12, P-14, P-15, P-17, P-21, and P-22 and simulator lesson SP-1.

(2) Assignment. Review TO 1H-3(C)E-1, Section III, as required.

c. Source Reference. TO 1H-3(C)E-1.

d. Supplemental Information:

(1) This lesson will give you time to recognize the abnormal/emergency system malfunctions identified on figure 2-14. If you have any questions, ask your instructor for additional analysis or for a repeat of the simulated malfunction.

(2) Do not hesitate to open your DASH ONE after completing the immediate action (BOLD FACE) items.

2-31. SIMULATOR LESSON, SP-3. (2.0 Hours)

a. Objectives. See figure 2-9.

b. Student Requirements and Tips:

(1) Prerequisite Training. All academic training and simulator mission SP-2."

(a) For students attending course H3P1 only, this lesson will be scheduled as close to the student's final check ride (either the operations or instrument check) as possible.

(b) For students continuing on to courses H3P2, H3CP2, and H3P3, this lesson will be scheduled as close to the student's final check ride (either RC-3 or ZC-1) as possible.

(c) The last simulator lesson scheduled in the basic course will normally be SR-1 or SZ-1 if the student will be receiving advanced training.

(2) Since this mission will be flown as close to the last check ride as scheduling will permit, you should be prepared to accomplish the procedures for any abnormal/emergency situation.

(3) Assignment. Review as required.

c. Source References:

(1) TO 1H-3(C)E-1, Flight Manual.

(2) H-3 Pilot Student Guide.

TEST COURSE

COURSE NUMBER	H3P1	DESIGNATION	H-3 (PROCEDURES)(SIMULATOR)			TRAIN
FLIGHT TIME	HOURS	2	2	2		
	TENTHS	0	0	0		
LESSON	PHASE/SUBJECT	SP	SP	SP		
	NUMBER	1	2	3		
FLIGHT PREPARATION		2	3	3		
ENGINE START		2	3	3		
COCKING/SCRAMBLE PROCEDURES			2			
ITO: Normal			2			
Running				3		
BASIC INSTRUMENTS			3	3		
ABNORMAL/EMERGENCY PROCEDURES: Bailout				3V		
ABNORMAL APU INDICATIONS			2	3		
BATTERY START/Use of External Power			3			
HOT START/ COLD HANGUP - Start			3			
SINGLE ENGINE FAILURE			2	3		
ENGINE SHUTDOWN AND RESTART			2	3		
AUX TANK RELEASE			2	3		
SINGLE ENGINE APPROACH AND LANDING			2	3		
SINGLE ENGINE GO AROUND				3		
TWO ENGINE FAILURE/AUTOROTATIONS			2	3		
ABNORMAL ENGINE INDICATIONS			2	3		
ENGINE OIL SYSTEM MALFUNCTION			3			
ENGINE COMPRESSOR STALL				3		
LOSS OF P_3 SENSING				3		
FLEX SHAFT FAILURE				3		
AIRCRAFT FUEL SYSTEM MALFUNCTIONS			3			
MGB MALFUNCTIONS				3		
MGB FAILURE				3		
MAIN ROTOR MALFUNCTIONS			3			
CHIP LIGHTS FOR IGB/TGB			3			
TAIL ROTOR CONTROL FAILURE				3		
TAIL ROTOR DRIVE FAILURE				3		
PRIMARY HYD SYSTEM MALFUNCTIONS/FAILURE			2	3		
AUX HYD SYSTEM MALFUNCTIONS/FAILURE			2	3		
UTILITY HYD SYSTEM MALFUNCTIONS/FAILURE			2	3		
AFCS MALFUNCTIONS			2	3		
ENGINE COMPARTMENT FIRE				3		
APU FIRE			2	3		
FUSELAGE/ELECTRICAL FIRE				3V		
SMOKE AND FUME ELIMINATION				3V		
ELECTRICAL/COMM SYS MALFUNCTIONS/FAILURE				3		
PITOT/WINDSHIELD ICING			3V			
ENGINE ICING			3V			
BLADE STALL			2	3		
POWER SETTLING			2	3		
USE OF CHECKLISTS		2	2	3		
CREW COORDINATION		2	2	3		
AIRMANSHIP		S	S	S		

Figure 2-14. H-3 (Procedures)(Simulator) - CPTS

NOTES, SKETCHES, ETC