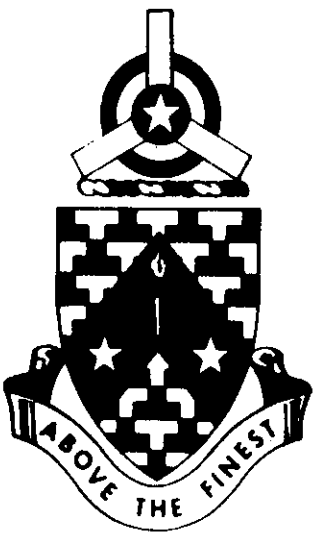
PROGRAMED TEXT

TH-55 ELECTRICAL SYSTEM

AM 18-55



OCTOBER 1968

UNITED STATES ARMY
PRIMARY HELICOPTER SCHOOL
FORT WOLTERS, TEXAS

PROGRAMED TEXT

PROGRAM TEXT

FILE NO: AM 18-55

PROGRAM TITLE

TH-55 Electrical System

POI SCOPE:

Discuss location, identity and function of the TH-55 Helicopter electrical system.

INSTRUCTOR REFERENCES:

269A/A - HMI Section VIII

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DATE: March 1968

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DATE: October 1968

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DATE:

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PREFACE

The purpose of this programmed text is to familiarize you with the electrical system of the TH-55 helicopter. The components are described by location, purpose, and function. The material is presented either in the manuscript or in the illustrations.

Start with Frame 1 and work each frame in succession. Each frame will usually ask you a question. The correct answer is printed on the top of the next frame. If you were incorrect, turn back and restudy the information before continuing on to the next frame. When you have finished the text, complete the self evaluation exercise. Now begin by studying the performance objectives on page iv.

PERFORMANCE OBJECTIVES

Given diagrams or pictures of the TH-55 helicopter, you will be able to locate and identify the various parts of the TH-55 electrical and lighting system.

Given situational, multiple choice and matching questions, you will demonstrate your knowledge of the functions of the various parts of the electrical system by selecting the correct response.

FRAME 1

The electrical power is supplied by one of three main sources available:

a. 24 volt storage battery. (BAT)

b. 28 volt alternator. (ALT)

c. an external power source **or** APU.

NOTE: Normally the helicopter will be started by an external power source i.e., Auxiliary Power Unit (APU) to preclude draining battery voltage. The battery switch must be in the "ON" position when an APU is being used.

Starts in an isolated area or in-flight re-starts are accomplished with the battery. This is done by turning the master switch to the "ON" position and depressing the starter button located on the end of the collective pitch lever.

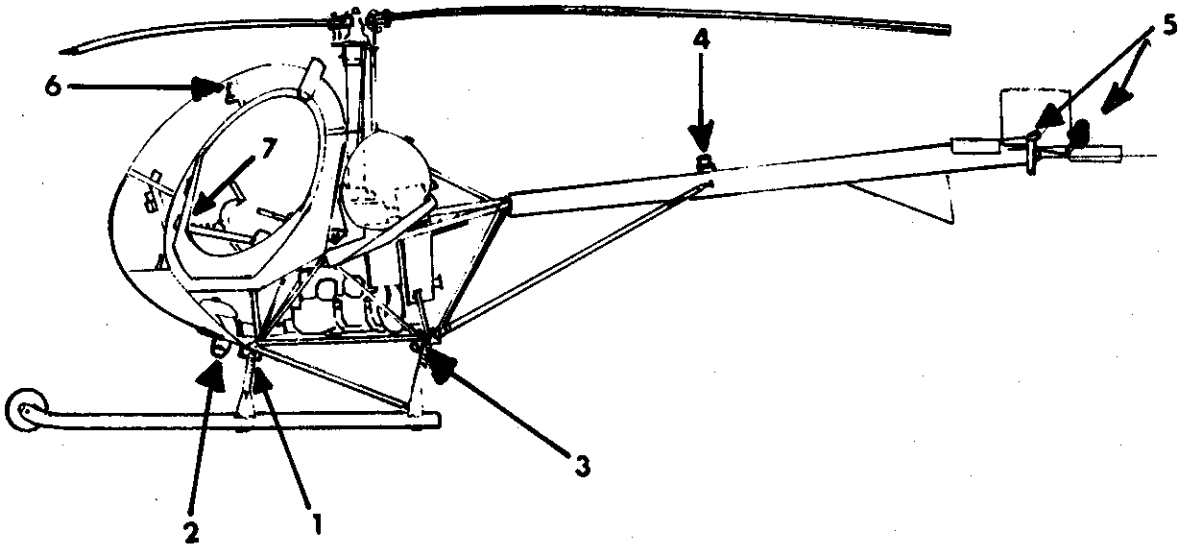
In the following areas, indicate by a check which power source would be used for starting.

Area	APU	BAT	ALT
a. Main Heliport	✓		
b. Isolated pinnacle		✓	
c. In-flight restart		✓	

TURN TO PAGE 3 FOR FRAME #2

FRAME 8

Below is a sketch of a TH-55 helicopter with interior and exterior lighting points illustrated. Study this carefully.



1. Forward navigation light (left)
2. Forward anti-collision light (or beacon)
3. Landing light
4. Aft anti-collision light (or beacon)
5. Aft navigation light
6. Cockpit map light
7. Instrument panel and console lights

TURN TO PAGE 4 FOR FRAME #9

a. Main Heliport - APU
b. Pinnacle - Batt
c. In-flight - Batt

FRAME 2

A circuit breaker (CB) acts as a safety device for the electrical system. When an electrical circuit becomes overloaded or there is a malfunction of a component, the circuit breaker does just what the name implies, it "breaks" the circuit. Each circuit has a breaker of some type. They are very much like a common house fuse in function, but of the two types used one can be reset without removal or replacement.

The two types of circuit breakers used on the TH-55 are

a. the spring loaded pop-up type.

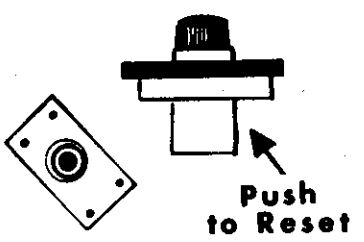
b. the fuse type that burns out.

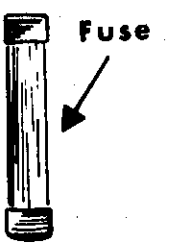
Continued resetting of a circuit breaker may lead to:

a. no difficulties because it automatically takes care of any problem.

(b) possible electrical fire.

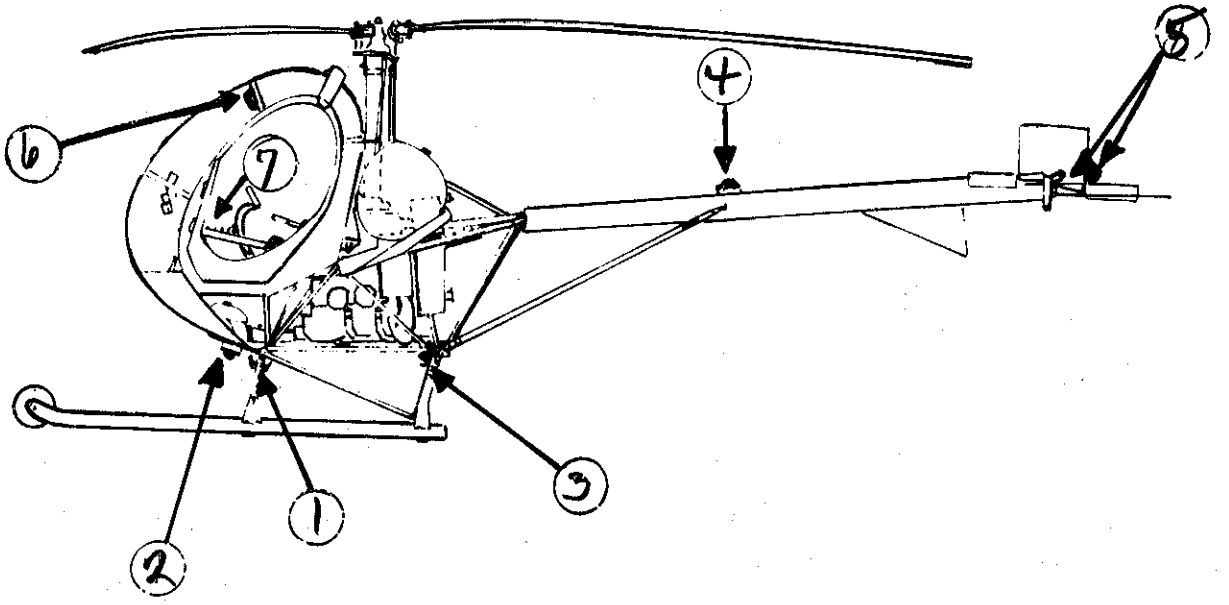
CIRCUIT BREAKERS





FRAME 9

Relying on knowledge obtained from Frame 8, match the item with the nomenclature by placing the correct number in the circle.



1. Forward navigation light **(left)**
2. Forward anti-collision light (or beacon)
3. Landing light
4. Aft anti-collision light (or beacon)
5. Aft navigation light
6. Cockpit map light
7. Instrument panel and console lights

Turn back to page 2 to check your responses.

b. possible electrical fire

FRAME 3

Once the helicopter has been started, the battery is no longer needed for operation of the electrical system (under normal trouble-free conditions). The alternator is the main source of electrical power during engine operation. It is mounted to, and is belt driven by the engine (left side of the aircraft).

Rules to remember:

1. The alternator is the main source of electrical power during engine operation. (The alternator takes the place of a generator. Some switches are labled generator rather than alternator.)

2. The battery is the main source of power when engine is not running.

During normal flight, which component of the electrical system is not required?

(a) Battery.

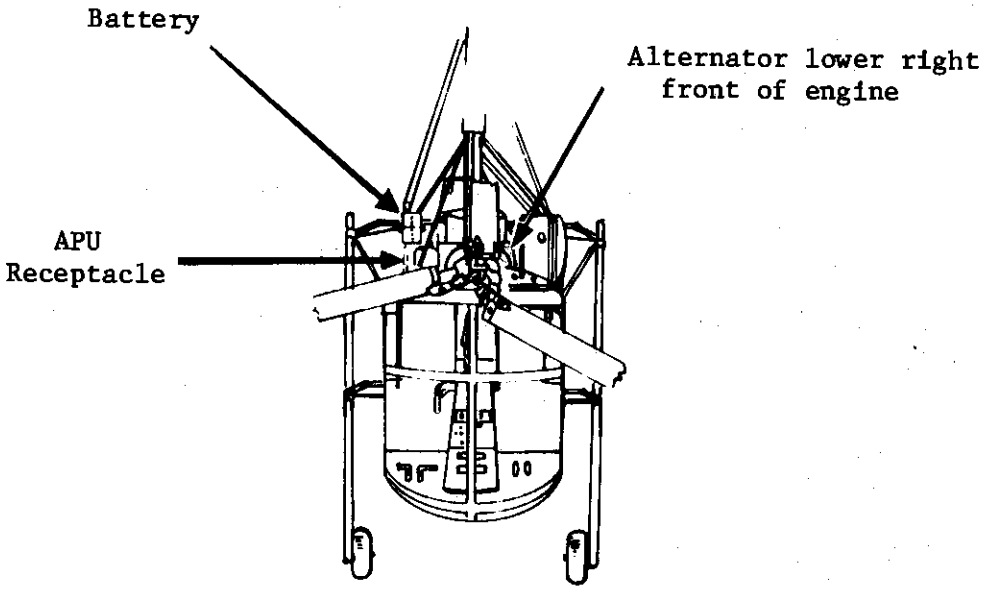
b. Alternator.

c. Voltage regulator.

d. Circuit breaker.

FRAME 10

To enable you to locate the various components of the electrical system, a diagram is presented below indicating their relative position on the TH-55 helicopter.



Now turn to the next frame and without referring back to this frame try to lable the three labled components of the electrical system.

a. Battery.

FRAME 4

The voltage regulator controls the amount of voltage being produced by the alternator. It can therefore effect alternator performance by restricting voltage output or allowing an excessive voltage output.

An ammeter on the instrument panel indicates the amount of power being drawn from the battery or, after the alternator is turned on, it tells how much power is being returned to the battery.

After starting, the battery will draw a large amount of current, in order to re-store the electrical charge loss during the start.

Initially after start, the ammeter, sometimes referred to as the loadmeter, will read higher than normal, but as the battery regains its charge, the ammeter needle will slowly but very steadily decrease to normal.

With no change in electrical load (i.e. turning on or off electrical equipment) you notice the ammeter fluctuating. Which of the following would be the most probable cause?

a. Weak battery.

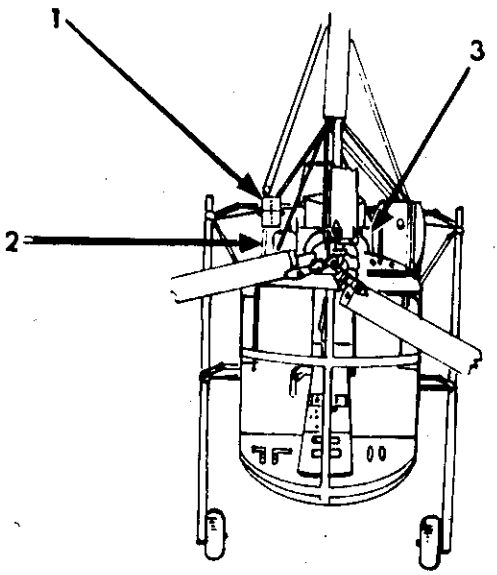
(b) Voltage regulator malfunction.

c. A circuit breaker malfunction.

FRAME 11

The components as numbered on the diagram are:

1. battery
2. APU receptacle
3. alternator



b. Voltage regulator sticking or malfunctioning

FRAME 5

Suppose during preflight warm-up you had an indication that your battery was weak or dead. This would be indicated by a high reading on the ammeter when no electrical equipment was on. You continue your preflight checks and just prior to take-off you notice that the ammeter is still reading high.

Which of the following actions should you take?

a. Shut down the engine to determine trouble.

b. Take-off and fly to an isolated site.

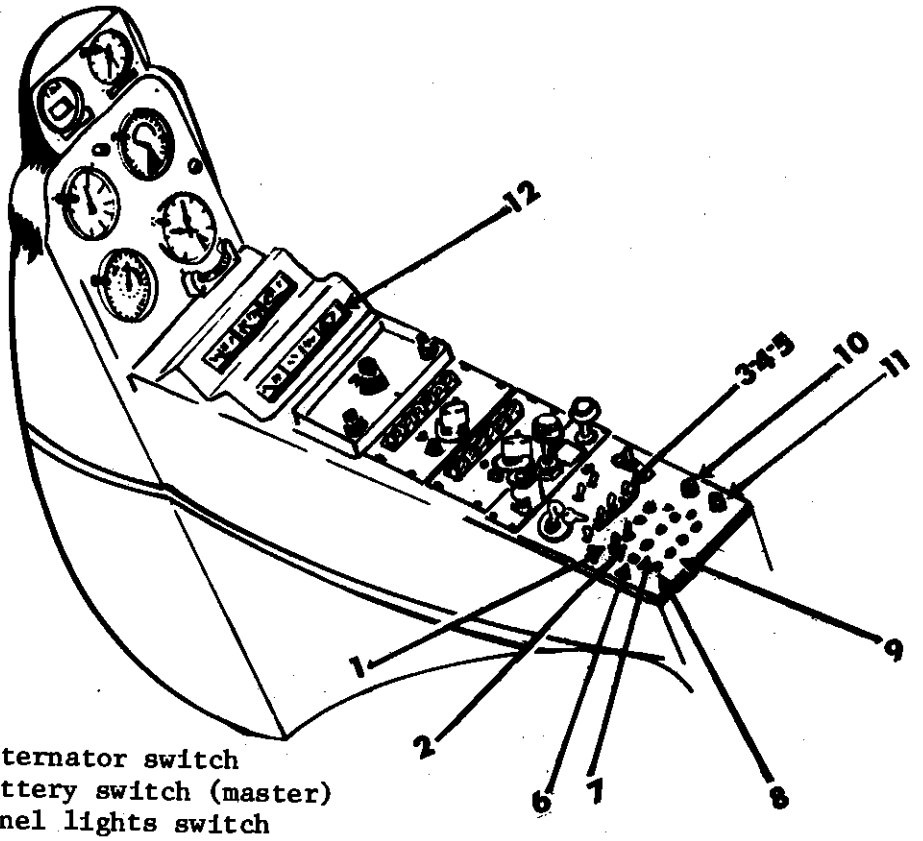
1. Battery 2. APU Receptacle 3. Alternator

FRAME 12

It is important that you know the location of the various instruments and switches which are an integral part of the TH-55 electrical system.

This frame will assist you in reaching this goal.

On the bottom of this page is a sketch of a typical instrument panel (console) on the TH-55 helicopter. Study this sketch carefully so that you will be able to locate these instruments, switches, and circuit breakers later on.



1. Alternator switch
2. Battery switch (master)
3. Panel lights switch
4. Navigation (position) lights switch
5. Beacon lights switch
6. Navigation position C/B
7. Panel lights C/B
8. Landing lights C/B
9. Beacon lights C/B (anti-collision)
10. Panel lights intensity control
11. Console lights intensity control
12. Ammeter

Not Shown:

1. Cockpit light mounted overhead in cabin
2. Landing light switch on cyclic control sticks

a. Shut down the engine and try to determine the cause for the high reading.

FRAME 6

Complete failure of the electrical system is improbable because DC power will be supplied by the battery in the event the alternator fails. If the alternator fails, or if below battery voltage, the ammeter needle will show a discharge.

If an electrical failure occurs, take the following action:

a. check battery and alternator switches ON.

b. land when convenient and investigate.

Flight can be sustained without the battery or alternator operating (no electrical power), however, the use of electrical equipment such as radios and fuel boost pumps will be lost.

You experience an electrical system failure during flight. Which of the following actions would you follow?

a. Go to emergency electrical system.

b. Execute an autorotation.

(c) Continue the flight and land when convenient.

FRAME 13

Now that you have studied the instrument panel and console, see how well you can match the components listed below.

Put the correct number in the space to the left.

a. 1 Alternator switch (not on later models)

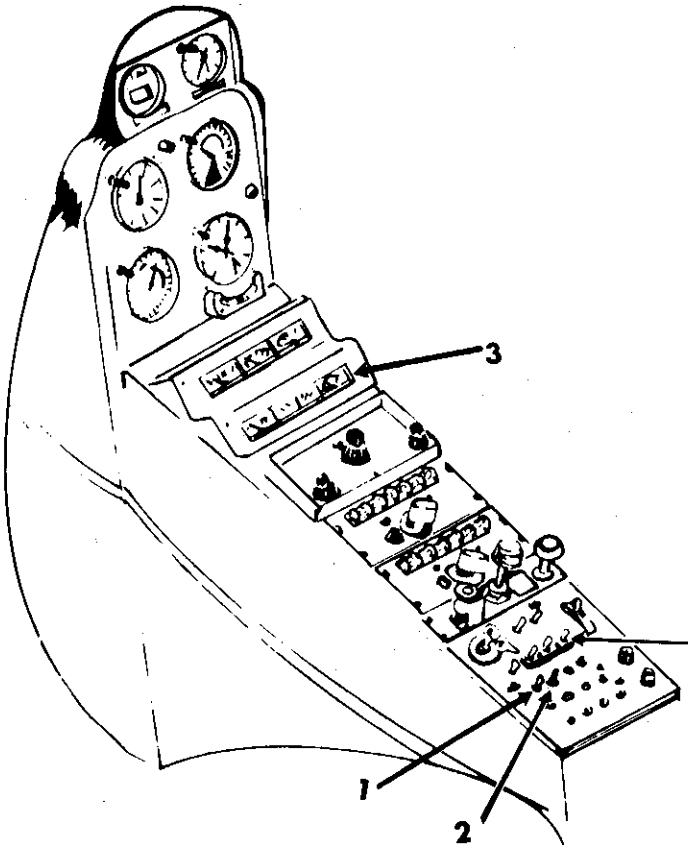
b. 2 Battery switch (master)

c. 3 Ammeter

d. 4 Panel lights switch

e. 5 Navigation lights switch

f. 6 Beacon lights (anti-collision)



(reading from left to right)

c. Continue the flight and land when convenient.
Since the TH-55 has no emergency electrical system, this is the only action that an aviator can take. Remember - an electrical failure in the TH-55 will not affect engine performance.

FRAME 7

The electrical lighting configuration is identified by the location of the lights. Identification is made by: (1) lighting systems and (2) lighting circuits within the system.

Lights within the cabin enclosure are in the interior lighting system and lights at various points of the airframe are in the exterior lighting system.

Within each system there are individual lighting circuits. These circuits each contain a control (switch) and a circuit protector (breaker or fuse). The common source of power for all these systems is from the Direct Current (DC) power source.

The circuits within each system are as follows:

Interior System	Exterior System
Circuits: 1. ~~*Cockpit map light~~ →	1. Navigation lights
2. Instrument panel and console lights	2. Anti-collision lights (beacon)
	3. Landing light

*Several TH-55 helicopters at Fort Wolters do not have the map light installed. It is connected to the navigation light c and nav. lt. must be 'on'.

STOP RETURN TO PAGE 2 FOR FRAME 8

a. 1 Alternator switch (not on later models)

b. 2 Battery switch (master)

c. 3 Ammeter

d. 4 Panel lights switch

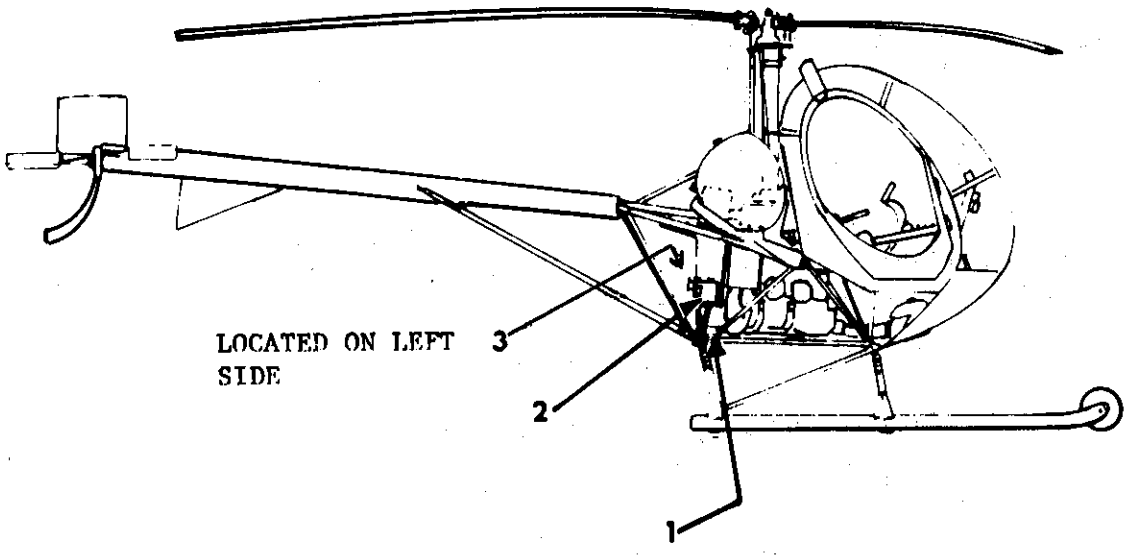
e. 5 Navigation lights switch

f. 6 Beacon lights (anti-collision)

CONTINUE TO THE SELF EVALUATION EXERCISE

TH-55 ELECTRICAL SYSTEM
SELF EVALUATION EXERCISE

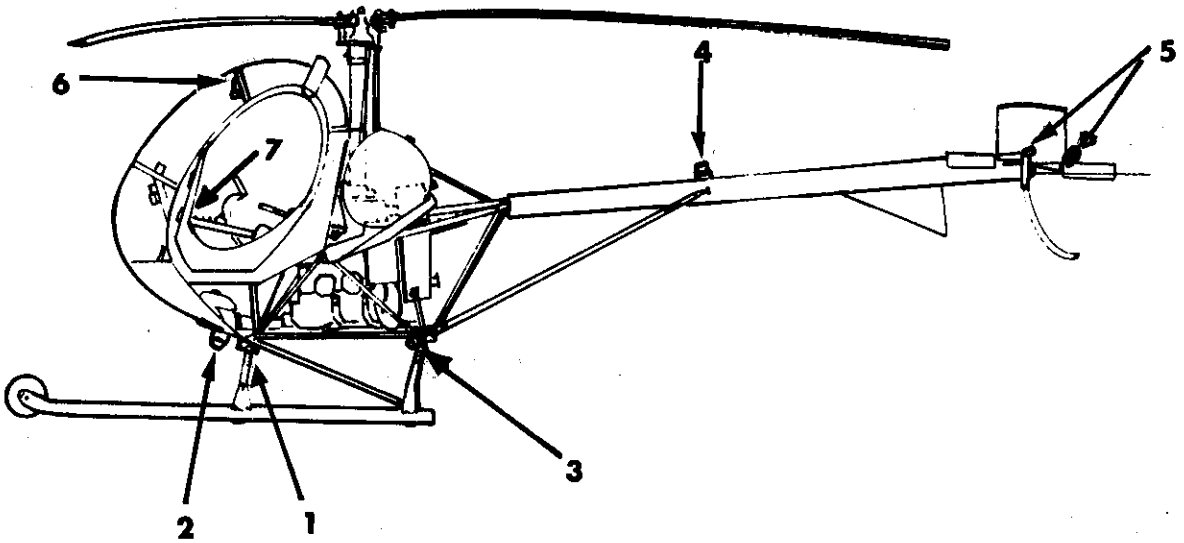
1. To determine if you know the major components of the electrical system and their location, place the numbers indicated on the sketch in the space adjacent to the appropriate nomenclature.



a. 3 Alternator

b. 2 Battery

c. 1 External Power Receptacle (APU)



2. To determine if you know the location of the main lighting points on the TH-55, place the numbers above, in the space adjacent to the appropriate nomenclature below.

   a. 2 Forward anti-collision light

   b. 1 Forward navigation light (left)

   c. 3 Landing light

   d. 4 Aft anti-collision light

   e. 5 Aft navigation light

3. Which of the following is not a function of the alternator?

   a. N Furnish power for engine starting.

   b. Y Source of power for the electrical system.

   c. Y Charge the battery.

4. By what method is alternator failure indicated on the TH-55?

   a. N Warning light

   b. N Warning buzzer

   c. Y Ammeter needle drop

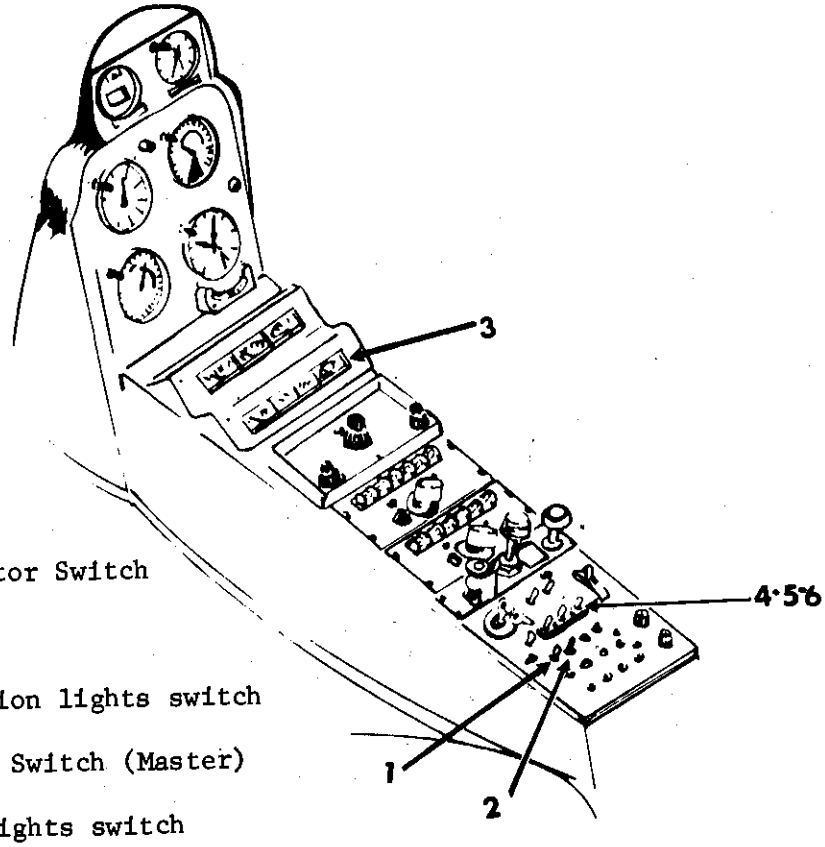
5. The TH-55 series has which of the following emergency electrical systems?

   a. ____ One

   b. ____ Two

   c. ✓ None

6. The TH-55 instrument panel and console. Match the numbers with the corresponding nomenclature listed below.



   a. 1 Alternator Switch

   b. 3 Ammeter

   c. 5 Navigation lights switch

   d. 2 Battery Switch (Master)

   e. 4 Panel lights switch

   f. 6 Beacon lights (anti-collision)

7. Which one of the following is not an emergency procedure in the event alternator failure occurs?

   a. ✓ Alternator switch in ON position.

   b. ✓ Turn off all unnecessary electrical equipment.

   c. ✓ Magneto switch OFF.

   d. ✓ Land as soon as possible.

8. During a flight at night the navigation lights fail. Make a check to indicate which of the following actions should be taken.

   a. ✓ Check circuit breaker for that lighting system.

   b. ✓ Check position of master switch.

   c. ✓ Check loadmeter reading.

9. When external power (APU) is being used on the TH-55, the master switch (battery) should be in the

   a. ✓ ON position.

   b. ____ OFF position.

10. During normal aircraft operation the electrical load is carried by the

   a. ✓ alternator.

   b. ____ magnetos.

   c. ____ starter.

   d. ____ battery.

11. Which of the following items is not a source of electrical power for the TH-55?

   a. ✓ Battery.

   b. ✓ Emergency power unit.

   c. ✓ Alternator.

   d. ✓ Auxiliary power unit.

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ELECTRICAL SYSTEM TH-55
ANSWERS TO SELF EVALUATION EXERCISE

1. 3. - Alternator

   2. - Battery

   1. - External Power Receptacle

2. 2 a. - Forward anti-collision light

   1 b. - Forward navigation light (Left)

   3 c. - Landing light

   4 d. - Aft anti-collision light

   5 e. - Aft navigation light

3. a. Furnish power for starting.

4. c. Ammeter needle drop

5. c. None

6. 1 a. - Alternator switch

   3 d. - Battery switch (master)

   5 b. - Ammeter

   2 e. - Panel light switch

   4 c. - Navigation light switch

   6 f. - Beacon light (anti-collision) switch

7. c. Magneto switch "OFF"

8. a. Check circuit breaker for that lighting system.

9. a. "ON" position

10. a. Alternator

11. b. Emergency power unit

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