VISUAL AIRCRAFT RECOGNITION

SUBCOURSE NO. IS4400

US Army Air Defense Artillery School

Fort Bliss, Texas

GENERAL

This subcourse presents procedures and techniques to visually identify both threat and friendly aircraft so that soldiers can function in an air-land battle.

Lesson 1: VISUAL AIRCRAFT RECOGNITION

TASK: This subcourse covers the following tasks:

MQS II 01-0401.00-0005, Visually Identify Threat Aircraft (officer task)

MQS II 01-0401.00-0007, Visually Identify Friendly Aircraft (officer task)

441-066-1040, Visually Identify Threat and Friendly Aircraft (SHORAD task)

441-091-1040, Visually Identify Threat Aircraft (common task)

CONDITIONS: Use only the lesson material to complete the examination.

STANDARDS: You must attain a grade of 70 percent or more on on this subcourse.

Unless otherwise stated, the masculine gender applies to both men and women.

ADMINISTRATIVE INSTRUCTIONS

SUBCOURSE CONTENT

This subcourse contains one lesson that presents an introduction to aircraft recognition methods and procedures and gives descriptions of selected aircraft for study and identification. All aircraft appearing in this subcourse are on the list of aircraft that air defense crew members must know. Also in this subcourse are the ten threat aircraft that

appear in STP 21-24, Soldier's Manual of Common Tasks, that all skill level 2 through 4 soldiers must identify.

SUPPLEMENTARY REQUIREMENTS

Prerequisite Courses

None required.

Supervisory Assistance

None required.

Reference

No supplementary references are needed for this subcourse. FM 44-30, Visual Aircraft Recognition (October 1986), is the reference to use for follow-on studies.

GRADING AND CERTIFICATION INSTRUCTIONS

INSTRUCTIONS TO THE STUDENT

This subcourse has a multiple-choice examination that covers the lesson. You must score a minimum of 70 percent on the examination to meet the objectives of the subcourse.

IPD awards three credit hours for successful completion of this subcourse.

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LESSON 1 VISUAL AIRCRAFT RECOGNITION

TASK

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Use only the lesson material to complete the examination

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You must attain a grade of 70 percent or more on the examination to receive credit for this subcourse.

REFERENCE

FM 44-30

Learning Event 1: INTRODUCTION TO VISUAL AIRCRAFT RECOGNITION

In past conflicts the US and its allies retained air superiority over most battlefields and, therefore, nearly all aircraft seen were of the friendly type. However, our enemies have since reached at least a parity in aircraft quantity and quality and we can no longer assume that we can control the airspace above all battlefields. There will be large numbers of both threat and friendly aircraft occupying the airspace above any given battlefield. This means that visual aircraft recognition is important for all members of the

ground-based combat force. We must be able to detect and identify hostile and friendly aircraft on all battlefields.

Learning Event 2: THREAT AND FRIENDLY AIRCRAFT

Threat Aircraft

Threat aircraft will consist of attack helicopters and subsonic aircraft in the forward areas near the line of contact, and ground-attack fighter-bombers in the rear areas and against convoys. In the division and corps rear areas, high performance aircraft will be used.

Friendly Aircraft

You can expect to see large numbers of attack, transport, and reconnaissance helicopters; subsonic attack aircraft; and even air-to-air fighters. In the rear areas you will see the same type aircraft, with an increase in air-to-air fighters and cargo planes. In the division and or corps rear areas, you will see air superiority aircraft and cargo planes (Figure 1).

FIGURE 1. SCENE EXAMPLE.

Learning Event 3: FACTORS AFFECTING DETECTION AND RECOGNITION OF AIRCRAFT

Two events are involved in every attempt at visual aircraft recognition. First, you must visually detect the aircraft. Second, you must inspect the aircraft to distinguish the characteristics of shape that make the aircraft recognizable as a particular aircraft.

Good Eyesight

Because detection and recognition are basically visual processes, your ability to detect and recognize an aircraft is heavily dependent upon your visual keenness. The task requires long-range detection of small objects against a variety of backgrounds, followed by an inspection of the object to distinguish recognition features. You must have good (corrected, if necessary) eyesight.

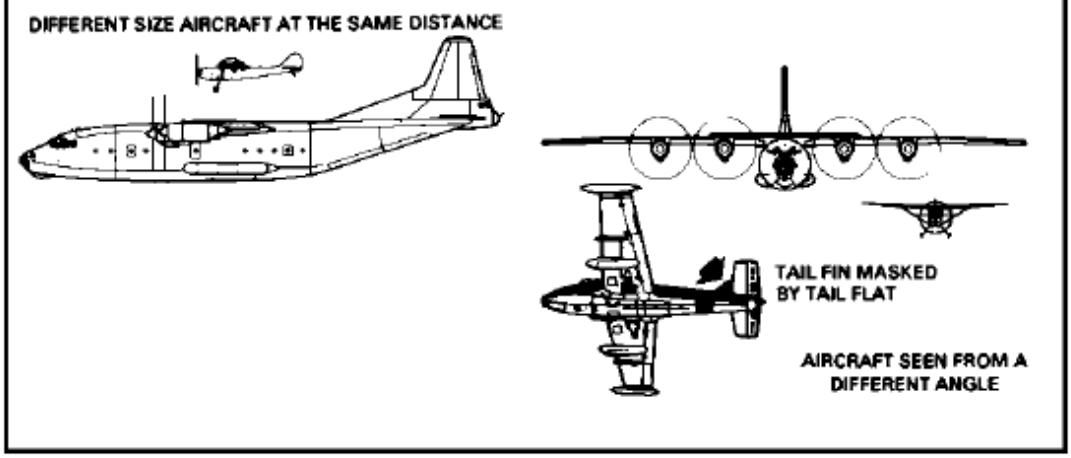
Physical Factors

Several physical factors influence your ability to detect and recognize aircraft. These include size of aircraft and viewing aspect, contrast with background, visibility conditions, terrain masking, search sector size, and alert warning.

Size of Aircraft and Viewing Aspect

The distance at which you can detect and recognize an aircraft increases with aircraft size. The size varies with the type of aircraft (large troop transports as opposed to small observation aircraft) and also as a function of the aspect from which you view the aircraft. Apparent size of the aircraft is much larger to you at broadside aspects than at incoming or outgoing aspects. The viewing aspect can also influence you by masking critical recognition features. For example, you are standing on the ground and your critical recognition feature is the vertical tail assembly, that feature might be masked by the wing structure (Figure 2).

FIGURE 2. AIRCRAFT SIZE AND VIEWING ASPECT.



Contrast with Background

Your ability to detect and recognize aircraft improves with increased contrast between the aircraft and the background (Figure 3). A black object against a white background can be visible to you at a great distance, while the same object viewed against a dark background may be visible only at a short distance. Your ability to detect and recognize an aircraft will decrease when the background is vegetation or bare mountain slopes, and will increase when the background is overcast sky (as opposed to the bright blue of sunny days). Smoke trails produced by jet aircraft are valuable aids to you in detecting at long ranges under conditions of poor contrast. Motion against the background also improves detection ability. Conversely, aircraft hovering or moving at low speeds are difficult to detect.

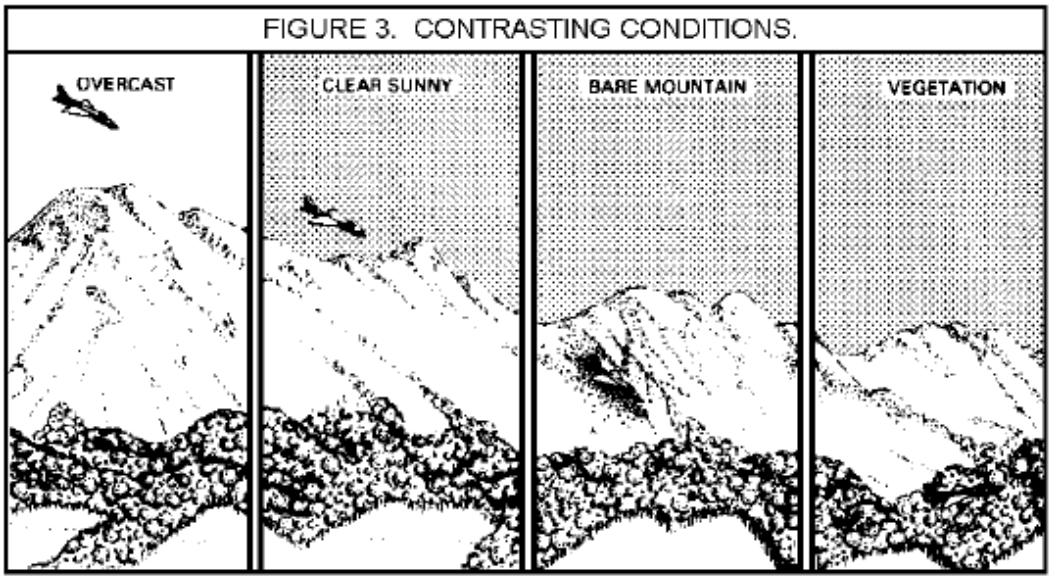
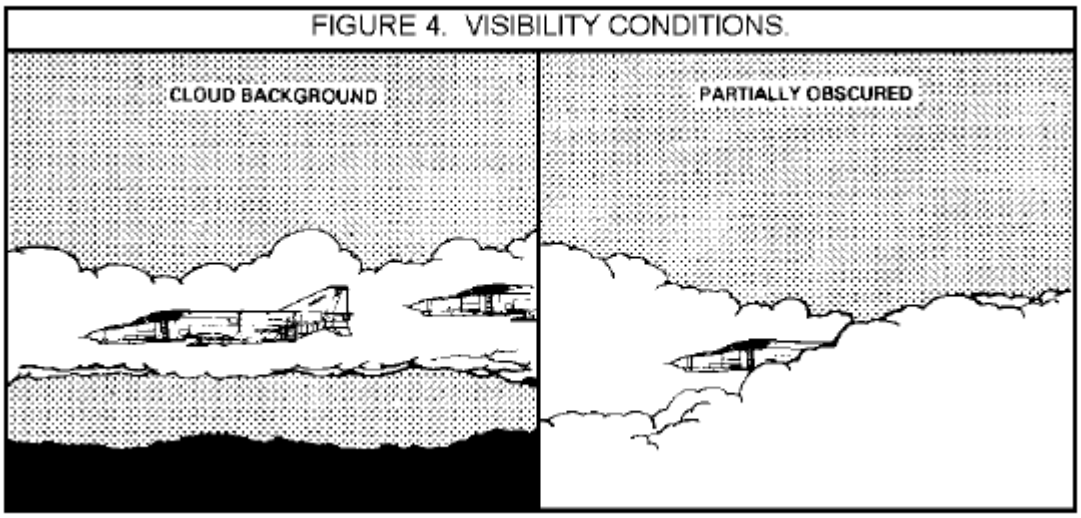


FIGURE 3. CONTRASTING CONDITIONS.

Visibility Conditions

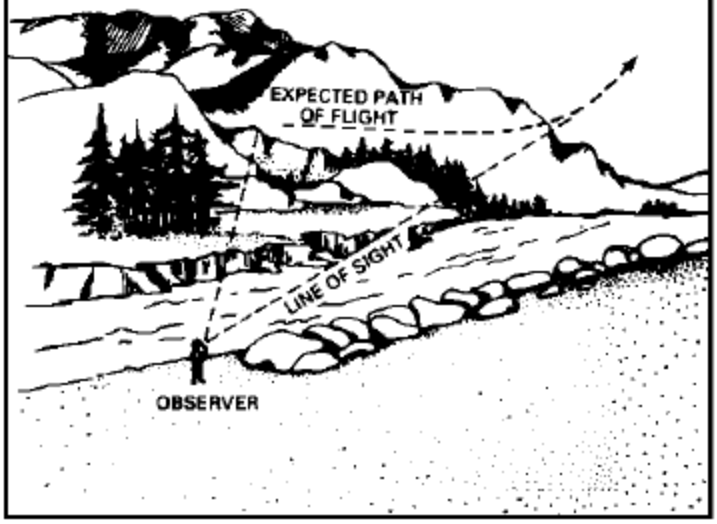
An aircraft may be visible to you at a long distance in a clear atmosphere, while dust, fog, haze, rain, or snow may reduce your detection range to a short or, in extreme cases, zero distance (Figure 4).



Terrain Masking

Terrain features such as mountains, hills, vegetation, and other natural or man-made objects mask an aircraft from view and limit your aircraft detection and recognition ranges. You can expect an enemy to plan his flight path to take advantage of terrain masking to avoid visual observation. You should consider terrain masking when selecting an observer position. Choose a position that has a clear line of sight along expected flight paths (Figure 5).

FIGURE 5. A CLEAR LINE OF SIGHT.



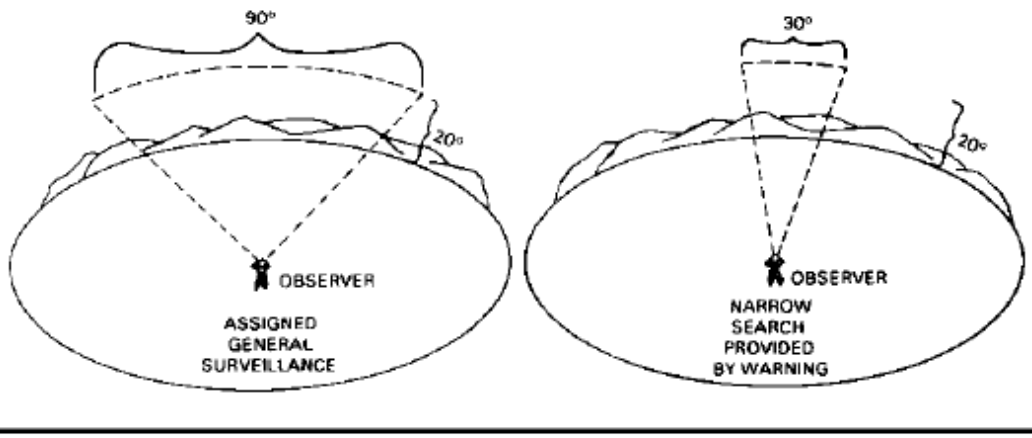
Aids in Aircraft Recognition

Binoculars are a positive aid in aircraft recognition. By magnifying an aircraft image, they aid you in distinguishing features at long distances. In contrast, if you use binoculars to search for aircraft, you reduce detection range because of the binoculars' limited field of view. Adjust the binoculars for your use and prefocus at the range the binoculars will be used (where targets are expected to appear). Keep the binoculars readily available and uncased for immediate use. When you detect an aircraft, keep your eyes on it and carefully raise the binoculars to your eyes. Because of the binocular's narrow field of view, you may lose the target with a jerky movement.

Search Sector and Alert Warning

Your ability to detect and recognize aircraft increases as the size of your assigned search area decreases. Detection is more likely if you are assigned responsibility for searching a narrow sector as opposed to searching the entire area surrounding your position. If you are being supported by an aircraft alert warning system, a fairly large sector of about 90 degrees may be assigned for general surveillance. When a warning is received, narrow your search sector to 30 degrees and center the search on the aircraft's approach azimuth. When you use the horizon as a reference, do not concentrate your search too near the horizon or you will miss detecting an aircraft at a higher altitude. Define your search sector in both vertical and horizontal planes (Figure 6).

FIGURE 6. SECTOR SURVEILLANCE.



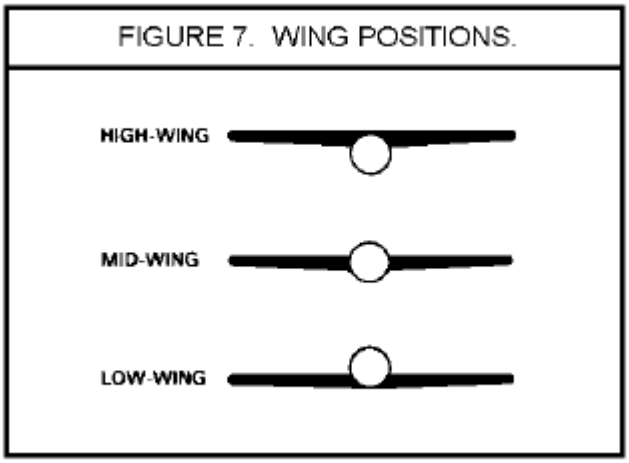
Learning Event 4: AIRCRAFT RECOGNITION FEATURES

All aircraft have the same basic parts: wings to give lift, engine(s) to give motive power, a fuselage to carry the payload and aircraft controls, and a tail assembly that usually controls the direction of flight. The WEFT (Wings, Engine(s), Fuselage, Tail) method is used to describe the basic aircraft parts. The size, shape, number, and position of these parts are different. These differences distinguish one aircraft type from another.

Wings

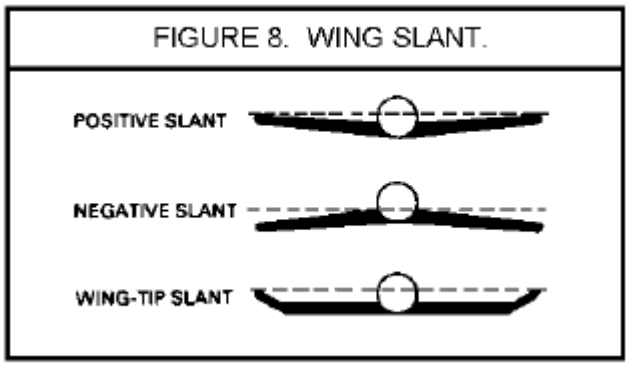
Features of wings that are useful to you in aircraft identification are the location and shape (slant, taper, and wingtip).

Location. The usual wing positions for fixed-wing aircraft are shown in Figure 7.



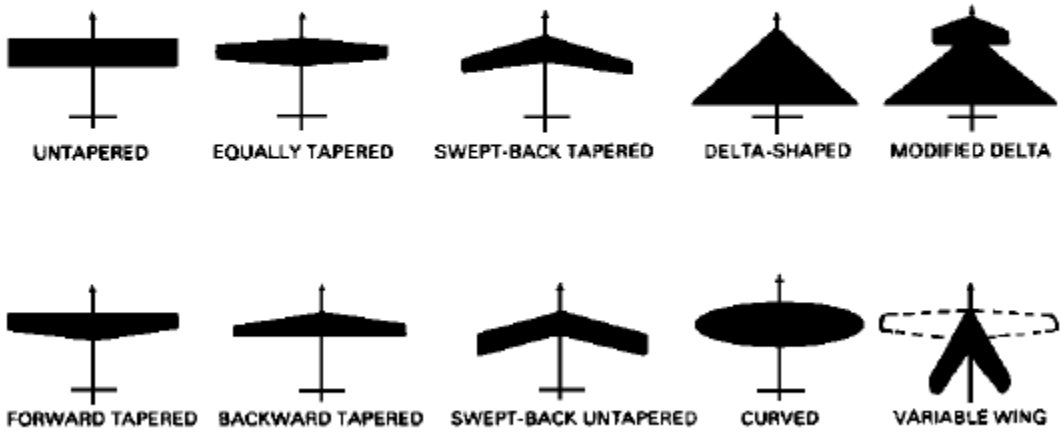
Shape. Wing shapes are different and are classified by their dihedral (slant), taper (diminishing width), and wingtip shape. A wing may have any of the following combinations of slant, taper, or wing-tip shape:

- Slant. The vertical angle of the wing with respect to a horizontal line drawn through the fuselage is the wing slant (Figure 8).



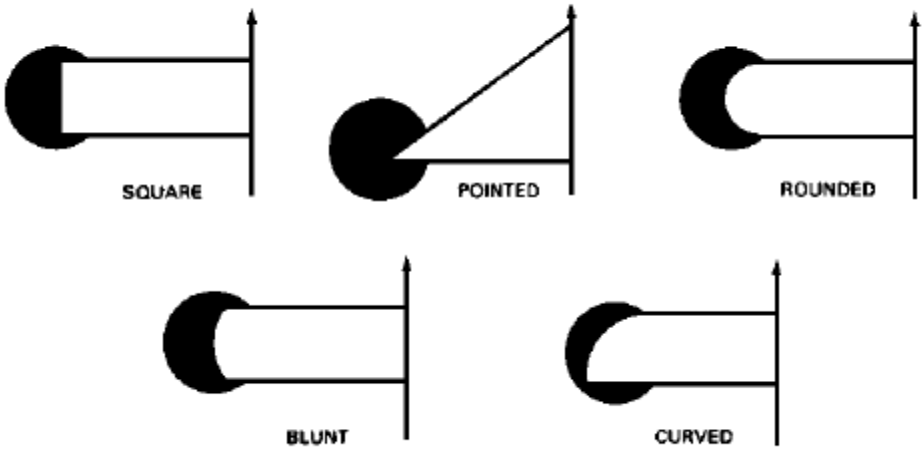
- Taper. Aircraft may have the leading, the trailing, or both edges of the wing tapered, or the wing may be untapered (Figure 9).

FIGURE 9. WING TAPER.



- Wing-tip Shape. The manner in which the leading and trailing edge meet determines the wing-tip shape (Figure 10).

FIGURE 10. WING-TIP SHAPE.

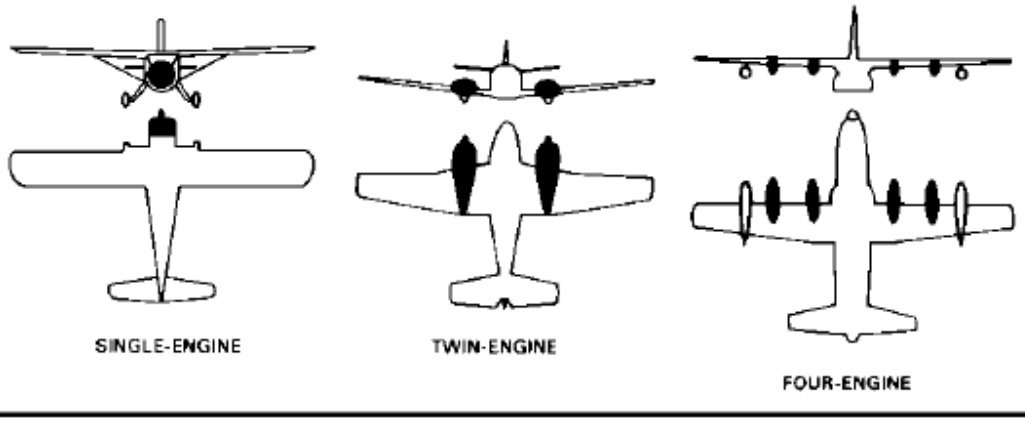


Engines

Engine types, numbers, and locations and air intake number, shape, and location help you identify a particular aircraft.

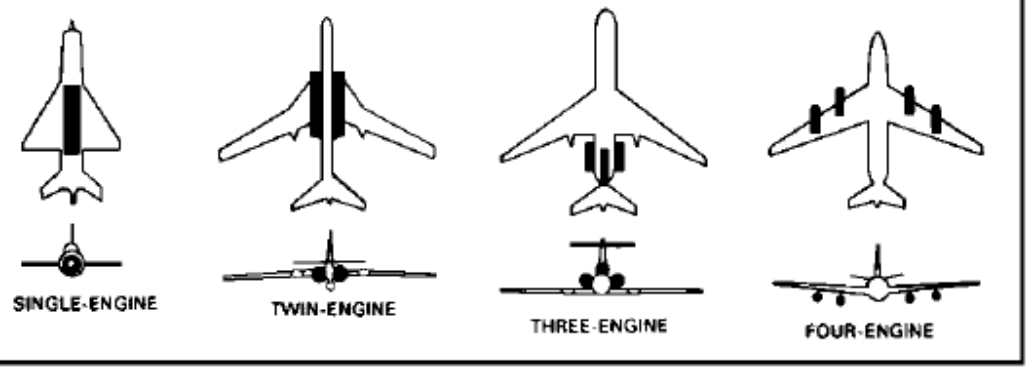
Propeller Aircraft. Figure 11 shows you examples of propeller-driven aircraft.

FIGURE 11. PROPELLER-DRIVEN AIRCRAFT.



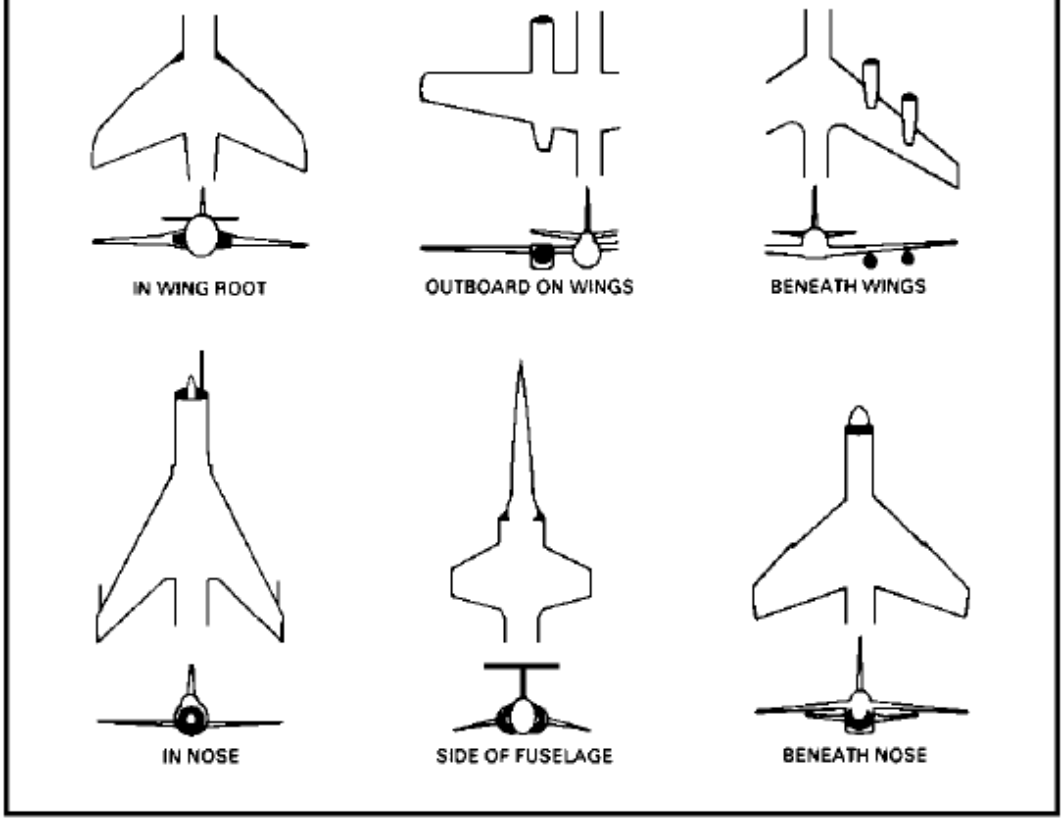
Jet Aircraft. Figure 12 illustrates examples of jet-engined aircraft.

FIGURE 12. JET-ENGINED AIRCRAFT.



Intake Location. Figure 13 shows example air intake locations for jet aircraft.

FIGURE 13. AIR INTAKE LOCATIONS.

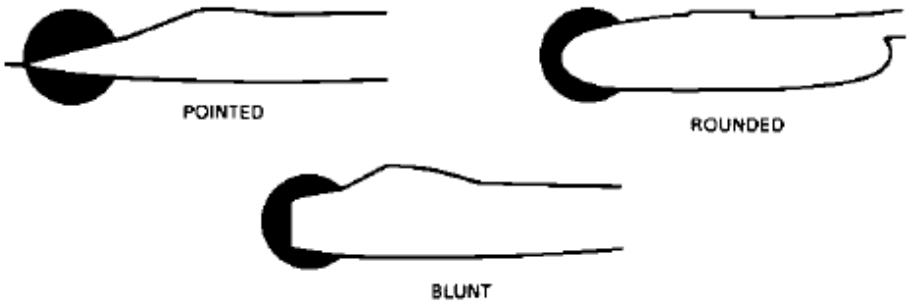


Fuselage

The fuselage (body) of an aircraft is made up of three separate and distinct sections. They are the nose, mid, and rear section. The canopy, cabin, or cockpit is also discussed when describing a fuselage.

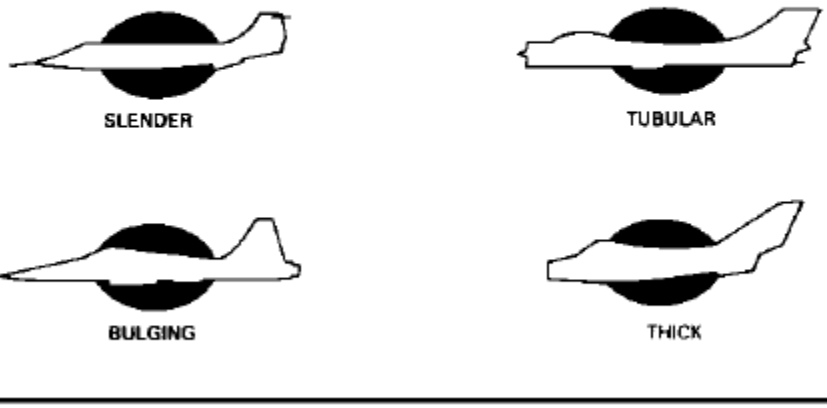
Nose Section. The front or forward portion of an aircraft fuselage is the nose section. The nose of an aircraft is classified by its shape (Figure 14).

FIGURE 14. NOSE SECTION SHAPES.



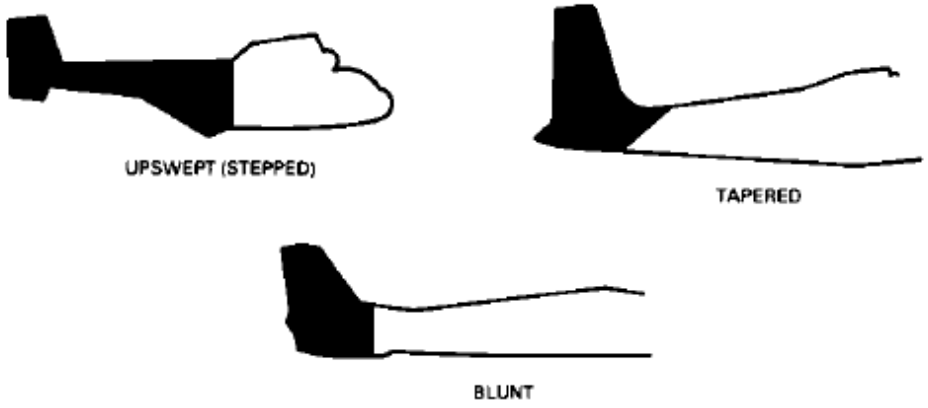
Midsection. The center section of an aircraft is the midsection. Some examples of midsection shapes are shown in Figure 15.

FIGURE 15. MIDSECTION SHAPES.



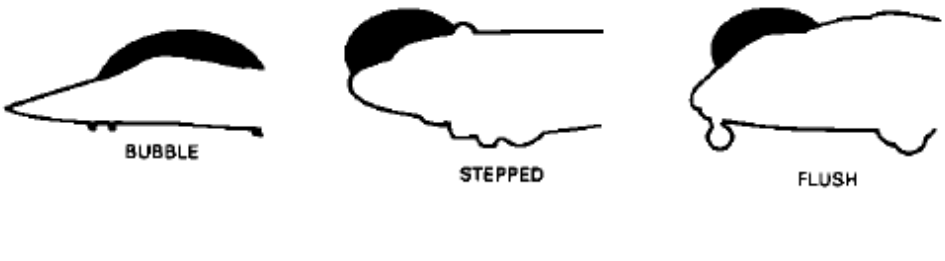
Rear Section. Rear sections are classified by the shapes shown in Figure 16.

FIGURE 16. REAR SECTION SHAPES.



Canopy, Cabin, Cockpit. The cockpit (cabin) is the compartment in an aircraft for the pilot and or other persons. The cover of the cockpit or cabin is the canopy. Figure 17 shows examples of cockpits or cabins.

FIGURE 17. COCKPIT SHAPES.

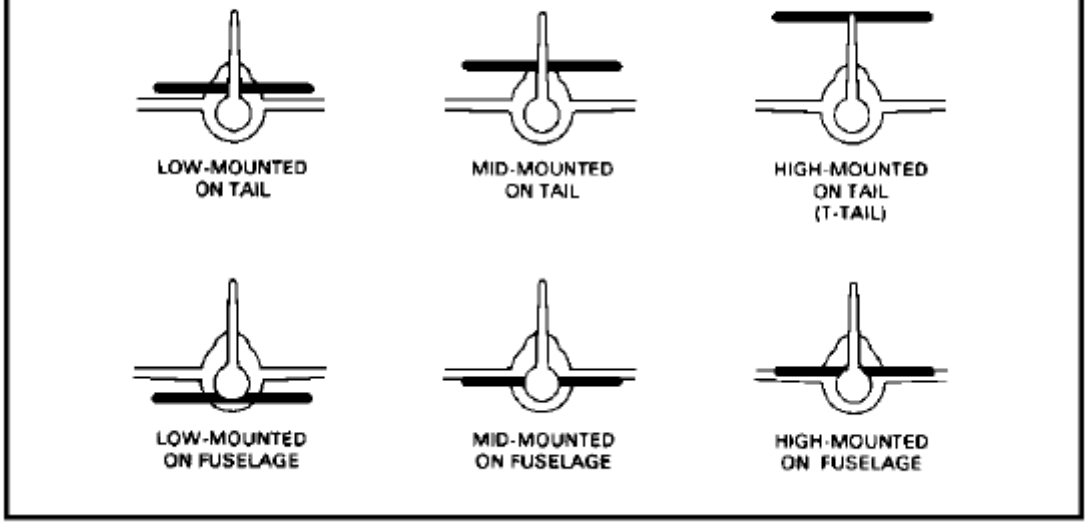


Tail

Recognition features of the tail section on an aircraft are the tail flats (horizontal piece) and tail fin (vertical piece). The description of the tail section is nearly identical to the description of wings.

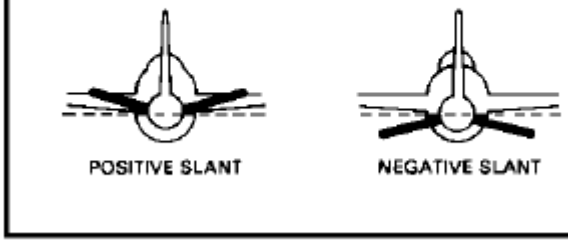
Tail Flat Position. Position of the tail flat in relation to the tail fin or fuselage is an aid in aircraft recognition. Example tail flat positions are shown in Figure 18.

FIGURE 18. TAIL FLAT POSITIONS.



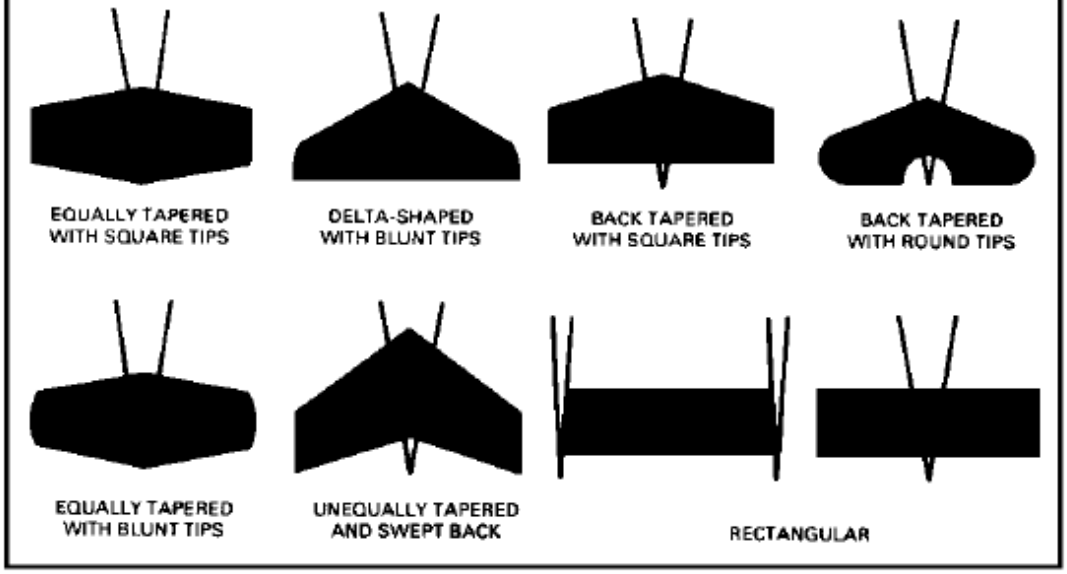
Tail Flat Slant. The vertical angle of the tail flat, with respect to a horizontal line drawn through the fuselage, is tail flat slant (Figure 19).

FIGURE 19. TAIL FLAT SLANT.



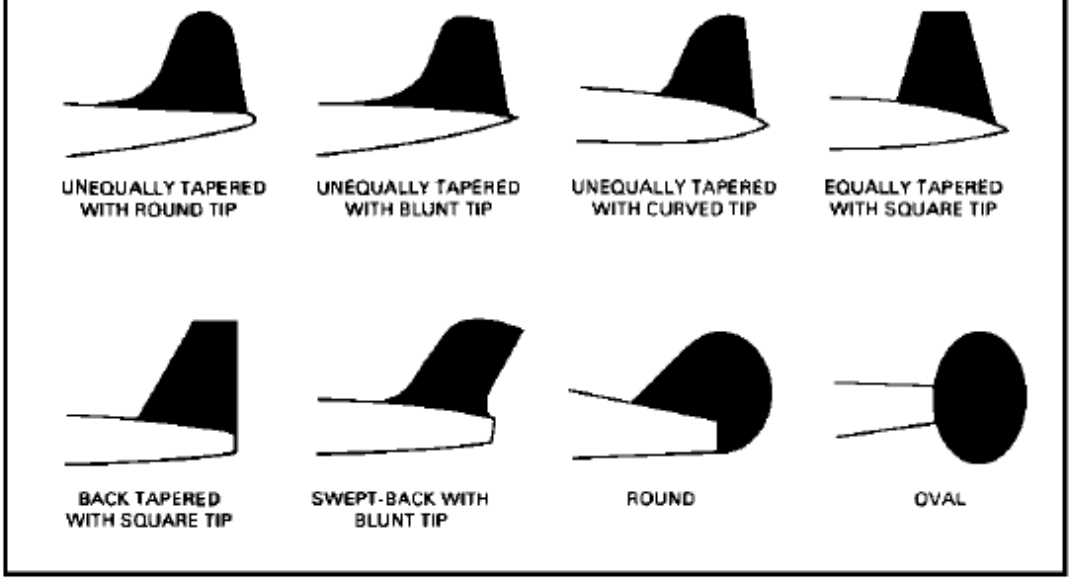
Tail Flat Shape. Tail flats usually consist of only one element and are classified like wings. Figure 20 shows some examples.

FIGURE 20. TAIL FLAT SHAPES.



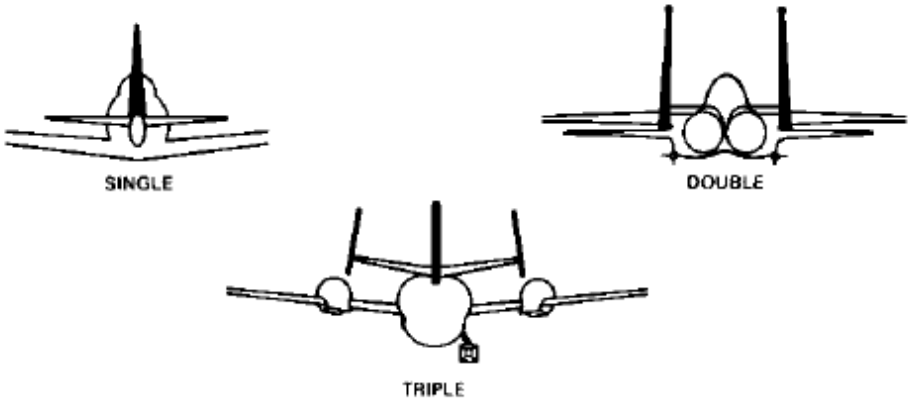
Tail Fin Shape. There are many fin shapes. Some of the common fin shapes are shown in Figure 21.

FIGURE 21. TAIL FIN SHAPES.



Number of Fins. Figure 22 shows the fin combinations that you will most likely see on combat aircraft.

FIGURE 22. FIN COMBINATIONS.



Learning Event 5: NAMES AND NUMERICAL DESIGNATIONS OF AIRCRAFT

All countries, whether or not they manufacture aircraft, have their own system for naming and numbering aircraft. The United States and the Soviet Union's systems are shown here as examples.

United States

No standard system is used for naming US aircraft. Some aircraft, like the F-111, are not named. Some helicopters have been named for Indian tribes: Apache, Iroquois, and Kiowa are examples. Some fixed-wing aircraft have the same name as famous aircraft of yesteryear, such as the Corsair and Thunderbolt. US aircraft use a letter-number designation which indicates the aircraft role and a series number as shown in Figure 23.

FIGURE 23. US AIRCRAFT DESIGNATIONS.

PREFIX	MEANING
A	ATTACK
B	BOMBER
C	CARGO
E	ELECTRONIC (Countermeasure)
F	FIGHTER
H	HELICOPTER
K	TANKER
O	OBSERVATION
P	PATROL
R	RECONNAISSANCE
S	STRATEGIC; SCOUT; SUBMARINE HUNTER
T	TRAINER
U	UTILITY
V	VERTICAL (Take Off and Landing)
X	EXPERIMENTAL
Y	PROTOTYPE

DESIG	TYPE OF AIRCRAFT
A-10	ATTACK
F-15	FIGHTER
B-1	BOMBER
KC-135	TANKER VERSION OF CARGO
KA-3	TANKER VERSION OF ATTACK
EA-6	ELECTRONIC WARFARE VERSION OF ATTACK
AV-8	VERTICAL TAKE OFF VERSION OF ATTACK
P-2	PATROL
RF-4	RECONNAISSANCE VERSION OF FIGHTER
SR-71	STRATEGIC RECONNAISSANCE
OA-37	OBSERVATION VERSION OF ATTACK
UH-1	UTILITY HELICOPTER
AH-1	ATTACK HELICOPTER
CH-47	CARGO HELICOPTER
RB-57	RECONNAISSANCE VERSION OF BOMBER
EF-111A	ELECTRONIC WARFARE FIGHTER-BOMBER
T-38	TRAINER
AT-28	ATTACK VERSION OF A TRAINER

Soviet Union

Soviet aircraft names are based on a system used by NATO countries. Examples of NATO names are Flogger, Cub, Hind, and Badger. The initial letter in the name indicates the aircraft's role; for example, F for fighter, C for cargo, H for helicopter, and B for bomber. Soviet aircraft are letter designated for people who designed and or manufactured the aircraft. An example is Su-24 Fencer. The Su is for P. O. Sukhoi who headed the team that designed the aircraft. Sample designations and names for Soviet aircraft are at Figure 24.

FIGURE 24. SOVIET AIRCRAFT AND DESIGNATIONS.

DESIGNER/MANUFACTURER	TYPE AIRCRAFT
ANTONOV (An)	CARGO ONLY
BERIEV (Be)	SEAPLANES ONLY
ILYUSHIN (Il)	CARGO MOSTLY, ONE BOMBER, ONE RECON
KAMOV (Ka)	HELICOPTERS
MIL (Mi)	HELICOPTERS
MIKOYAN GUREVICH (MiG)	FIGHTERS
SUKHOI (Su)	FIGHTERS
TUPOLEV (Tu)	BOMBERS, RECON, CARGO, ONE FIGHTER
YAKOVLEV (Yak)	BOMBERS, RECON, CARGO, FIGHTERS

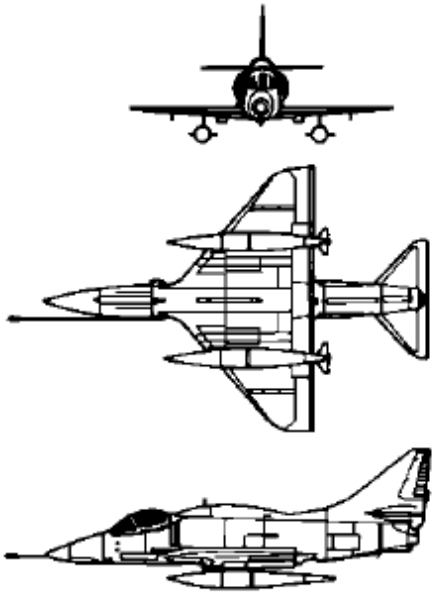
SOVIET DESIG.	DESIGNER/MANUFACTURER	NATO NAME
An-2	ANTONOV	COLT
Il-14	ILYUSHIN	CRATE
Mi-8	MIL	HIP
MiG-27	MIKOYAN-GUREVICH	FLOGGER D
Su-7	SUKHOI	FITTER
Tu-22	TUPOLEV	BLINDER
Yak-28	YAKOVLEV	BREWER

Learning Event 6: LINE DRAWINGS, GENERAL DATA, AND WEFT DESCRIPTIONS

You can expect to see large numbers of ground-attack, fighter-bomber, fixed-wing aircraft along with attack, assault, and troop transport helicopters engaged in a variety of missions in the forward area. Also, reconnaissance, interdiction, and strike flights at low altitudes will pass over the battle area. The following examples give you line drawings, general data, and WEFT descriptions of aircraft, both threat and friendly, that will most likely be seen over a battle area.

EXTRACTS OF FM 44-30

A-4 SKYHAWK (McDONNELL DOUGLAS)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. None.

Crew. One; trainer — two.

Role. Attack, close air support.

Armament. Bombs, rockets, missiles, gun pods, two cannon.

Dimensions. Length 40 feet, span 27 feet.

WEFT DESCRIPTION

Wings. Low-mounted, delta-shaped with curved tips.

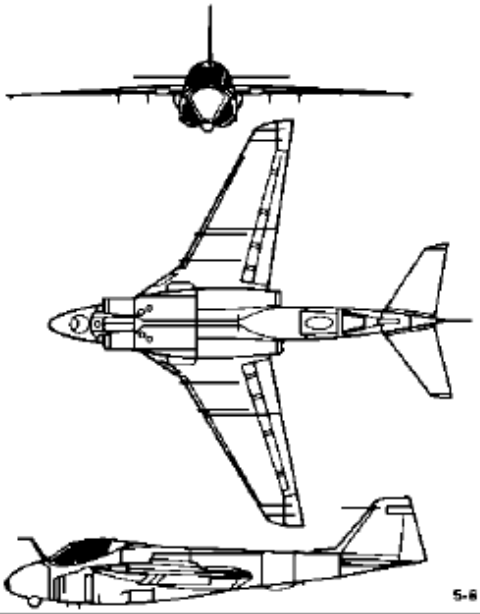
Engine(s). Single turbojet inside body. Air intakes semi-circular and mounted on the body above and extending forward of wings' leading edges.

Fuselage. Barrel-shaped with solid, pointed nose. Dorsal spine. Body widens at air intakes and tapers to the rear. Bubble canopy. (Some versions have an extended nose and dorsal hump.)

Tail. Delta-shaped tail flats with curved tips mounted low on a swept-back and tapered tail fin. Fin has a curved fairing in the leading edge and a square tip.

5-2

A-6 INTRUDER (GRUMMAN)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. Hunter.

Crew. Two. EA-6B Prowler — four.

Role. Marine/naval all-weather attack bomber. Also tanker and ECM versions.

Armament. Bombs, missiles.

Dimensions. Length 54 feet, span 53 feet.

WEFT DESCRIPTION

Wings. Mid-mounted, swept-back, and tapered with blunt tips.

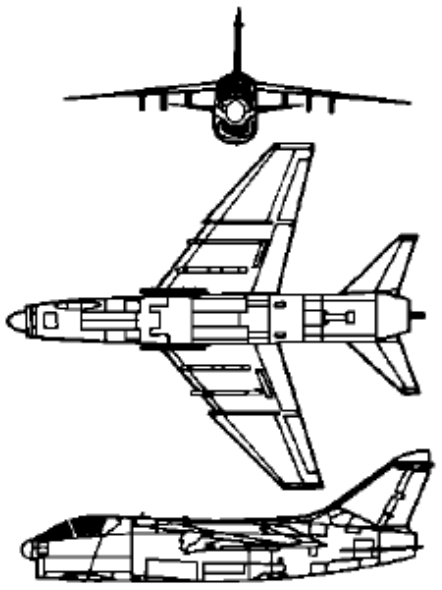
Engine(s). Two turbojets, mounted on body midsection. Semicircular air intakes below and forward of the wing roots. Exhausts in the trailing edges of the wing roots.

Fuselage. Teardrop-shaped with rounded nose. Body tapers to the rear section. Bubble cockpit.

Tail. Unequally tapered tail fin with square tip and small, stepped fairing in the leading edge. Swept-back, tapered tail flats high-mounted on the fuselage with blunt tips.

5-6

A-7 CORSAIR II (VOUGHT)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. F-8 Crusader, not in this manual.

Crew. One; TA-7H and A-7K — two.

Role. Attack, close air support.

Armament. Bombs, rockets, missiles, cannon, gun pods.

Dimensions. Length 46 feet, span 39 feet.

WEFT DESCRIPTION

Wings. High-mounted, swept-back, and tapered with blunt tips and a slight negative slant. Sawtooth in each leading edge.

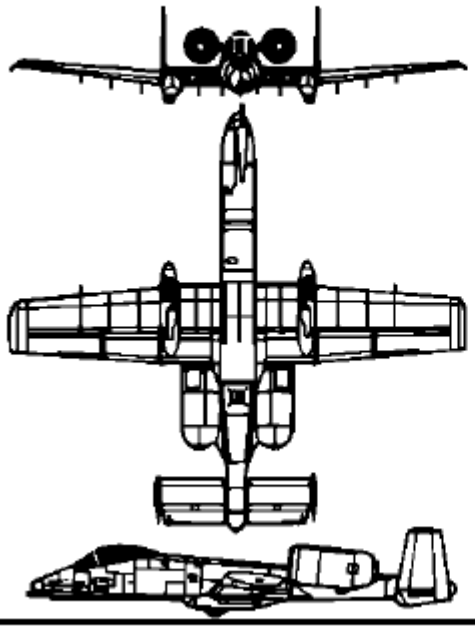
Engine(s). One turbofan inside body, one air intake under a round nose. One exhaust in rear.

Fuselage. Long, thick body with rounded nose and blunt tail section. Bubble cockpit is far forward on the nose.

Tail. Flats mid-mounted on the body, swept-back, and tapered with blunt tips and slight positive slant. The fin is swept-back with a curved fairing and tip.

5-8

A-10A THUNDERBOLT II (FAIRCHILD REPUBLIC)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. None.

Crew. One.

Role. Close air support, ground attack.

Armament. 30-mm cannon, bombs, rockets, HELLFIRE missiles, gun pods.

Dimensions. Length 53 feet, span 58 feet.

WEFT DESCRIPTION

Wings. Wings are low-mounted on the fuselage, unequally tapered, with blunt curled-under tips. Landing gear pods extend forward of the wings' leading edges.

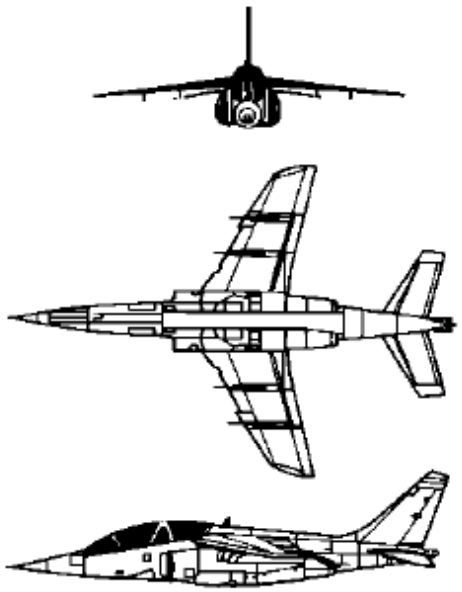
Engine(s). Two turbofan engines in pods, high on the rear of the body between the wings and the tail section.

Fuselage. Rounded nose, tapered rear, bubble canopy. Protrusion in nose is the 30-mm GAU-8 cannon.

Tail. Two tail fins on tips of rectangular tail flat, unequally tapered fins extend above and below the tail flat. Flat is low-mounted on fuselage.

5-12

ALPHA JET (DASSAULT-BREGUET, DORNIER)



GENERAL DATA

Country of Origin. France, West Germany.

Similar Aircraft. Hawk.

Crew. Two.

Role. Light attack, advanced trainer.

Armament. Gun pods, bombs, rockets, missiles.

Dimensions. Length 40 feet, span 30 feet.

WEFT DESCRIPTION

Wings. High-mounted, swept-back, and tapered with curved tips, slight negative slant.

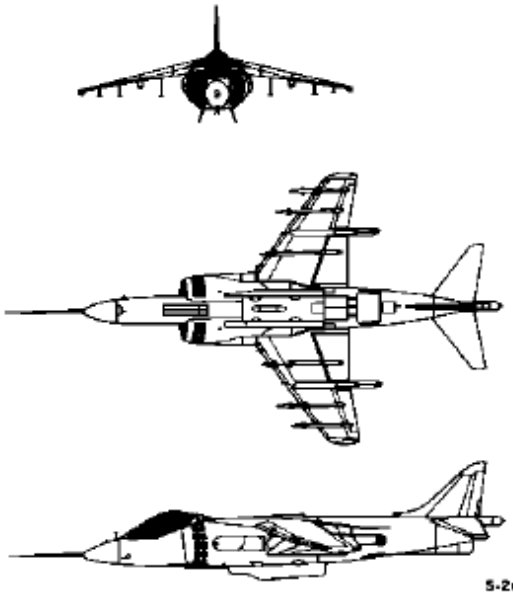
Engine(s). Two alongside body under the wings, oval-shaped air intakes forward of the wings' leading edges. Exhausts at rear of wings' trailing edges.

Fuselage. Slender, pointed nose and tail. Two-seat bubble cockpit.

Tail. Swept-back and tapered tail fin with squared tip. Swept-back and tapered tail flats mid-mounted on body with negative slant and square tips.

5-16

AV-8 HARRIER (McDONNELL DOUGLAS, BAe)



GENERAL DATA

Country of Origin. USA, UK.

Similar Aircraft. Yak-36 Forger.

Crew. One.

Role. VSTOL fighter, close air support.

Armament. Cannons, missiles, bombs, rockets, gun pods.

Dimensions. Length 46 feet, span 30 feet.

WEFT DESCRIPTION

Wings. High-mounted, swept-back, and tapered, negative slant and curved tips.

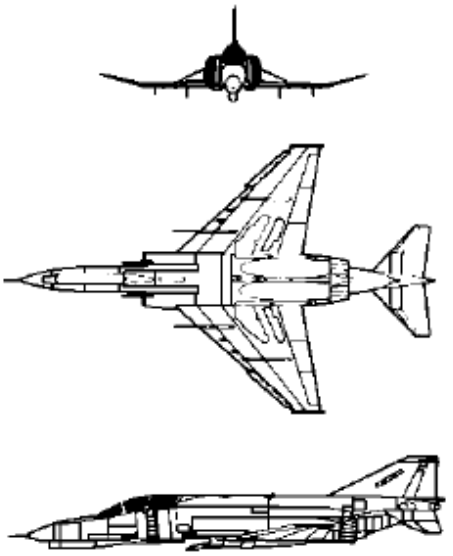
Engine(s). One vectored thrust turbofan mounted in the body. Large, semicircular air intakes that give the body a rounded appearance from the head-on view.

Fuselage. Thick, rounded, tapering to a slender tail. Pointed nose, stepped canopy.

Tail. Fin swept-back and tapered with curved tip. Small step in leading edge. Tail flats high-mounted on fuselage with negative slant, blunt tips. Pointed rear tail cone.

5-20

F-4 PHANTOM (McDONNELL DOUGLAS)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. Jaguar.

Crew. Two.

Role. Fighter-bomber, close support, reconnaissance, and ECM.

Armament. Cannons, rockets, missile, bombs.

Dimensions. Length 63 feet, span 38 feet.

WEFT DESCRIPTION

Wings. Low-mounted, swept-back, semidelta wings with square tips that have positive slant to the wing tips. There is a sawtooth in each leading edge.

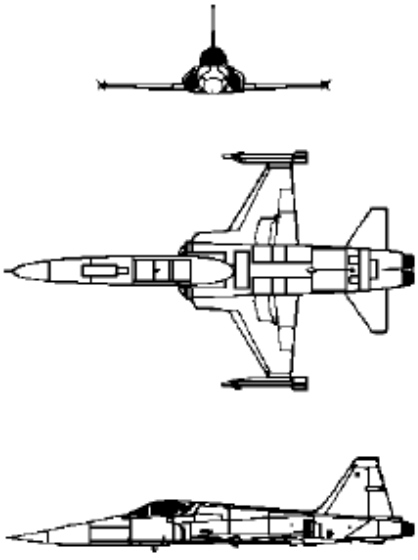
Engine(s). Two engines inside body with two rectangular air intakes alongside the body in front of the wings. Twin exhausts beneath an overhanging rear section.

Fuselage. Rectangular midsection, pointed droopy nose, and a bubble cockpit.

Tail. Tail flats mid-mounted on the body, delta-shaped with negative slant. Sharply back-tapered tail fin with a straight trailing edge and square tip.

6-30

F-5 FREEDOM FIGHTER, TIGER II (NORTHROP)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. F-104 Starfighter, F-20 Tigershark.

Crew. One, F-5F — two, T-38 Talon — two.

Role. Fighter-bomber, close air support.

Armament. Cannons, rockets, bombs.

Dimensions. Length 48 feet, span 27 feet.

WEFT DESCRIPTION

Wings. Low-mounted, stubby, and unequally tapered with square tips.

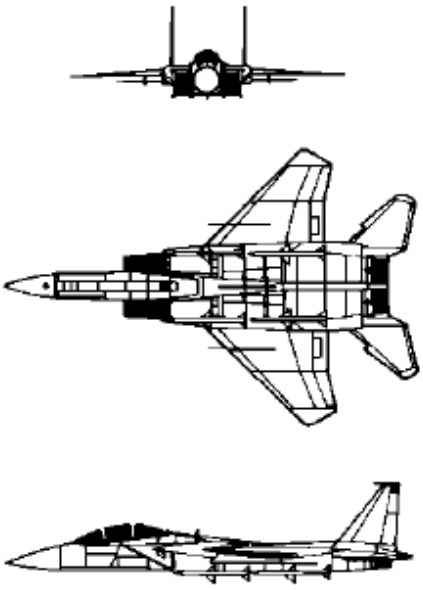
Engine(s). Two engines inside body, air intakes forward of the wing roots, and shotgun exhausts.

Fuselage. Bullet-shaped, long, drooping, pointed nose. Bottom is flat from the air intakes to the dual exhausts. Bubble cockpit.

Tail. Flats are low-mounted, swept-back, and tapered, with straight trailing edges and square tips. Fin is large and unequally tapered with a square tip.

5-34

F-15 EAGLE (McDONNELL DOUGLAS)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. F-14 Tomcat, Su-24 Fencer, Tornado.

Crew. One; trainer — two.

Role. Air-superiority fighter, ground attack.

Armament. Cannon, missiles, bombs.

Dimensions. Length 64 feet, span 43 feet.

WEFT DESCRIPTION

Wings. High-mounted, semidelta with angular blunt tips.

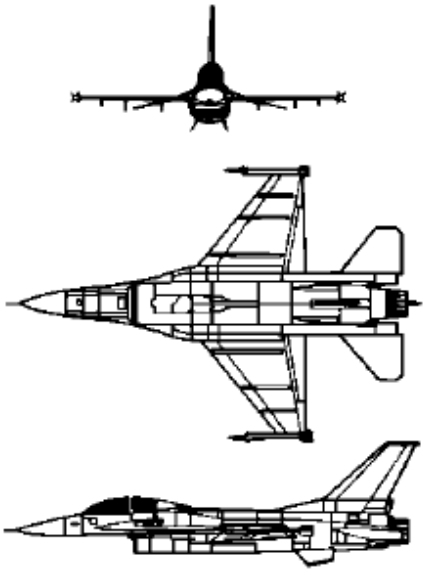
Engine(s). Two mounted in rear. Diagonal-shaped, box-like air intakes alongside fuselage. Dual exhausts.

Fuselage. Long pointed nose and a bubble cockpit. Box-like large center section that tapers to the rear.

Tail. Two tail fins with tapered leading edges and straight trailing edges with square tips. Tail flats mid-mounted on the fuselage and swept-back, tapered with angular, blunt tips, and large sawtooth in leading edge.

5-40

F-16 FIGHTING FALCON (GENERAL DYNAMICS)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. F/A-18 Hornet, MiG-29 Fulcrum.

Crew. One; F-16B — two.

Role. Multirole (ground attack/fighter).

Armament. Cannon, missiles, bombs.

Dimensions. Length 48 feet, span 31 feet.

WEFT DESCRIPTION

Wings. Mid-mounted, semidelta-shaped with square tips.

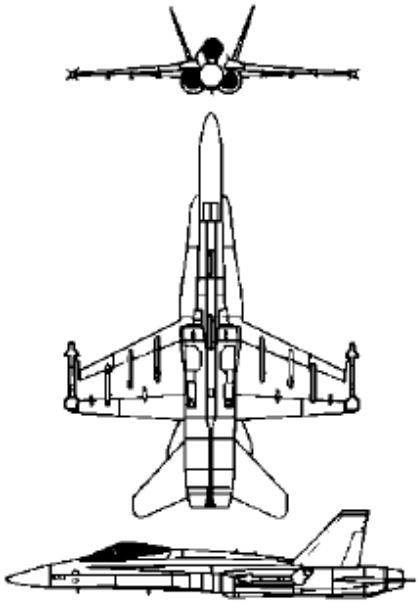
Engine(s). One in body. Oval air intake under the center of the fuselage. Single exhaust.

Fuselage. Long, slender body, widens at air intake. Pointed nose. Bubble cockpit.

Tail. Swept-back tail fin with square tip. Tail flats mid-mounted on the fuselage, delta-shaped, square tips with slight negative slant. Two belly fins.

5-44

F/A-18 HORNET (McDONNELL DOUGLAS)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. F-16 Fighting Falcon, MiG-29 Fulcrum.

Crew. One; TF/A-18 — two.

Role. Marine/naval fighter, strike.

Armament. Cannon, bombs, missiles, rockets.

Dimensions. Length 56 feet, span 38 feet.

WEFT DESCRIPTION

Wings. High-mounted, semidelta-type with prominent fairing (leading-edge extension [LEX]) on side of fuselage from wing to front of cockpit. Square tips (usually with missiles).

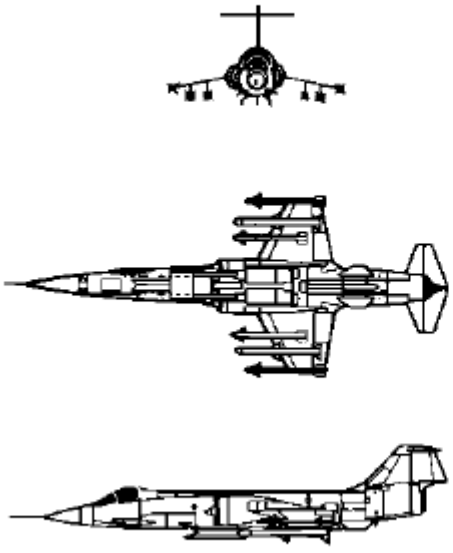
Engine(s). Two turbofans mounted in aircraft rear section. Oval air intakes under the wings.

Fuselage. Barrel-shaped with solid, pointed nose. Aircraft widens at the air intakes and tapers to the rear. Bubble cockpit.

Tail. Swept-back and tapered tail flats mid-mounted on the body. Twin, swept-back, and tapered tail fins mounted well forward on the fuselage. Fins have an outward tilt.

5-48

F-104 STARFIGHTER (LOCKHEED)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. F-5 Freedom Fighter, F-20 Tigershark.

Crew. One.

Role. All-weather tactical strike, fighter, reconnaissance.

Armament. Cannon, bombs, missiles.

Dimensions. Length 55 feet, span 22 feet.

WEFT DESCRIPTION

Wings. Mid-mounted, equally tapered, and stubby with square tips (missiles or tip tanks).

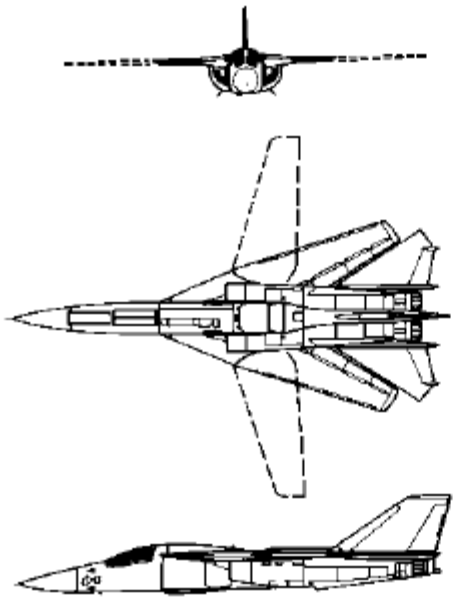
Engine(s). One turbojet in midsection of body. Semicircular air intakes forward of the wings' leading edges.

Fuselage. Long and slender, thickens at air intakes. Sharp pointed nose. Bubble cockpit.

Tail. Unequally tapered tail fin. Approximately one-third of the fin overhangs the exhaust. Tail flats equally tapered with square tips mounted high on the tail fin forming a **T**.

5-58

F-111 (GENERAL DYNAMICS)



5-60

GENERAL DATA

Country of Origin. USA.

Similar Aircraft. MiG-27 Flogger D, Su-24 Fencer, Tornado.

Crew. Two.

Role. All-weather strike, attack, bomber.

Armament. Cannon, bombs, missiles (SRAMs, ALCMs)

Dimensions. Length 74 feet, span 63 feet.

WEFT DESCRIPTION

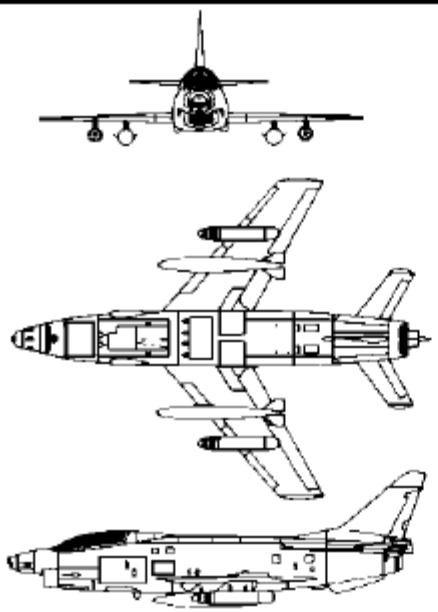
Wings. High-mounted, variable, swept-back, tapered, blunt tips (wing span changes in flight).

Engine(s). Two jet engines mounted inside rear section of body. Air intakes are one-quarter pie-shaped under the wings, giving the aircraft a rounded appearance when viewed head-on. Twin exhausts.

Fuselage. Long, sharp, pointed nosed-body widens at air intakes and continues through rear section. Stepped-up cockpit forward of the wing roots.

Tail. Large, swept-back tail fin covering one-third of the body, square tip. Swept-back flats with square tips high on the fuselage. Tail fin splits the dual exhaust.

G.91Y (AERITALIA)



5-66

GENERAL DATA

Country of Origin. Italy.

Similar Aircraft. G.91, F-100 Super Sabre.

Crew. One; G.91T — two.

Role. Fighter-bomber, reconnaissance.

Armament. Two 30-mm cannons, rockets, bombs, missiles.

Dimensions. Length 38 feet, span 30 feet.

WEFT DESCRIPTION

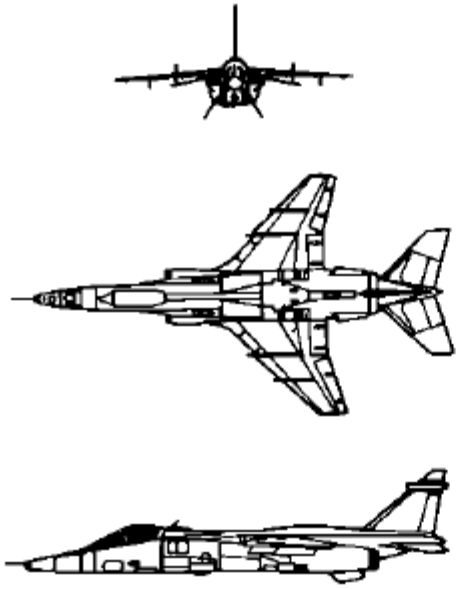
Wings. Low-mounted, swept-back, and tapered with blunt tips.

Engine(s). Two turbojets mounted in the fuselage. Oval air intake beneath the nose section. Dual exhaust.

Fuselage. Flat and thick with pointed nose. Bubble canopy well forward on the nose section.

Tail. High-mounted on body, swept-back and tapered tail flats with blunt tip. Swept-back, tapered tail fin with blunt tip and a step in the leading edge.

JAGUAR (BREGUET BAe)



GENERAL DATA

Country of Origin. France, UK.

Similar Aircraft. Phantom.

Crew. One; trainer — two.

Role. Strike, fighter, trainer.

Armament. Cannon, rockets, bombs, missiles.

Dimensions. Length 51 feet, span 28 feet.

WEFT DESCRIPTION

Wings. High-mounted, swept-back, modified delta with square tips.

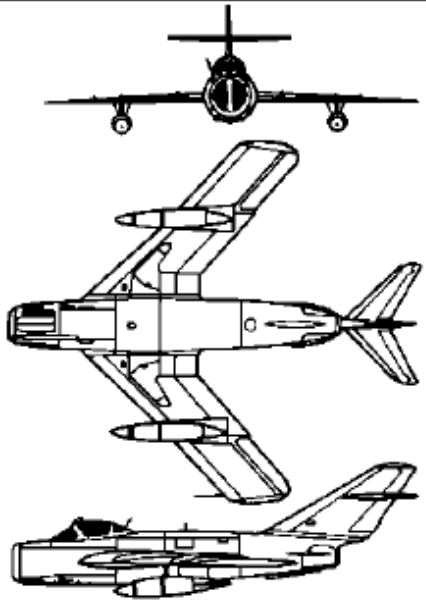
Engine(s). Two turbofans mounted to rear of cockpit. Rectangular air intakes on both sides of cockpit. Engine exhausts show prominently under forward portion of tail.

Fuselage. Long, pointed, chiseled nose. Body widens at air intakes, rectangular to exhausts. Overhanging tail section. Two belly fins.

Tail. Tail flats and fin are swept-back and cut off at tips. Flats are mid-mounted on fuselage with a negative slant.

5-74

MiG-17 FRESCO (MIKOYAN-GUREVICH)



GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. F-86 Sabrejet.

Crew. One.

Role. Fighter-bomber.

Armament. Three 23-mm cannons, bombs, rockets.

Dimensions. Length 36 feet, span 32 feet.

WEFT DESCRIPTION

Wings. Mid-mounted, swept-back, and tapered with round tips. Wide wing root.

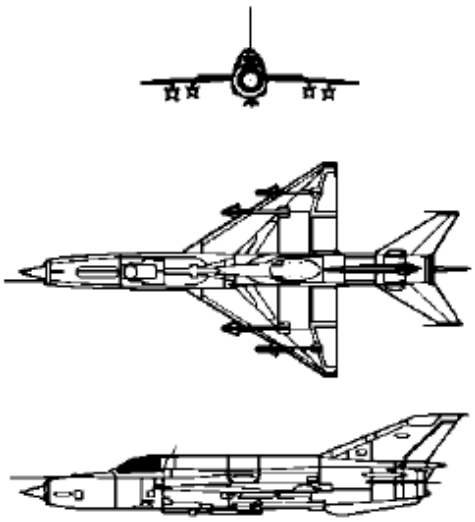
Engine(s). One turbojet inside body, round air intake in the nose. Single, small exhaust.

Fuselage. Short, thick, cigar-shaped, tapered to the rear, blunt nose. Bubble cockpit.

Tail. Fin is swept-back and tapered with rounded tip. Flats high-mounted on tail fin, swept-back, and tapered with curved tips. Flats and fin overhang the exhaust.

5-88

MiG-21 FISHBED (MIKOYAN-GUREVICH)



GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. Fitter, all models; Lightning. (Su-9 Fishpot, not in this manual).

Crew. One; MiG-21U Mongol — two.

Role. Interceptor, ground attack, trainer.

Armament. Cannon, missiles, rockets, bombs.

Dimensions. Length 52 feet, span 23 feet.

WEFT DESCRIPTION

Wings. Mid-mounted, delta wing with square tips.

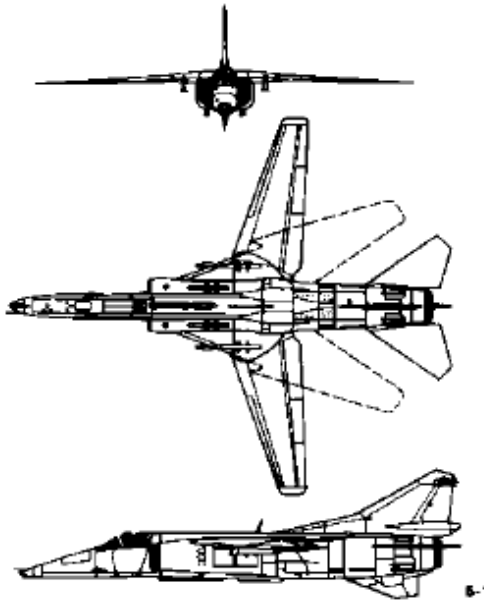
Engine(s). One turbojet inside body. Small round air intake in nose. Single exhaust rear.

Fuselage. Long, tubular body with a blunt nose and stepped cockpit. One belly fin under the rear section. Prominent dorsal spine.

Tail. Fin swept-back and tapered with square tip. Flats are mid-mounted on the body, swept-back, and tapered with square tips.

5-92

MiG-27 FLOGGER D, J (MIKOYAN-GUREVICH)



GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. MiG-23 Flogger B, E, G, Tornado, Su-24 Fencer, F-111.

Crew. One.

Role. Fighter, ground attack.

Armament. Missiles, bombs, rockets, cannon.

Dimensions. Length 54 feet, span 47 feet.

WEFT DESCRIPTION

Wings. High-mounted, variable, swept-back, and tapered with blunt tips.

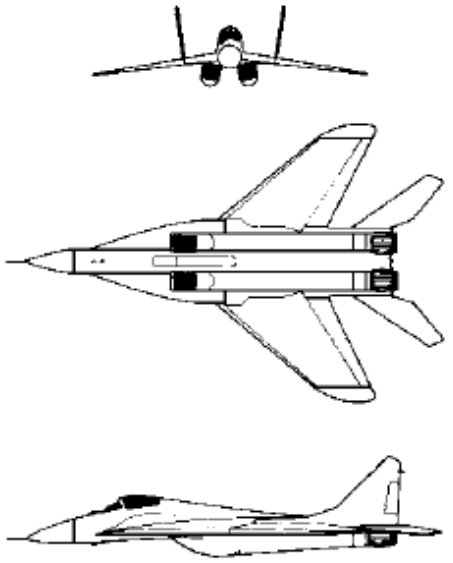
Engine(s). One inside body. Rectangular, box-like air intakes forward of wing roots. Single exhaust.

Fuselage. Long, tubular body except where air intakes give a box-like appearance. Extended, downward-sloping, sharply pointed nose. Stepped cockpit. Large, swept-back, and tapered belly fin under the rear section.

Tail. Large, swept-back, and tapered tail fin with step in leading edge and angular tip. Swept-back and tapered tail flats high-mounted on the fuselage with angular tips.

5-100

MiG-29 FULCRUM (MIKOYAN-GUREVICH)



5-102

GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. F/A-18 Hornet, F-16 Fighting Falcon.

Crew. One.

Role. Counter air fighter, attack.

Armament. Missiles, 30-mm gun.

Dimensions. Length 57 feet, span 39 feet.

WEFT DESCRIPTION

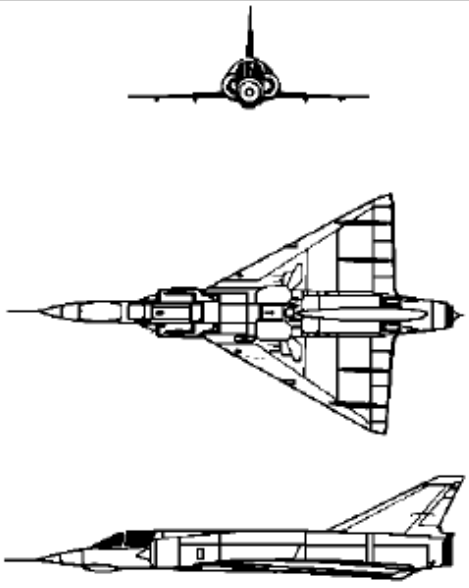
Wings. Swept-back, tapered semidelta with blunt tips. LEX are wide and curve down to the front. Wing shape and mounting differ significantly from other aircraft. The LEX begins on the nose below the mid-mount point. The wings trailing edges end at a high-mounted point.

Engine(s). Widely separated twin jets mounted low and to the sides of the fuselage under the wings. Diagonal-shaped and round-bottomed air intakes, mounted under the wings, give a box-like appearance when viewed from head-on. Large, twin exhausts.

Fuselage. Long, thin, slender body with long, pointed drooping nose. High-mounted bubble cockpit.

Tail. Twin tail fins with sharply tapered leading edges are canted outward and have angular, cutoff tips. Flats are high-mounted on the fuselage, fully movable, swept-back and tapered with blunt tips and negative slant.

MIRAGE III/5 (DASSAULT-BREGUET)



5-104

GENERAL DATA

Country of Origin. France.

Similar Aircraft. KFIR C-2, Viggen, (Mirage 50/2000, not in this manual).

Crew. One; trainer — two.

Role. Fighter, ground attack, reconnaissance.

Armament. 30-mm cannon, bombs, rockets, missiles.

Dimensions. Length 50 feet, span 27 feet.

WEFT DESCRIPTION

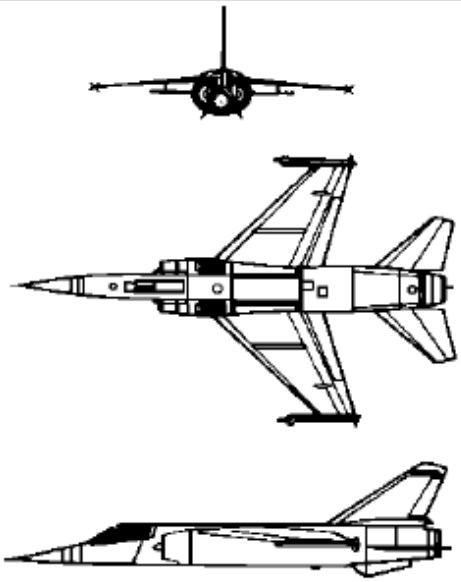
Wings. Low-mounted, true delta-shaped with pointed tips.

Engine(s). One turbojet inside fuselage. Semicircular air intakes are forward of wing root below the cockpit. Large, single exhaust.

Fuselage. Long, slender, tubular with a pointed nose and stepped cockpit.

Tail. Large, swept-back, and tapered tail fin with squared tip. No tail flats.

MIRAGE F1 (DASSAULT-BREGUET)



GENERAL DATA

Country of Origin. France.

Similar Aircraft. Super Etendard, F-1 (Mitsubishi).

Crew. One; trainer — two.

Role. Fighter, attack, reconnaissance.

Armament. Two 30-mm cannons, missiles, bombs.

Dimensions. Length 49 feet, span 28 feet.

WEFT DESCRIPTION

Wings. High-mounted, swept-back, and tapered with square tips.

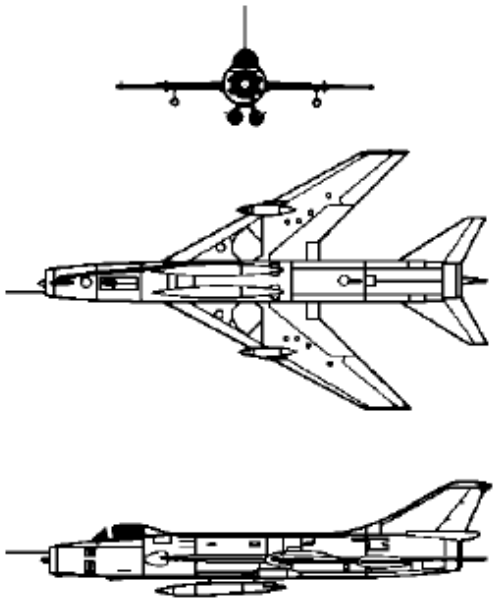
Engine(s). One turbojet in body. Semicircular air intakes alongside the body forward of the wing roots and just behind and below the cockpit. Single exhaust.

Fuselage. Long, slender, pointed nose and blunt tail. Two small belly fins under tail section. Bubble cockpit.

Tail. Swept-back and tapered tail fin with blunt tip. Flats mid-mounted on fuselage, swept-back, and tapered with square tips.

5-108

Su-7B FITTER A (SUKHOI)



GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. Lightning, F-100 Super Sabre, MiG-21 Fishbed (head-on view).

Crew. One.

Role. Ground attack.

Armament. Two 30-mm cannon, rockets, bombs.

Dimensions. Length 57 feet, span 29 feet.

WEFT DESCRIPTION

Wings. Low-mounted (wings are mounted below center of aircraft) with wide wing roots, swept-back, and tapered with blunt tips.

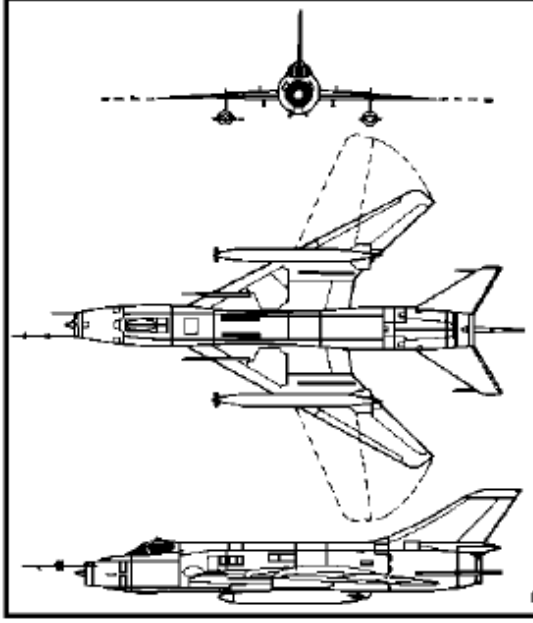
Engine(s). One in body. Large, single exhaust. Circular air intake in nose.

Fuselage. Long, tubular body with blunt nose and rear. Large bubble cockpit.

Tail. Swept-back, tapered tail fin with blunt tip. Swept-back, tapered flats mid-mounted on fuselage with blunt tips.

6-114

Su-17, 20, 22 FITTER (SUKHOI)



GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. F-100 Super Sabre, MiG-21 Fishbed (head-on view), Lightning.

Crew. One.

Role. Ground attack.

Armament. Cannon, rockets, missiles, bombs.

Dimensions. Length 62 feet, span 45 feet.

WEFT DESCRIPTION

Wings. Low-mounted (wings are mounted below the center), variable, swept-back, and tapered with blunt tips. Wide wing roots.

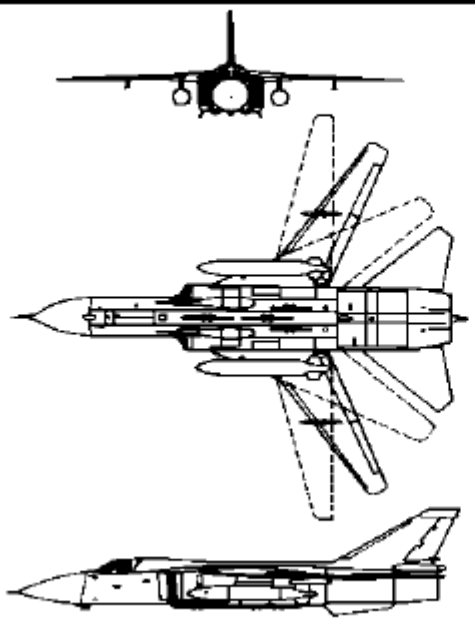
Engine(s). One turbojet in fuselage. Circular air intake in nose. Large, single exhaust.

Fuselage. Long, tubular with blunt nose and rear section. Large, bubble cockpit. Prominent dorsal spine on top of body from cockpit to tail fin.

Tail. Swept-back, tapered tail fin with square tip. Flats mid-mounted on fuselage, swept-back, and tapered with blunt tips.

5-118

Su-24 FENCER (SUKHOI)



GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. Tornado, F-14 Tomcat, F-15 Eagle.

Crew. Two.

Role. All-weather attack, fighter-bomber, strike.

Armament. Cannon, missiles, rockets, bombs.

Dimensions. Length 70 feet, span 57 feet.

WEFT DESCRIPTION

Wings. High-mounted, variable, swept-back, and tapered.

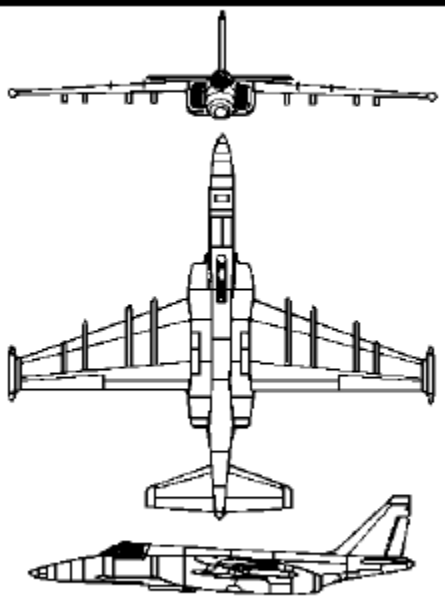
Engine(s). Twin turbofans inside the body. Two large air intakes appear to be tapered away from the body, rectangular-shaped and mounted on the body forward of the wings' leading edges. Twin exhausts.

Fuselage. Long, slender fuselage with pointed, solid nose, rectangular-shaped body from air intakes to exhaust. Two belly fins, four pylons under the belly. Stepped cockpit. Dorsal spine extends from cockpit to tail fin.

Tail. Fin swept-back and tapered with square tip. Flats high-mounted on the fuselage, swept-back, and tapered with angular tips.

5-122

Su-25 FROGFOOT (SUKHOI)



GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. A-6 Intruder (head-on view), Alpha Jet.

Crew. One.

Role. Close air support, ground attack.

Armament. Cannon, missiles, rockets, bombs.

Dimensions. Length 48 feet, span 51 feet.

WEFT DESCRIPTION

Wings. High-mounted, back-tapered, straight trailing edge. Pods mounted at the square tips.

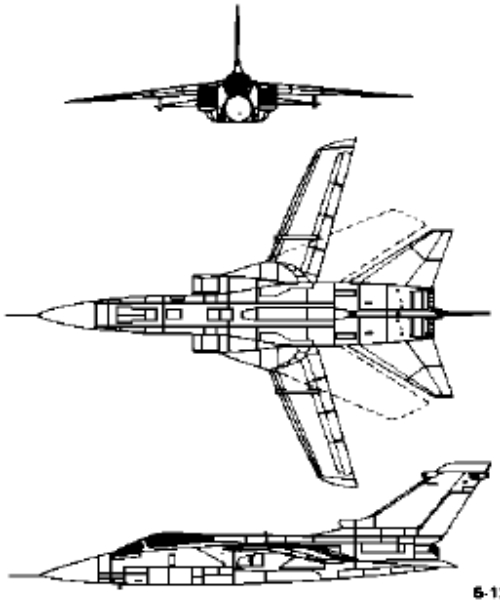
Engine(s). Twin turbojets mounted alongside the body under the wings. Semicircular air intakes forward of the wings' leading edges. Exhausts to the rear of the wings' trailing edges.

Fuselage. Long, slender, rounded nose. Body tapers to the rear tail section, overhangs the exhausts. Stepped cockpit.

Tail. Swept-back and tapered tail fin with square tip. Flats mid-mounted on the fuselage, swept-back and unequally tapered with blunt tips.

5-124

TORNADO (AERITALIA, MBB, BAe)



GENERAL DATA

Country of Origin. Italy, West Germany, UK.

Similar Aircraft. Su-24 Fencer, F-14 Tomcat, F-15 Eagle.

Crew. Two.

Role. Interdictor strike, air defense variant.

Armament. Missiles, bombs, rockets, cannon.

Dimensions. ADV: Length 59 feet, span 46 feet.
IDS: Length 55 feet, span 46 feet.

WEFT DESCRIPTION

Wings. High-mounted, variable, swept-back, and tapered with angular blunt tips.

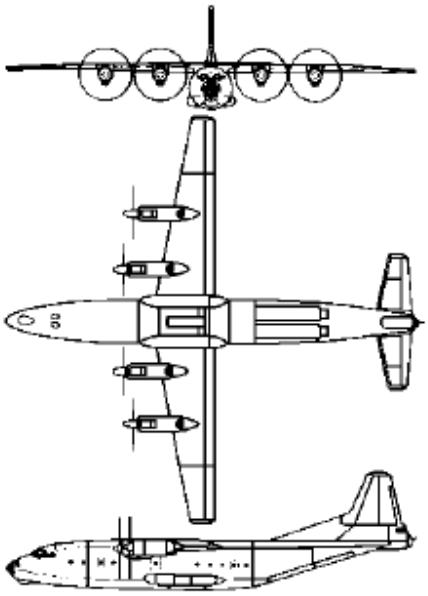
Engine(s). Two turbofans inside body. Air intakes diagonal, box-like alongside the fuselage forward of the wing roots. Twin exhaust.

Fuselage. Solid needle nose. Body thickens at midsection and tapers to the tail section. Bubble cockpit.

Tail. Tall, swept-back, and tapered tail fin with curved tip and a step in the leading edge. Flats are large, mid-mounted on the body, swept-back, and tapered with blunt tips.

5-128

An-12 CUB (ANTONOV)



7-2

GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. C-130 Hercules.

Crew. Six.

Role. Medium cargo/transport (90 equipped troops, vehicles, and weapons), ECM, ELINT.

Armament. Cannon (in tail).

Dimensions. Length 121 feet, span 125 feet.

WEFT DESCRIPTION

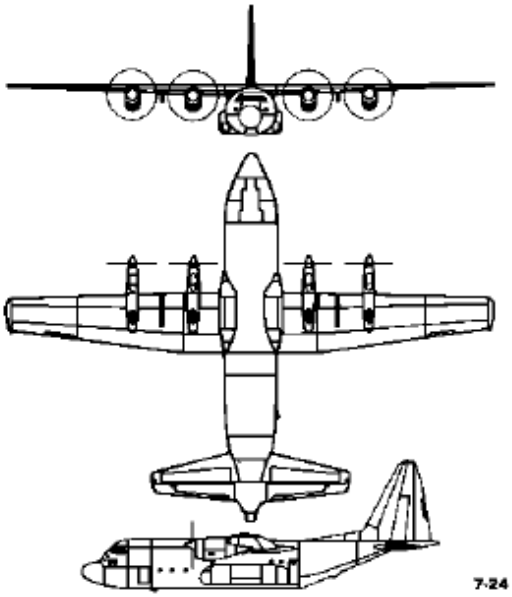
Wings. High-mounted, drooping outer wing panels, backward-tapered leading edges, straight trailing edges with blunt tips.

Engine(s). Four turboprop engines mounted on the wings' leading edges.

Fuselage. Round, slender body with stepped cockpit and glassed-in nose. Landing gear pods bulge at lower body midsection. Upswept rear section.

Tail. Flats are unequally tapered with blunt tips and mounted high on the fuselage. Fin is tapered with a blunt tip and a step in the leading edge. Gunner compartment behind the tail.

C-130 HERCULES (LOCKHEED)



7-24

GENERAL DATA

Country of Origin. USA.

Similar Aircraft. An-12 Cub.

Crew. Four; alternate crew — four.

Role. Transport, cargo (92 equipped troops, light tactical vehicles), airdrop, low-level extraction, air refueling, reconnaissance, and gunship.

Armament. Usually none, except AC-130G gunship.

Dimensions. Length 98 feet, span 133 feet.

WEFT DESCRIPTION

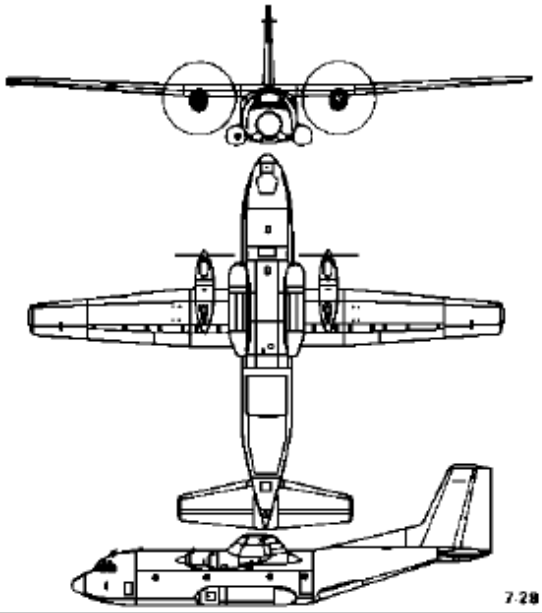
Wings. High-mounted, swept-back, and tapered. Negative slant and curved tips.

Engine(s). Four turboprops mounted under and extending beyond wings' leading edges.

Fuselage. Wide, circular, solid, blunt nose. Stepped cockpit. Upswept rear section.

Tail. Flats equally tapered and high-mounted on the body. Tall tail fin, tapered with blunt tip, and a fairing in the leading edge.

C-160 TRANSALL (AEROSPATIALE, MBB)



GENERAL DATA

Country of Origin. France, West Germany.

Similar Aircraft. G.222, C-123 Provider, Aviocar C-212.

Crew. Three.

Role. Transport, cargo (93 equipped troops, tactical vehicles), airdrop, EW, surveillance, and airborne command.

Armament. Usually none.

Dimensions. Length 106 feet, span 131 feet.

WEFT DESCRIPTION

Wings. High-mounted, equally tapered with blunt tips.

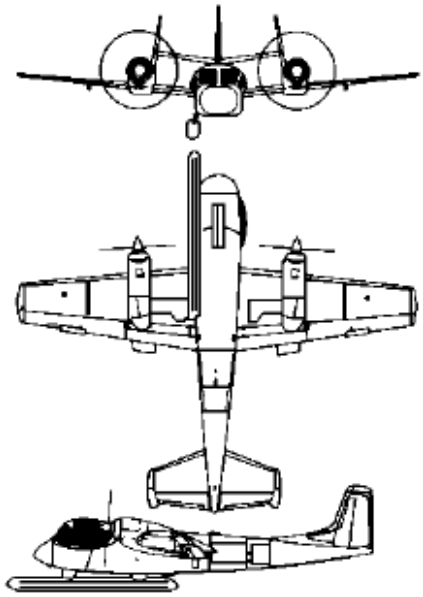
Engine(s). Two turboprops mounted under and extended beyond wings' leading edges.

Fuselage. Long, thick, tapered to the rear with rounded, solid nose. Stepped cockpit and an upswept tail section.

Tail. Flats mid-mounted on thinned body, tapered with blunt tips. Fin is tall, tapered, blunted with a fairing in the leading edge.

7-28

OV-1 MOHAWK (GRUMMAN)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. None.

Crew. Two.

Role. Battlefield surveillance.

Armament. Normally unarmed. Capable of carrying minigun, bombs, and rockets.

Dimensions. Length 41 feet, span 48 feet.

WEFT DESCRIPTION

Wings. Mid-mounted, unequally tapered with blunt tips. Positive slant.

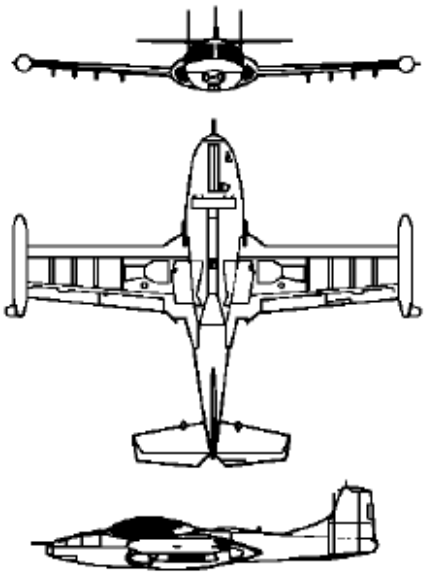
Engine(s). Two turboprops mounted on top of and extending beyond wings' leading edges.

Fuselage. Club-shaped, tapered to rear section. Blunt nose. Two-seat stepped cockpit. (When installed, side-looking airborne radar [SLAR] is prominently exposed beneath the right side and forward part of the body.)

Tail. Triple tail fins are equally tapered. Outer tail fins extend above and below the tail flat. Center fin appears taller. Flats are tapered with positive slant.

8-14

OA 37 DRAGONFLY (CESSNA)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. Galeb-Jastreb, Strikemaster.

Crew. Two.

Role. Light attack, forward air control, reconnaissance, observation.

Armament. Bombs, rockets, gun pods, minigun in body.

Dimensions. Length 29 feet, span 34 feet.

WEFT DESCRIPTION

Wings. Low-mounted, straight leading edge, slight taper in trailing edge with square tips (fuel tanks are generally carried here).

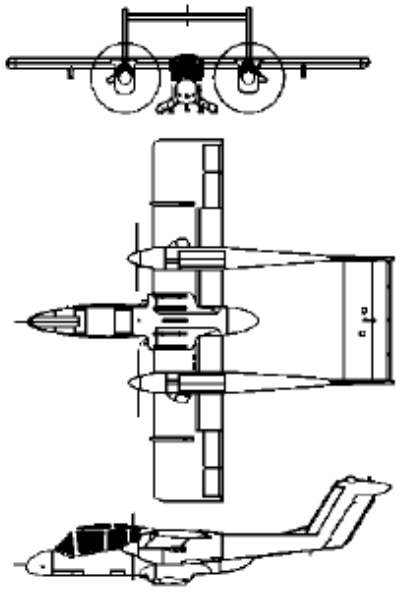
Engine(s). Two turbojets mounted internally. Small semi-circular air intakes and round exhausts are located in the wing roots.

Fuselage. Flattened, oval front section tapered to the rear. Bubble cockpit.

Tail. Flats low-mounted on the fin, equally tapered with blunt tips. Fin is tapered with blunt tip and a small fairing in the leading edge.

8-12

OV-10 BRONCO (ROCKWELL INTERNATIONAL)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. None in this manual.

Crew. Two.

Role. Forward air control, armed reconnaissance, quick-response ground support.

Armament. Machine guns, rockets, bombs.

Dimensions. Length 42 feet, span 40 feet.

WEFT DESCRIPTION

Wings. High-mounted, rectangular-shaped with blunt tips.

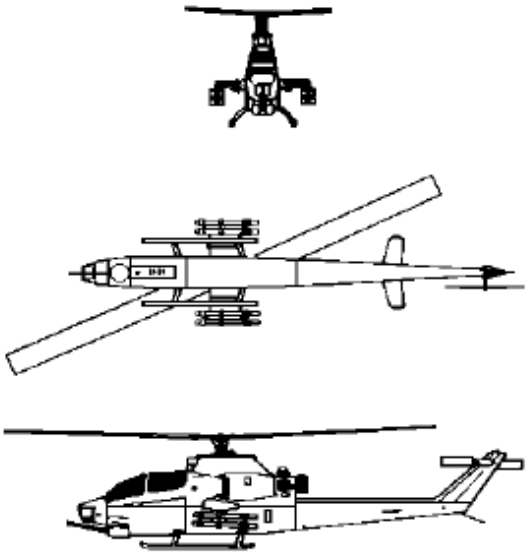
Engine(s). Two turboprops in booms under wings.

Fuselage. Short, oval with glassed-in, stepped cockpit.

Tail. Twin tail booms, swept-back fin on each boom. Rectangular tail flat that connects the tail fins at the top.

8-18

AH-1S HUEYCOBRA (BELL)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. Mi-24 Hind.

Crew. Two.

Role. Attack helicopter.

Armament. Cannon, grenade launcher, rockets, missiles, TOW missile.

Dimensions. Length 45 feet, rotor diameter 44 feet.

WEFT DESCRIPTION

Wings. Weapon-carrying wings are mid-mounted, short and stubby. Large, dual-blade main rotor.

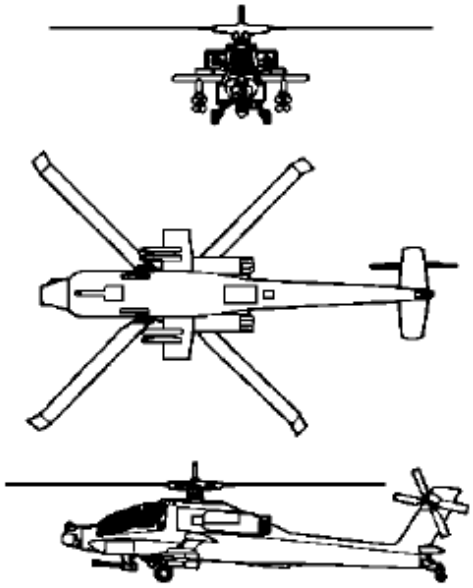
Engine(s). One turboshaft mounted on top of the body forming a hump-like appearance. The exhaust is located behind the cabin and above the tail boom.

Fuselage. Thin, oval body with a short, pointed nose. Stepped, flat-plated canopy, tapered rear section forming a low-mounted, tubular tail boom.

Tail. Flat is mid-mounted, small, swept-back and tapered, blunt-tipped, located forward of the fin. Swept-back fin is tapered. Rotor on the right.

9-2

AH-64 APACHE (HUGHES)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. Mi-28 Havoc, Mangusta A129.

Crew. Two.

Role. Advanced attack helicopter.

Armament. 30-mm chain gun, missiles, rockets, HELLFIRE missiles.

Dimensions. Length 49 feet, rotor diameter 48 feet.

WEFT DESCRIPTION

Wings. Short, stubby, weapons-carrying wings, mid-mounted with square tips. Four-blade main rotor mounted above body midsection. Blade tips are swept-back.

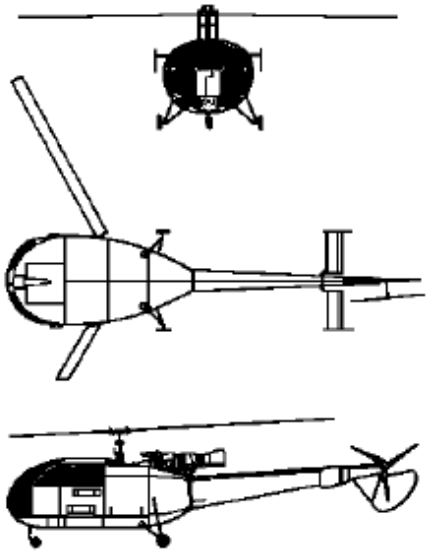
Engine(s). Two turboshaft engines mounted high and outside the fuselage and to rear of the cockpit.

Fuselage. Blunt nose, flat-plated cockpit. Fixed landing gear. Flat belly except for chain gun.

Tail. Large, equally tapered tail flats with square tips, low-mounted on fin. Swept-back tail fin with square tip. Rotor on the top left of tail fin.

9-8

ALOUETTE III (AEROSPATIALE)



GENERAL DATA

Country of Origin. France.

Similar Aircraft. Alouette II, Gazelle, Scout/Wasp, OH-13 Sioux.

Crew. One.

Role. Light attack, transport (six equipped troops), general purpose.

Armament. Machine guns, cannon, antitank missiles, rockets.

Dimensions. Length 33 feet, rotor diameter 36 feet.

WEFT DESCRIPTION

Wings. Three-blade main rotor on top of fuselage to the rear of the cockpit.

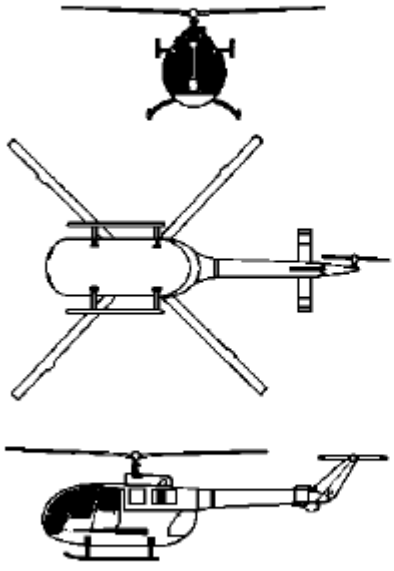
Engine(s). One turboshaft above and to the rear of the cockpit. Exhaust turns upward.

Fuselage. Oval-shaped, glassed-in cockpit. Fixed landing gear.

Tail. Rectangular flats with small, oval fins on tips. Rotor on right with prominent tail rotor guard.

9-14

BO 105 (MBB)



GENERAL DATA

Country of Origin. West Germany.

Similar Aircraft. OH-6 Cayuse, Hughes 500.

Crew. Two.

Role. Observation, antitank, utility.

Armament. HOT antitank missiles.

Dimensions. Length 39 feet, rotor diameter 32 feet.

WEFT DESCRIPTION

Wings. Four-blade main rotor mounted above center of cabin. (Short, stubby, weapons-carrying outriggers on lower midsection of body on antitank version.)

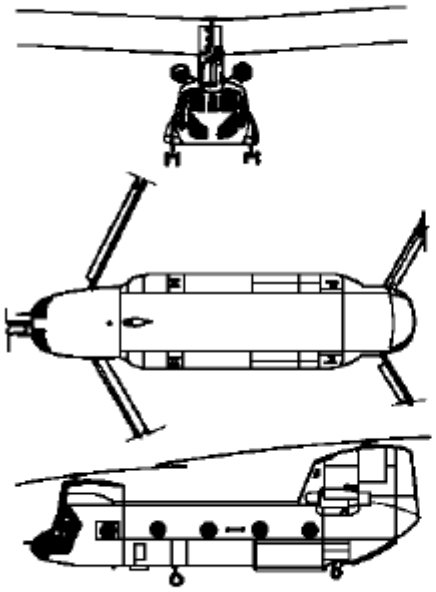
Engine(s). Two turboshaft engines on top of fuselage, forming a hump.

Fuselage. Short, thick, oval-shaped, rounded at nose and rear. Glassed-in cockpit. Landing skids.

Tail. Swept-back and tapered tail fin. Small, rectangular fins mounted at the tips of the rectangular flats. Tail rotor on left.

9-16

CH-47 CHINOOK (BOEING VERTOL)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. CH-46 Sea Knight.

Crew. Two on flight deck.

Role. Transport, cargo (44 equipped troops), recovery.

Armament. Usually none.

Dimensions. Length 51 feet, rotor diameter 60 feet.

WEFT DESCRIPTION

Wings. Two three-blade main rotors, one above the nose and one above the tail section.

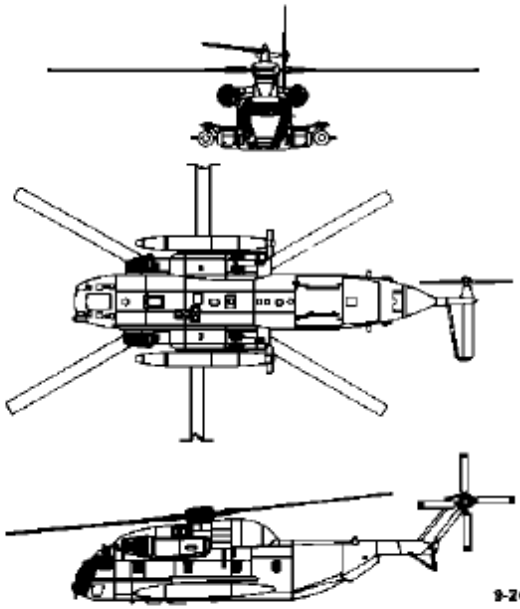
Engine(s). Two turboshafts in pods, one on each side of thick tail fin.

Fuselage. Thick, box-like body with bulges along the sides of the midsection. Tapered rear. Glassed-in, stepped cockpit above a short, rounded nose. Fixed landing gear.

Tail. High, thick tail fin.

9-22

CH-53 SEA STALLION (SIKORSKY)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. CH-3 Jolly Green Giant, SH-3 Sea King, Super Frelon, Puma.

Crew. Two on flight deck.

Role. Heavy assault transport (55 equipped troops, vehicles, guns), rescue.

Armament. Usually none.

Dimensions. Length 67 feet, rotor diameter 72 feet.

WEFT DESCRIPTION

Wings. Large, six-blade main rotor mounted on a hump above body midsection.

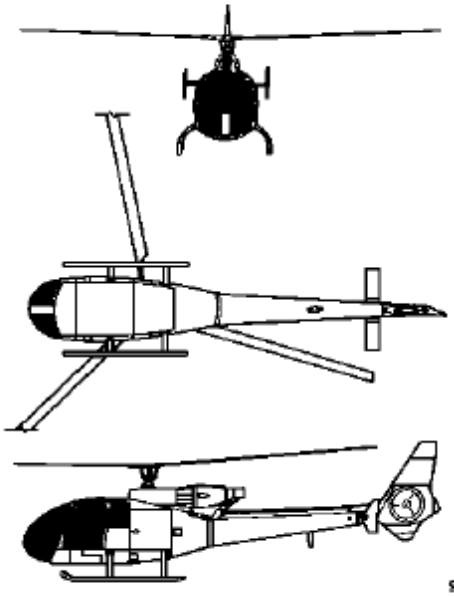
Engine(s). Two turboshafts mounted high and outside the body midsection.

Fuselage. Large, boat-shaped with rounded nose. Glassed-in cockpit. Upswept rear section. Landing gear pods at lower midsection.

Tail. One tapered tail flat on right side of swept-back tail fin. Tail rotor on left side of fin.

9-26

GAZELLE (AEROSPATIALE, WESTLAND)



GENERAL DATA

Country of Origin. France.

Similar Aircraft. Alouette II, Alouette III, Scout/Wasp, OH-13 Sioux.

Crew. One.

Role. General utility, attack.

Armament. Machine guns, rockets, missiles.

Dimensions. Length 39 feet, rotor diameter 34 feet.

WEFT DESCRIPTION

Wings. Three-blade main rotor mounted on top of the fuselage at the rear of the cabin.

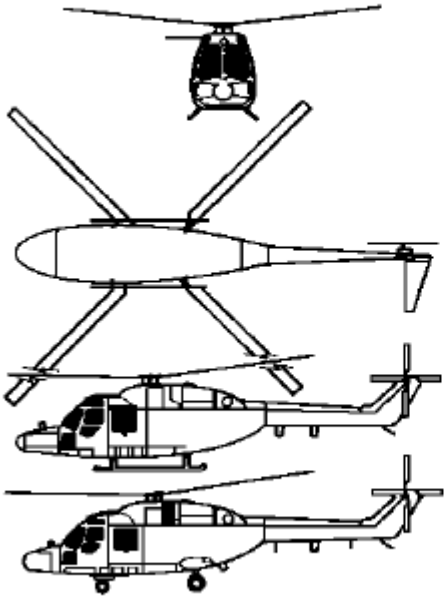
Engine(s). One turboshaft engine mounted on top of the fuselage and to the rear of the rotor shaft. Prominent, upturned exhaust.

Fuselage. Teardrop-shaped with round, glassed-in cockpit. Tapering tail boom mid-mounted on fuselage. Landing skids.

Tail. Fin backward-tapered with square tip. Rectangular flats with small fins on tips. Fan rotor housing is built into lower tail.

9-28

LYNX (WESTLAND)



GENERAL DATA

Country of Origin. UK.

Similar Aircraft. OH-58 Kiowa, Hirundo A109, UH-1 Iroquois, UH-1N Model 212.

Crew. Two.

Role. Utility, attack, antitank.

Armament. Cannon, minigun, rockets, missiles, HOT or TOW antitank missiles.

Dimensions. Length 40 feet, rotor diameter 40 feet.

WEFT DESCRIPTION

Wings. Four-blade main rotor on a hump on top of the cabin.

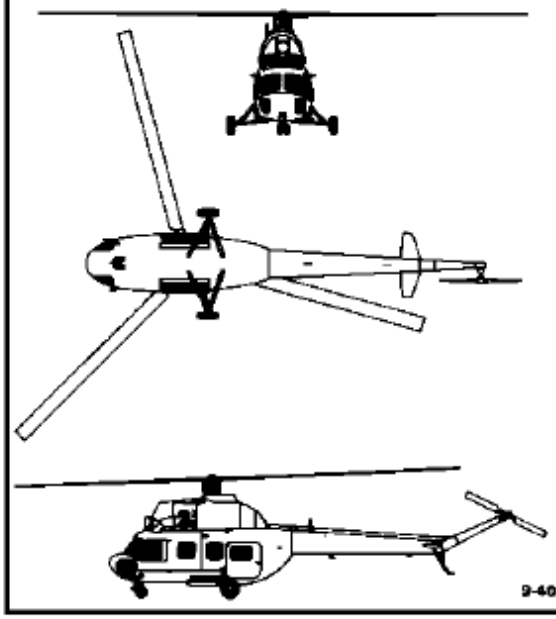
Engine(s). Two turboshaft engines on top of rear of cabin.

Fuselage. Oval, stepped-up and glassed-in cockpit. Box-like cargo compartment. High-mounted, tapered tail boom. Landing skids on army versions. Naval versions have wheels (bottom side view).

Tail. Swept-back fin is tapered. Single flat on right side near top of tail fin. Tail rotor on left side.

9-34

Mi-2 HOPLITE (MIL)



GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. None.

Crew. One.

Role. Transport, cargo, reconnaissance, trainer, search and rescue, Nalson, armed support.

Armament. Rockets, missiles, machine guns.

Dimensions. Length 57 feet, rotor diameter 47 feet.

WEFT DESCRIPTION

Wings. Three-blade main rotor on top of large hump above the body midsection.

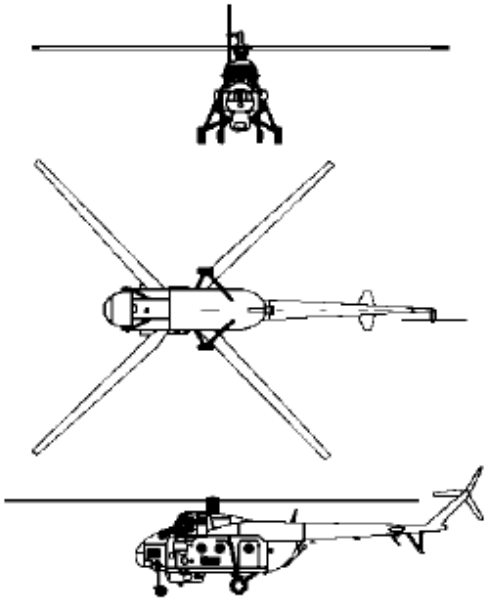
Engine(s). Two turboshafts mounted side-by-side on top of cabin, forming a hump. Round air intakes above cockpit windshield. Oval exhausts on sides of engines.

Fuselage. Small, bus-like. Stepped-up cockpit, rounded nose. Tadpole-shaped body when viewed from bottom. Fixed landing gear.

Tail. Tapered tail boom. Small, unequally tapered flats. Thin, swept-back fin. Tail rotor on right.

9-40

Mi-4 HOUND (MIL)



GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. None in this manual.

Crew. Three.

Role. Transport (12 to 16 equipped troops), armed support, trainer.

Armament. Machine gun pod, rockets.

Dimensions. Length 55 feet, rotor diameter 68 feet.

WEFT DESCRIPTION

Wings. Large, four-blade main rotor mounted on top of fuselage midsection.

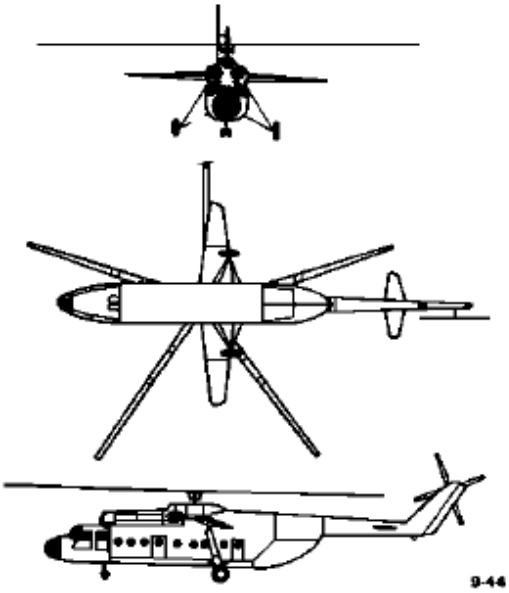
Engine(s). One radial (piston) engine mounted within the nose section.

Fuselage. Short, oval with solid, rounded nose and stepped-up cockpit. High-mounted, long, thin tail boom. Gun mount under belly (oil pan). Four-wheeled landing gear.

Tail. Small, three-blade tail rotor attached to right side of thin tail fin. Small flats forward of the fin.

9-42

Mi-6 HOOK (MIL)



9-44

GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. Mi-26 Halo.

Crew. Five.

Role. Heavy transport (65 equipped troops), vehicles.

Armament. Machine gun.

Dimensions. Length 109 feet, rotor diameter 115 feet.

WEFT DESCRIPTION

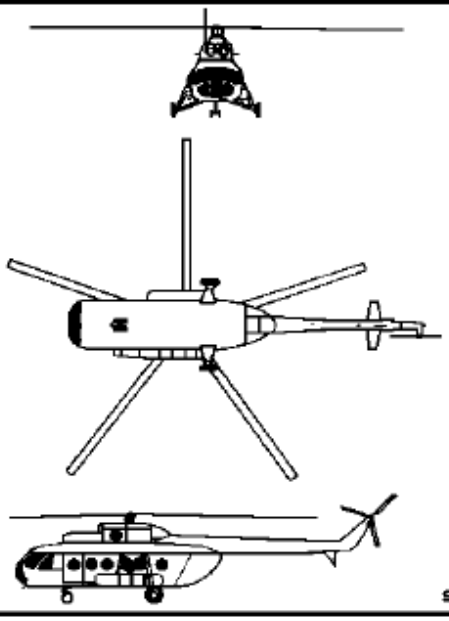
Wings. Large, five-blade main rotor centered over fuselage midsection. Stabilizing wings unequally tapered with blunt tips, mounted high on the fuselage, tilted upward to the front.

Engine(s). Two turboshafts on top of fuselage midsection. Round air intakes above cockpit. Oval-shaped exhaust ports on sides.

Fuselage. Long, bus-like with round, glassed-in, stepped-up cockpit; round, glassed-in nose section. Upswept rear section, tapered tail boom. Fixed landing gear.

Tail. Swept-back fin is tapered. Small rotor on right. Unequally tapered flats forward of the tail fin.

Mi-8 HIP (MIL)



9-46

GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. Mi-17 Hip H, not in this manual.

Crew. Two (three with flight engineer).

Role. Armed assault transport (24 equipped troops), light weapons, and vehicles.

Armament. Rockets, antitank missiles, machine gun, bombs.

Dimensions. Length 61 feet, rotor diameter 70 feet.

WEFT DESCRIPTION

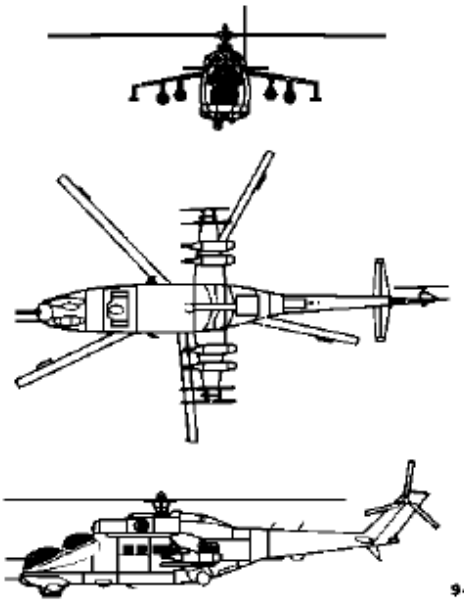
Wings. Large, five-blade main rotor over the engine at the body midsection. Weapons-carrying platform at lower body midsection.

Engine(s). Twin turboshafts mounted on top of the fuselage. Two round air intakes just above the cockpit. Rounded exhaust ports on sides of engines.

Fuselage. Long, bus-like body with rounded nose and glassed-in cockpit. Two fuel pods offset and mounted low on the body. Upswept rear section. Tricycle landing gear does not retract.

Tail. Tail boom tapers to the small, swept-back, and tapered fin with rotor on top right. Small, equally tapered tail flats mounted forward of the tail fin.

Mi-24 HIND (MIL)



9-60

GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. AH-1 HueyCobra (all models).

Crew. Two.

Role. Assault, gunship, antitank.

Armament. Missiles, guns, rockets.

Dimensions. Length 56 feet, rotor diameter 55 feet.

WEFT DESCRIPTION

Wings. Five-blade main rotor mounted on top of fuselage midsection. Short, stubby, weapons-carrying wings mounted at mid-fuselage.

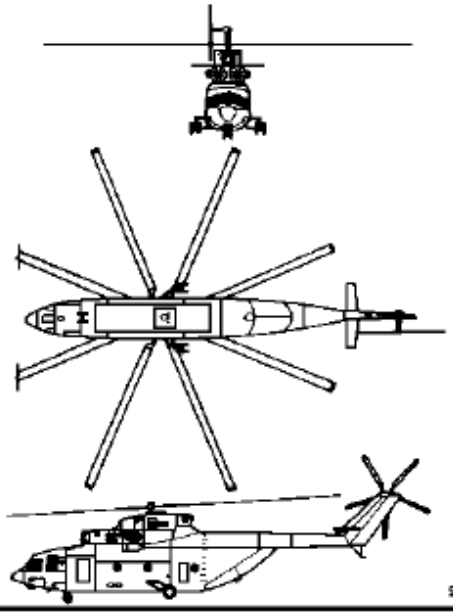
Engine(s). Two turboshafts mounted above body midsection. Two round air intakes located just above the cockpit. Exhaust ports on sides of engine(s).

Fuselage. Hind A: Large, oval-shaped body, glassed-in cockpit. Fuselage tapers at the rear to the tail boom.

Hind D: Large, oval-shaped body, nose modification incorporating tandem bubble canopies and a chin-mounted gun turret. Fuselage tapers at the rear to the tail boom.

Tail. Swept-back and tapered tail fin, rotor on right on some models. Tapered tail flats on boom just forward of tail fin.

Mi-26 HALO (MIL)



9-54

GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. Mi-6 Hook.

Crew. Four.

Role. Heavy cargo-transport (100+ equipped troops, armored vehicles).

Armament. Usually none.

Dimensions. Length 111 feet, rotor diameter 105 feet.

WEFT DESCRIPTION

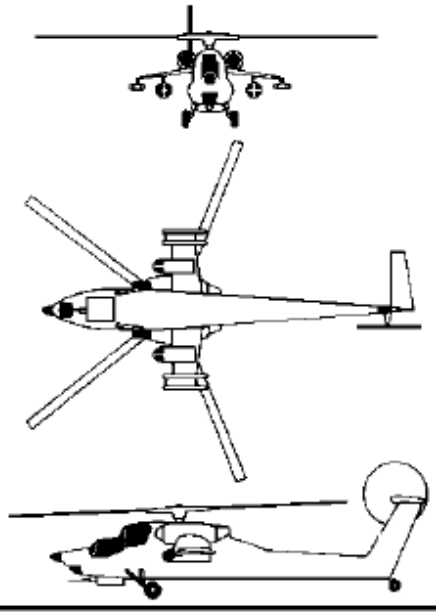
Wings. Eight-blade main rotor mounted above the fuselage midsection on a hump.

Engine(s). Two turboshafts mounted on top of the cabin. Round air intakes above and behind the cockpit. Exhaust ports at sides of engines.

Fuselage. Long, bus-like body tapers to the nose and rear. Upswept rear section. Rounded nose and stepped cockpit. Fixed tricycle landing gear.

Tail. Swept-back, slightly tapered tail fin with large tail rotor on right side. Flats are forward-tapered and mounted low on leading edge of tail fin.

Mi-28 HAVOC (MIL)



GENERAL DATA

Country of Origin. USSR.

Similar Aircraft. Mangusta A129, AH-64 Apache.

Crew. Two.

Role. Attack.

Armament. Air-to-air missiles, antitank missiles, cannon, rockets.

Dimensions. Length 57 feet, rotor diameter 56 feet.

WEFT DESCRIPTION

Wings. Five-blade main rotor mounted above the body midsection. Short, wide, tapered, weapons-carrying wings mounted to the rear of body midsection.

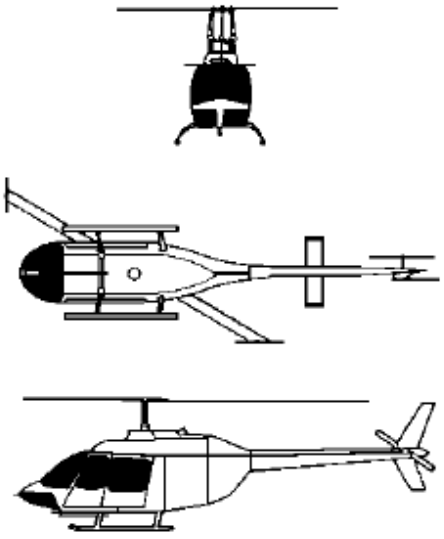
Engine(s). Two turboshafts in pods mounted alongside the top of the fuselage. Upturned exhausts.

Fuselage. Slender, tapers to the tail boom and nose. Tandem, stepped-up cockpits. Cannon mounted beneath the belly. Fixed landing gear.

Tail. Tapering tail boom to swept-back fin. Tail flat high-mounted on the fin. Rotor mounted on right.

9-56

OH-58 KIOWA (BELL)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. Hirundo A109, Lynx, UH-1 Iroquois, UH-1N Model 212.

Crew. Two.

Role. Utility, scout, observation.

Armament. 7.62-mm minigun.

Dimensions. Length 31 feet, rotor diameter 33 feet.

WEFT DESCRIPTION

Wings. Two-blade main rotor on top of aircraft midsection.

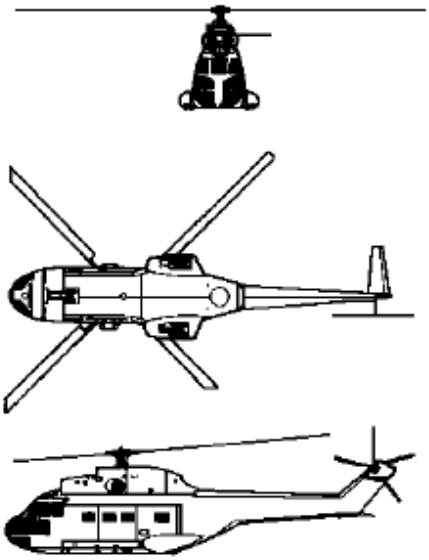
Engine(s). One engine on top rear of midsection in a hump-like fairing.

Fuselage. Oval body, pointed nose, tapered rear section to a mid-mounted tail boom.

Tail. Mid-mounted, rectangular tail flats. Swept-back and tapered tail fin that is boomerang shaped. Tail rotor on the left.

9-62

PUMA (AEROSPATIALE, WESTLAND)



GENERAL DATA

Country of Origin. France, UK.

Similar Aircraft. Super Frelon, CH-3 Jolly Green Giant, SH-3 Sea King, CH-53 Sea Stallion.

Crew. Two.

Role. Armed transport (16 equipped troops).

Armament. Cannon, missiles, machine guns, rockets.

Dimensions. Length 46 feet, rotor diameter 49 feet.

WEFT DESCRIPTION

Wings. Large, four-blade main rotor mounted above center of fuselage on a hump.

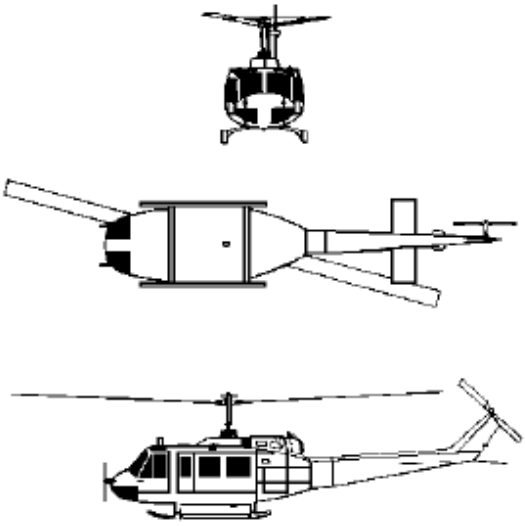
Engine(s). Two turboshaft engines mounted on top of fuselage midsection giving the helicopter a humpbacked appearance.

Fuselage. Long, rectangular, upswept and tapered rear section. Rounded, stepped, glassed-in cockpit. Retractable landing gear.

Tail. Swept-back and tapered tail fin. Rotor on the right. Tapered, single flat on left top of tail fin.

9-66

UH-1 IROQUOIS (BELL)



GENERAL DATA

Country of Origin. USA.

Similar Aircraft. UH-1N Model 212, OH-58 Kiowa, Lynx, Hirundo A109.

Crew. Two.

Role. Utility transport (seven equipped troops).

Armament. Missiles, rockets, machine guns.

Dimensions. Length 42 feet, rotor diameter 48 feet.

WEFT DESCRIPTION

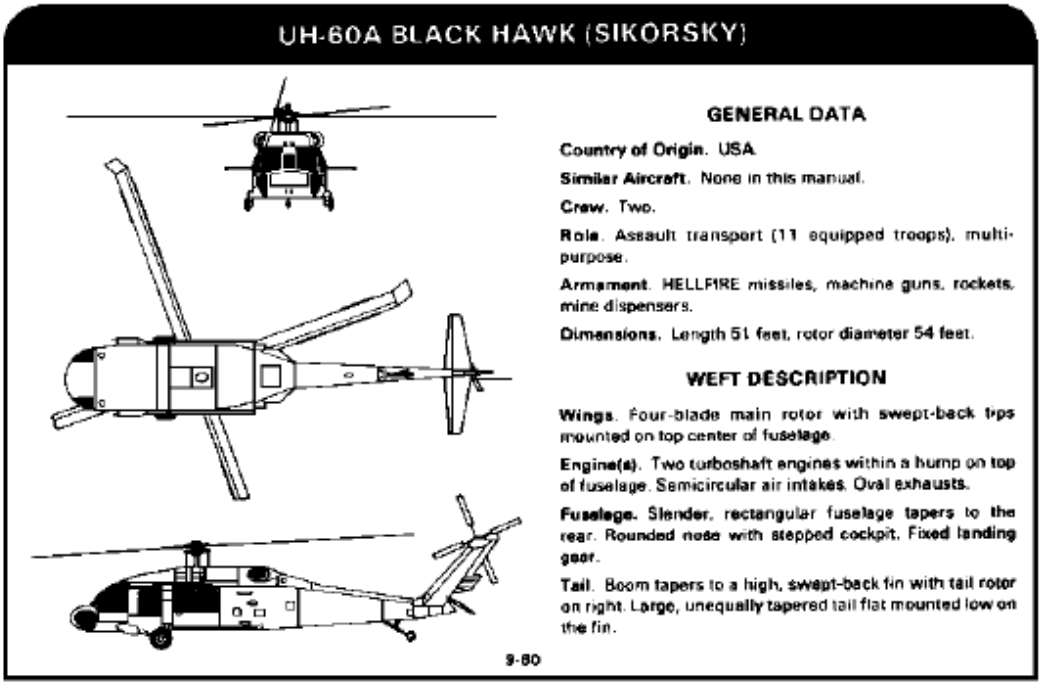
Wings. Dual-blade main rotor mounted over the cabin.

Engine(s). One turboshaft on top of rear of cabin.

Fuselage. Long, oval body, tapered rear. Rounded nose. Stepped-up cockpit. Swell in center of cabin. Landing skids.

Tail. Mid-mounted, rectangular tail flats with square tips. Swept-back tail fin with rotor on the left.

9-74



LESSON 1 PRACTICAL EXERCISE

Instructions

The following items will test your understanding of the material covered in this lesson. There is only one correct answer for each item. When you have completed the exercise, check your answers with the answer key that follows. If you answer any item incorrectly, review that part of the lesson which contains the portion involved.

1. An aircraft appears larger to you at which of the following aspects?

   a. Incoming.

   b. Outgoing.

   c. Broadside.

   d. Angled.

2. Detection and or recognition ranges decrease when the contrasting conditions are _____.

a. bare mountain slopes or vegetation

b. bare mountain or overcast

c. clear and sunny or overcast

d. vegetation or overcast

3. When an alert warning system is supporting you, your search sector will be about 90 degrees. When a hostile aircraft warning is received, you then center your search on the aircraft approach azimuth and narrow your search sector to _____.

a. 40

b. 30

c. 50

d. 75

4. Which is a good practice when using binoculars?

a. Using binoculars for search and detection.

b. Using binoculars for ground targets only.

c. Focusing binoculars at ranges that targets are expected.

d. Keeping the binoculars cased so they won't get dirty.

5. Which description fits an aircraft's major features?

a. Ordnance for ground attack.

b. National markings and camouflage.

c. Ordnance for air attack.

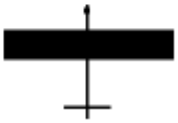
d. Wings to give lift.

6. An aircraft's trailing edge or both wing edges may be tapered. A description of wing taper is the diminishing width of the wing from the base to the wing tip. Which of the following drawings show a wing that is backward tapered?

a. 

b. 

c. 

d. 

7. Which description is correct for a wing that has straight edges for both the leading and trailing edge?

a. Forward tapered.

b. Untapered.

c. Equally tapered.

d. Backward tapered.

8. Which line drawing shows a low-mounted wing with a positive slant from the base?

a. 

b. 

c. 

d. 

9. There are three distinct sections of an aircraft. They are the _____ sections.

a. forward, central, and rear

b. rear, mid, and nose

c. mid, aft, and forward

d. nose, central, and rear

10. Choose the correct statement concerning aircraft tail flats.

a. Tail flats are always high-mounted or mid-mounted on the tail fin.

b. Tail flats are classified like wings and usually are made up of only one element.

c. Tail flats always follow the same shape as the wings.

d. Tail flats are always low-mounted or high-mounted on the fuselage.

11. Kiowa, Apache, and Iroquois are US names for which aircraft?

a. Helicopters.

b. Bombers.

c. Fighters.

d. Interceptors.

12. Which NATO named Soviet aircraft are fighter aircraft?

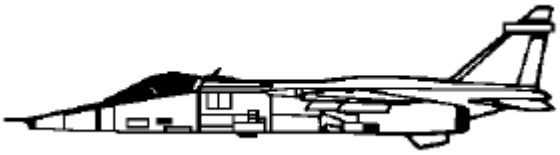
a. Bear, Bison, and Badger.

b. Cub, Candid, and Coaler.

c. Flogger, Fitter, and Fulcrum.

d. Hind, Hip, and Havoc.

13. This line drawing is a European aircraft. Which one?



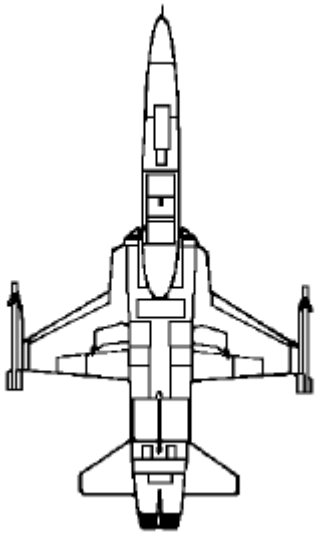
a. Tornado.

b. Jaguar.

c. Alpha Jet.

d. Mirage F1.

14. Wings and tail flats low-mounted on the fuselage, two engines with shotgun exhausts, and a long, droopy nose are WEFT descriptions of which aircraft?



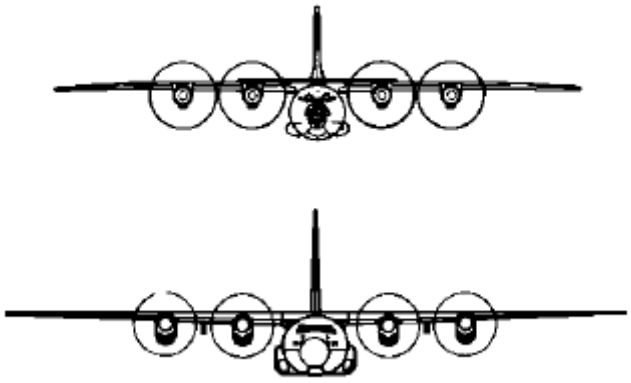
a. F-4 Phantom.

b. F-15 Eagle.

c. F-16 Fighting Falcon.

d. F-5 Freedom Fighter.

15. The Soviet aircraft An-12 Cub and the US aircraft C-130 Hercules are often compared. Both have which one of the following WEFT descriptions?



a. Four turboprop engines, high-mounted wings, and a bubble cockpit.

b. Four turboprop engines, high-mounted wings, and upswept rear section.

c. Four turboprop engines, mid-mounted wings, and upswept rear section.

d. Four turboprop engines, high-mounted wings, and flats mid-mounted on the tail fin.

ANSWERS TO PRACTICE EXERCISE

Question	Answer
1	c.
2.	a.
3.	b.
4.	c.
5.	d.
6.	a.
7.	b.

8.	a.
9.	b.
10.	b.
11.	a.
12.	c.
13.	b.
14.	d.
15.	b.