TC 3-01.80

Visual Aircraft Recognition

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*This publication supersedes TC 3-01.80, dated 29 February 2016.

Headquarters Department of the Army

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Preface

This manual provides a reference to assist the user in the technique of identifying friendly, hostile, or foreign country aircraft. This manual provides information on current operational aircraft that are observed worldwide or in the combat area. It can be used as source material for personnel conducting unit training in visual aircraft recognition (VACR). The procedures in this publication apply throughout the United States Army (USA). The data contained herein is based on the best information available at the time of publication; however, it is not all-inclusive because of some classification guidelines. This publication, by nature, has a built-in time lag, and some aircraft may still be under development or classified at the time of writing, but may be fielded or unclassified at, or after, publication.

This publication applies to the Active Army, the Army National Guard and the USA Reserve unless otherwise stated. The proponent of this publication is the USA Training and Doctrine Command. The target audience for VACR training and execution includes leaders, trainers, and evaluators of Air and Missile Defense units all the way down to Soldier level. All commanders, trainers, and leaders must plan, train, and stress risk management integration during all planning and operations. VACR is a highly perishable skill and must be trained on and evaluated regularly in conjunction with table training. While it is the Soldier on the ground, weapon system in hand that is executing VACR, leaders at all levels must be proficient at this skill.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

The proponent for this publication is the Fires Center of Excellence and the United States Army Training and Doctrine Command. The preparing agency is the United States. Army Fires Center of Excellence and Fort Sill. Send comments and recommendations on DA Form 2028 (*Recommended Changes to Publications and Blank Forms*) to Directorate of Training and Doctrine, 700 McNair Road, Suite 128 ATTN: ATSF-D, Fort Sill, OK 73503 or submit an electronic DA Form 2028 by email using the following link: usarmy.sill.fcoe.mbx.dotd-doctrine-inbox@mail.mil.

Introduction

There is little discussion about the depth and breadth of the automation of weapons and weapon systems in the United States (US) Military. Soldiers rely heavily on the use of these systems to employ their will on the battlefield and defeat the enemy. There are times when Soldiers must utilize training that is solely dependent on their knowledge and skill, without the use of automation. VACR is one of these skills. Soldiers utilize VACR to identify a possible enemy target that could cause grave danger to friendly forces. Once identified, the Soldier must act accordingly. Soldiers must be knowledgeable in the identification of all types of aerial platforms ranging from fixed, tilt, and rotary wing aircraft and unmanned aircraft, in order to protect friendly forces and to prevent fratricide. There have been many arguments through the years that the military does not need VACR, because of the advancement of technology that identifies friendly or enemy aerial platforms. VACR is a basic skill that every Soldier should know. Soldiers cannot blindly depend on automation to do their jobs for them. VACR give Soldiers the necessary skills to perform at the highest level in defending friendly forces from enemy aerial attack.

Chapter 1 discusses the need for visual aircraft recognition

Chapter 2 describes Factors Affecting VACR

Chapter 3 show Aircraft identifying features

Chapter 4 describes VACR training program

Appendix A discuss ground attack, close air support and fighter-bomber aircraft.

Appendix B discusses air superiority and interceptor aircraft.

Appendix C discusses bomber aircraft.

Appendix D discusses cargo and transport aircraft.

Appendix E discusses utility aircraft.

Appendix F discusses unmanned aircraft platforms.

Appendix G discusses rotary wing aircraft.

Summary of Changes

Training Circular (TC) 3-01.80 has changed from the previous version dated 29 February 2016. The current TC provides information on current operational aircraft that are observed worldwide or in the combat area. The TC can be used as source material for personnel conducting unit training in VACR.

- Chapters contained within this TC present VACR training and execution includes leaders, trainers, and evaluators.
- Chapters/Appendixes have been revised from the previous version of TC 3-01.80, dated 29 February 2016. Changes include chapter Titles and Appendixes:

Chapter 1 The Need for Visual Aircraft Recognition.
Chapter 2 Factors Affecting VACR.
Chapter 3 Aircraft Identifying Features.
Chapter 4 VACR Training Program.
Appendix A Ground Attack, Close Air Support and Fighter Bomber Aircraft is a new title.
Appendix B Air Superiority and Interceptor Aircraft is a new title.
Appendix C Bomber Aircraft is a new title.
Appendix D Cargo and Transport Aircraft is a new title.
Appendix E Utility Aircraft is a new title.
Appendix F Unmanned Aircraft Platforms is a new title.
Appendix G Rotary Wing Aircraft is a new title.

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Chapter 1

The Need for Visual Aircraft Recognition

This chapter outlines the causes for the decline in recognition skills in the past, the reasons for visual aircraft recognition skills today, and an overview of the potential threat.

GENERAL OVERVIEW

1-1. Air platforms are as much a part of the operational environment as tanks and artillery. These aircraft, with their various roles and missions, add a vertical dimension. On today's battlefield, a Soldier must be able to recognize and identify aircraft (i.e. Close Air Support (CAS) rotary-wing, and unmanned aircraft system (UAS)). Since there may be many of each type, aircraft recognition training is necessary for every Soldier in the combat force.

FACTORS OF VACR

1-2. A unit's area of operation can be the deciding factor of the types of aircraft that will be seen in the area. Air threat awareness is critical at the Soldier level. Knowledge of enemy and friendly aerial platforms further decreases any chance of fratricide. Lessons learned have identified factors listed below as the major cause of improper identification of various aircraft entering the combined arms Soldier's areas of operation. Increased aircraft capabilities and proliferation demands increased visual aircraft recognition (VACR) capability. Possible results of incorrect identification include:

Factor 1. Recognizing a friendly aircraft as a hostile aircraft will result in fratricide.

Factor 2. Recognizing a hostile aircraft as a friend aircraft will allow hostile aircraft entry into or safe passage through a defended area.

1-3. The geographic location of the theater of operations can be a deciding factor on the type(s) of aircraft that will be encountered. Personnel must be provided ongoing training with specific focus on these particular types of aircraft and their evolving changes in performance and designs that will be seen in that particular theater of operations to decrease the possibility of fratricide. The emphasis on VACR remains a required skill for Soldiers. However, this skill has declined as a critical enabler because of the increased capabilities of sensors, missiles, missile defense, and identification systems (e.g. identification friend or foe (IFF). To maintain air superiority, Soldiers should also realize that some formerly friendly types of aircraft are gradually finding themselves in the hands of non-friendly forces and nations.

1-4. Surveillance for threat aircraft is a 24-hour mission. Unmanned aircraft platforms have been increasingly used for missions as they are cost-effective and there are no requirements for safety considerations for the pilot or increased cost for pilot training. The enemy's will to fight, state of readiness, order of battle, and combat capability are some additional factors that will determine the enemy's mission rates or frequencies (sorties) of attacks. Air defense personnel follow rules of engagement that include hostile target criteria, identification, friend or foe (IFF), sensors, and air defense warnings (ADW) in making their engagement decisions. Additionally, weapon control status (WCS) apply to air defense systems in particular, and may be a part of the supported ground force standing operating procedures as well.

1-5. The WCS sets the degree of control over the firing of Air Defense weapon systems. During wartime, aircraft are engaged according to the WCS in effect. The WCS are:

Weapons Free: Fire at any aircraft not positively identified as friendly.

Weapons Tight: Fire only at aircraft positively identified as hostile according to the prevailing hostile target criteria.

Weapons Hold: Do not fire except in self-defense. This status may be set in an area in terms of aircraft type and time. For example, weapons hold, rotary wing, 1200 to 1500 hours.

1-6. Soldiers of these weapon systems depend on visual recognition and identification of aircraft when making engagement decisions. The effectiveness of weapon systems in defeating the low-altitude air threat is directly affected by the skills of the crews and teams in recognition and identification of aircraft. Depending on the environment, rules of engagement may demand that both positive visual identification and electronic identification are obtained prior to target engagement, which makes it imperative that Soldiers have the appropriate level of VACR skill.

AIR THREAT

1-7. The air threat to friendly ground forces operating in the forward area near the line of contact are UAS, fixed-wing and rotary-wing aircraft. The threat consists of low performance and high performance ground-attack aircraft. These aircraft will conduct CAS reconnaissance, surveillance, interdiction, anti-armor, and troop support missions.

1-8. Thousands of aircraft manufactured by the former Union of Soviet Socialist Republics remain in the inventories of potential enemies throughout the world. Many of these aircraft were modified to perform certain roles or upgraded using some of the latest technology. Countries continually upgrade their guidance and weapon systems as needed to support their standing military forces.

1-9. Aircraft manufactured by friendly countries can also be a threat in some regions depending on current situations. For example, the A-4 Skyhawk and Mirage F1 platforms were in the hands of the Iraqi military during the Persian Gulf War. The current air threat makeup is of various types of aircraft with specific missions. Specific threat information in your area of operation is included in your unit's operation order, intelligence preparation of the battlefield and tactical standing operating procedures.

1-10. A major air threat in the forward area near the line of contact is rotatory-winged aircraft and low, slow, small UAS. Rotary-wing aircrafts once unmasked are very noticeable, but UAS can provide their operators generally close contact with opposing forces with little or no notice.

1-11. Elements in the division and corps rear areas, especially nuclear-capable units, command posts, logistics facilities and reserve forces, can expect repeated attacks by high-performance aircraft. Fighter-bombers and ground attack aircraft are also used to attack convoys. This threat's effectiveness can be greatly enhanced when UAS tactics are implemented when providing intelligence and surveillance.

1-12. The enemy's order of battle, combat capability, readiness, resources and willingness to fight are some of the factors that will determine the times and rates of attack.

1-13. Members of the ground forces should understand that while an aircraft may be hostile, not all hostile aircraft are a direct threat. For example, an interceptor or highflying reconnaissance aircraft have little or no direct or tactical threat.

1-14. Threat interceptor aircraft are normally given the mission of countering friendly aircraft on approaches, flanks, and beyond the maximum range of forward area air defense weapon systems. These hostile aircraft will seldom enter the engagement range since their normal operating altitudes are suitable only for air-to-air combat. Additionally, highflying reconnaissance aircraft are not normally within the engagement range.

Chapter 2

Factors Affecting VACR

This chapter covers early recognition and identification, aircraft confusion, physical factors, and search techniques. It also covers the use of binoculars, and other recognition considerations. Every attempt made at visual aircraft recognition involves two events. First, an aircraft must be detected. Second, the aircraft must be inspected to distinguish the characteristics or shape that makes it recognizable as a particular aircraft.

PHYSICAL FACTORS INFLUENCING AIRCRAFT DETECTION

2-1. Human Physiology: The human eye is "camera-like" and just as a camera lens focuses light onto film; the cornea (lens) focuses light onto a light-sensitive membrane called the retina (film). The central part of the retina is called the fovea. The fovea is where vision is sharpest. In humans, the fovea is a very small part of the eye that constitutes only one degree of horizontal and vertical vision. Nothing outside this narrow one-degree field can be seen in detail. As an example, an airplane that is visible in the fovea from 6,000 meters would only be visible at 600 meters (or less) if the lens projects the image onto the retina more than 5 degrees on either side of the fovea. Therefore, if a soldier is merely staring at a point in the sky or a point on the horizon the soldier will not see much, if anything, and is missing out on the vast majority of the objects in the sky.

2-2. All aircraft must be detected, recognized and then identified at the farthest range possible. Early detection aide's operators with making timely decisions to report and possibly engage any threat aircraft. The farther out an aircraft is positively identified, the more time a gunner has to make engagement decisions.

2-3. Where a sensor is not available, a more accurate perspective can be placed on VACR by teaching aircraft characteristics as they are viewed from the Soldier's perspective on the surface (ground observation).

2-4. There will be varying degrees of required time of detection and identification of aircraft depending on the aircraft's characteristics (size, speed, heading, and camouflage scheme). Other contributing factors are terrain, available light, background and weather (reduced visibility due to clouds, and combat conditions such as battlefield noise, or smoke from destroyed targets). These contrasting conditions will affect time of detection and identification.

FACTORS AFFECTING AIRCRAFT IDENTIFICATION

2-5. Factors that can affect how effectively or how soon an aircraft can be identified is its size or aspect of direction (incoming, outgoing, or crossing). With the aircraft, incoming or outgoing view less surface area of aircraft will be seen. The crossing view (lengthwise) will provide a side view of the aircraft. This side view enables the observer to see the entire shape of the aircraft making it easier to identify. Large transport type aircraft can be more readily detected and identified at a greater range than smaller fighters or observation type aircraft due to their size. Early identification is critical in areas where an air threat is anticipated. Visual observation techniques are demonstrated in the following illustrations.

2-6. Atmospheric Conditions: Haze, smoke, a low ceiling (5/8) of the sky covered with clouds) or an obscured horizon can make it challenging to see distant objects such as aircraft. The same conditions can occur when fog or a cloud layer surrounds the soldier and a high overcast layer hangs overhead.

2-7. Other Factors: In additional to atmospheric conditions, allergens or other airborne irritants, fatigue, age, dehydration, and hypoxia can all inhibit the ability of the human eye to perform at an optimum level.

ESTIMATION OF SEARCH LIMITS

2-8. When searching and scanning for aircraft, do not limit the search too near the horizon and miss higher-flying aircraft, nor search too high above the horizon and miss lower flying targets. The correct upper limit of search is 20 degrees above the apparent horizon. As shown in figure 2-1, the observer extends one hand straight in front of him with his fingers fully spread. With his thumb in the air and his little finger pointed at the ground and touching the apparent horizon, the thumb tip will be about 20 degrees above the horizon.

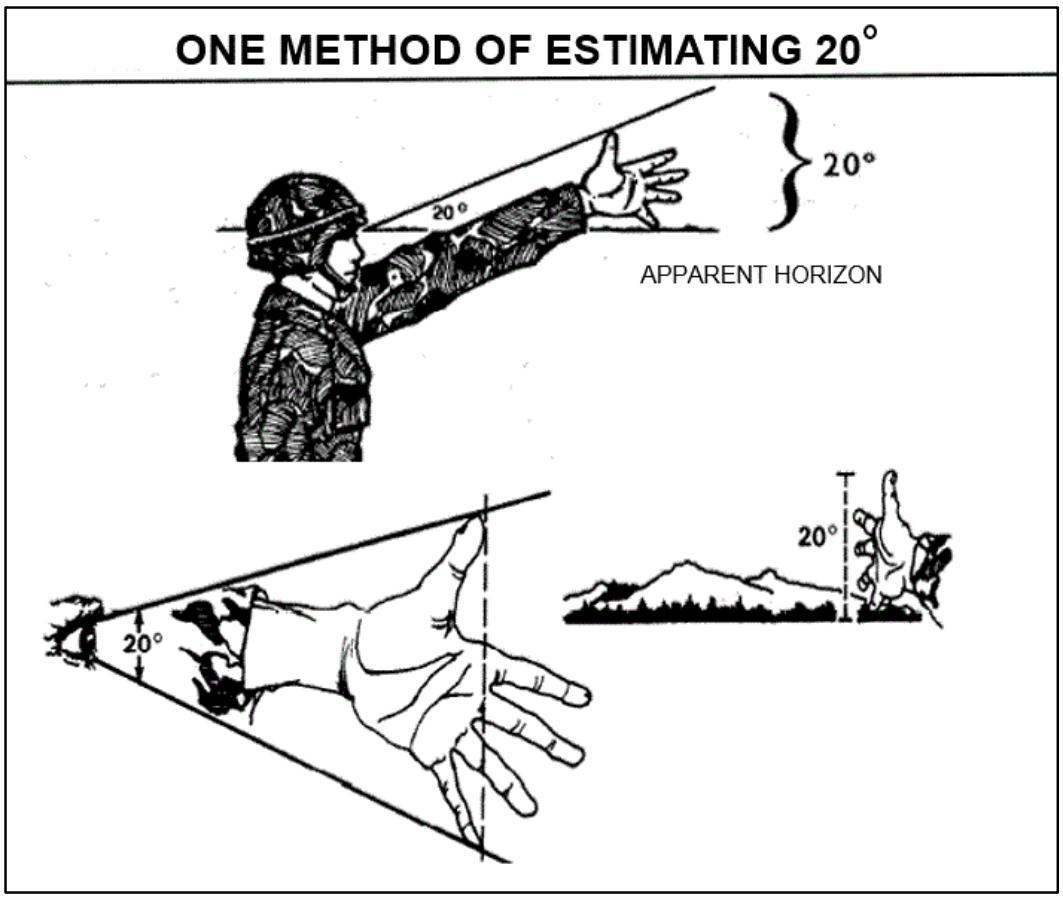

Figure 2-1. Method of Estimating 20 Degrees

VERTICAL SCAN AND SEARCH

2-9. The scan is the technique used to optimize vision for VACR. As shown in figure 2-2, the observer should locate prominent terrain features as quick reference points. By using quick eye movements upward toward the sky, then downward to the horizon and continuing across the terrain, the observer should scan using the same pattern to approximately 20 degrees below the horizon to compensate for all aircraft (manned or unmanned) that require nap-of-the-earth altitude to initiate their missions.

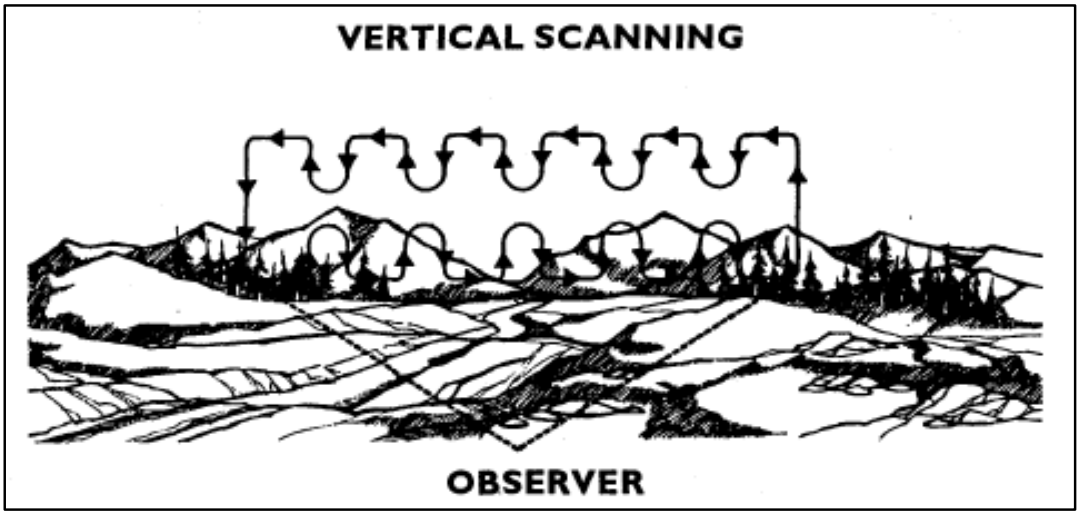

Figure 2-2. Vertical Scan and Search method

HORIZONTAL SEARCH AND SCAN

2-10. As can be viewed in figure 2-3 on page 2-3, from the horizon, the observer should search using short, quick eye movements across the sky while working upward to approximately 20 degrees. As in vertical scanning, the observer should continue the search and scan technique to 20 degrees below the horizon to detect aircraft flying nap of earth. Air guards should employ this technique when friendly forces are at a halt.

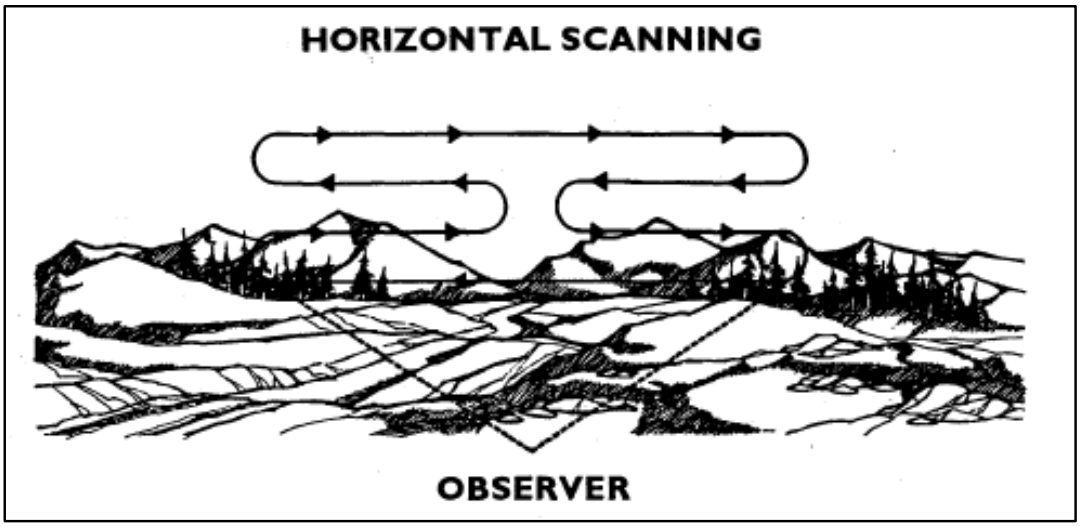

Figure 2-3. Horizontal Scanning

GROUND OBSERVER SITING AND OFFSET SEARCH SECTOR SIZE

2-11. The ground observer position should be offset from the expected flight path as viewed in figure 2-4 to avoid the tail-on or nose-on aspects.

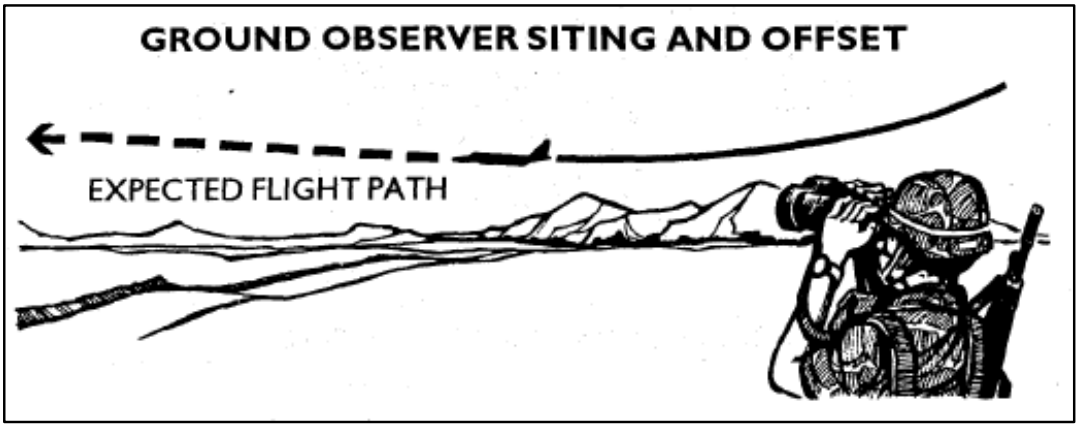

Figure 2-4. Ground Observer Siting and Offset

SEARCH TECHNIQUES

2-12. The search techniques listed below will help the observer in aircraft detection.

- Squinting aids in focusing the eyes at long ranges. Squinting changes the eyes' focal length and will aid in bringing distant aircraft into focus.
- The blinding effect of the sun can be shielded by extending the arm, blocking the glare. Looking into the sun without shielding the eyes may damage them, and even a temporary blinding effect may cause the observer to miss aircraft.
- When searching, especially above the horizon, the eyes will tend to relax and distant objects may become blurred. The problems associated with blurred vision can be overcome by "resetting" or "refocusing" the eye by looking at an object far in the distance for several seconds. During prolonged periods of poor visibility, refocusing can be repeated every 60-120 seconds.
- The observer should keep his eyes on the aircraft. Looking away may make it necessary to search for the aircraft again. If it is necessary to look away, the observer should try to remember exactly where the aircraft was and it is heading direction from a specific point such as a terrain feature.

2-13. Aircraft can be detected more easily if the mission requirement demands a narrow search sector by the observer. If an observer is assigned a large search sector such as a 90-degree field of view, the observer's chances of detecting aircraft are greatly reduced. When the observer is alerted by a supporting alert warning system such as the Sentinel radar and forward area air defense command, control, and intelligence system, then a much smaller sector can be observed. Assigned sectors of search must be defined both horizontally and vertically. If tactically possible, the observer will have a clear line of sight on both the vertical and horizontal planes. Figure 2-5 shows the observer assigned general surveillance and a narrow search provided by warning.

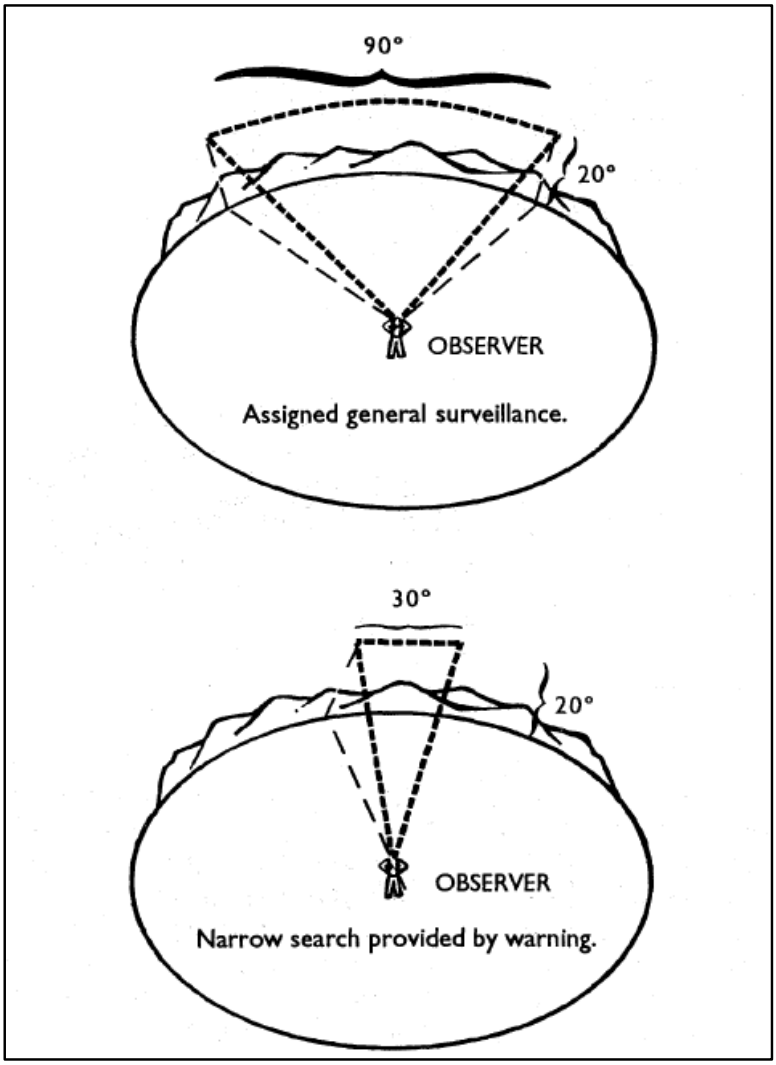

Figure 2-5. Sector Surveillance

USING BINOCULARS (FIELD GLASSES)

2-14. Binoculars can also be referred to as field glasses. After detecting an aircraft, use binoculars to positively recognize, identify and report the aircraft. This magnification aid has a limited field of view that reduces the observers' detection range. Binoculars are more effective for fixed siting and not recommended for search and scan techniques.

INTERPAPILLARY ADJUSTMENT

2-15. The two monocles that make up a set of field glasses are hinged together so that the lenses can be centered over the pupils of the eyes. The hinge is equipped with a scale (called the interpapillary scale) to indicate the distance from you to the target in millimeters. To find the correct setting look through the binoculars and adjust the hinge until the field of vision appears as a single sharply defined circle. Remember to record the scale setting so that no time is lost when the field glasses need to be used again.

FOCAL ADJUSTMENT

2-16. Focal adjustments are performed by looking through the lens at a distant object with both eyes open and placing one hand over the lens of the right monocle turning the focusing ring of the left monocle until the object is acutely defined (figure 2-6).

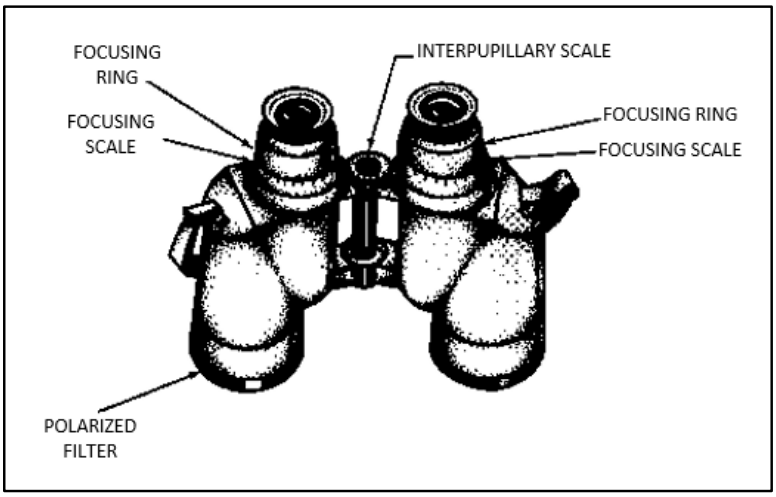

Figure 2-6. Binoculars (field glasses) Focal Adjustment

METHOD OF HOLDING BINOCULARS

2-17. Binoculars magnify an aircraft's image and can aid in recognizing and identifying aircraft at greater ranges. In contrast, do not use them for search and scan because binoculars have a limited field of view, which reduces detection range. Binoculars are most effective when used correctly. Use the following steps:

Keep the binoculars uncased and ready for use.

Use polarized filters when they are available.

Use a stationary rest position for your elbows.

Hold the binoculars lightly, with the monocles resting on and supported by the heels of the hands.

Hold the eyecups lightly to the eyes to avoid transmission of body movement.

Use the thumbs to block out unwanted light that would enter between the eyes and eyecups.

Keep the eyes on the detected aircraft, and carefully raise the binoculars to the eyes to acquire the aircraft. Sudden or jerky movements may cause the observer to lose sight of the aircraft.

2-18. The following illustration figure 2-7, demonstrates the correct hand position when using binoculars.

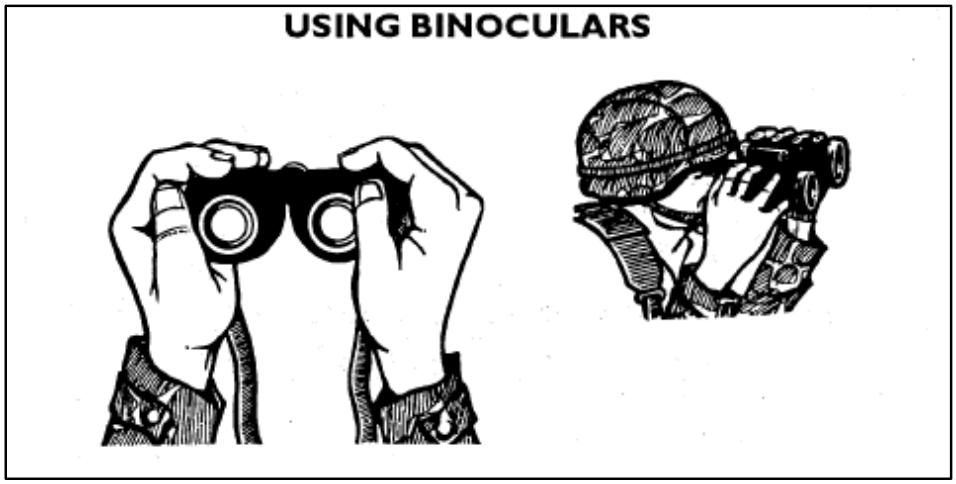

Figure 2-7. How to Hold Binoculars

SPECIAL RECOGNITION CONSIDERATION

2-19. Another option for the observer to consider for recognition support is integrating with any systems equipped with the forward looking infrared (FLIR). FLIR can be used for early aircraft detection and tracking in adverse weather and nighttime operations. It enhances the crew's ability to provide 24-hour coverage to a defended asset. FLIR can give the gunner a choice to switch from a normal wide field of view on the screen display, to a narrow field of view that provides detail of distant objects by enlarging their image. Unlike binoculars, systems such as RADAR or low-light television, FLIR is able to pick up minimal temperature differences and convert them to a crisp thermal image from which aircraft details can be identified. FLIR uses thermal imaging that can see in total darkness and can see through light fog, rain and snow. FLIR also has the ability to see through smoke, which gives it more utility since it can see across a smoke-obscured battleground.

2-20. An aircraft recognition and identification shortcoming, when using the FLIR on some weapon systems, is that the display is available only to the gunner. Another area of concern is that FLIR provides little or no aircraft identification capability at its maximum range. As the aircraft draws nearer, the definition of shape and outline begins to appear and the gunner can distinguish between a jet, propeller-driven, and helicopter aircraft. In some instances, only the aircraft type will be recognized. Finally, as with binoculars, an observer must be trained in aircraft recognition using the wings, engine(s), fuselage, and tail (WEFT) method to be able to identify specific aircraft in the FLIR environment.

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Chapter 3

Aircraft Identifying Features

All aircraft have several identifying features. These identifying features for fixed wing and rotary wing enable instructors and consequently the Soldier on the ground to identify the aircraft. Instructors in a VACR training program can teach Soldiers what identifying features to look for. The Soldier can then use this knowledge, look at an incoming aircraft, determine the type of aircraft, and make the initial determination of friend or foe. This chapter outlines these identifying features.

AIRCRAFT RECOGNITION

3-1. All aircraft are built with the same basic design. These features are:

Wings or rotary blades for lift.

Engines or jet propellers.

A fuselage to carry the crew or fuel.

A payload.

A tail assembly (empennage) to mount the control surface for flight configuration.

3-2. Although aircraft have the same basic features, these features can differ in design, size, and location. The differences can distinguish and ultimately identify one aircraft from another. For description and identification, learning purposes, and the instructor can isolate individual components of an aircraft. The composite of an aircraft's features must be trained to effectively recognize the aircraft quickly.

WEFT

3-3. WEFT is the accepted system of aircraft identification based on the aircraft's individual features. WEFT is a memory aid used in training VACR. By isolating individual features of an aircraft, the instructor can assist the Soldier in learning the required techniques to identify the aircraft. WEFT is explained and illustrated below.

WING

3-4. There are three basic wing configurations. 1) fixed wing, 2) variable geometry, and 3) rotary wing, see figure 3-1.

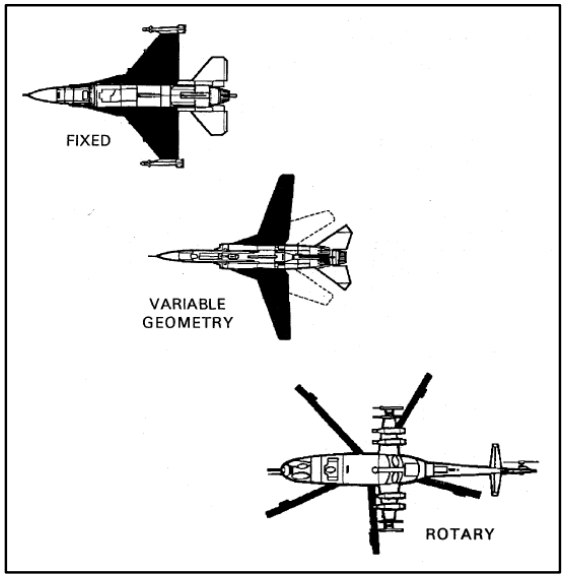

Figure 3-1. Wing Types

Fixed-wing

3-5. With fixed-wing aircraft, their wing positions are affixed permanently to their bodies or fuselages. The usual three wing positions for fixed wing aircraft are high, mid, and low mounted. See figure 3-2.

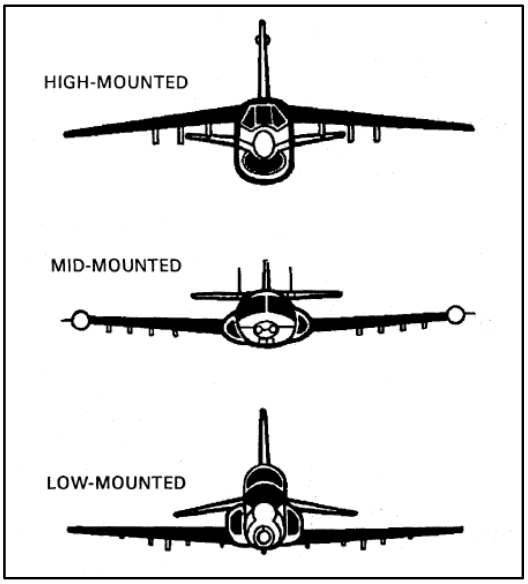

Figure 3-2. Fixed Wing Positions

Variable Geometry

3-6. With Variable Geometry wings the importance is it changes the aircraft appearance. As the mission changes or increased capability is required the aircraft can transition to any degree of sweep angle (position), increasing its speed. When the wings are extended, the same aircraft can operate at a slower airspeed. See figure 3-3.

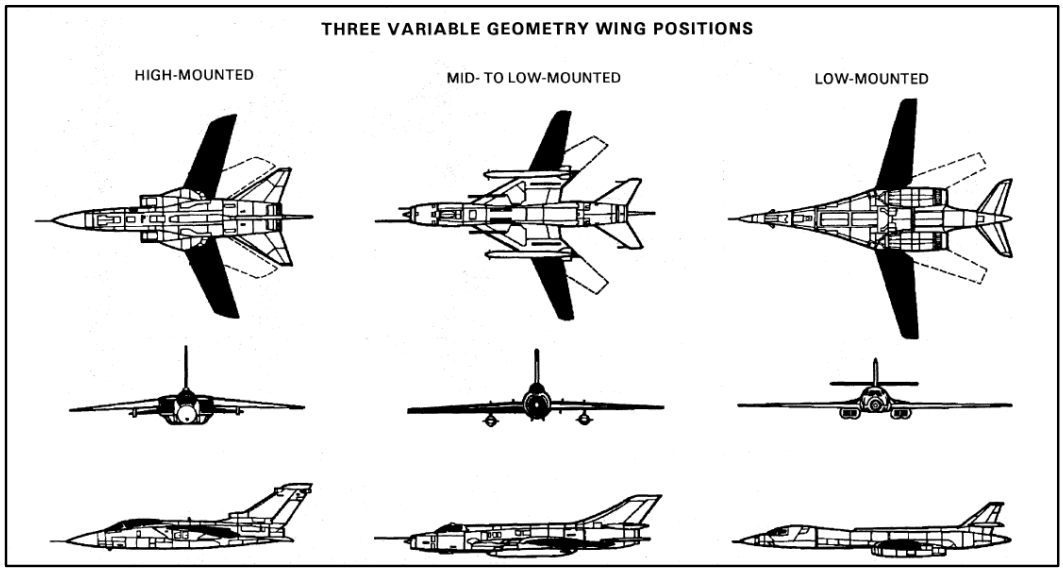

Figure 3-3. Variable Geometry

Wing Tapers

3-7. Wing taper is defined as the gradual reduction of the wing width from the attachment point on the fuselage to the wing tip. As seen in the upper figure, an aircraft may have its leading, trailing or both edges of its wing tapered. Conversely, some aircraft are designed with no taper at all. See figure 3-4.

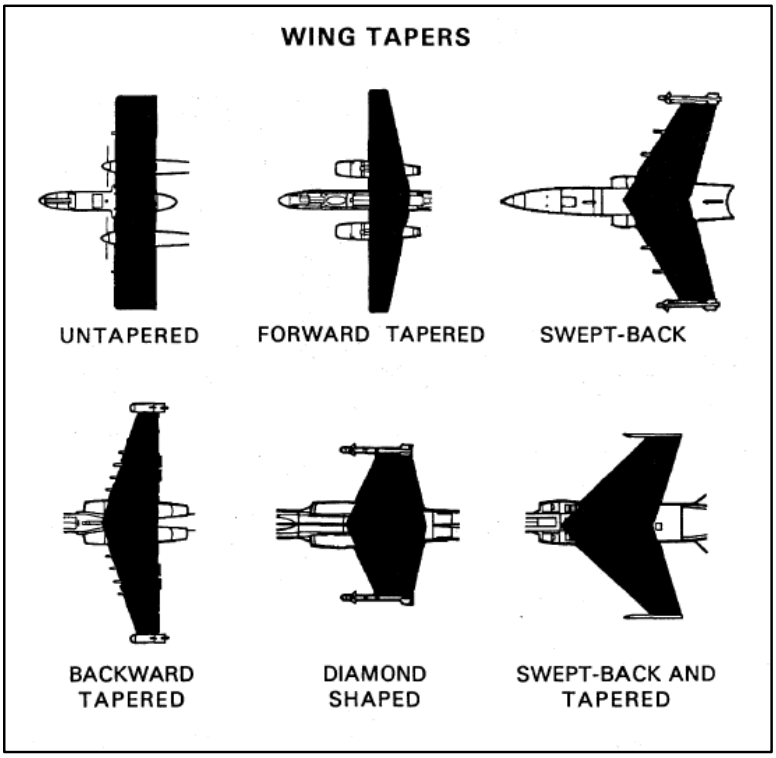

Figure 3-4. Types of Wing Tapers

Wing Shapes

3-8. There are many variations in designs of aircraft wings. However, the four most common wing shapes are, straight, swept-back, delta, and semi delta. See figure 3-5.

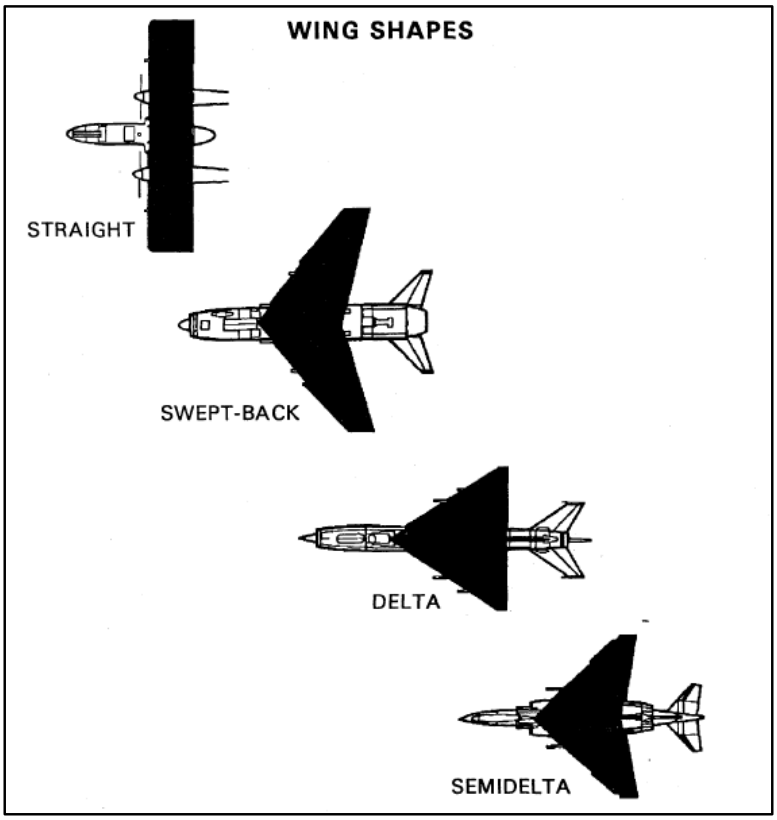

Figure 3-5. Wing Shapes

Canards

3-9. Canards are designed for stability, control and are located in forward part of the fuselage.

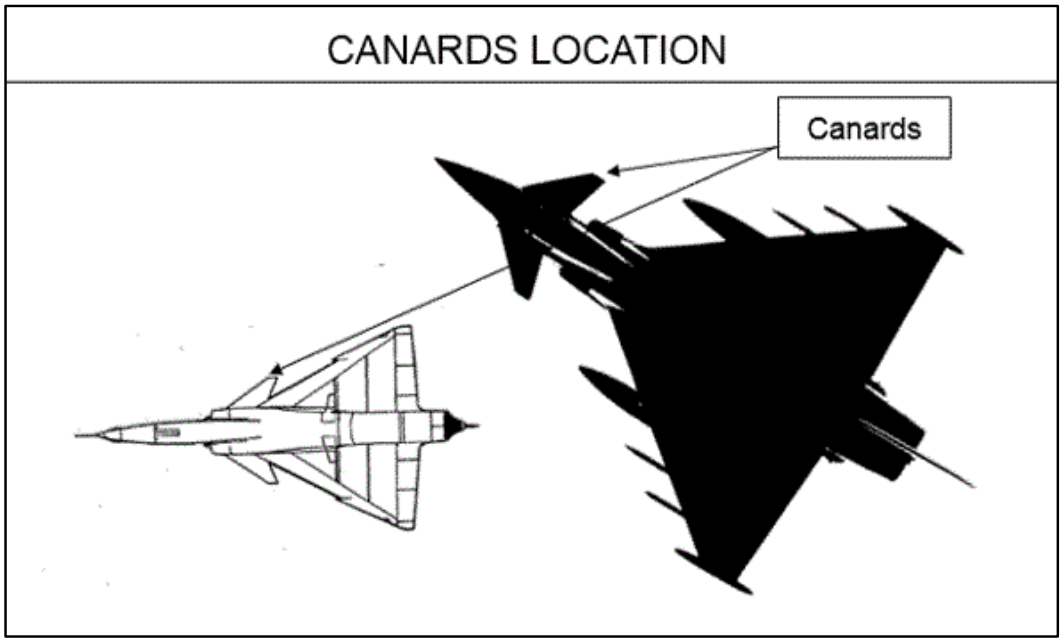

Figure 3-6. Canards

Wing Slants

3-10. Slant is the vertical angle of the wing with respect to a horizontal line drawn through the fuselage. See figure 3-6.

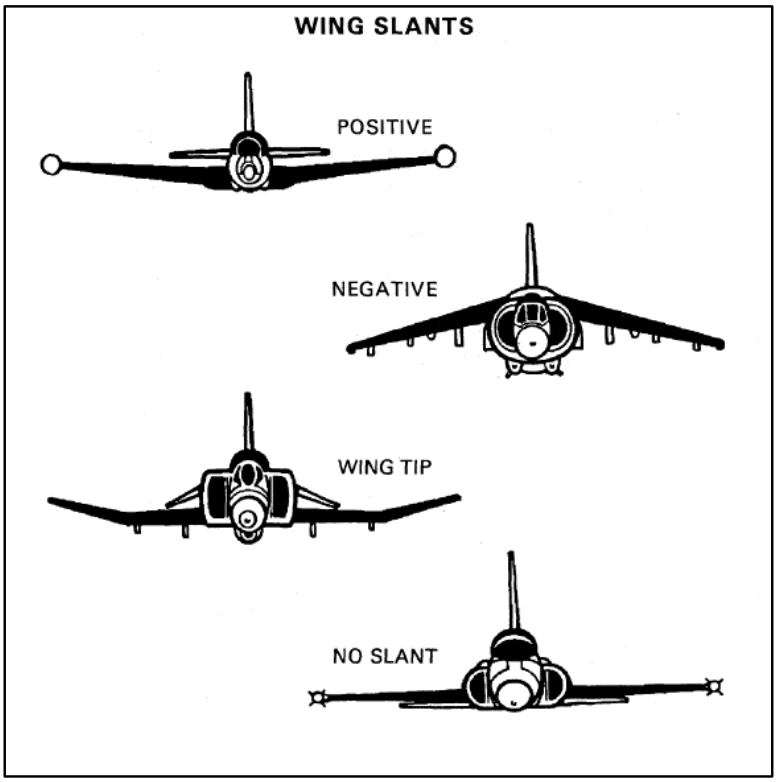

Figure 3-7. Wing Slants

ENGINE(S)

3-11. Recognition and identification features for aircraft engines are type, number, and location. Of significant interest is whether an aircraft has a propeller or no propeller. Aircraft that have engines that drive propellers identified as "propeller driven." Those aircraft that have engines that do not have propellers called "jets." Those aircraft that have an overhead propeller or rotor blades called rotary wing (e.g. a helicopter or tiltrotor).

Jet Engine

3-12. Jet driven aircraft have their engine(s) mounted inside or faired into their fuselages. They can be a single mounted engine or have multiply mounted engines. Figure 3-7, shows examples of single or multi-engine locations.

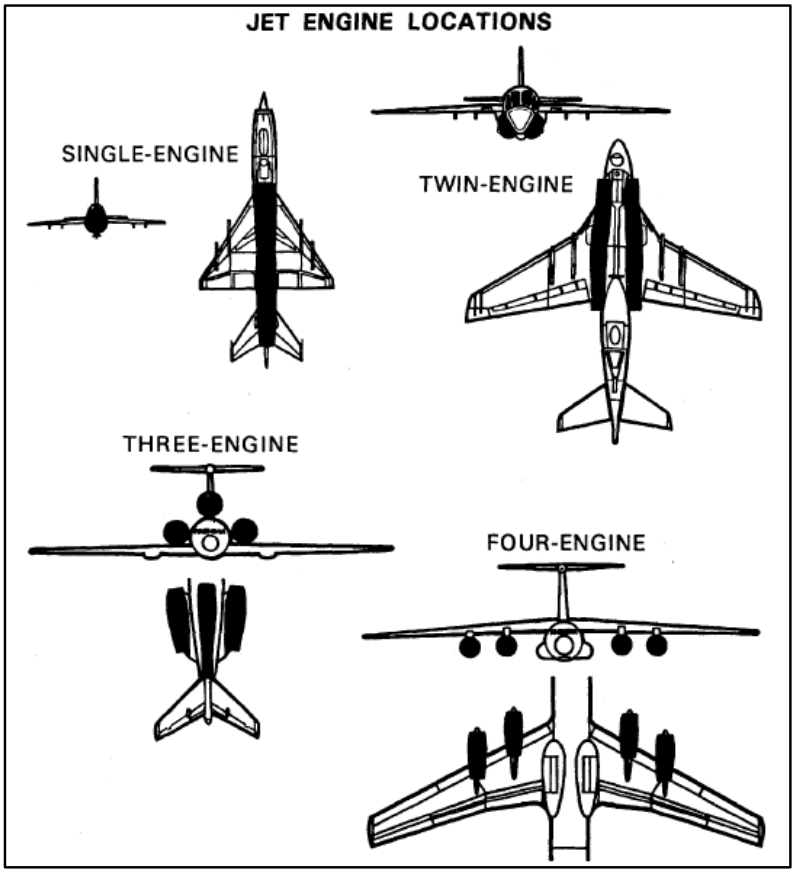

Figure 3-8. Engines and Locations

Propeller Driven

3-13. Propeller aircraft have engines that are located on the nose (for single engine aircraft) and on the leading edges of the wings (for the majority of multiengine aircraft). See figure 3-8.

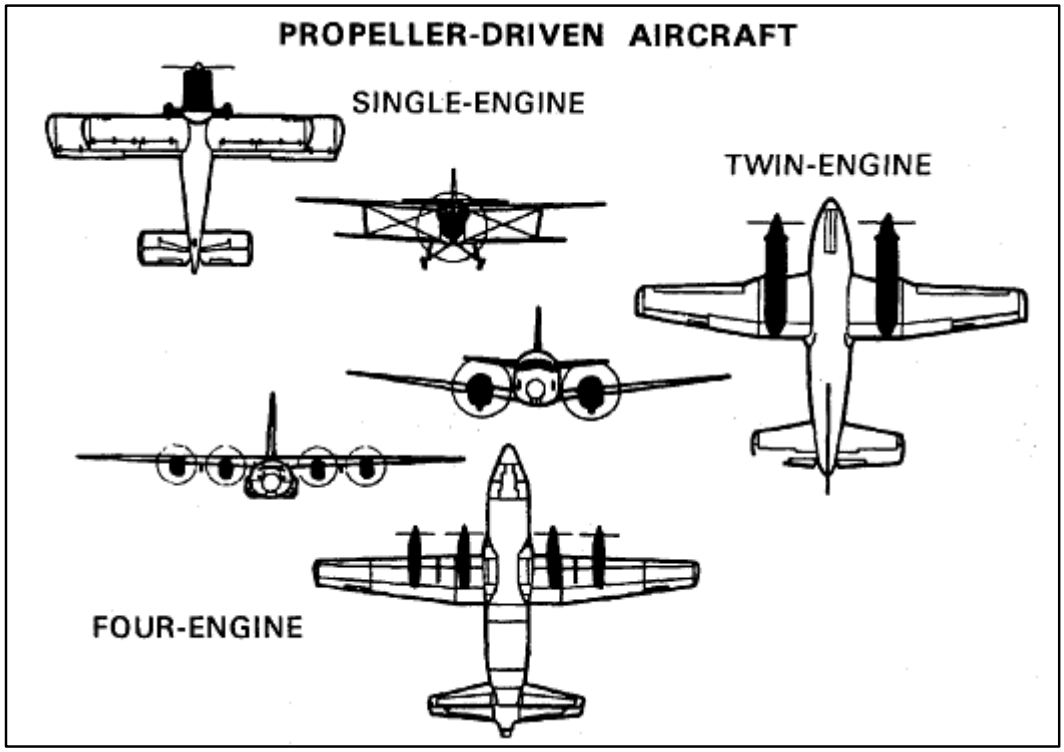

Figure 3-9. Propeller Driven Engines

FUSELAGE

3-14. Like other features, the fuselage comes in many shapes and sizes depending on its designed mission. There are three main sections of the fuselage: nose section, mid-section, and rear section, to include tail assembly. The cockpit or cabin is also a component of the fuselage, (nose section) as well as special fuselage features. Figure 3-9 shows the four main examples of configurations of aircraft fuselages. They can be thick or wide, rectangular (boxed), tubular (round), and slender tapered.

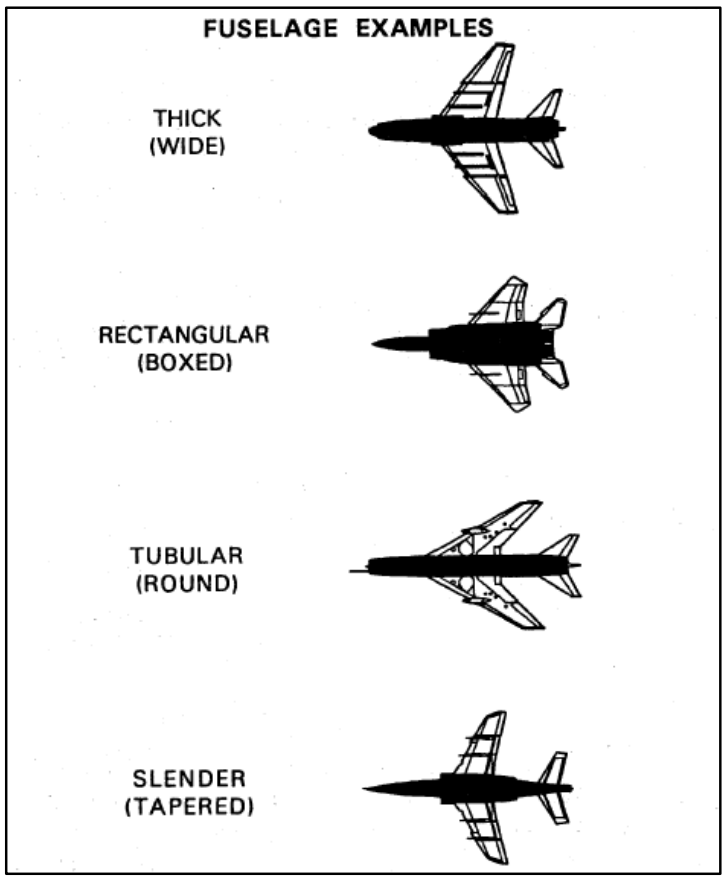

Figure 3-10. Fuselage Types

Canopy

3-15. The cockpit or cabin of an aircraft is the compartment that accommodates the pilot and or other personnel. It is usually covered by a transparent canopy or glassed-in enclosure. At times, the terms cockpit, cabin, and canopy are interchanged. The following illustration shows three examples of canopy shapes.

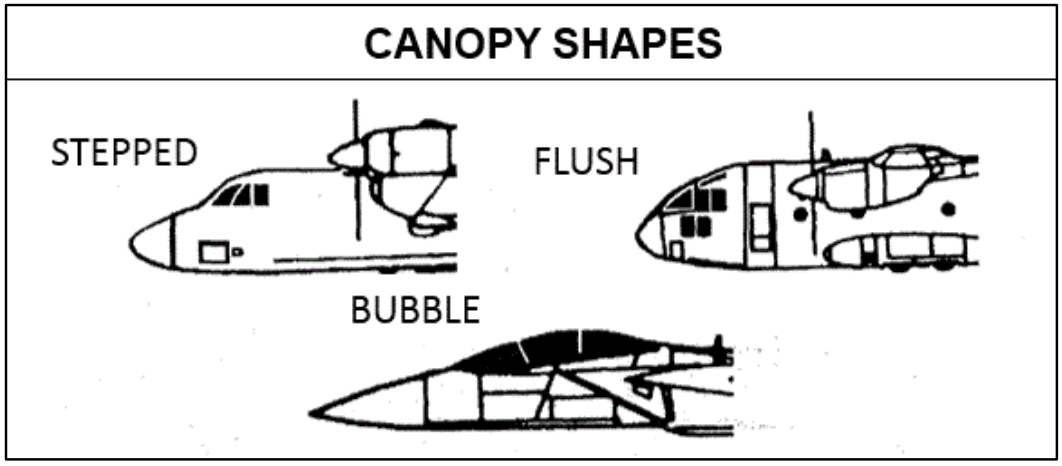

Figure 3-11. Canopy Shapes

Tail Fins

3-16. The number of tail fins on an aircraft helps to distinguish aircraft types such as jets or propeller-driven aircraft. This reduces the number of aircraft that must be sorted through to identify a specific aircraft. The following illustration shows four examples of single and multiple fin aircraft fin locations. See figure 3-10.

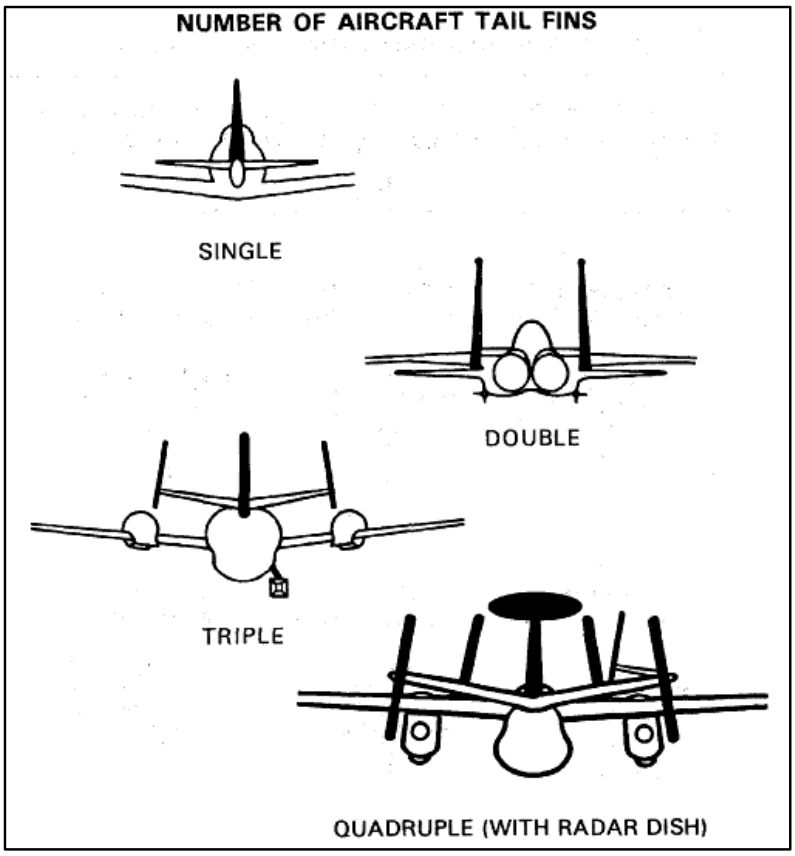

Figure 3-12. Number of Tail Fins

Fin Shapes

3-17. Tail fins (figure 3-11), are located on the aft sections of these fuselages. There are many fin shapes.

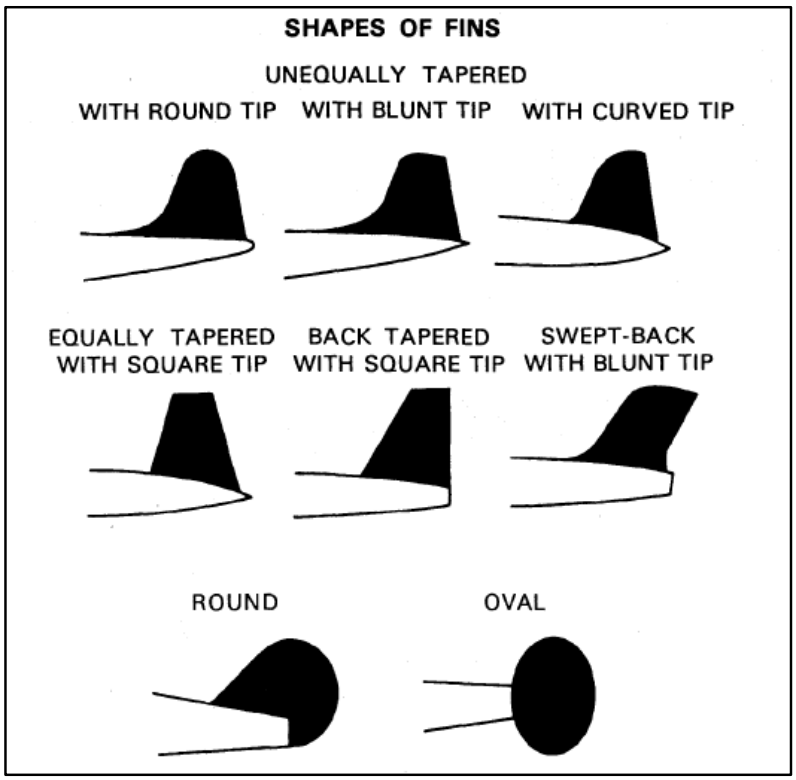

Figure 3-13. Tail Fins

Tail Flat Designs and Locations

3-18. Tail flats are located on the aft sections of these fuselages. They can have a positive slant, negative slant, or neutral slant. The tail flats may be slanted upward, neutral (straight across/no slant) or slanted downward. The shape of the tail flat is generally varied. See figure 3-12.

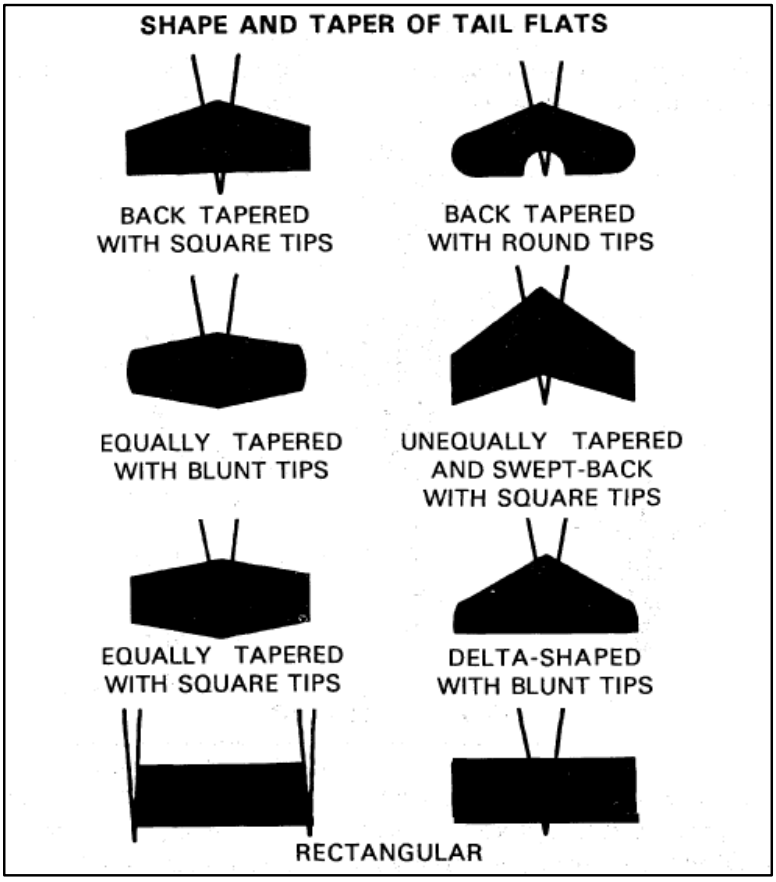

Figure 3-14. Tail Flats

Location/Position of Tail Flats

3-19. The location or position of the tail flat varies in relation to the fuselage and or tail fin. The location may be high mounted, mid mounted or low mounted. Some, but very few aircraft have no tail flats or tail fins at all. See figure 3-13.

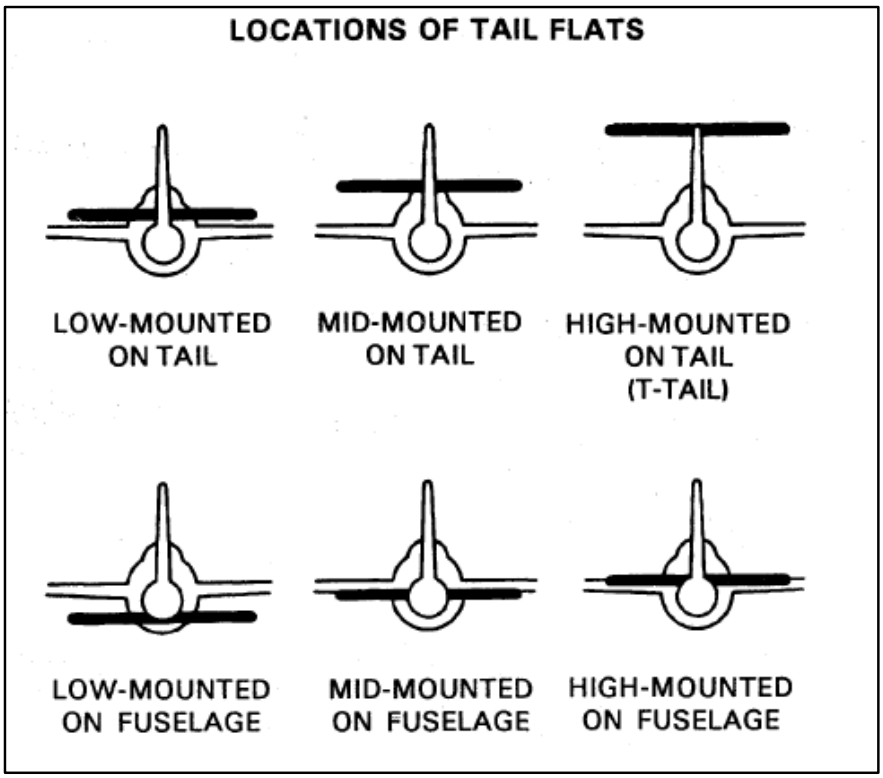

Figure 3-15. Location of Tail Flats

ROTARY WING (HELICOPTERS) AND TAIL ROTOR MOUNTING LOCATIONS

3-20. The main rotors of rotary wings are considered lifting devices (airfoils) and are classified as wings (as wings are considered lifting devices). Rotary wings may have from two to eight main rotor blades mounted both forward and aft or to the right and left of the fuselage. Figure 3-14 shows three examples of rotary wing rotor mounting locations as counting the number of blades is not feasible as a recognition feature due to speed rotation of the blades. In addition, some tail rotors are enclosed within the vertical fin at the tail section of the aircraft. Rotary wing aircraft have many tail configurations. Generally they are classified the same as fixed-wing aircraft

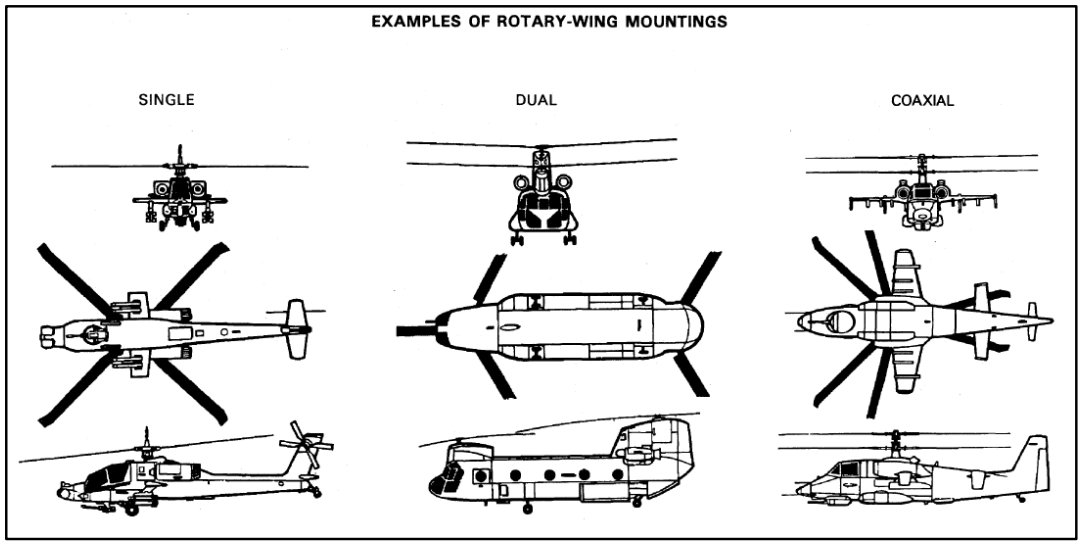

Figure 3-16. Rotary Wing and Tail Rotor Mounting Locations

3-21. Rotary-wing aircraft have many tail configurations. Generally they are classified the same as fixed-wing aircraft. The difference is the tail rotors. Figure 3-15 illustrates the two examples of tail rotors.

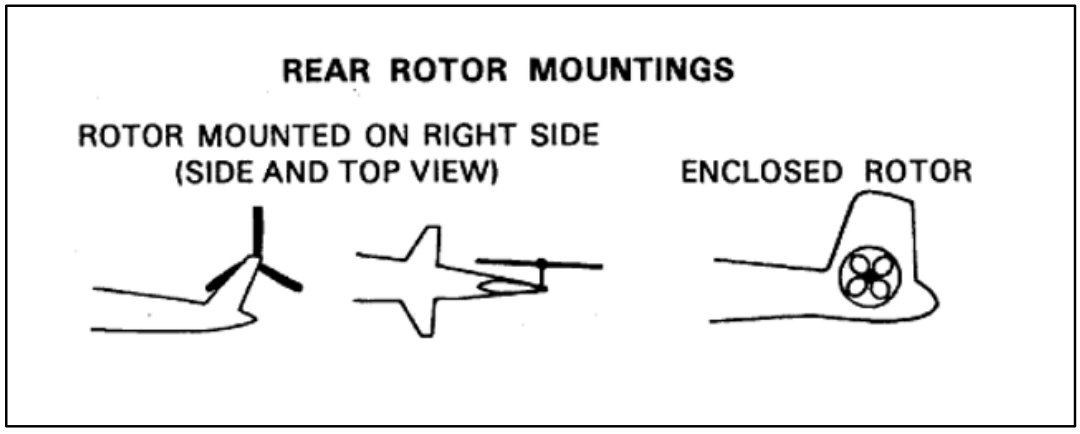

Figure 3-17. Rear Rotor Mounting

Chapter 4

VACR Training Program

This chapter describes training methods and the fundamentals of VACR. In addition, the chapter features training aids and slide kit training, which are used to develop and implement aircraft recognition training. PowerPoint and or interactive multimedia instruction are other media used for instruction.

FUNDAMENTALS OF VACR

4-1. Soldiers are required to recognize a selected number of aircraft in order to report an advisory's activities, avoid fratricide, and/or to enhance their ability to survive. When the mission is to defend the airspace above the battlefield to protect friendly assets, the ability to recognize and identify aircraft becomes even more important. VACR skills and training make it possible to discriminate between friendly and hostile aircraft by name, number, and type, which will help avoid destruction of friendly aircraft, and at the same time, recognize, identify, and engage hostile aircraft.

TRAINING METHODS, MANNER AND STYLE

4-2. Aircraft recognition and identification proficiency skills are gained through training. The training functions of plan, prepare, present, practice, and perform are the same in VACR training as for other classroom subjects. The skill level to which the unit will train depends on the unit's mission. A VACR training program should be based on established training methods; clearly defined individual skill levels that must be met; and the fundamentals of VACR

4-3. Key methodology in teaching and learning VACR skills has evolved over many years. VACR skills have become increasingly important, and several methods have been developed and used. Some US allies have developed VACR training that has had varying degrees of success, but that is different from the method used by the US military. Manner and style of presentation is nearly as varied, as there are individuals. These differences are not critical in VACR training. Most important is to understand and follow the training method currently in use and the sequence of instruction.

WINGS, ENGINE(S), FUSELAGE, AND TAIL (WEFT)

4-4. In the US military, the WEFT theory is the teaching method used to achieve an acceptable level of performance in VACR skills. Emphasize the aircraft's recognition and identification features that can be seen at a distance. Point out the characteristics of an aircraft that are similar to another aircraft, and also those features that make an aircraft unique. With the WEFT method, each aircraft is trained in its clean, uncluttered configuration. Aircraft speed, ceiling, and armament are not trained because they are not recognition or identification features.

AIRCRAFT COMPARISON

4-5. Paired comparison is the most effective way to present aircraft for recognition training. It is the key to sorting out aircraft and establishing a file of aircraft images for memorization. Use paired comparison training when teaching Soldiers new aircraft, or discrimination between aircraft. To pair aircraft, arrange the aircraft in sets based on the degree of similarity. When there is little to no similarity, pair the aircraft by type and primary roles.

NOTE: Introduce a new aircraft and point out the WEFT features for study.

4-6. Compare the new aircraft with an aircraft that was previously presented. When making comparisons, point out similarities and differences for each view presented. Use the same heading and climb angle for both aircraft. As the images are presented, it becomes obvious that the two aircraft have different forms and features, even when there are some similarities.

NOTE: If Soldiers confuse one aircraft with another, then pair the two aircraft for comparison.

4-7. Remember always use comparison training. Single images of aircraft are used to introduce new aircraft, for reviews, and for testing. Figure 4-1, shows an example paired comparison.

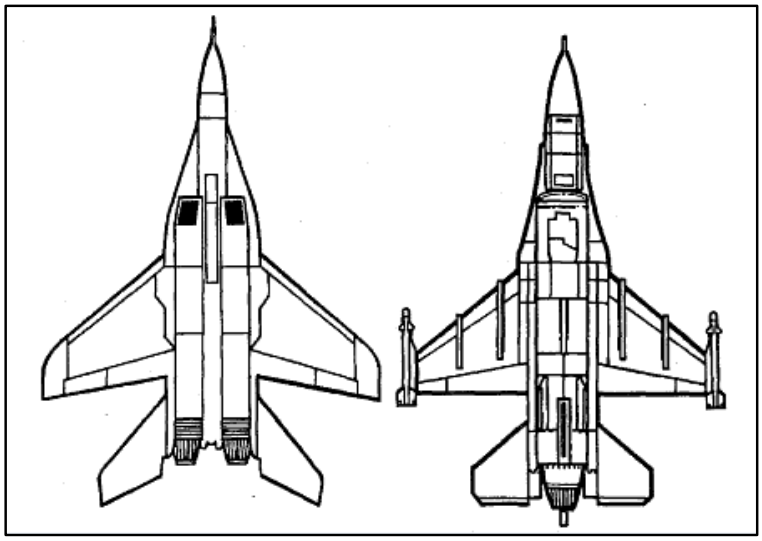

Figure 4-1. Paired Comparison

SELECTING AIRCRAFT FOR TRAINING

4-8. Select the aircraft to train from the unit's established list, and from the Soldier's manuals. The aircraft listed in the following illustration are the current minimum aircraft air defense Soldiers must recognize.

4-9. Depending on the theater of operation, a unit commander may select additional mission essential aircraft to add to the list. The aircraft selected should be those aircraft that will most likely be seen; that is, aircraft operating below 10,000 feet where identification by visual means is possible. Teaching noncritical aircraft such as highflying interceptors' uses up training time that would best be used to learn to recognize and identify highly critical forward area aircraft.

TRAINING

TRAINING FUNDAMENTALS

4-10. VACR basics and recall learning are essential for effective training. Understanding the fundamentals of VACR is an integral part of the planning stage of the training program.

PERSONNEL REQUIREMENTS

4-11. Evaluate your training needs. A review of personnel training records and the results of a VACR proficiency test will provide a list of Soldiers who need recognition training and to what degree they must be trained.

LEARNING VACR

4-12. The first step in recognizing and identifying aircraft is through repetitive memorization drills. With practice, the soldier can progress through successive, higher levels of learning and train other soldiers on VACR. Aircraft recognition should be presented in a manner that will encourage good performance. Motivation plays a major role in learning to recognize and identify aircraft. Extra effort is necessary to motivate yourself and others to learn VACR skills as an essential element of job performance as well as survival.

ELIMINATION OF DISTRACTION

4-13. VACR training is enough of a challenge without adding distractions. In a VACR class, such subjects as aircraft attack profiles, hostile target criteria, and IFF should not be included. The primary goal or focus in a VACR class is the identification of specific aircraft.

BEFORE TRAINING STARTS

4-14. Prepare the VACR presentations by developing training objectives, conditions, and standards. Then, write a lesson plan and set up a classroom. Planned VACR presentations are necessary to get the most from a unit's limited training time. Rehearse all VACR classes. Use the assistant instructor as an audience to provide feedback to improve your presentation. Instructors will use whatever resources are available (i.e. projectors, computers, and laptop).

INTRODUCTION TO VACR

4-15. During the introduction to visual aircraft recognition, present the Soldier with the description of the components of aircraft that are important to recognition and a simple vocabulary for use in describing aircraft. As a minimum, the introduction will include the following:

- A statement of the training objectives and standards as defined in your Soldier's manuals and programs of instruction.
- An explanation of the WEFT theory of visual aircraft recognition.
- A simplification of terms used in VACR (for example, tail flats and fins instead of horizontal and vertical stabilizers).
- A discussion of aircraft configurations using the WEFT method.

AIRCRAFT TEACHING TECHNIQUE

4-16. When teaching aircraft, state and restate the aircraft's name and or number when referring to the aircraft as a whole or any feature of the aircraft. Figure 4-2 on page 4-4, provides an example of this teaching technique.

AIRCRAFT·TEACHING·TECHNIQUE

"Wings·of·the·MIG-23·Flogger·are·high-mounted,·variable·swept-back and·tapered·with·blunt·tips·(the·MIG-23's·wingspan·changes·in·flight).

The·MIG-23's·one·jet·engine·is·mounted·inside·the·rear·section·of·the·fuselage. Rectangular·box·like·air·intakes·forward·of·the·wing,·giving·the·MIG-23·a·box·like appearance.·The·MIG-23·has·a·single·exhaust.

A·long,·sharp-pointed·nose·is·the·highlight·of·the·MIG-23's·fuselage. The·MIG-23's·body·widens·at·the·air·intakes·and·narrows·at·the·rear·section. The·MIG-23·has·a·stepped·canopy.

The·MIG-23·has·a·large·swept-back·and·tapered·tail·fin·has·a·curved·dorsal in·the·leading·edge·and·an·angular·tip.·Swept·back·and·tapered·flats·are high-mounted·on·the·fuselage·with·angular·tips.·Large·swept·back·tapered belly·fin·under·the·rear·section."

Figure 4-2. Aircraft Teaching Technique

PRACTICE AND PERFORM

4-17. After planning, preparing, and presenting all the aircraft. Proceed with the two final training functions of practice and perform which are accomplished through reviews and evaluations.

COMPREHENSIVE REVIEWS

4-18. After Soldiers have reached the desired level of VACR proficiency, the training program should not be relaxed based on the results of a single test. To continue peak performance, review the required list of aircraft regularly to refresh memories. Perform reviews as a member of a squad, section, or platoon, or through self-study. Provide reviews at the beginning of each training session and before a test.

PERFORMANCE EVALUATIONS

4-19. Validate the VACR training through evaluation, scheduling testing throughout the VACR course. End each period of instruction with a test, and include all previously learned aircraft in the test. Testing controls the individual Soldier's progress. If a test confirms that, a Soldier cannot recognize aircraft to standard, that Soldier should not continue in the course until the standards have been achieved.

4-20. Degradation of skills in VACR is very high, so schedule formal reviews and tests often, and in short training sessions. The time needed for review and testing will vary. For planning purposes, begin with 45 minutes to 1 hour per week to review and test 10 to 15 aircraft. In this way, all the mandatory aircraft will be covered in four or five weeks. Add more time if needed.

LEADER GUIDANCE

4-21. VACR training requires command guidance. Commanders should demand maximum performance in VACR and provide the training opportunities to reach and sustain excellence. Commanders should provide incentive through unannounced VACR skill evaluations and reward Soldiers who maintain high levels of performance. When the mandatory number of aircraft has been presented, reviewed, and tested, begin the process again, see table 4-1 on pages 4-5 through page 4-7.

Table 4-1. 2016 Aircraft list

MANUFACTURER	*AIRCRAFT NOMENCLATURE*	*NAME OF AIRCRAFT*
Ground Attack, Close Air Support, and Fighter bomber Aircraft		
Fairchild	A-10C	Thunderbolt II
Cessna	A-37	Dragon Fly (Cessna)
Dassault Aviation, Dornier Flugzeugwerke	Alpha Jet	Alpha Jet
AMX International	AMX	AMX
Boeing	AV-8B	Harrier II
Embraer Defense and Security	Embraer A-29	Super Tucano
Northrop	F-5A/T-38	Freedom Fighter/Tiger II/Talon
Chengdu Aircraft Corporation/Guizhou Aircraft Industry Corporation	F-7P	Airguard
Lockheed Martin	F-16	Fighting Falcon
Boeing	F/A-18	Hornet
Lockheed Martin	F-35	Lightning II
NAMC	Hawk	Hawk
Chengdu	J-10	Jian-10/Annihilator-10
PAC	JF-17	Thunder
SEPECAT	Jaguar	Jaguar
Israel Aircraft Industries	F-21	KFIR
Aero Vodochody	L-39	Albatross
Turbomeca Marbore	Fouga CM-170	Magister
Alenia Aermacchi	MB-339AN	
Mikoyan-Gurevich	MiG-17	Fresco
Mikoyan-Gurevich	MiG-21	Fishbed
Mikoyan-Gurevich	MiG-27	Flogger
Mikoyan-Gurevich	MiG-29	Fulcrum
Dassault Aviation	Mirage III/5	
Dassault Aviation	Mirage F1	
Nanchang Aircraft Mfg. Co.	Q-5/A-5	Fantan/Nanchang
SOKO	J-22	Orao
SIAI Marchetti	SF-260W	
Komsomoisk-on-Amur Aircraft Production Association	SU-17, 20, 22	Fitter
Sukhoi	SU-24	Fencer
Sukhoi	SU-25/28	Frogfoot
Panavia Aircraft GmbH	Tornado IDS	Tornado
List of Air Superiority and Interceptor Aircraft		
Eurofighter Jagdflugzeug GmbH	Typhoon	Typhoon
Grumman Aerospace Corporation	F-14	Tomcat
Boeing/McDonnell Douglas	F-15	Eagle
Lockheed Martin	F-22	Raptor
Saab	JAS 39	Gripen
Mikoyan-Gurevich OKB	MiG-19	Farmer
Mikoyan-Gurevich	MiG-23	Flogger
Mikoyan-Gurevich OKB	MiG-25	Foxbat
Mikoyan	MIG-31	Foxhound
Dassault Aviation	Mirage 2000	Mirage
Dassault Aviation	Rafale	Rafale
Sukhoi	SU-27	Flanker

Table 4-1. 2016 Aircraft list (continued)

MANUFACTURER	*AIRCRAFT NOMENCLATURE*	*NAME OF AIRCRAFT*
List of Bomber		
North American Rockwell/Rockwell International	B-1B	Lancer
Northrop Grumman	B-2	Spirit
Boeing	B-52	Stratofortress
IIyushin	IL-28	Beagle
Tupolev	TU-22M/TU-26	Backfire
Tupolev	TU-95	Bear
Tupolev	TU-160	Blackjack
List of Cargo and Transport Aircraft		
Antonov	An-12	Cub
Antonov	An-24/An-26	Coke/Curl
Antonov	An-32	Cline
Antonov	An-72	Coaler
Antonov	An-124	Condor
Construcciones Aeronauticas	C-212	Aviocar
De Havilland Canada	C-8A	Buffalo
Lockheed Martin	C-5	Galaxy
McDonnell Douglas/Boeing	C-17A	Globemaster III
Lockheed Martin	C-130/C-130J	Hercules/Super Hercules
Transall	C-160	Transall
Aeritalia	G.222	Aeritalia
ILyushin	IL-76	Candid
List of Utility Aircrafts		
Antonov	An-2	Colt
Beechcraft	C-12/B200	Super King
Short Brothers	C-23	Sherpa
Beechcraft	King Air	King Air
Cessna	O-2	Skymaster
Dornier Flugzeubau GmbH	DO-128-2	Skyservant
Pilatus Aircraft	PC-7	
Bell/Boeing	MV-22 Osprey	Osprey
List of Unmanned Aircraft		
Meggitt Defence Systems	BTT-3	Banshee
GIE Eurodrone	Brevel	Brevel
SAGEM	Crecerelle	Crecerelle
Xian	D-4 NPU	NPU
Teledyne Ryan	Model 324	Scarab
Teledyne Ryan	Model 410	
Selex ES	Mirach 26	
Selex	Mirach 100	Meteor
Northrop Grumman	MQ-5B	Hunter
Northrop Grumman	MQ-8	Fire Scout
AAI Corporation/Israel Aircraft Industries	RQ-2	Pioneer
General Atomics Aeronautical Systems	MQ-1	Predator
Northrop Grumman	RQ-4	Global Hawk
AAI Corporation	RQ-7	Shadow
Lockheed Martin	RQ-170	Sentinel

Table 4-1. 2016 Aircraft list (continued)

MANUFACTURER	*AIRCRAFT NOMENCLATURE*	*NAME OF AIRCRAFT*
AeroVironment	RQ-11B	Raven
General Atomics Aeronautical Systems	MQ-9	Reaper
Boeing Defense, Space & Security Insitu	ScanEagle	ScanEagle
IAI	Scout	Scout
Yakovlev	Shmel-1	Yak-061
	List of Rotary Wing Aircraft	
Bell	AH-1F	Cobra
Boeing	AH-64A	Apache
Boeing	AH-6/MH-6	Little Bird
Sud Aviation, Aerospatiale	SA-316/SA-319	Alouette III
Airbus Hellicopters, Helibras, Aerospatiale, Turkish Aerospace Industries	AS332/AS532	Super Puma/Cougar
Messerschmitt-Bolkow-Blohm (MBB)	BO-105	
Boeing	CH-47	Chinook
Sikorsky	CH-53	Sea Stallion
Aerospatiale, Eurocopter, Airbus Helicopters	SA 365	Dauphin 2
Hughes Helicopters, McDonnell Douglas Helicopter Systems	MD 500	Defender
Aerospatiale/Westland Aircraft/Soko	SA 342M	Gazelle
Harbin Aircraft manufacturing Corporation, Westland Lynx	Harbin Z-9/AS 365	Lynx/Super Lynx
Changhe Agusta Helicopter Co	Hirundo A109	
Kamov	Ka-27	Helix
Kamov	Ka-50/52	Hokum A/Hokum B
Westland Helicopters. AgustaWestland	WG-13	Lynx
Agusta, AgustaWestland	Agusta A129	Mangusta
Mil	Mi-2	Hoplite
Aerospatiale/Westland Aircraft/Soko	SA 342M	Gazelle
Mil	Mi-17/Mi-8	Hip
Mil	Mi-24/25/35	Hind
Mil	MI-26	Halo
Mil	Mi-28	Havoc
NHIndustries/Eurocopter	NH90	NH90
Hughes Tool Co.	OH-6A	Cayuse
Bell	OH-58D	Kiowa
Eurocopter	PAH-2/EC-665	Tiger/Tiger
Aerospatiale	SA-330	Puma
Sikorsky Aircraft	SH-3	Sea King
Sud Aviation, Aerospatiale	SA-321	Super Frelon
Sikorsky	UH-60	Black Hawk
Eurocopter	UH-72	Lakota

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Appendix A

Ground Attack, Close Air Support and Fighter Bomber

These aircraft can perform a variety of missions to include everything from reconnaissance to interdiction in both the forward and rear areas. If deployed in a close air support or air-to-ground interdiction role their function is tactical rather than strategic, operating at the front of the battle rather than against targets deep in the enemy's rear.

SPECIFIC PLATFORMS

A-1. As with many classifications of combat aircraft, the definition of ground attack is somewhat vague. Ground-attack aircraft are military aircraft designed to attack targets on the ground and are often deployed as close air support for, and in proximity to, their own ground forces. The proximity to their own forces requires precision strikes from these aircraft that are not always possible with conventional bomber aircraft although several near-peer militaries are developing precision-guided munitions that mimic those precision-guided munitions that the US employs. The resultant proximity to enemy targets and the expectation that they will receive crew-served and small arms fire requires aircraft that are more robust than other types of military aircraft. Russian ground interdiction and multi-role models have similar speed and range to US air superiority aircraft but lack beyond-visual-range, air-to-air missiles and sophisticated radar that air superiority fighters carry. They often they carry more powerful guns and other weapons than air superiority fighters.

A-2. Examples of ground interdiction and CAS aircraft include the American A-10 Thunderbolt II (CAS), the Russian Sukhoi Su-25 Frogfoot (CAS), Beechcraft T-6 Texan II (CAS), Russian Sukhoi Su-24 Fencer (multi-role), the French Dassault Rafale (multi-role), and the Chinese Chengdu J-10 (multi-role).

A-3. It is imperative to remember the primary means of VACR: the use of WEFT. It is good to know range, length, payload capabilities of aircraft but the underlying principal in VACR to enable Soldiers to identify, determine and engage is the use of WEFT (see figure A-1 on page A-2).

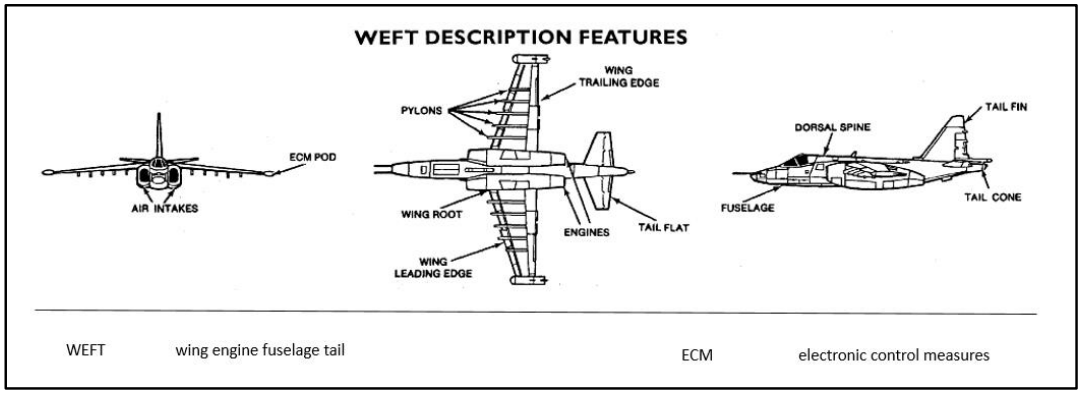

Figure A-1. WEFT Description Features

A-4. The appendix list current ground attack, CAS and fighter-bomber aircraft that Soldiers should be familiar with. Leadership must ensure that any list used for VACR training remains current and is updated depending on the regional threat information that units receive when deployed see table A-1.

Table A-1. List of Ground Attack, CAS and Fighter Bomber Aircraft

NAME OF AIRCRAFT	*COUNTRY OF ORGIN*
A-10C Thunderbolt II	US
A-37 Dragon Fly (Cessna)	US
Alpha Jet	France and Germany
AMX	Italy and Brazil
AV-8 Harrier II	US, United Kingdom
Embracer A-29 Super Tucano	Brazil
F-5 Freedom Fighter/Tiger II/ T-38 Talon	US
F-7P Airguard	China
F-16 Fighting Falcon	US
F/A-18 Hornet	US
F-35 Lightning II	US
Hawk	United Kingdom
J-10	China
JF-17 Thunder	China/Pakistan
Jaguar	France, United Kingdom
F-21 KFIR	Israel
L-39 Albatross	Czechoslovakia
Fouga Magister CM-170	France
MB-339AN	Italy
MiG-17 Fresco	Russia
MiG-21 Fishbed	Russia
MiG-27 Flogger	Russia
MiG-29 Fulcrum	Russia
Mirage III/5	France
Mirage F1	France
Q-5 Fantan/A-5 Nanchang	China
J-22 ORAO	Romania and Yugoslavia
SF-260W	Italy
SU-17, 20, 22 Fitter	Russia
SU-24 Fencer	Russia
SU-25/28 Frogfoot	Russia
Tornado IDS	Italy, Germany, United Kingdom

A-5. General criteria for each aircraft platform covered in this appendix is provided in the following illustrations. See figures A-2 through A-33 (on pages A-3 through A-34).

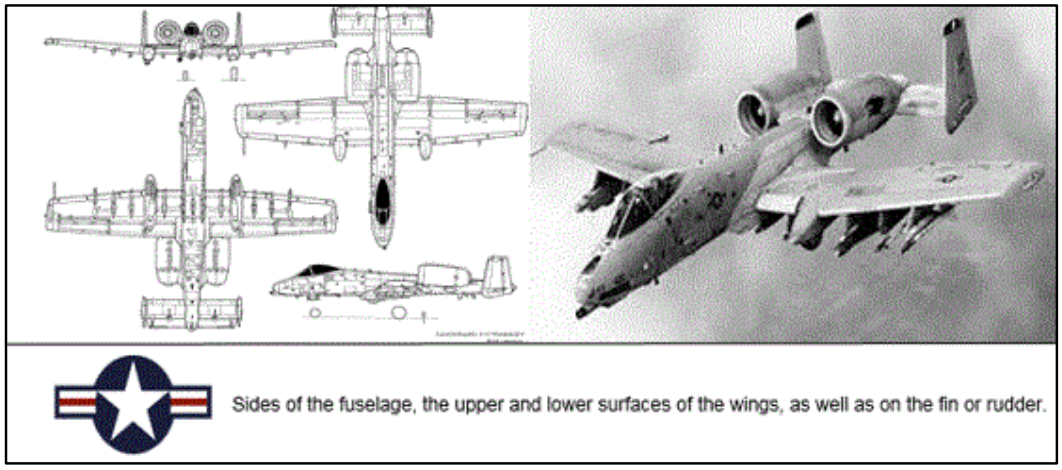

Figure A-2. A-10C Thunderbolt II

GENERAL DATA:

Country of Origin: US

Similar Aircraft: None, but compares with the Su-25 Frogfoot

Crew: One

Role: CAS, Ground Attack

Armament: Bombs, Rockets, Missiles, and Guns

Dimensions: Length: 53 ft, 4 in (16.23 m), Span: 57 ft, 6 in (17.54 m)

WEFT DESCRIPTION

Wings: Low-mounted on the fuselage, untapered to the wheel pods, and equally tapered from the wheel pods to the blunt, curled under tips. Landing gear pods are under the wings.

Engine(s): Two turbofans mounted externally. Large circular air intakes and round exhausts are located in the tubular cowls.

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

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

Sides of the fuselage, the upper and lower surfaces of the wings, as well as on the fin or rudder

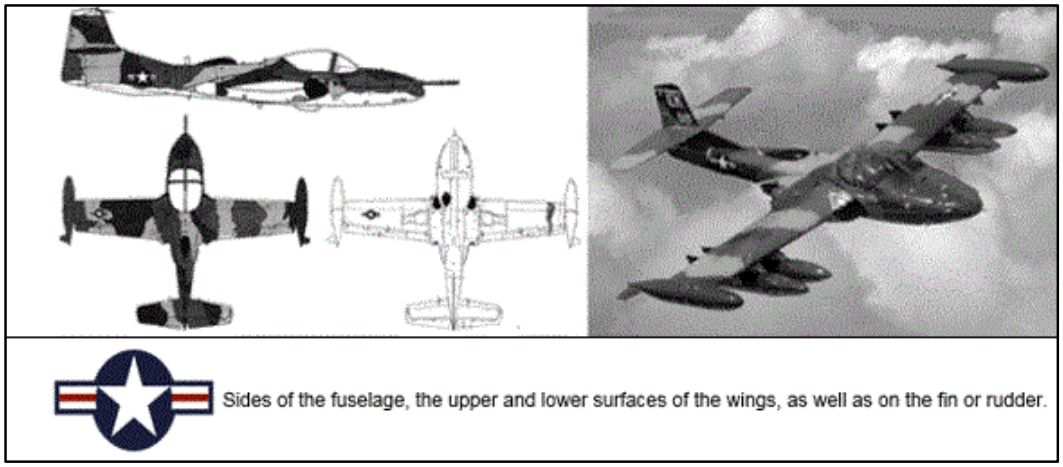

Figure A-3. A-37 Dragon Fly (Cessna)

GENERAL DATA:

Country of Origin: US

Similar Aircraft: Galeb-Jastreb, M.B.326, M.B.339, Hawk

Crew: Two

Role: Light-attack, forward air control, reconnaissance, observation

Armament: Bombs, rockets, gun pods, mini-gun

Dimensions: Length: 29 ft, 3 in (8.94 m), Span: 33 ft, 9 in (10.32 m).

WEFT DESCRIPTION

Wings: Mid-mounted, straight leading edge and slight forward taper in the trailing edge with square tips (generally fuel tanks).

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

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

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

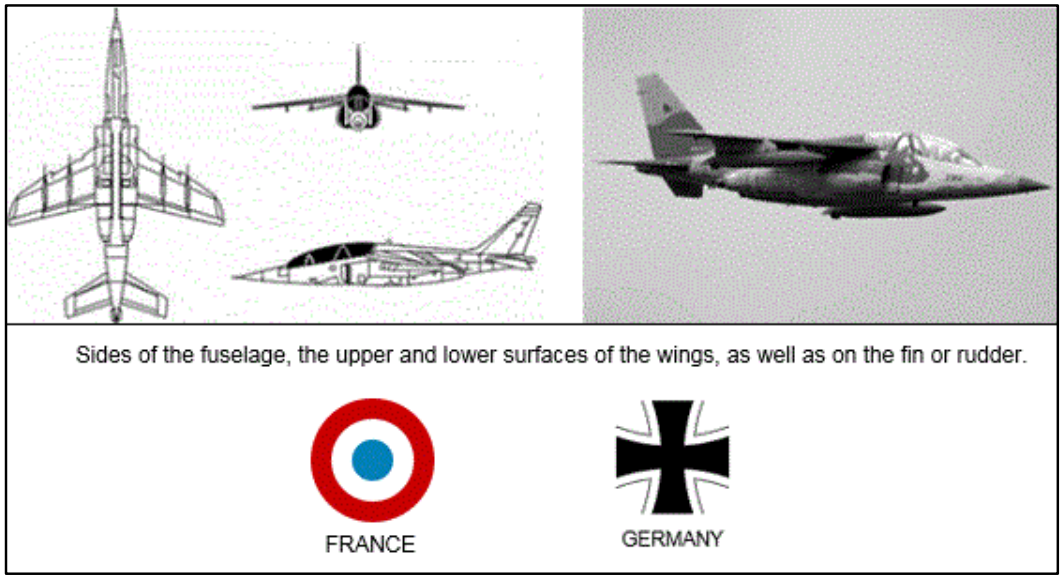

Figure A-4. Alpha Jet

GENERAL DATA:

Countries of Origin: France, Germany.

Similar Aircraft: Hawk, AMX, Mirage F1, AV-8B Harrier II

Crew: Two

Armament: Gun pods, bombs, rockets, missiles

Dimensions: Length: 40 ft., 3 in (12.3 m), Span: 30 ft. (9.14 m)

WEFT DESCRIPTION

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

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

Fuselage: Slender, pointed nose and tail. Two seat cockpit with a bubble canopy.

Tail: Swept-back and tapered tail fin with a clipped tp. Swept-back and tapered tail flats mid-mounted on the body with a negative slant and square tips.

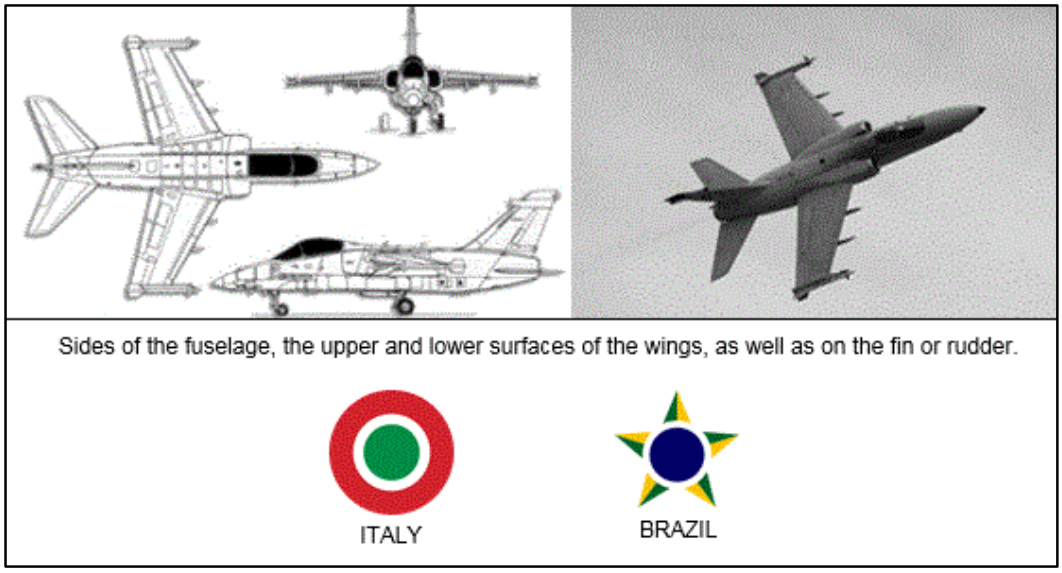

Figure A-5. AMX

GENERAL DATA

Countries of Origin: Italy, Brazil.

Similar Aircraft: Alpha Jet, Mirage F1, AV-8B Harrier II.

Crew: One

Role: Light bomber, fighter

Armament: Bombs, cluster bombs, rockets, AAMs, ASMs

Dimensions: Length: 44 ft, 6 in (13.58 m), Span: 29 ft (8.84 m)

WEFT DESCRIPTION

Wings: High-mounted, swept-back, and tapered with square tips (AAMs usually mounted).

Engine(s): One turbofan inside body. Two air intakes forward of the wing roots. Single exhaust.

Fuselage: Pointed nose and bubble canopy. Body widens at the air intakes and tapers to the rear section.

Tail: Flats mid-mounted on fuselage, swept-back, and tapered fin with a blunt tip.

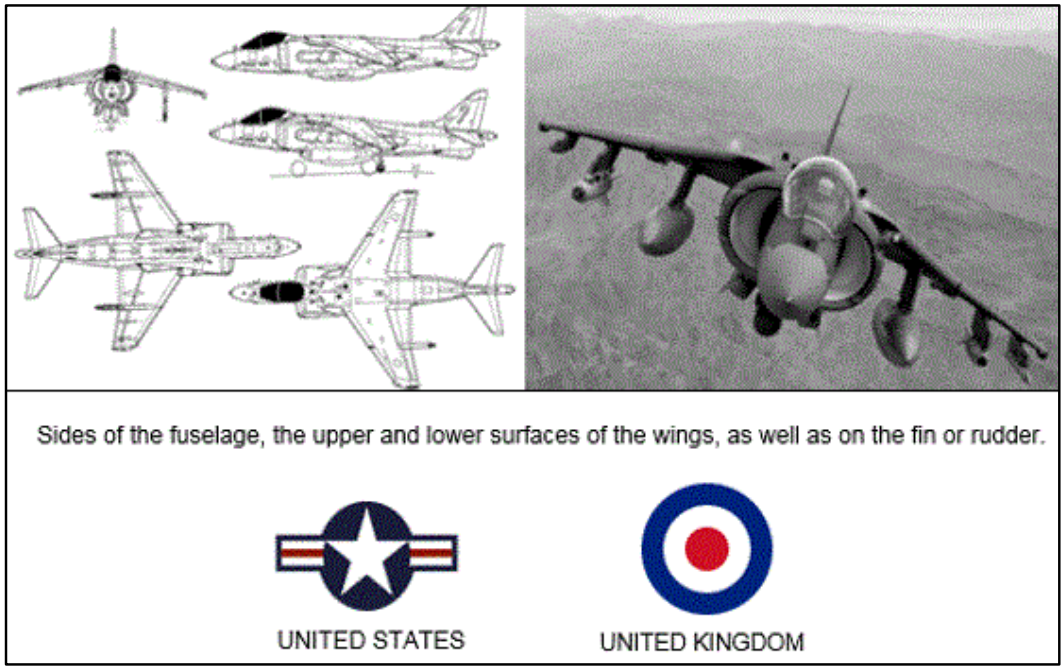

Figure A-6. AV-8B Harrier II

GENERAL DATA

Countries of Origin: US, United Kingdom

Similar Aircraft: Yak-38 Forger, Mirage F1, AMX.
Crew: One

Role: VSTOL fighter, CAS.

Armament: Cannon, missiles, bombs, rockets, and gun pods.

Dimensions: Length: 46 ft, 4 in (14.13 m), Span: 30 ft, 4 in (9.25 m).

WEFT DESCRIPTION

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

Engine(s): One vectored thrust turbofan mounted in the body. Large semi-circular air intakes that give the body a round appearance from the head-on view.

Fuselage: Thick, rounded, and tapering to a slender tail. Pointed nose and bubble canopy.

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

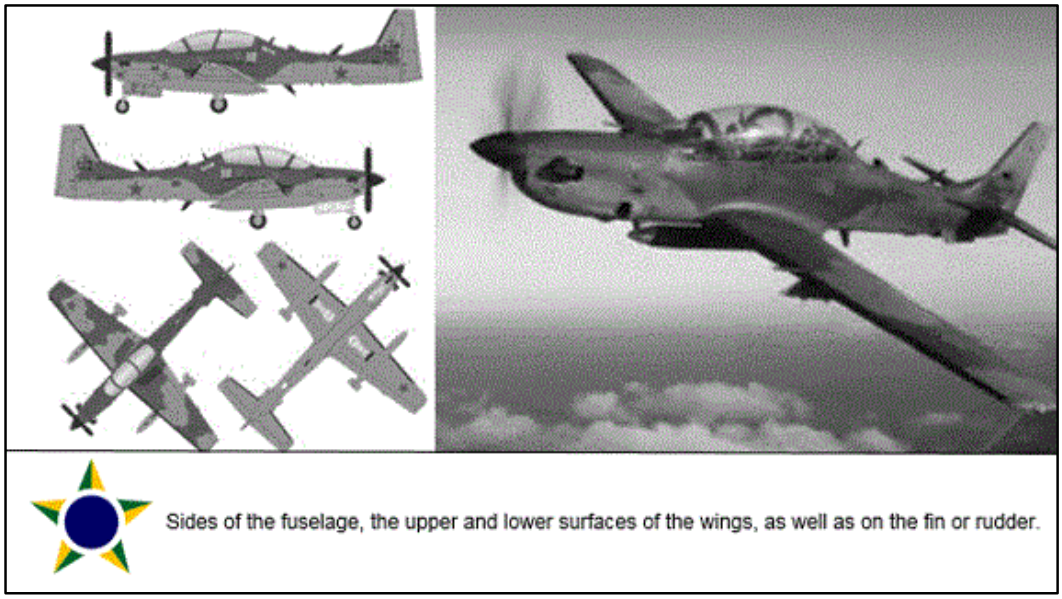

Figure A-7. Embracer A-29 Super Tucano

GENERAL DATA:

Country of Origin: Brazil

Similar Aircraft:

Crew: Two

Role: Light attack, counter-insurgency aircraft

Armament: machine gun, bombs, missiles, rockets

Dimensions: Length: 37 ft, 3.6 in (11.3 m), Span: 36 ft, 6 in (11.1 m)

WEFT DESCRIPTION

Wings: Low-mounted, straight shaped, positive slant, forward tapered wings.

Engine(s): One turboprop engine mounted in the nose section.

Fuselage: Tubular slender body tapering toward the end.

Tail: Mid-mounted tail flat. Back tapered tail fin with square tip.

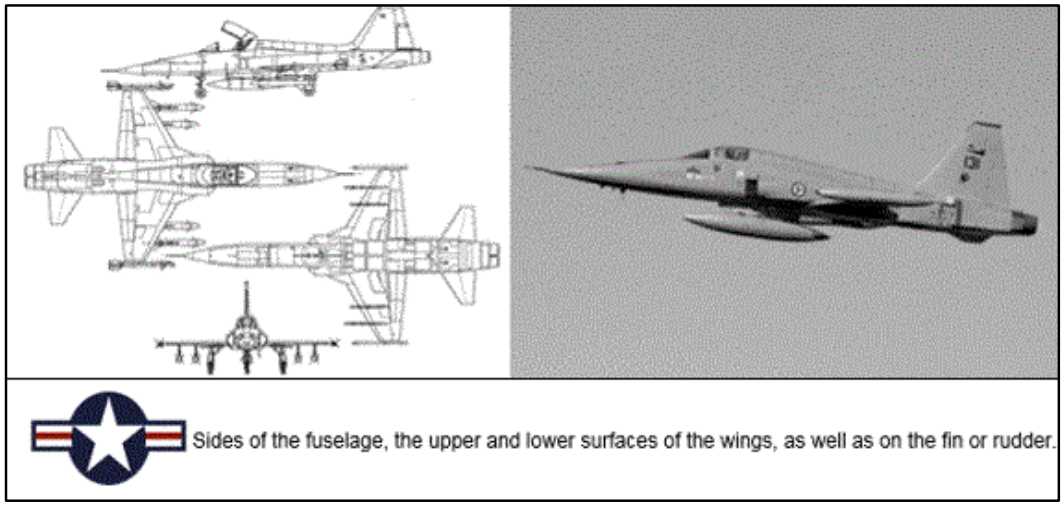

Figure A-8. F-5 Freedom Fighter/Tiger II/T-38 Talon

GENERAL DATA:

Country of Origin: US

Similar aircraft: F-104 Starfighter, Hawk, M.B.339, Yak-38 Forger

Crew: F-5F = One; T-38 = Two

Role: Fighter-bomber, CAS

Armament: Cannon, Bombs, Rockets.

Dimensions: Length: 48 ft (14.65 m), Span: 26ft, 8 in (8.14 m).

WEFT DESCRIPTION

Wings: Low-mounted, stubby, and unequally tapered. Missile or fuel tanks are normally carried on the square tips.

Engine(s): Two engines inside the body, semicircular air intakes forward of the wing roots. Shotgun exhaust.

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

Tail: Flats are low mounted and equally tapered. Fin is large and equally Tapered with a square tip.

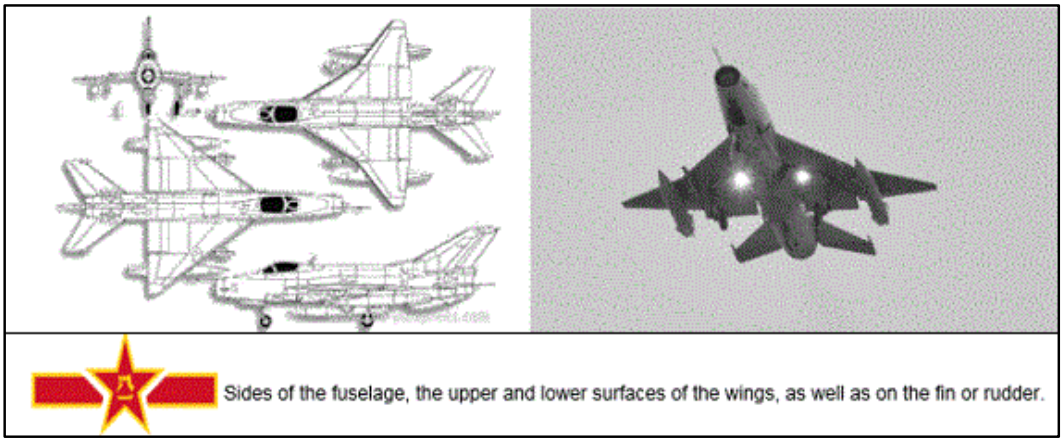

Figure A-9. F-7P Airguard

GENERAL DATA:

Country of Origin: China

Similar aircraft: MiG-21Fishbed

Crew: One

Role: Interceptor/strike fighter

Armament: Cannon, Bombs, Missiles, Rockets.

Dimensions: Length: 45 ft. (13.95 m), Span 23ft, 5 in (7.15 m).

WEFT DESCRIPTION

Wings: Mid-mounted, delta shaped, no slant, swept-back and tapered.

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

Fuselage: Long, tubular body with a blunt nose and bubble canopy. One belly fin under the rear section. Large dorsal spine, flush with the canopy.

Tail: Flats low mounted, unequally tapered and swept-back with square tips. Single fin is large and swept-back with blunt tip.

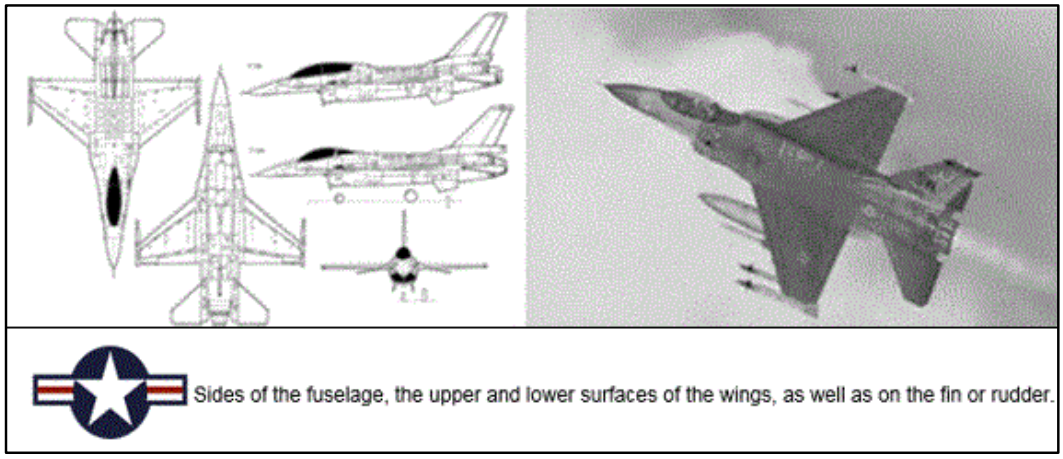

Figure A-10. F-16 Fighting Falcon

GENERAL DATA:

Country of Origin; US

Similar aircraft: F/A-18 Hornet, MiG-29 Fulcrum, Mirage F1, J-10, JF-17 Thunder

Crew: One; F-16B = Two

Role: Multi-role ground-attack/fighter.

Armament: Cannon, Bombs, Missiles.

Dimensions: Length: 47 ft 8 in (14.54 m), Span: 31 ft, (9.46 m).

WEFT DESCRIPTION

Wings: Mid-mounted, delta-shaped. Missiles are normally mounted at the win tips.

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

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

Tail: Swept-back, tapered fin with square tip. Flats are mid-mounted on the fuselage, delta-shaped with square tips, and a slight negative slant and has two belly fins.

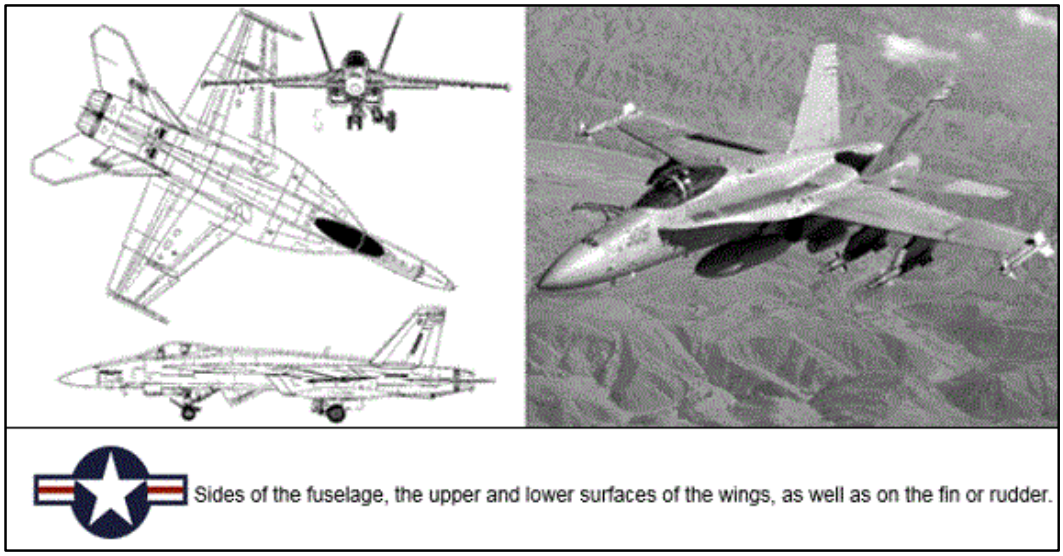

Figure A-11. F/A-18 Hornet

GENERAL DATA:

Country of Origin—US

Similar aircraft: F-16 Fighting Falcon, Mig-29 Fulcrum, Su-27 Flaker, F-15 Eagle.

Crew: One; TF/A-18 = Two

Role: US Marine Corps fighter, strike

Armament: Cannon, Bombs, Missiles, Rockets

Dimensions: Length: 56 ft (17.08 m), Span: 37 ft, 6 in (11.44 m)

WEFT DESCRIPTION

Wings: Mid-mounted, semi delta with prominent leading edge root extension on sides of fuselage from the wing to the front of the cockpit. Missiles are usually on square tips.

Engine(s): Two turbofans mounted in the 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 canopy.

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

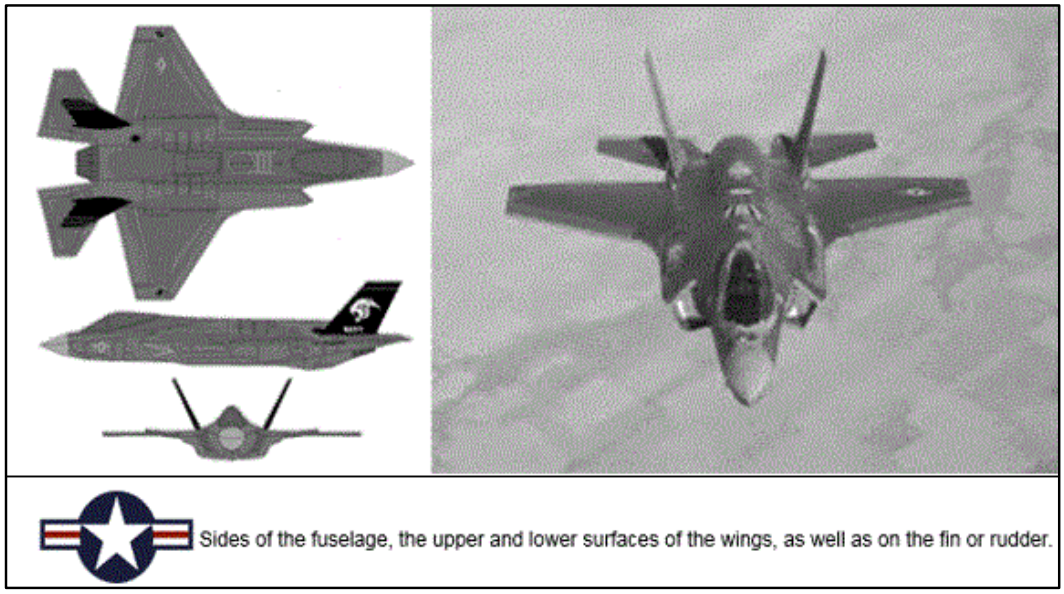

Figure A-12. F-35 Lightning II

GENERAL DATA:

Country of Origin: US

Similar aircraft: F-16.

Crew: One

Role: US Marine Corps fighter, strike.

Armament: Cannon, Bombs, Missiles, Rockets.

Dimensions: Length: 51.4 feet (15.67m), Span: 35 feet (10.7m)

WEFT DESCRIPTION

Wings: Mid-mounted, semi delta with prominent leading edge root extension on sides of fuselage from the wing to the front of the cockpit. Missiles are usually on square tips.

Engine(s): Two turbofans mounted in the 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 canopy.

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

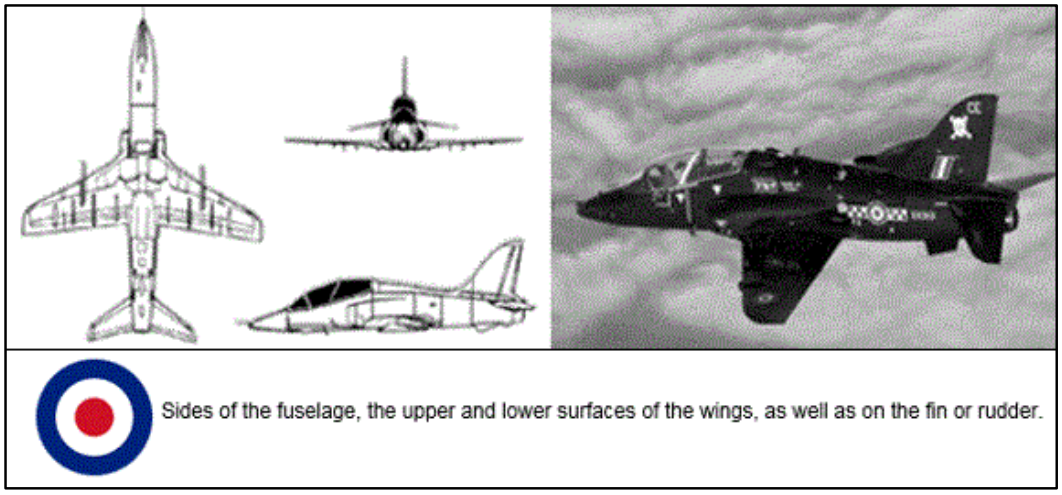

Figure A-13. Hawk

GENERAL DATA

Country of Origin: United Kingdom

Similar aircraft: Alpha Jet, M.B.326, AMX, F-5 Freedom Fighter

Crew: Two

Role: Light-attack, trainer

Armament: Bombs, Gun Packs, Rockets

Dimensions: Length: 39 ft (11.94 m), Span: 31 ft, (9.42 m).

WEFT DESCRIPTION

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

Engine(s): One turbofan located inside the body. Semicircular air intakes alongside the body forward of the wing roots. Single exhaust.

Fuselage: Club-shaped with pointed nose and a taper to the rear. Bubble canopy.

Tail: Flats are high-mounted on the fuselage, swept-back, and tapered. Swept-back and tapered fin with a curved tip.

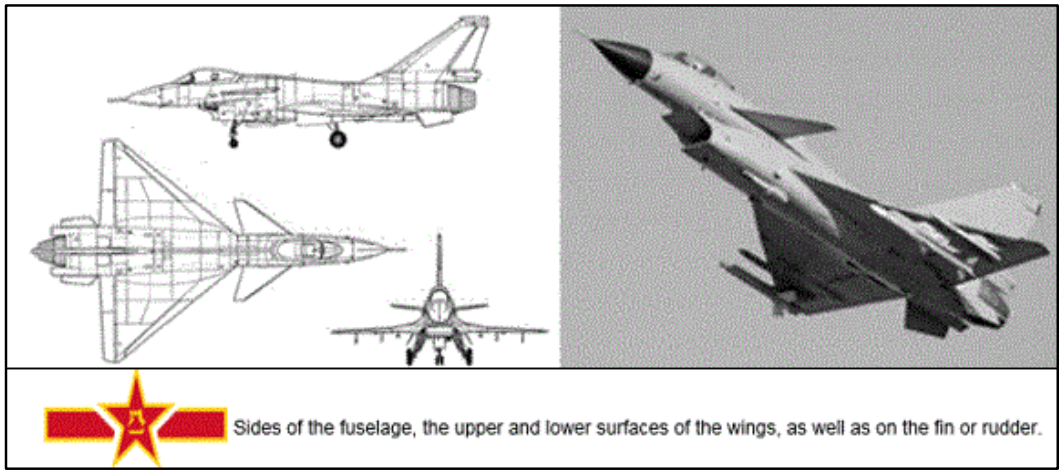

Figure A-14. J-10 (Jian-10/Annihilator-10)

GENERAL DATA:

Country of Origin: China.

Similar aircraft: MiG-29 Fulcrum

Crew: One

Role: Multi-role ground-attack/fighter

Armament: Cannon, bombs, missiles, rockets

Dimensions: Length: 50 ft 10.2 in. (15.5 m), Span: 31ft, 11.88 in (9.75 m)

WEFT DESCRIPTION

Wings: Low-mounted monoplanes with gradual sweep back that run along more than half the length of the fuselage sides.

Engine(s): One turbojet inside body. Rectangular intake ramp located underneath the fuselage providing air supply to engine.

Fuselage: Tubular complete with a conical nose assembly fitted just forward and below the high mounted cockpit.

Tail: Flats low-mounted on the tail fin, equally tapered with square tips. Single fin swept- back and tapered with a square tip.

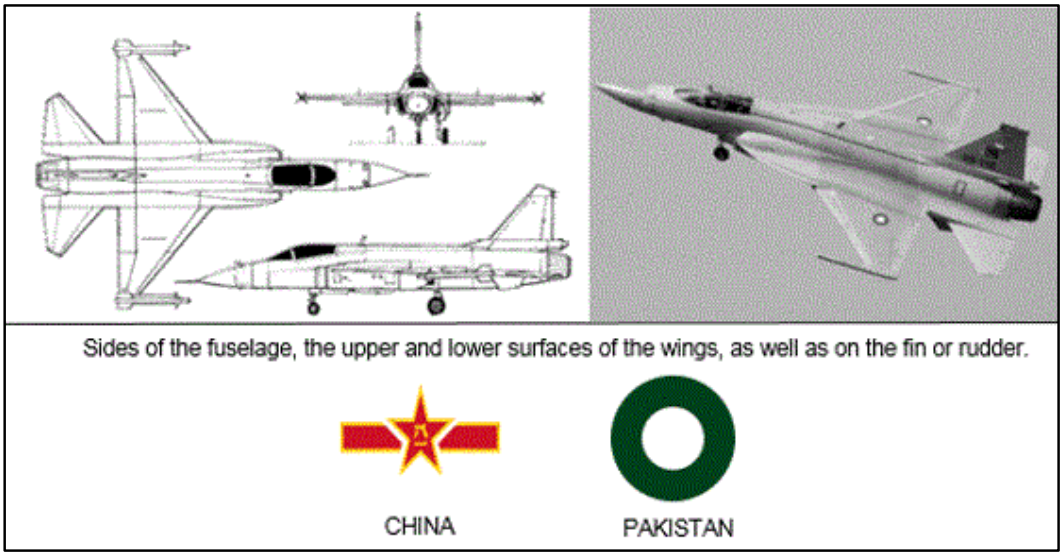

Figure A-15. JF-17 Thunder

GENERAL DATA:

Country of Origin: China/Pakistan.

Similar aircraft: F-5A Freedom Fighter, F-16, T-38 Talon, Mirage F-1

Crew: One

Role: Multi-role ground-attack/fighter

Armament: Cannon, bombs, missiles, rockets

Dimensions: Length: 49 ft. (14.93 m), Span: 31ft. (9.45 m)

WEFT DESCRIPTION

Wings: Low-mounted monoplanes with gradual sweep back that run along more than half the length of the fuselage sides.

Engine(s): One turbofan inside body. Rectangle air intakes in the wing roots. Single exhaust.

Fuselage: Tubular complete with a conical nose assembly fitted just forward and below the high mounted cockpit.

Tail: Flats low-mounted on the tail fin, equally tapered with square tips. Single fin swept- back and tapered with a square tip.

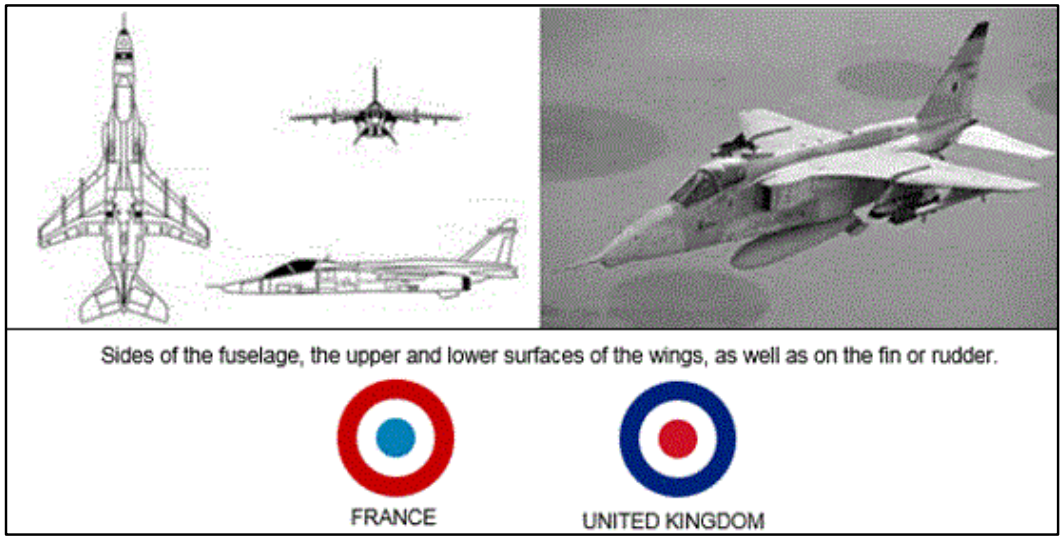

Figure A-16. Jaguar

GENERAL DATA:

Countries of Origin: France, United Kingdom

Similar aircraft: MiG-27 Flogger, AMX

Crew: One; trainer = Two.

Role: Strike, fighter, trainer.

Armament: Cannon, rockets, bombs, and missiles

Dimensions: Length: 51 ft (15.54 m), Span: 28 ft (8.54 m)

WEFT DESCRIPTION

Wings: High-mounted, swept-back, and modified delta with blunt tips.

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

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

Tail: Tail flats and fin are swept-back and tapered with square tips. Flats are mid- mounted on the fuselage with a negative slant.

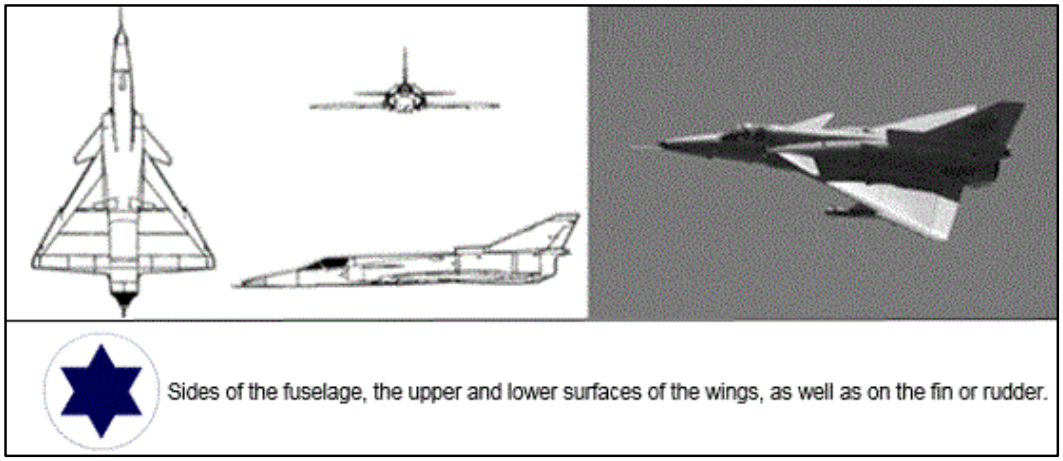

Figure A-17. F-21 KFIR

GENERAL DATA:

Country of Origin: Israel

Similar aircraft: Mirage III/5, Mirage 2000

Crew: One; trainer = Two

Role: Ground-attack, interceptor.

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

Dimensions: Length: 53 ft 8 in (16.36 m), Span: 27 ft (8.24 m).

WEFT DESCRIPTION

Wings: Low-mounted, delta-shaped with a saw tooth in the landing edges. Small canards are mounted on the air intakes.

Engine(s): One turbojet inside fuselage. Semi-circular air intakes alongside the fuselage. Large single exhaust.

Fuselage: Tube-shaped with long, solid, pointed nose. Body widens at the air intakes. Bubble canopy flush with the spine.

Tail: No tail flats. Fin is swept-back and tapered with a prominent step in the leading edge.

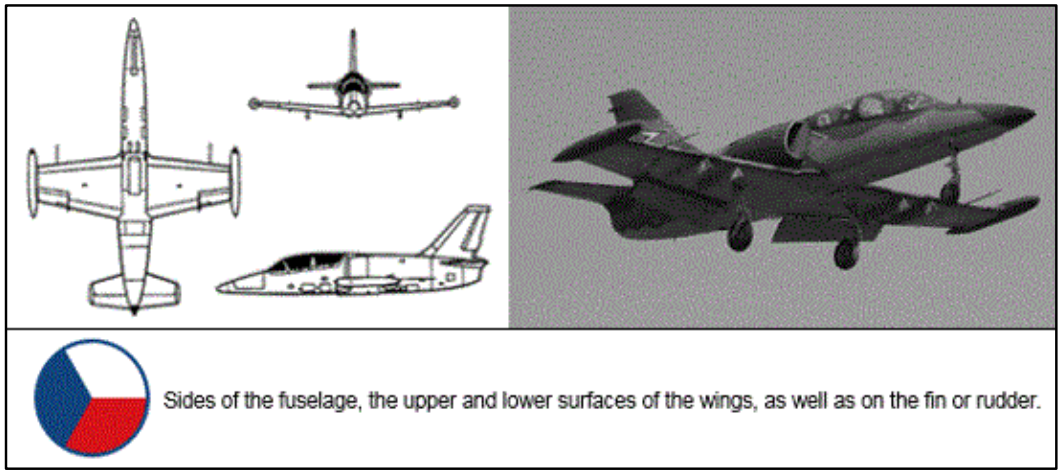

Figure A-18. L-39 Albatross

GENERAL DATA:

Country of Origin: Czechoslovakia.

Similar aircraft: Galeb/Jastreb, Hawk.

Crew: Two

Role: Trainer, light attack

Armament: Pod-mounted gun pack, bombs, rockets

Dimensions: Length: 39 ft 8 in (12.1 m), Span: 31 ft, (9.4 m)

WEFT DESCRIPTION

Wings: Low-mounted, equally tapered with wing tip tanks.

Engine(s): One turbofan inside body. Air intakes are semicircular and high-mounted on the fuselage aft of the cockpit. Small single exhaust.

Fuselage: Tube-shaped, tapering to the front and the rear. Pointed nose and bubble canopy.

Tail: Swept-back and tapered fin with a blunt tip. Flats are high-mounted on the fuselage equally tapered with blunt tips.

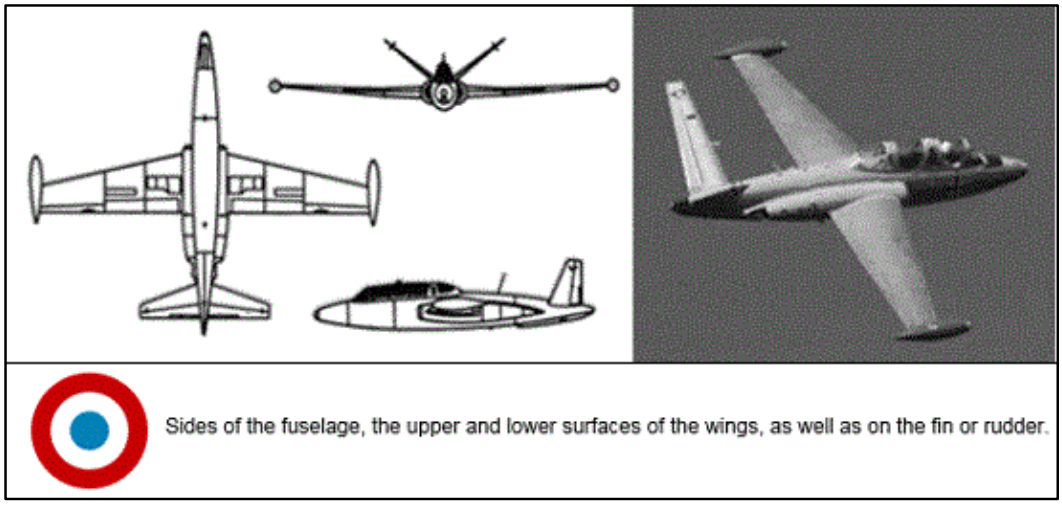

Figure A-19. Fouga CM-170 Magister

GENERAL DATA:

Country of Origin: France.

Similar aircraft: M.B. 337.

Crew: Two

Role: Light attack, trainer

Armament: Missiles, bombs, rockets, machine guns

Dimensions: Length: 33 ft (10.06 m), Span: 37 ft, 5 in (11.4 m)

WEFT DESCRIPTION

Wings: Mid-mounted and back-tapered. Fuel tanks are usually at the square tips.

Engine(s): Two turbojets mounted on sides of fuselage. Semicircular air intakes mounted in the wing roots. Small exhausts located just forward of the tail section.

Fuselage: Slender, tubular, and tapered at the rear. Rounded nose and long, bubble canopy.

Tail: V-shaped tail fins that also serve as tail flats, back-tapered with blunt tips.

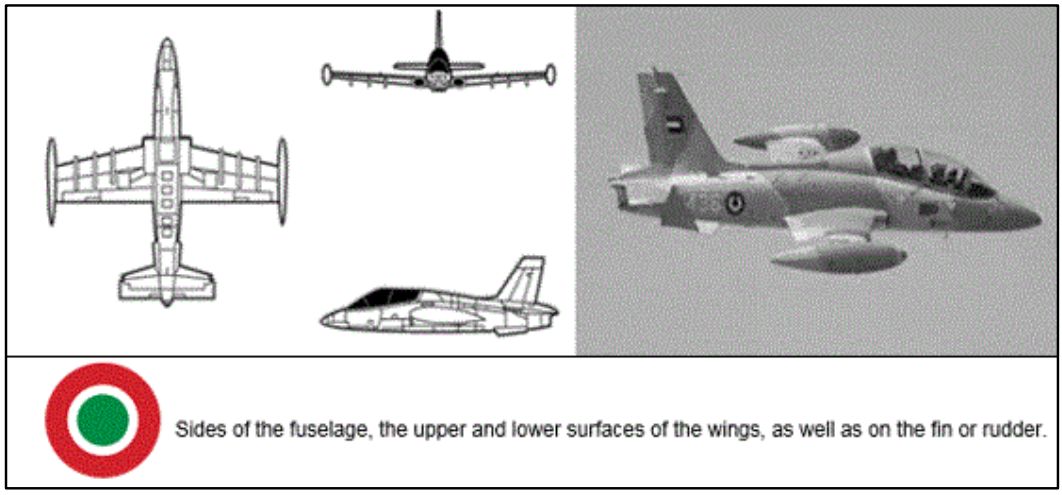

Figure A-20. MB-339AN

GENERAL DATA:

Country of Origin: Italy

Similar aircraft: Galeb'Jastreb, Hawk, Dragonfly

Crew: Two; 339K = One

Role: Trainer, ground-attack, ECM.

Armament: Bombs, gun pods, minigun, missiles, rockets.

Dimensions: Length: 36 ft (10.98 m), Span: 35 ft, 8 in (10.86 m)

WEFT DESCRIPTION

Wings: Low-mounted with back-tapered leading edge and straight trailing edge. Positive slant. Fuel tanks are usually at the square tips.

Engine(s): One turbojet inside the body. Oval air intakes in wing roots. Single exhaust protrudes past tail.

Fuselage: Tubular, tapered to the front and to the rear. Long, bubble canopy and a curved dorsal spine.

Tail: Flats high-mounted on the fuselage with tapered leading edges and blunt tips. Fin is swept-back and tapered with a blunt tip.

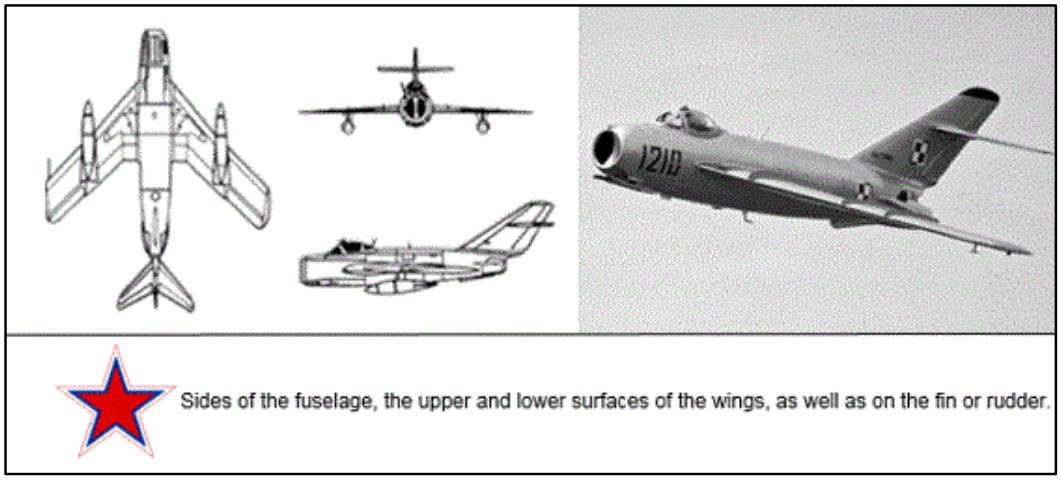

Figure A-21. MiG-17 Fresco

GENERAL DATA:

Country of Origin: Russia.

Similar aircraft: MiG-19 Farmer, Su-17 Fittler, MiG –21 Fishbed.

Crew: One

Role: Fighter-bomber

Armament: Three 23-mm cannons, bombs, rockets

Dimensions: Length: 36 ft, 5 in (11.1 m), Span: 31 ft, 7 in (9.46 m)

WEFT DESCRIPTION

Wings: Mid-mounted, swept-back, and tapered with blunt tips. Wide wing roots.

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

Fuselage: Short, thick, cigar-shaped, tapered to the rear. Blunt nose and bubble canopy.

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

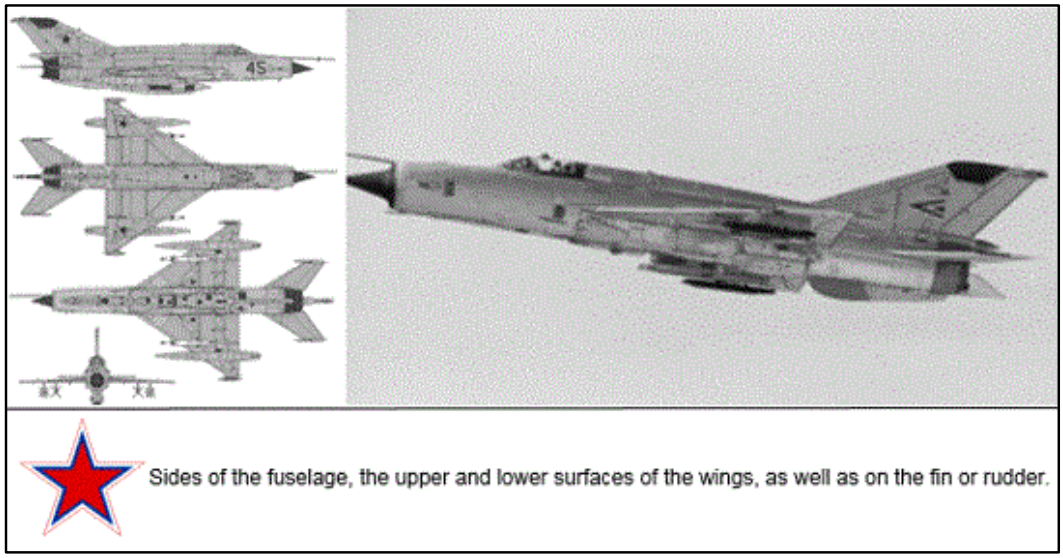

Figure A-22. MiG-21 Fishbed

GENERAL DATA:

Country of Origin: Russia

Similar aircraft: Fitters, all models, Mirage III/5, F-7P Airguard

Crew: One; MiG-21U Mongol = Two

Role: Ground attack, interceptor, trainer

Armament: Cannon, missiles, rockets, and bombs

Dimensions: Length: 51 ft, 8 in (15.54 m), Span: 23 ft, 5 in (7.16 m)

WEFT DESCRIPTION

Wings: Mid mounted, delta wing with small square tips.

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

Fuselage: Long, tubular body with a blunt nose and bubble canopy. One belly fin under the rear section. Large dorsal spine, flush with the canopy.

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

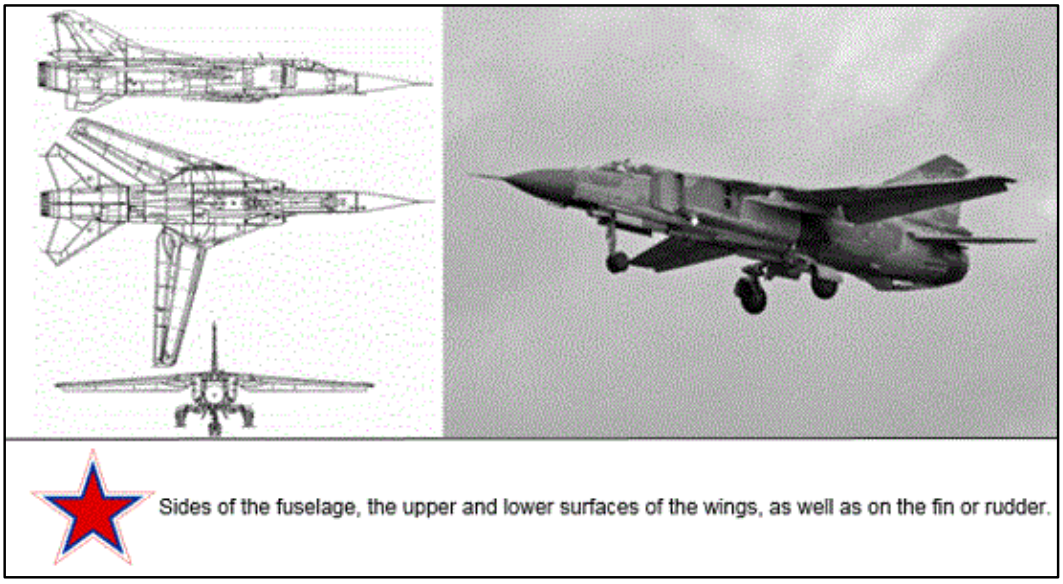

Figure A-23. MiG-27 Flogger

GENERAL DATA:

Country of Origin:Russia

Similar aircraft; Mig-23 Flogger B/E/G, Tornado, Su-24 Fencer, Mirage F1, Jaguar

Crew: One

Role: Ground-attack, fighter

Armament: Cannon, bombs, missiles, and rockets

Dimensions: Length: 55 ft (16.6 m), Span: 46 ft, 9 in (14.26 m)

WEFT DESCRIPTION

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

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

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

Tail: Swept-back and tapered tail fin with curved dorsal in leading edge and angular tip. Swept back and tapered flats high mounted on the fuselage with angular tips.

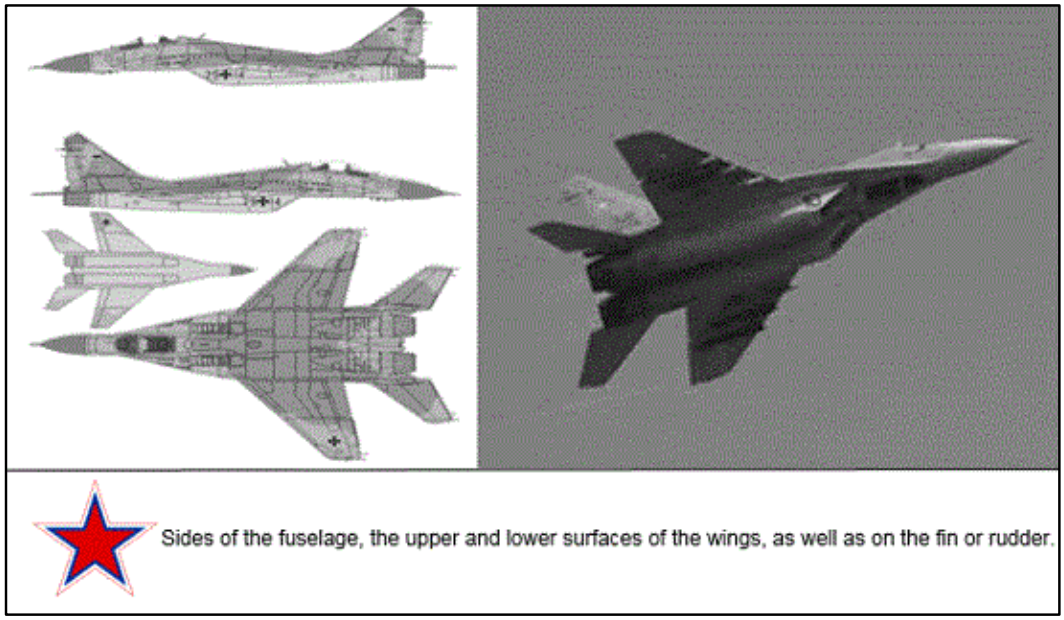

Figure A-24. MiG-29 Fulcrum

GENERAL DATA:

Country of Origin: Russia.

Similar aircraft: F/A-18 Hornet, F-16 Fighting Falcon, F-15 Eagle, Su-27 Flanker

Crew: One

Role: Attack, Counter air fighter

Armament: Missiles. 30-mm gun, bombs, missiles, and rockets

Dimensions: Length: 56 ft 9 in (17.3 m), Span: 37 ft, 5 in (11 m)

WEFT DESCRIPTION

Wings: Swept-backed and tapered with square tips. LERXs are wide and curved down to the front. LERX begins on the nose below the mid-mount point, and the wings' trailing edges end at a high mounted point.

Engine(s): Twinjets mounted low and to the sides of the fuselage. Diagonal-shaped air intakes.

Fuselage: Long, thin, slender body with pointed drooping nose.

Tail: Fins have sharply tapered leading edges, canted outward with angular cutoff tips. Flats are high-mounted on the fuselage, movable, swept-back, and tapered with a negative slant.

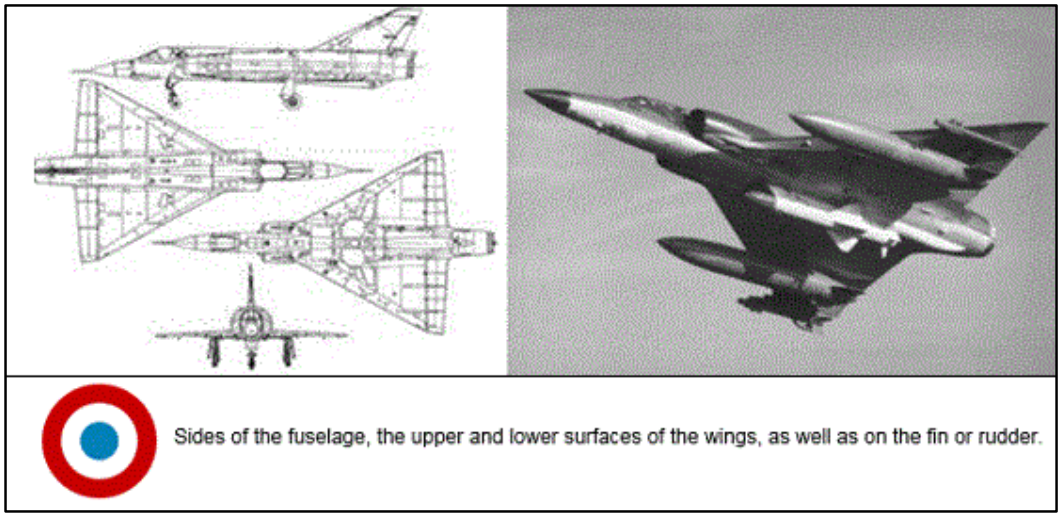

Figure A-25. Mirage III/5

GENERAL DATA:

Country of Origin: France

Similar aircraft: Kfir, MiG-21 Fishbed, Fantan A

Crew: One; Trainer = Two

Role: Ground-attack, fighter, reconnaissance

Armament: 30-mm cannon, Bombs, Rockets

Dimensions: Length: Mirage III: 49 ft 3 in (15.02 m), Span: 27 ft, (8.24 m); Mirage 5: 51ft (15.55m), Span: 27 ft, (8.24 m)

WEFT DESCRIPTION

Wings: Low-mounted, delta wing with pointed tips.

Engine(s): One turbojet inside fuselage. Semicircular air intakes are forward of the wing roots below the canopy fuselage. Single exhaust.

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

Tail: Large swept-back and tapered tail fin with square tip. No tail flats.

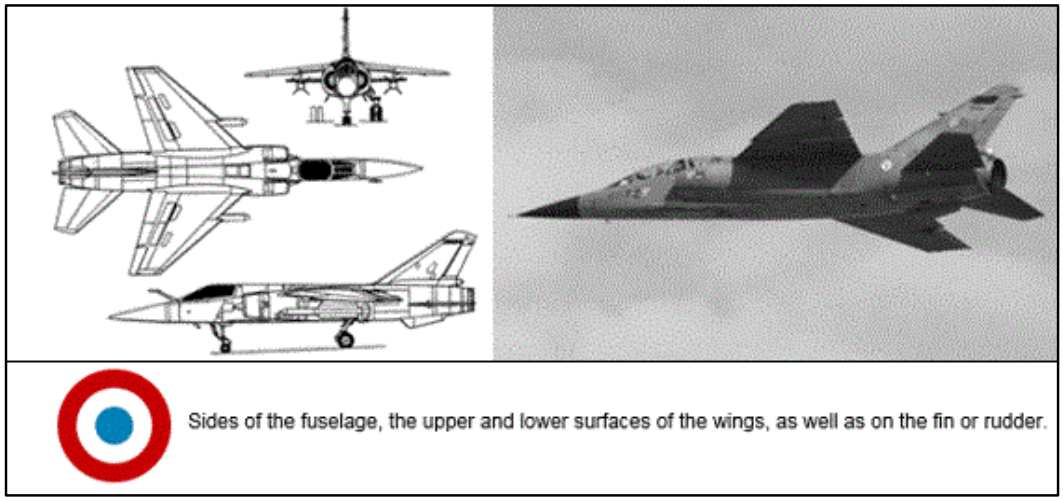

Figure A-26. Mirage F1

GENERAL DATA:

Country of Origin: France

Similar aircraft: AV-8B Harrier II, Fantan A

Crew: One; Trainer = Two

Role: Attack, fighter, reconnaissance

Armament: Two 30-mm cannons, bombs, missiles

Dimensions: Length: 49 ft (14.94 m), Span: 27 ft, 7in (8.4 m)

WEFT DESCRIPTION

Wings: High mounted, swept back, and tapered. Missiles are usually mounted at the wing tips.

Engine(s): One turbojet in the body. Semi-circular air intakes alongside the body forward of the wing roots. Single exhaust.

Fuselage: Long slender pointed nose and a blunt tail. Two small belly fins under the tail section. Bubble canopy.

Tail: Swept back and tapered fin with blunt tip. Flats are mid mounted on the fuselage, swept back, and tapered with blunt tips.

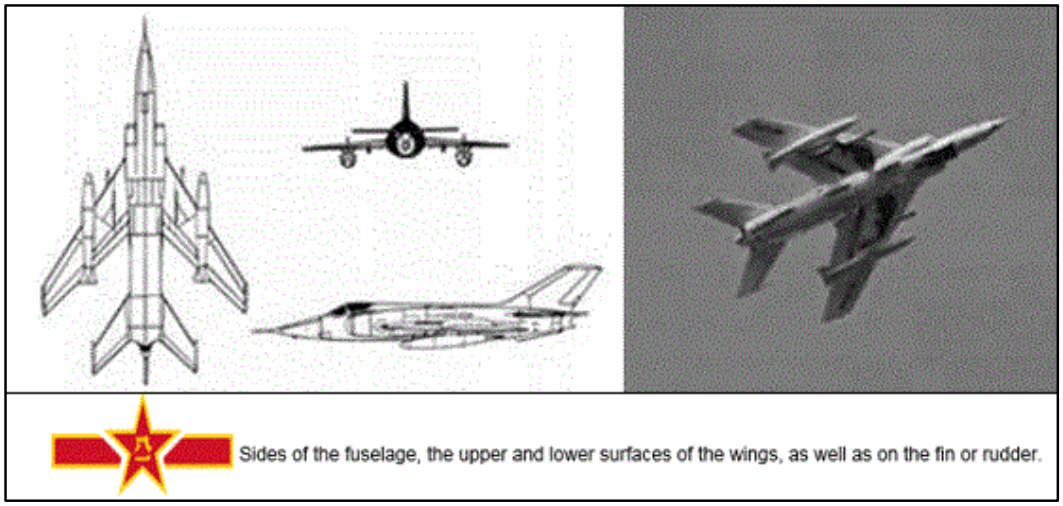

Figure A-27. Q-5 Fantan/A-5 Nanchang

GENERAL DATA:

Country of Origin: China

Similar Aircraft: Yak-38 Forger, MirageF1

Crew: One

Role: Fighter-bomber

Armament: Rockets, missiles, bombs

Dimensions: Length: 54 ft, 10 in (16.74 m), Span: 31 ft, 10 in (9.8 m)

WEFT DESCRIPTION

Wings: Mid-mounted, sharply swept back, and tapered with blunt tips. Wing fences.

Engine(s): Two turbojets are located inside the body. Semicircular air intakes. Two exhausts.

Fuselage: Thick, flattened, and upward taper to the rear section. Bubble canopy. Pointed nose.

Tail: Flats high-mounted on the body, swept-back, and tapered with square tips. Sharply swept-back tail fin with blunt tip.

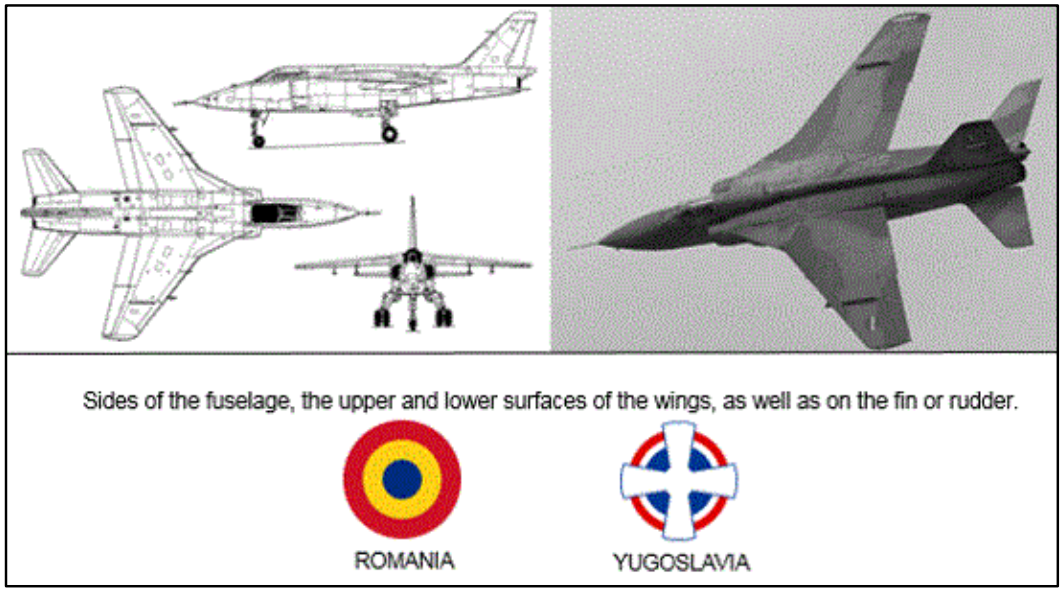

Figure A-28. J-22 ORAO

GENERAL DATA:

Country of Origin: Romania and Yugoslavia

Similar aircraft: F/A-18 Hornet, Mig-29 Fulcrum, Mirage F1

Crew: One or two

Role: Light ground attack and reconnaissance

Armament: Cannon, Bombs, missiles

Dimensions: Length: 42 ft 8.5 in (13.02 m), Span: 30 ft 6.25in (9.30 m)

WEFT DESCRIPTION

Wings: High-mounted and missiles mounted across five external hard points.

Engine(s): Twin turbojets mounted in the body. Exhaust through a pair of circular jet pipes under the tail fin.

Fuselage: Long slender body that widens at air intake. Pointed nose. Bubble canopy.

Tail: Swept back, tapered fin with square tip. Flats are mid-mounted on the fuselage, delta shaped with square tips and a slight negative slant. Two belly fins.

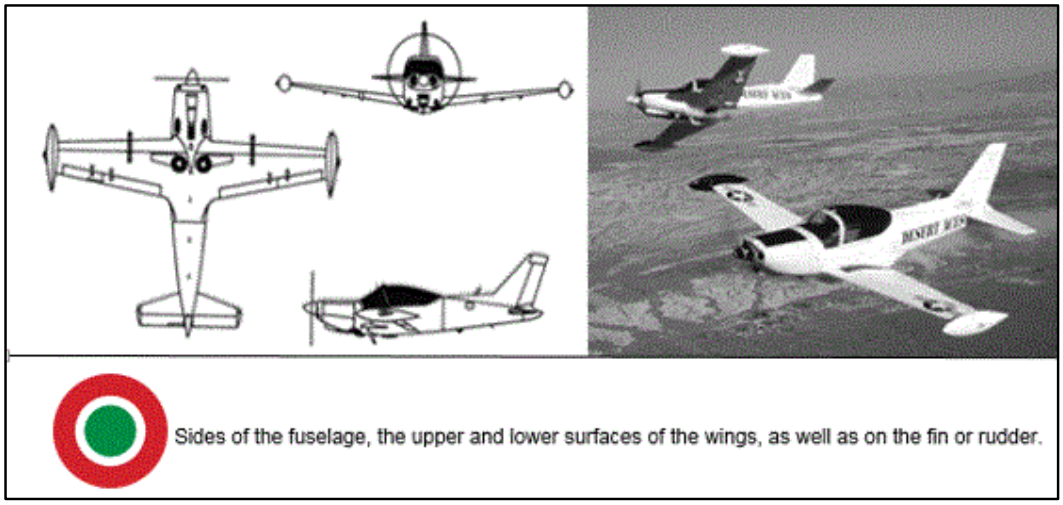

Figure A-29. SF-260W

GENERAL DATA:

Country of Origin: Italy

Similar aircraft: O-1 Bird Dog, PC-7

Crew: One; Trainer: either Two or Three

Role: Trainer, Light attack.

Armament: Machine guns, bombs, rockets

Dimensions: Length: 23 ft, 3 in (7 m), Span: 27 ft, 5 in (8.36 m)

WEFT DESCRIPTION

Wings: Low mounted and forward tapered with fuel tanks mounted on the square tips.

Engine(s): One piston engine mounted in the nose section.

Fuselage: Oval tapers to the rear. Long bubble canopy.

Tail: Flats mid mounted on the fuselage, and back tapered with blunt tips. Fin is swept-back and tapered with a square tip.

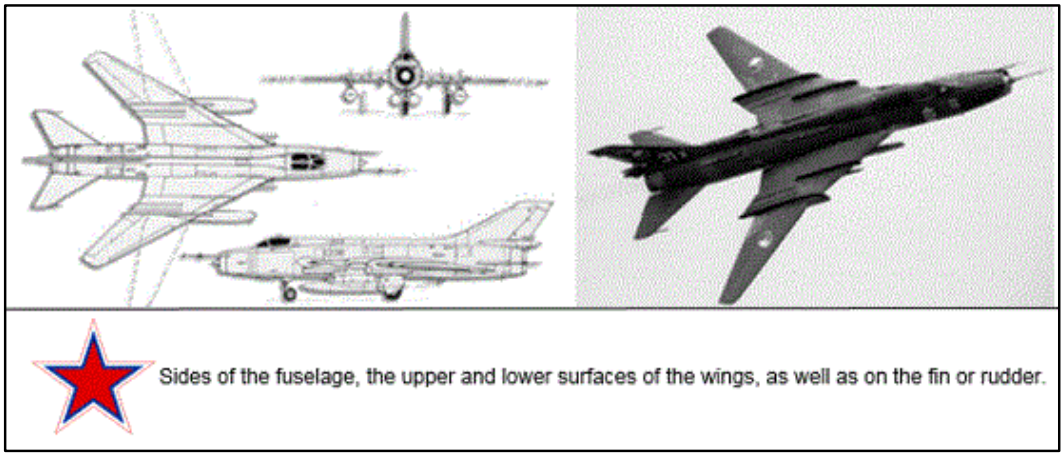

Figure A-30. Su-17, 20, 22 Fitter

GENERAL DATA:

Country of Origin: Russia

Similar Aircraft: MiG-21 Fishbed, Su-7 Fitter-A

Crew: One

Role: Ground-attack

Armament: Cannon, rockets, missiles, and bombs

Dimensions: Length: 61 ft, 6 in (18.76 m), Span: 45 ft (13.8 m)

WEFT DESCRIPTION

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

Engine(s): One turbojet in the fuselage. One circular air intake in the nose with a large single exhaust.

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

Tail: Swept back and tapered fin with a square tip. Flats mid to low mounted on the fuselage swept back and tapered.

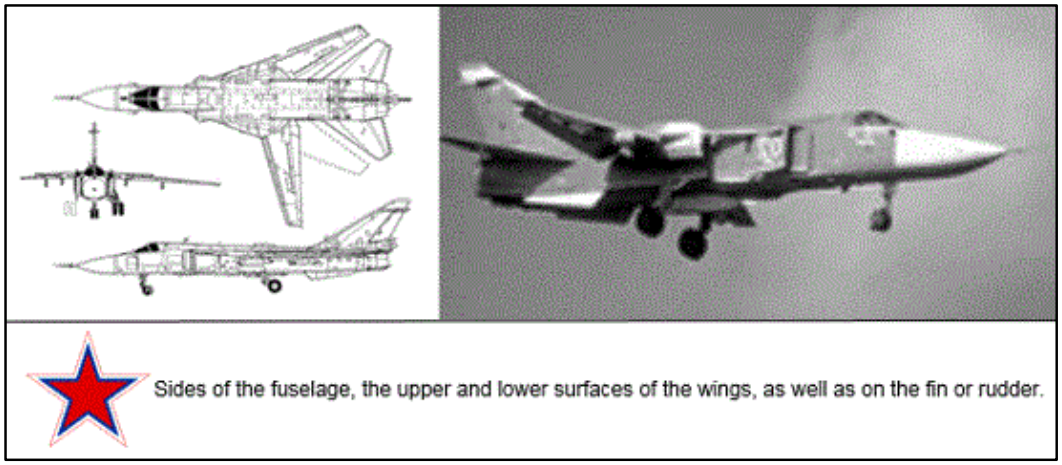

Figure A-31. Su-24 Fencer

GENERAL DATA:

Country of Origin: Russia

Similar Aircraft: Tornado, F-15 Eagle, MiG-23/27 Flogger

Crew: Two

Role: All weather attack, fighter-bomber, strike

Armament: Cannon, missiles, bombs

Dimensions: Length: 69 ft, 6 in (20 m), Span 56 ft, 6 in (17.26 m).

WEFT DESCRIPTION

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

Engine(s): Twin turbofans. Air intakes are tapered away from the body, rectangular shaped and mounted on the body forward of the wings' leading edges. Twin exhausts.

Fuselage: Long, slender with a pointed solid nose and rectangular shaped body from the air intakes to the exhausts. Two belly fins and four pylons. Bubble canopy. Dorsal spine extends from the cockpit to the tail.

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

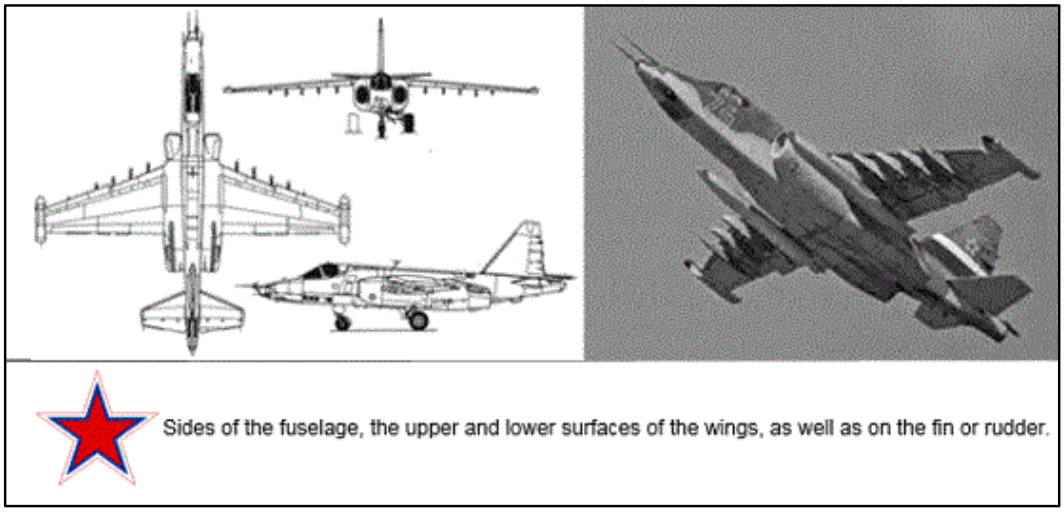

Figure A-32. Su-25/28 Frogfoot

GENERAL DATA:

Country of Origin: Russia

Similar Aircraft: Magister, Alpha Jet, Jaguar, AMX, A-10A Thunderbolt II

Crew: One

Role: CAS, ground-attack

Armament: Cannon missiles, rockets, and bombs

Dimensions: Length: 47 ft, 6 in (14.6 m), Span: 50 ft, 10 in (15.6 m)

WEFT DESCRIPTION

Wings: High mounted and back tapered with straight trailing edges. Pods mounted at the square tips.

Engine(s): Two turbojets mounted alongside the body under the wings. Semi-circular air intakes forward of the wings' leading edges. Exhaust to the rear of the wings' trailing edges.

Fuselage: Long and slender rounded nose. Body tapers to the rear section that overhangs the exhausts. Stepped canopy.

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

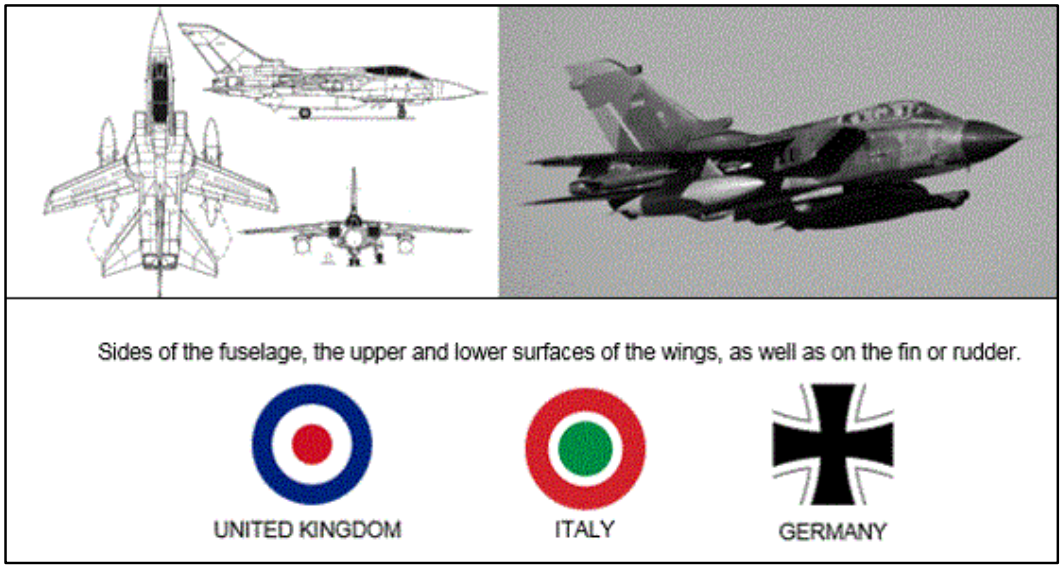

Figure A-33. Tornado IDS

GENERAL DATA:

Countries of Origin: Italy, Germany, United Kingdom.

Similar Aircraft: Su-24 Fencer, F-15 Eagle, MiG-23/-27 Flogger.

Crew: Two

Role: Interdictor strike

Armament: Missiles, bombs, rockets, cannon

Dimensions: Length: 55 ft, 9 in (16.8 m), Span: 45 ft, 7 in (14 m)

WEFT DESCRIPTION

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

Engine(s): Two turbofans in body. Air intakes are diagonal and box like alongside the fuselage forward of the wing roots. Twin exhausts.

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

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

Appendix B

Air Superiority and Interceptor Aircraft

This appendix shows examples of fighter aircraft. An interceptor aircraft (or simply interceptor) is a type of fighter aircraft designed specifically to intercept and destroy enemy aircraft, particularly bombers, usually relying on great speed.

SPECIFIC PLATFORMS

B-1. There are two types of interceptors, emphasizing different aspects of performance. Point defense interceptors were the first type, designed to take off and climb as quickly as possible to the attacking aircraft's altitude. This was a necessity in the era of relatively short-range radar, which meant defenders had very short warning times before having to engage the enemy. Area defense interceptors are larger designs intended to protect a much larger area from attack. This mission has been active since the Cold War and remains a dynamic, viable mission in providing a defense over large areas.

B-2. The normal operating ceiling for most of these aircraft will generally keep them out of range of individual or crew-served weapons, although some of the multi-role aircraft have ground-attack capabilities. Figure B-1 provides the WEFT description for air superiority and interceptor aircraft.

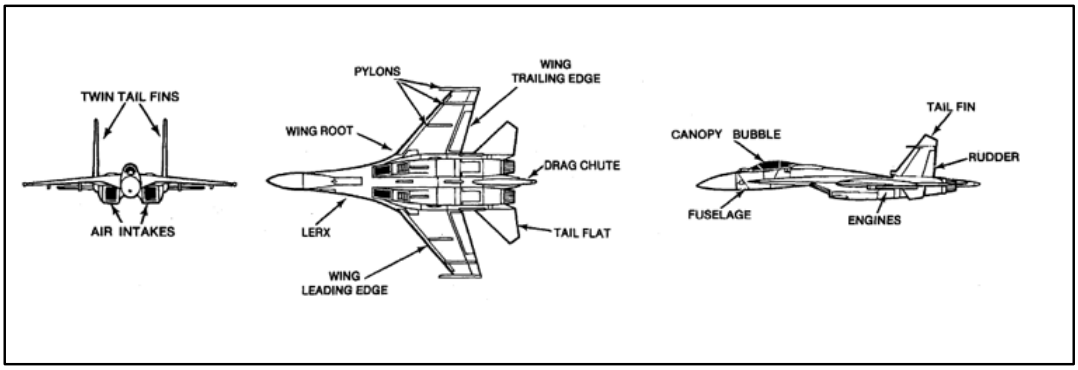

Figure B-1. WEFT description for Air Superiority and Interceptor Aircraft

B-3. This appendix will list the air superiority and interceptor aircraft. Leadership must ensure that this list is up to date depending on the area of operations. Refer to table B-1 on page B-2.

Table B-1. List of Air Superiority and Interceptor Aircraft

NAME OF AIRCRAFT	*COUNTRY OF ORGIN*
Euro Fighter Typhoon	Germany, Italy, Spain, United Kingdom
F-14 Tomcat	US (used by Iran)
F-15 Eagle	US
F-22 Raptor	US
Gripen JAS-39	Sweden
MiG-19 Farmer	Russia
MiG-23 Flogger	Russia
MiG-25 Foxbat	Russia
MiG-31 Foxhound	Russia
Mirage 2000	France
Rafale	France
SU-27 Flanker	Russia

B-4. General criteria for each aircraft platform covered in this section provides following illustrations. See figures B-2 through B-13 (on pages B-3 through B-14).

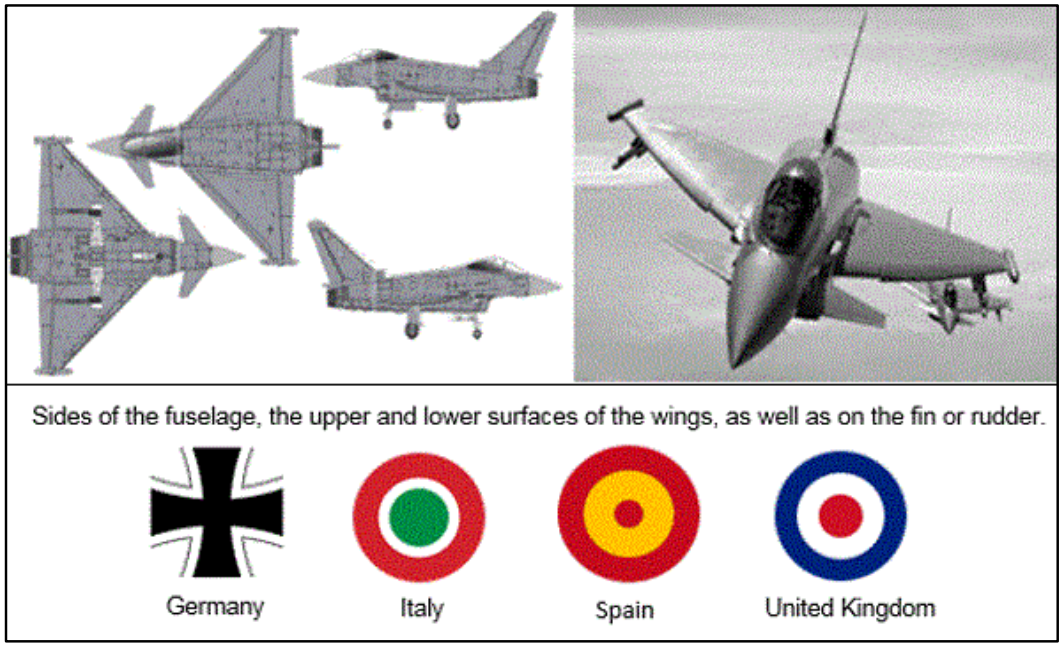

Figure B-2. Typhoon

GENERAL DATA:

Country of Origin: Germany, Italy, Spain, United Kingdom

Similar aircraft: JAS-39 Grippen, Rafale

Crew: One or two.

Role: Multi-role fighter

Armament: Cannons, bombs, rockets

Dimensions: Length: 52 ft, 4 in (15.96 m), Span: 35 ft, 11in (10.95 m).

WEFT DESCRIPTION

Wings: Low mounted, delta shaped. Canards mid mounted on fuselage below canopy.

Engine(s): Two turbofans mounted side by side in rear of fuselage. Two rectangular air intakes under the center of the fuselage. Dual exhaust.

Fuselage: Long slender body that widens at air intake. Pointed nose. Bubble canopy.

Tail: Swept back with a tapered fin and square tip. Flats are mid mounted on the fuselage, delta shaped with square tips and a slight negative slant. Two belly fins.

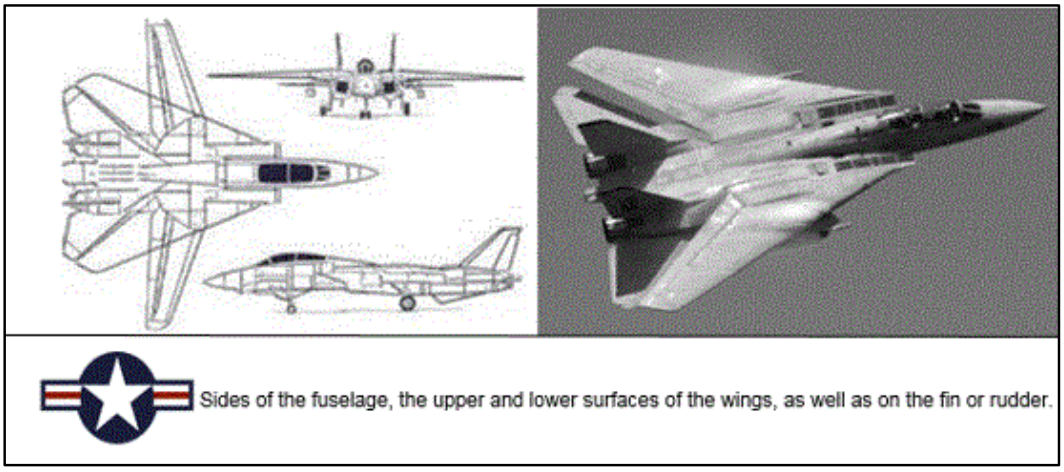

Figure B-3. F-14 Tomcat

GENERAL DATA:

Country of Origin: US (used by Iran)

Similar aircraft: F-15 Eagle, Su-24 Fencer, Tornado, Su-27 Flanker, MiG-29 Fulcrum

Crew: Two

Role: Air superiority fighter, interceptor

Armament: Missiles, cannon

Dimensions: Length: 62 ft (19 m), Span: 64 ft (19.54m)

WEFT DESCRIPTION

Wings: High mounted, variable, swept back, and tapered with curved tips.

Engine(s): Two turbofans in the fuselage. Diagonally shaped, box like air intakes alongside the fuselage. Dual exhausts.

Fuselage: Long, slender, and box like from the air intakes to the rear section. Pointed nose. Bubble canopy.

Tail: Twin tail fins, swept back, tapered and slanted outward. Flats are mid mounted on the fuselage, swept back, and tapered.

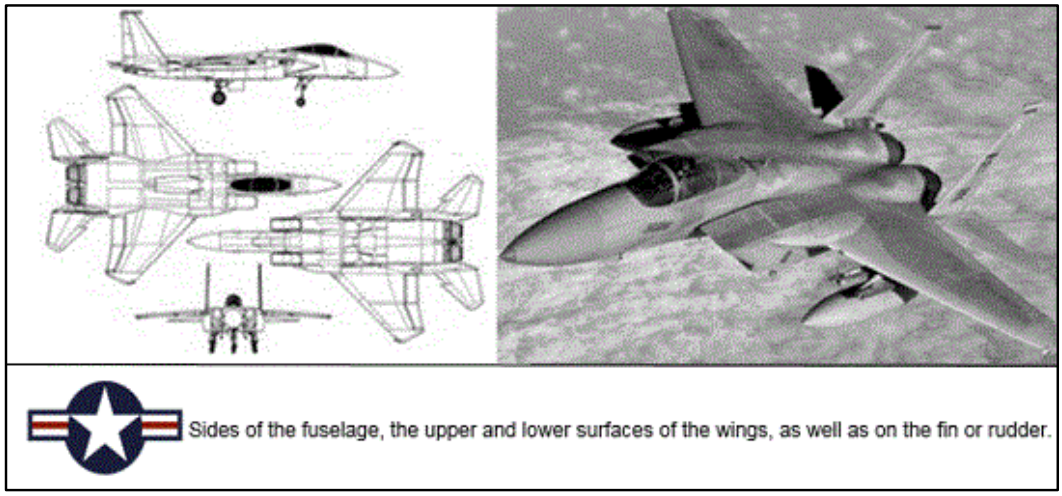

Figure B-4. F-15 Eagle

GENERAL DATA:

Country of Origin: US

Similar aircraft: F-14 Tomcat, Su-24 Fencer, Tornado, MiG-29 Fulcrum, Su-27

Flanker

Crew: One; trainer = Two

Role: Air superiority fighter, interceptor

Armament: Cannon, missiles

Dimensions: Length: 63 ft 9 in (19.45 m), Span: 42 ft, 9 in (13.05 m)

WEFT DESCRIPTION

Wings: High-mounted, semi-delta with angular blunt tips.

Engine(s): Two mounted in the rear. Diagonally shaped box like air intake alongside the fuselage. Dual exhaust.

Fuselage: Long pointed nose and a bubble canopy. Large box like center section that tapers slightly to the front and rear.

Tail: Two fins with tapered leading edges, straight trailing edges and square tips. Flats mid mounted on the fuselage swept back and tapered with angular blunt tips and a large saw-tooth in the leading edges.

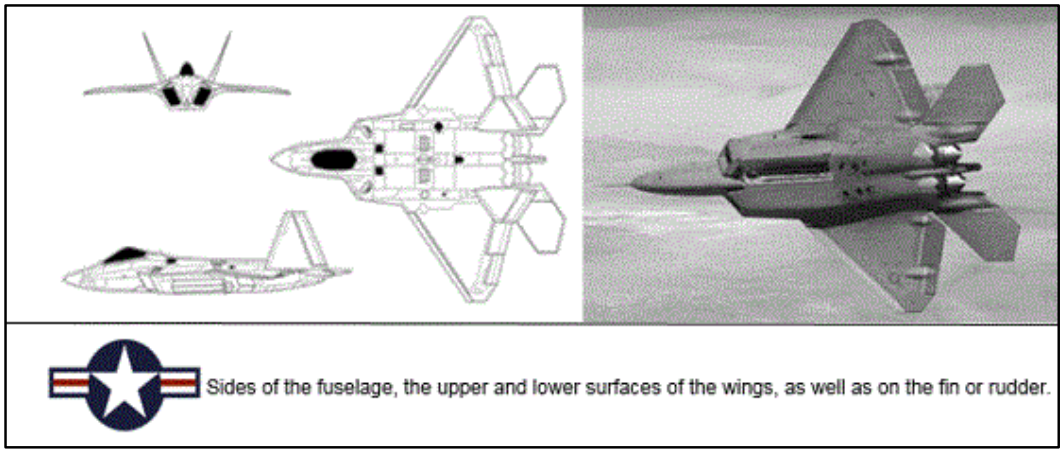

Figure B-5. F-22 Raptor

GENERAL DATA:

Country of Origin: US

Similar Aircraft: F-15 Eagle, F-14 Tomcat, Su-27 Flanker

Crew: One

Role: Stealth, air superiority fighter (primary), ground attack

Armament: 20 mm Gatling gun, air-to- air missiles, JDAM

Dimensions: Length: 62 ft (18.9m), Span: 44 ft (13.56m)

WEFT DESCRIPTION

Wings: High mounted semi-delta shape with rounded trailing edge and square tips. Hard point under each wing.

Engine(s): Two jet engines in body. Large, square and canted air intakes mounted under the wing's LERX. Small, lo exhausts under the rear body.

Fuselage: Wide square and canted in with tapers at the rear. High mounted bubble canopy and rounded, bullet shaped nose.

Tail: Twin fins are large, tapered, canted out with square tips. Flats mounted on the fuselage are large, angled and protrude to the rear of the fins.

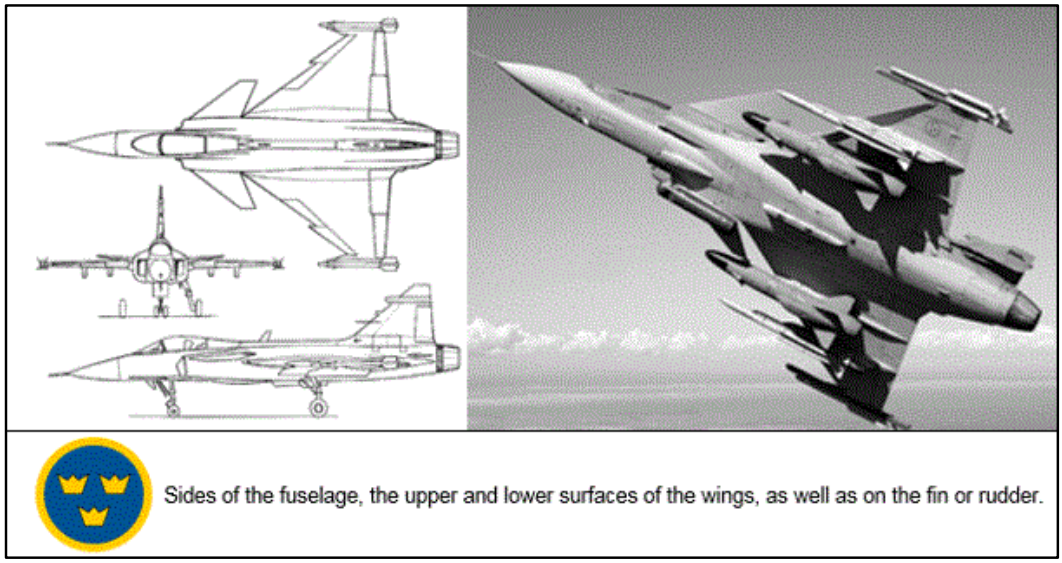

Figure B-6. JAS-39 Gripen

GENERAL DATA:

Country of Origin: Sweden

Similar aircraft: Typhoon, Rafale

Crew: 39A = One, 39B = Two

Role: All weather, all altitude interceptor, attack, reconnaissance

Armament: Cannon, bombs, missiles

Dimensions: Length: 39A = 46 ft 3 in (14.10 m); 39B = 48ft, 5in (14.755m), Span: 27 ft, 6 in (8.40 m)

WEFT DESCRIPTION

Wings: Mid-mounted, delta-shaped. Missiles are normally mounted at the wing tips.

Engine(s): One turbofan in the body. Rectangle air intakes in the wing roots. Single exhaust. Small canards are high mounted on the air intakes.

Fuselage: Rectangular box shape that widens at air intake with a pointed nose. Bubble canopy.

Tail: Swept-back, tapered fin with square tip. No tail flats.

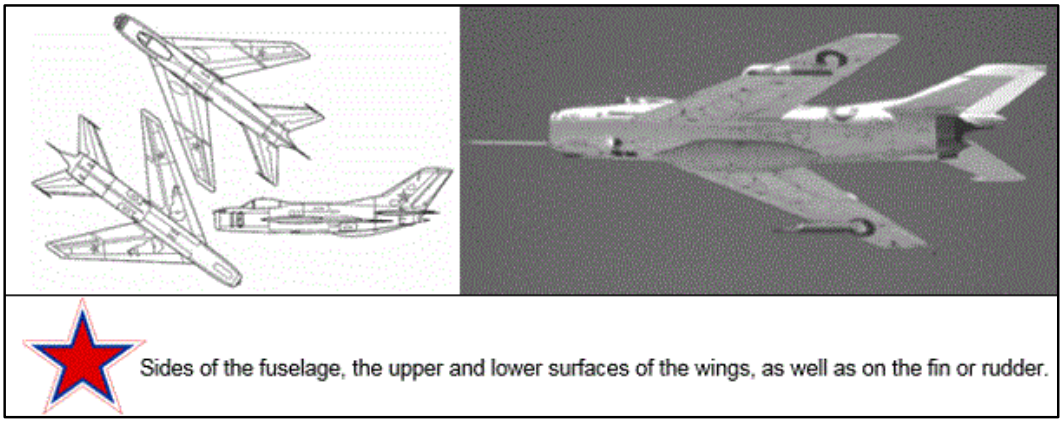

Figure B-7. MiG-19 Farmer

GENERAL DATA:

Country of Origin: Russia

Similar aircraft: MIG-17 Fresco

Crew: One

Role: Interceptor, capable of attacking ground targets

Armament: Cannon, bombs, missiles

Dimensions: Length: 42 ft. 11 in (13.1 m), Span: 29 ft., 6 in. (9 m)

WEFT DESCRIPTION

Wings: Mid mounted, swept back, and tapered with blunt tips. Wing fences with wide wing roots.

Engine(s): Two turbojets mounted inside the body. One single round intake in the nose and dual exhausts.

Fuselage: Long tube shaped that tapers slightly to the blunt nose and widens at the exhausts. Bubble canopy is well forward on the nose.

Tail: Fin sharply swept back and tapered with blunt tips. Flats are high mounted on the fuselage and swept back with blunt tips.

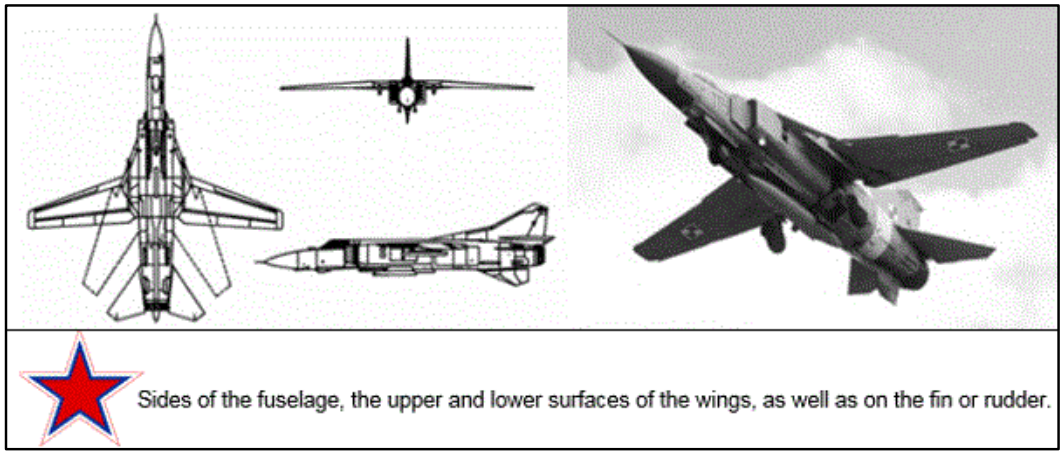

Figure B-8. MiG-23 Flogger

GENERAL DATA:

Country of Origin: Russia

Similar aircraft: MiG-27 Flogger D, Tornado, Su-24 Fencer

Crew: MiG-23U = One; MiG-23C = Two

Role: Interceptor, fighter

Armament: Missiles, cannon

Dimensions: Length: 55 ft (16.6 m), Span: 46 ft, 9 in (14.26 m)

WEFT DESCRIPTION

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

Engine(s): One turbofan inside the body. Rectangular box like air intakes forward of the wing roots. Single exhaust.

Fuselage: Long and tubular, except where intakes give a box like appearance. Long pointed nose. Stepped canopy. Large swept back tapered belly fin under the rear section.

Tail: Swept back and tapered tail fin has a curved dorsal in the leading edge and an angular tip. Swept back and tapered flats are high mounted on the fuselage with angular tips.

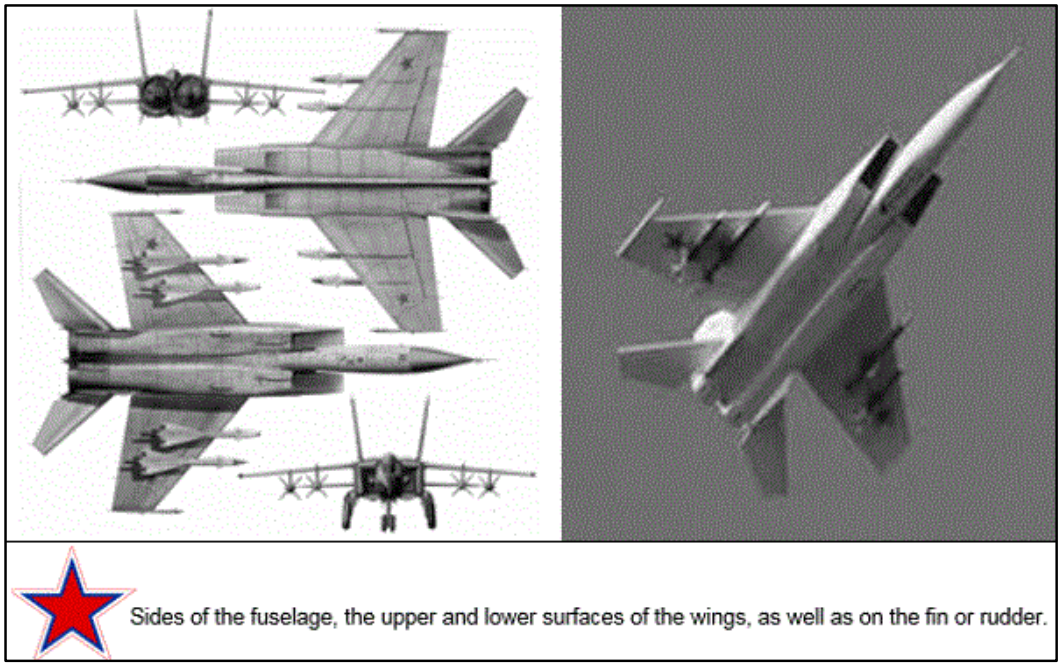

Figure B-9. MiG-25 Foxbat

GENERAL DATA:

Country of Origin: Russia

Similar aircraft: MiG-31 Foxhound, F-14 Tomcat, F-15 Eagle

Crew: One

Role: Interceptor, reconnaissance

Armament: Bombs and missiles

Dimensions: Length: 70 ft. (21.34 m), Span: 41 ft. (12.6 m)

WEFT DESCRIPTION

Wings: High mounted, swept back, tapered with square tips and a negative slant.

Engine(s): Two turbojet engines and large rectangular air intakes below the canopy and forward of the wing roots. Dual exhaust

Fuselage: Long and slender with solid, pointed nose. Aircraft is box-like from the air intakes to rear section and a bubble canopy.

Tail: Twin, sweptback, and tapered fins with angular tips. Flats mid- to low-mounted on fuselage, swept-back, and tapered with angular tips.

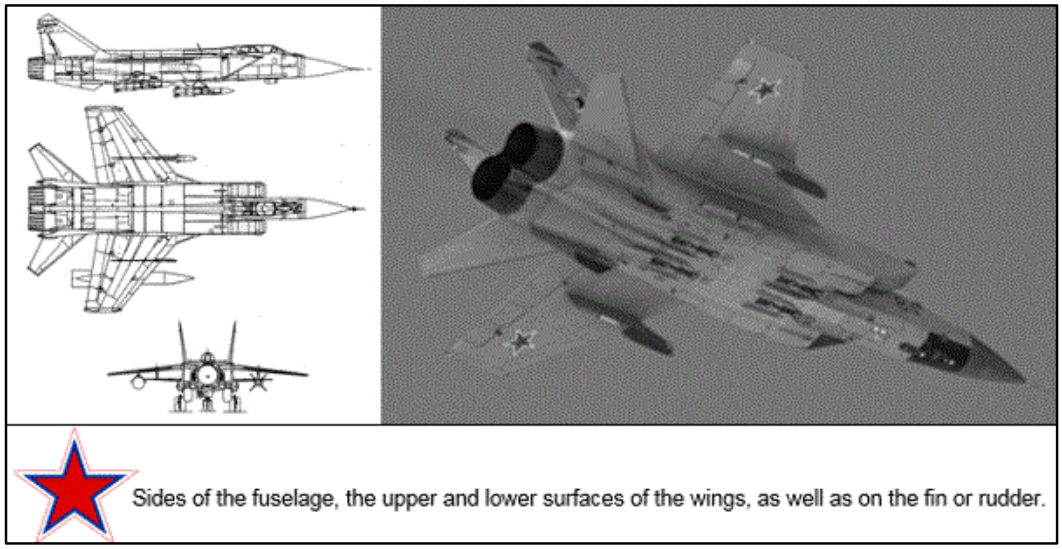

Figure B-10. MiG-31 Foxhound

GENERAL DATA:

Country of Origin: Russia

Similar aircraft: MiG-25 Foxbat, F-14 Tomcat, F-15 Eagle

Crew: Two

Role: Interceptor, air superiority

Armament: Cannon, Bombs

Dimensions: Length: 70 ft 5 in (21.5 m), Span: 45 ft, 9 in (14 m)

WEFT DESCRIPTION

Wings: Mid mounted and swept back with square tips and a negative slant. Four under-wing pylons.

Engine(s): Two turbofans in the fuselage. Rectangular and diagonal cut air intakes on sides of the fuselage. Exhaust extend beyond the tail plane.

Fuselage: Rectangular from the intakes to the exhausts. Long pointed nose. Bubble canopy.

Tail: Fins back-tapered with angular tips and canted outward. Flats swept back and tapered, mid to low mounted on the body.

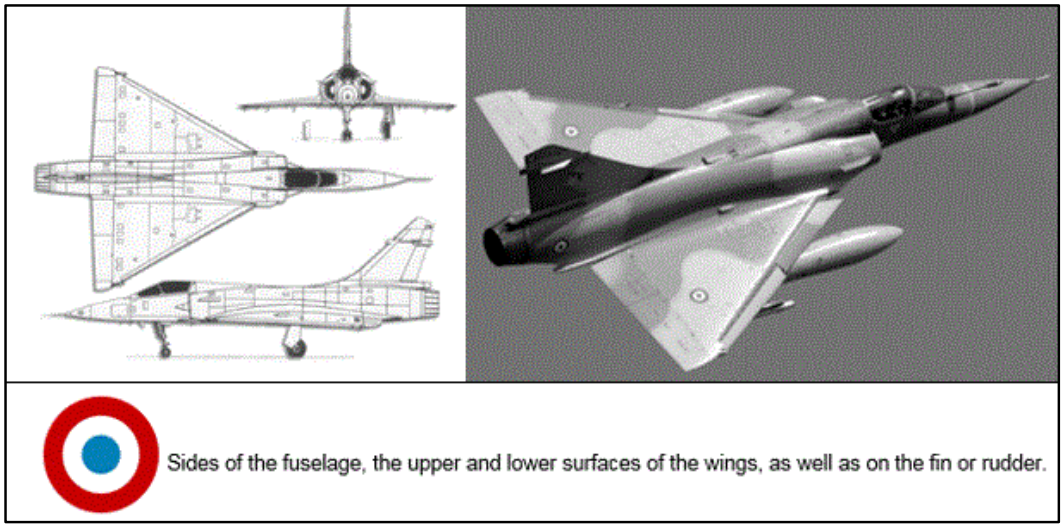

Figure B-11. Mirage 2000

GENERAL DATA:

Country of Origin: France

Similar aircraft: Mirage III/5, Kfir

Crew: One; Mirage 2000 = Two

Role: Interceptor

Armament: Missiles, cannon

Dimensions: Length: 50 ft, 3 in (15.3 m), Span: 29 ft, 5 in (9 m)

WEFT DESCRIPTION

Wings: Low mounted, delta with clipped tips.

Engine(s): One turbofan mounted in the fuselage. Semicircular air intakes alongside the fuselage forward of the wings. Large, single exhaust protrudes past the tail.

Fuselage: Tube shaped with pointed nose and bubble canopy.

Tail: No tail flats. Fin is swept back and tapered with a clipped tip.

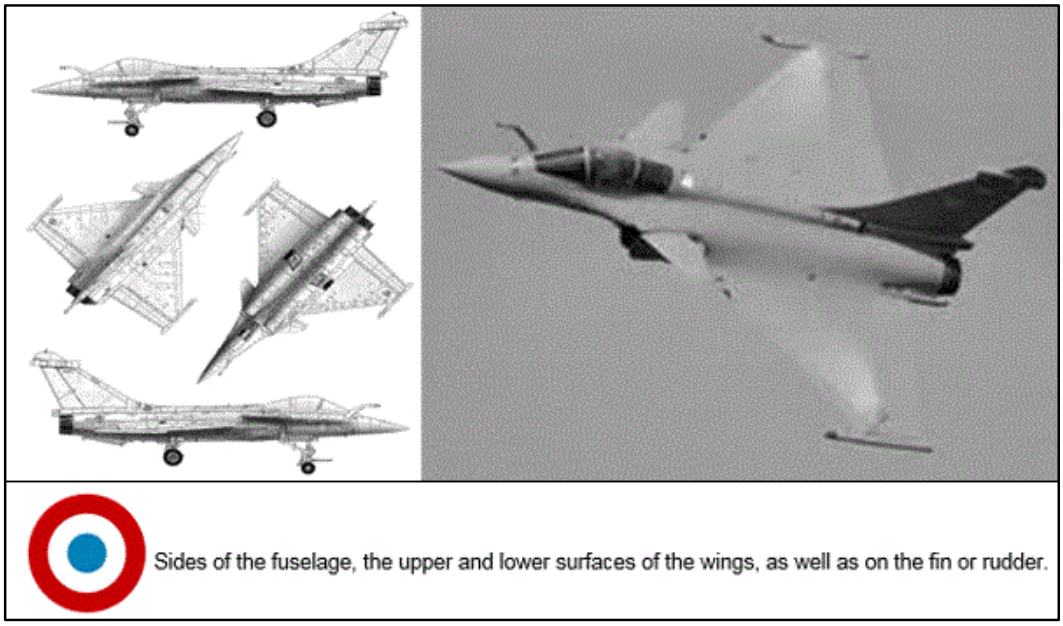

Figure B-12. Rafale

GENERAL DATA:

Country of Origin: France

Similar aircraft: Gripen

Crew: One or Two

Role: Multi-role fighter

Armament: Cannon, bombs, missiles.

Dimensions: Length: 50 ft 1 in (15.27 m), Span: 35 ft, 5 in (10.80 m)

WEFT DESCRIPTION

Wings: Mid mounted delta shaped. Missiles are normally mounted at the win tips.

Engine(s): Two turbofans in the fuselage. Semi-oval air intakes on either side of fuselage bottom. Dual exhaust.

Fuselage: Long slender body that widens at air intake. Pointed nose. Bubble canopy.

Tail: Swept back tapered fin with square tip. Flats are mid mounted on the fuselage delta shaped with square tips and a slight negative slant. Two belly fins.

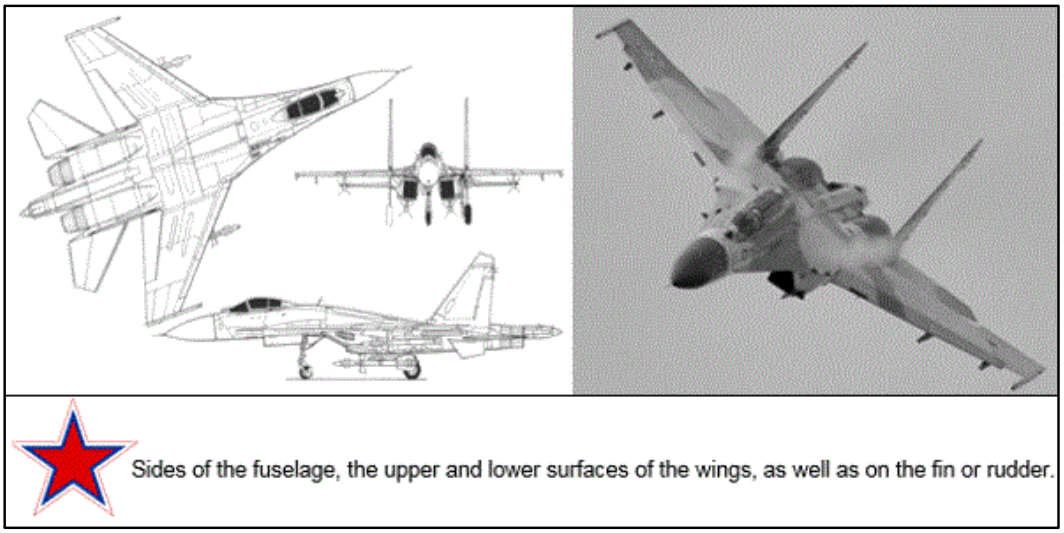

Figure B-13. Su-27 Flanker

GENERAL DATA:

Country of Origin: Russia

Similar aircraft: F-15 Eagle, F-14 Tomcat, MiG-29 Fulcrum

Crew: One

Role: Interceptor, air superiority

Armament: Missiles, cannon

Dimensions: Length: 69 ft (21 m), Span: 47 ft, 6 in (14.5 m)

WEFT DESCRIPTION

Wings: Mid-mounted; LERX extends downward and forward of the wing roots. Semi-delta with square tips.

Engine(s): Two turbojets in the fuselage. Square diagonally cut air intakes mounted under the wings alongside the fuselage.

Fuselage: Rectangular from air intakes to the tail. Pointed nose and bubble canopy.

Tail: Fins swept back with a tapered fin, square tips and mounted outboard of the engines. Flats are mid mounted, swept back, and tapered.

Appendix C

Bomber Aircraft

This appendix provides bomber aircraft list used by several countries. Modern bomber aircraft can fly at low altitudes for very long distances. Armament for these lethal machines modernized to include air-launched cruise missiles and short-range attack missiles, in addition to a huge assortment of nuclear and non-nuclear munitions.

SPECIFIC PLATFORMS

C-1. Although these bombers normally operate at high altitudes, they may operate at low altitudes where observers will be able to detect and recognize them. This appendix will list the bomber aircraft that Soldiers should know how to identify them. Figure C-1 provides the WEFT description for Bomber aircraft. Leadership must ensure that this list is updated depending on the area of operation. Table C-1 identifies a list of bomber aircraft.

C-2. General criteria for each aircraft platform is provided in the following illustrations. Refer to figures C-2 through C-68 (on pages C-2 through C-8).

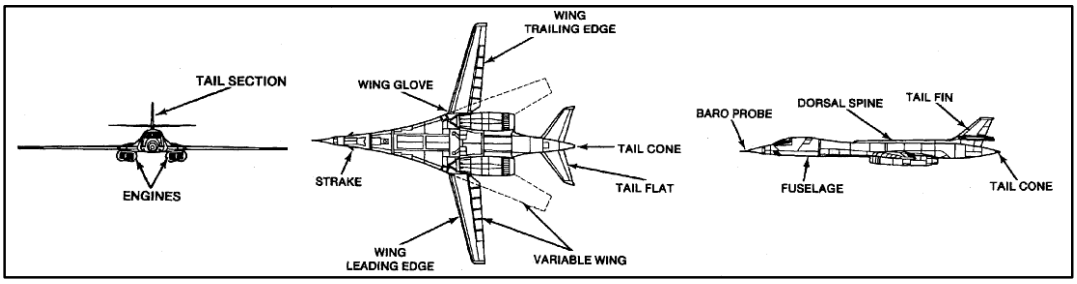

Figure C-1. WEFT description for Bomber Aircraft

Table C-1. List of Bomber Aircraft

NAME OF AIRCRAFT	*COUNTRY OF ORIGIN*
B1B Lancer	US
B2 Spirit	US
B52 Stratofortress	US
IL28 Beagle	Russia
TU-22M/TU-26 Backfire	Russia
TU-95 Bear	Russia
TU-160 Blackjack	Russia

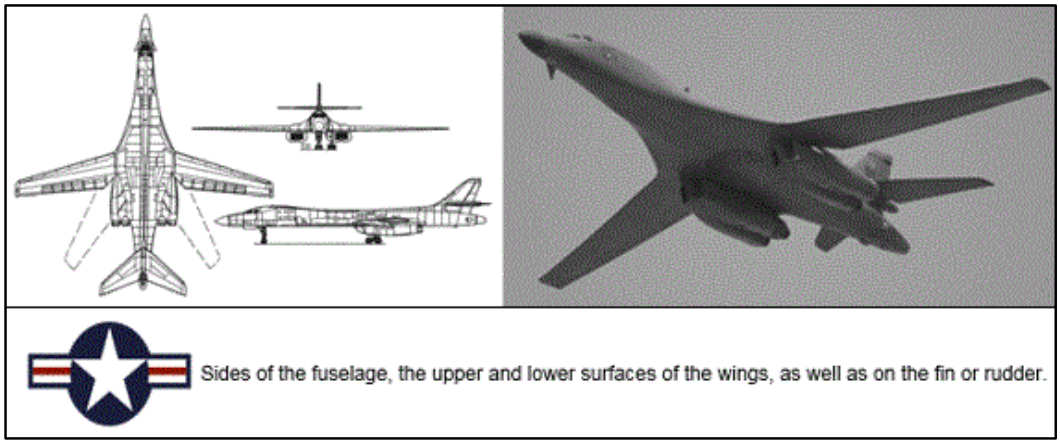

Figure C-2. B-1B Lancer

GENERAL DATA:

Country of Origin: US

Similar aircraft: Tu-26 Backfire, Tu-160 Blackjack

Crew: Four

Role: Supersonic, long range bomber

Armament: ALCMs, SRAMs, bombs

Dimensions: Length: 146 ft, 8 in (44.8 m), Span: 136 ft, 8 in (41.7 m)

WEFT DESCRIPTION

Wings: Low mounted, variable, swept back, and tapered with blunt tips. Leading edge root extension.

Engine(s): Four turbofans: two side by side pods on each side of the fuselage square air intakes under the wings. Four exhausts.

Fuselage: Long slender pointed nose and tail. Flattened belly except for engine pods. Body widens progressively from the LERX through the exhausts. Stepped canopy. Tapered tail section overhangs the exhausts. Tail cone.

Tail: Swept back with a tapered fin with a square tip. Flats are mid mounted on fin swept back and tapered with blunt tips.

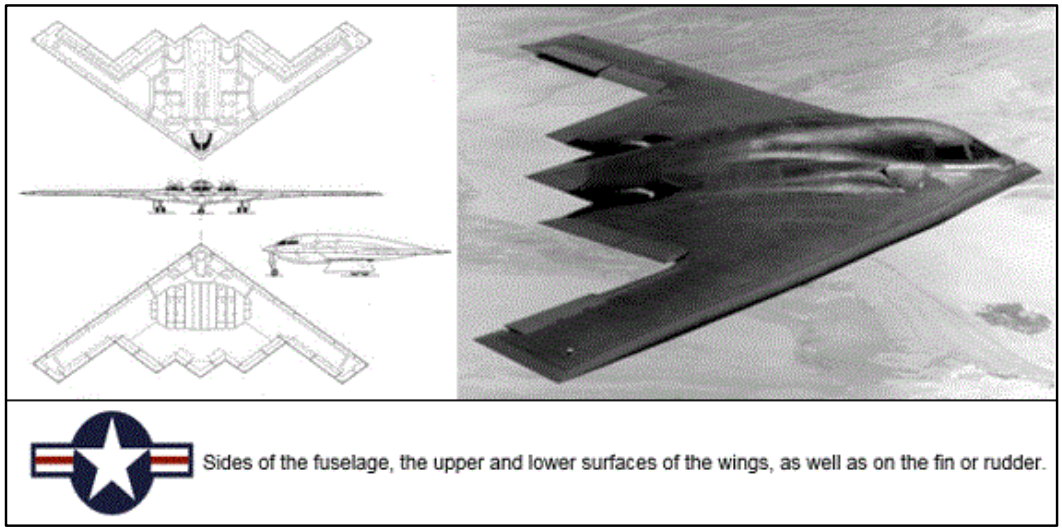

Figure C-3. B-2 Spirit

GENERAL DATA:

Country of Origin: US

Similar aircraft: None

Crew: Two (provisions for three)

Role: Low-observable strategic bomber.

Armament: Cruise and attack missiles. Bombs both tactical and nuclear. Sea mines.

Dimensions: Length: 69 ft (21.03 m), Span: 172 ft, (52.43 m)

WEFT DESCRIPTION

Wings: Straight, swept back with leading edges, double-V trailing edges and square tips.

Engine(s): Four turbofans mounted in pairs within wing structure. Exhausts over-wing.

Fuselage: Blended flying wing with sharp pointed nose. Flush cockpit, bulging spine.

Tail: No tail flats or fins.

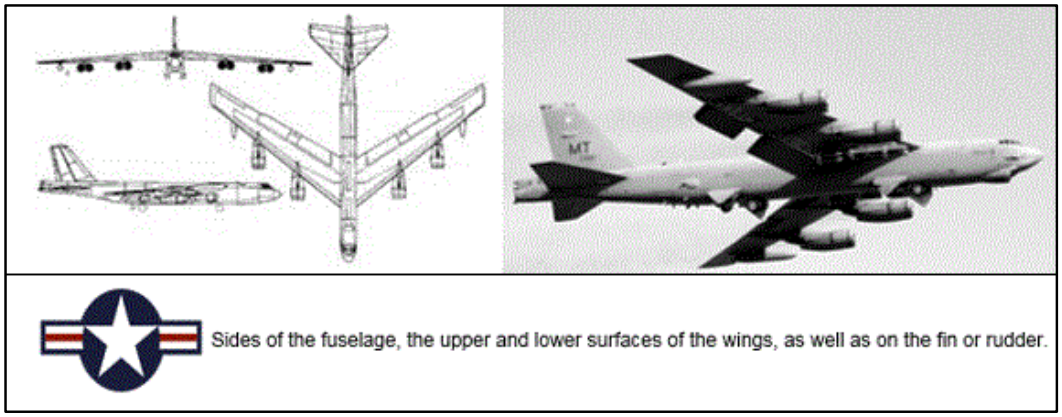

Figure C-4. B-52 Stratofortress

GENERAL DATA:

Country of Origin: US

Similar aircraft: Tu-95 Bear

Crew: Six

Role: Strategic bomber

Armament: Bombs, ALCMs, SRAMs, cannon

Dimensions: Length: 157 ft, 7 in (48. 6m), Span: 185 ft (56.4 m)

WEFT DESCRIPTION

Wings: High-mounted, swept-back, and tapered with blunt tips and a negative slant.

Engine(s): Eight turbofans suspended in four pairs from pylons beneath the wings. Engines extend forward of the wings' leading edges.

Fuselage: Long, slender and tapers to the rear. Solid tapered nose. Stepped cockpit.

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

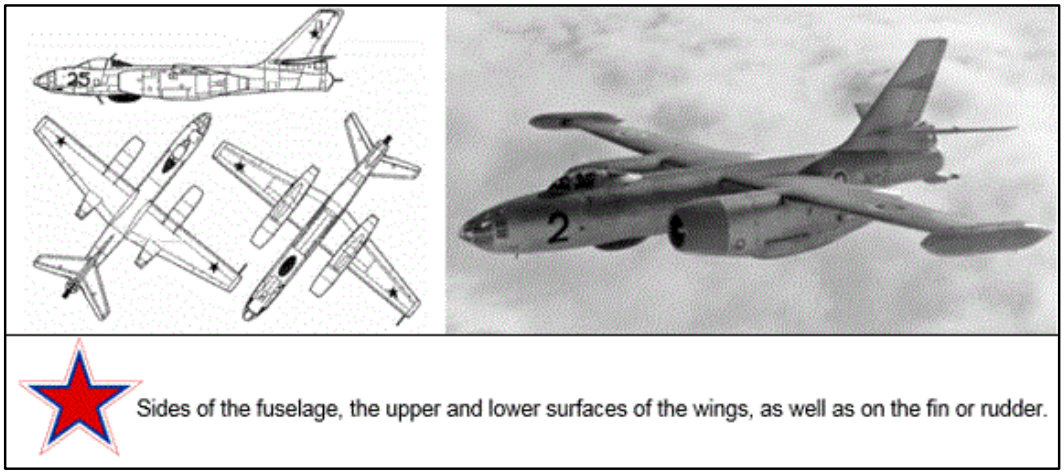

Figure C-5. IL-28 Beagle

GENERAL DATA:

Country of Origin: Russia

Similar Aircraft: None

Crew: Three

Role: Light bomber, trainer

Armament: Bombs, two 23-mm cannons in tail

Dimensions: Length: 57 ft, 11 in (17.6 m), Span: 70 ft, 5 in (21.5 m).

WEFT DESCRIPTION

Wings: High mounted with straight leading edge and forward tapered trailing edge with blunt tips.

Engine(s): Two turbojets mounted beneath the wings in pods. Pods extend beyond wings' leading and trailing edges.

Fuselage: Tubular and cigar shaped tapering to the rear. Rounded glassed in nose. Bubble canopy.

Tail: Fin is swept back and tapered with a blunt tip. Flats are low mounted on the fin, swept back, and tapered with blunt tips. A glassed in tail gunner compartment is to the rear of the tail.

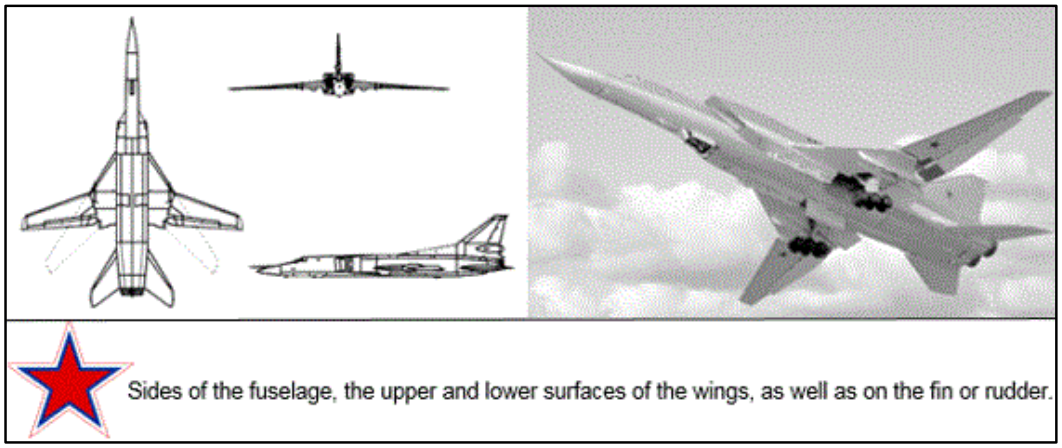

Figure C-6. TU-22M/TU–26 Backfire

GENERAL DATA:

Country of Origin: Russia

Similar Aircraft: B-1B Lancer, Tu-160 Blackjack

Crew: Four

Role: Strategic medium bomber, maritime reconnaissance

Armament: Bombs, missiles, cannon

Dimensions: Length: 138 ft (42 m), Span: 115 ft (35 m)

WEFT DESCRIPTION

Wings: Mid mounted, variable, swept back and tapered with curved tips. Wide wing root.

Engine(s): Two turbofans mounted in body. Large rectangular air intakes. Dual exhausts.

Fuselage: Long and slender with a solid pointed nose. Body is rectangular from the air intakes to the exhausts. Stepped cockpit.

Tail: Fin is swept back and tapered with a square tip. Flats are mid mounted on body, swept back and tapered with blunt tips.

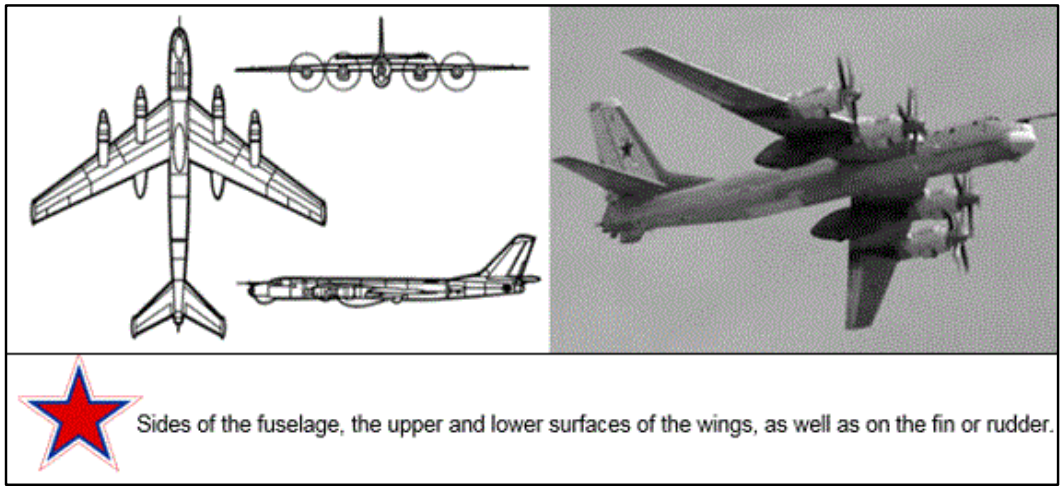

Figure C-7. TU-95 Bear

GENERAL DATA:

Country of Origin: Russia

Similar Aircraft: B-52 Stratofortress

Crew: Unknown

Role: Strategic bomber, also maritime

Armament: Bombs, missiles, cruise missiles, two 23-mm cannons in the tail

Dimensions: Length: 162 ft, 5 in (49.5 m), Span: 167 ft, 8 in (51.1 m)

WEFT DESCRIPTION

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

Engine(s): Four turboprops with contra-rotating propellers located on the wings. Engine nacelles extend well beyond the wings' leading edges.

Fuselage: Tube shaped with rounded nose; tapers to the rear. Stepped cockpit. Tail gun compartment.

Tail: Fin swept back and tapered with a square tip. Flats low mounted on the fin, swept back, and tapered.

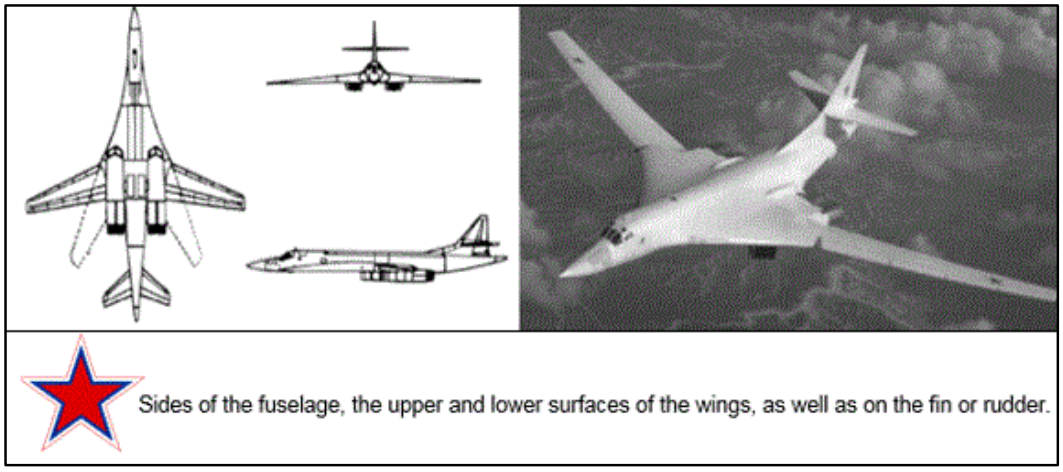

Figure C-8. Tu-160 Blackjack

GENERAL DATA:

Country of Origin: Russia

Similar Aircraft: B-1B Lancer, Tu-26 Backfire

Crew: Four

Role: Strategic bomber

Armament: Bombs, missiles, ALCMs

Dimensions: Length: 177 ft (54 m), Span: 182 ft, 9 in (55.7 m)

WEFT DESCRIPTION

Wings: Low mounted, swept back and tapered. Variable geometry wings with large fixed center section.

Engine(s): Four turbofans mounted in pairs under the fixed center section. Square intakes. Exhausts extend behind the wings' trailing edges.

Fuselage: Slim structure. Long, pointed, slightly upturned nose section. Stepped canopy.

Tail: Flats are swept back, tapered and mid mounted on the fin. Tail fin is back tapered with a square tip. Fin has a fairing in the leading edge. Tail cone is located past the tail section.

Appendix D

Cargo and Transport Aircraft

This appendix provides examples of cargo and transport aircraft. Many of these aircraft have very similar recognition features because they were all designed to perform similar, specific missions such as operating from short, unimproved runways, roads, or fields.

SPECIFIC PLATFORMS

D-1. Most modern cargo and transport (also referred to as airlift aircraft) are manufactured with high-mounted wings. Propeller-driven airlift aircraft typically have straight wings while larger airlift aircraft with jet engines often have swept wings. Both types of aircraft use mechanical devices such as flaps and/or slats to generate greater lift and better control at low speeds and altitudes. It is good to know range, length, payload capabilities of aircraft but the underlying principal in VACR to enable Soldiers to identify, determine and engage is the use of WEFT. Refer to figure D-1 for WEFT description for cargo and transport aircraft.

D-2. General criteria for each aircraft platform is provided in the following illustrations. Refer to table D-1 on page D-2 and figures D-2 through D-14 (on pages D-3 through D-15).

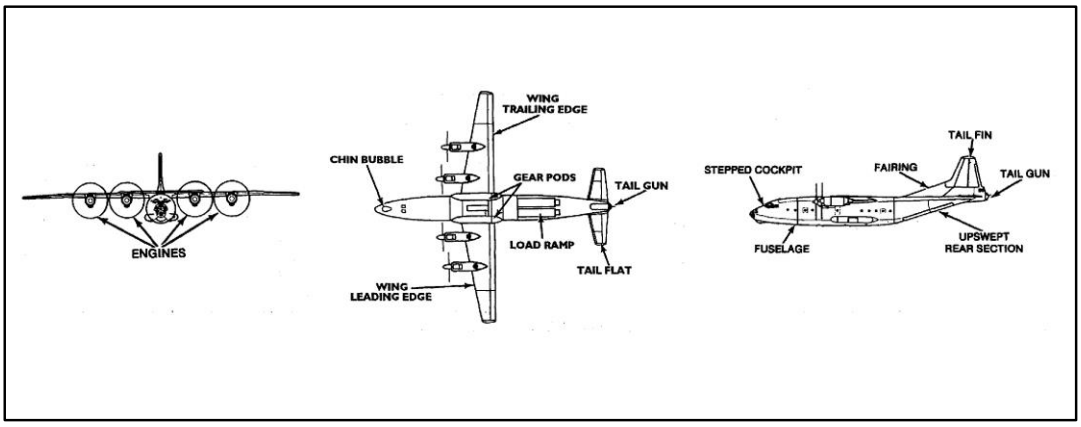

Figure D-1. WEFT description for Cargo and Transport

Table D-1. List of Cargo and Transport Aircraft

Name of Aircraft	Country of Origin
AN-12 CUB	Russia
AN-24 Coke, AN-26 CURL	Russia
AN-32 Cline	Russia
AN-72 Coaler	Russia
AN-124 Condor	Russia
C-212 Aviocar	Spain
C-8A Buffalo	Canada
C-5 Galaxy	US
C-17A Globemaster III	US
C-130 Hercules	US
C-160 Transall	France, Germany
G-222 (Aeritalia)	Italy
IL-76 Candid	Russia

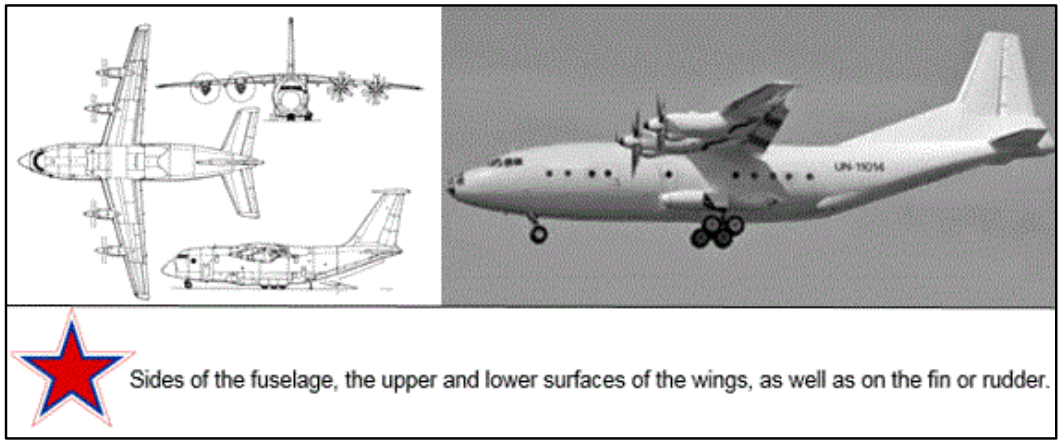

Figure D-2. AN-12 Cub

GENERAL DATA:

Country of Origin: Russia

Similar Aircraft: C-130 Hercules, C-160 Transall, G-222

Crew: Six

Role: Medium cargo/transport (100 equipped troops, vehicles, and weapons), ECM, ELINT

Armament: Twin 23-mm cannons in tail

Dimensions: Length: 121 ft, 4 in (37 m), Span: 124 ft, 8 in (38 m)

WEFT DESCRIPTION

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

Engine(s): Four turboprop engines mounted under 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. Two 23-mm guns in tail turret.

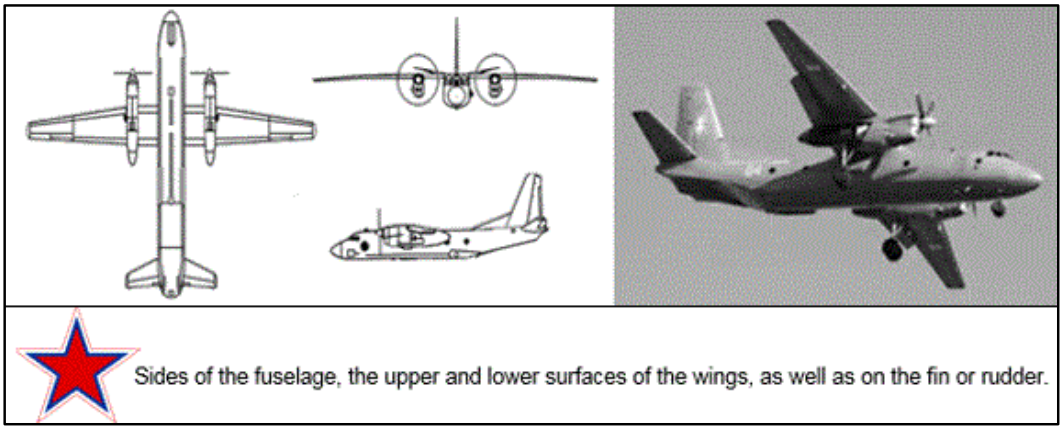

Figure D-3. AN-24 Coke, AN-26 Curl

GENERAL DATA:

Country of Origin: Russia

Similar Aircraft: An-32 Cline, IL-20 Coot, P-3C Orion, An-12 Cub

Crew: Five

Role: Short haul, light-transport, cargo (40 equipped troops, small vehicles) paratroop

Armament: Usually none

Dimensions: Length: 77 ft, 2 in (23.54 m), Span: 95 ft, 9 in (29.2 m)

WEFT DESCRIPTION

Wings: High-mounted and equally tapered from the engines to the blunt tips.

Engine(s): Two turboprops mounted in pods beneath the wings. Pods extend beyond the wings' leading and trailing edges.

Fuselage: Long, slender, upswept rear section. Solid rounded nose. Stepped cockpit.

Tail: Fin is back tapered with a blunt tip and angular fairing. Flats are high mounted on the body, back tapered with blunt tips, and have a positive slant.

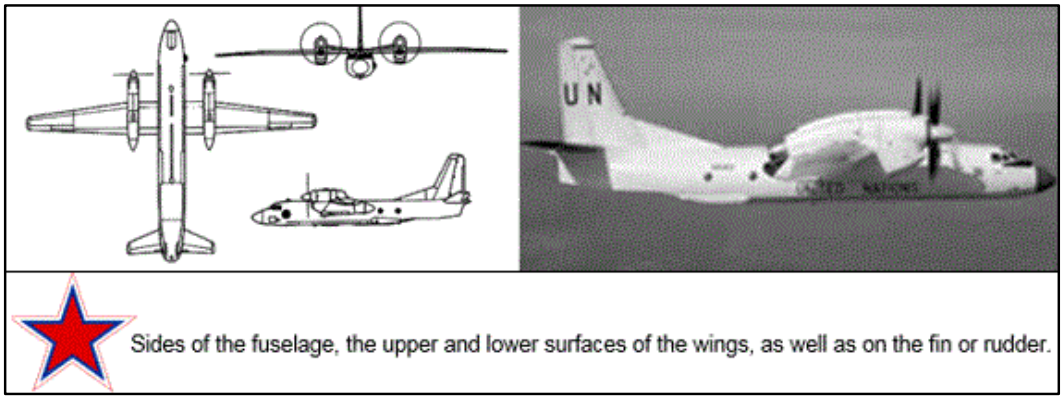

Figure D-4. AN-32 Cline

GENERAL DATA:

Country of Origin: Russia

Similar Aircraft: An-24 Coke, An-26 Curl

Crew: Five

Role: Short-to-medium range, light transport, cargo (39 equipped troops, small vehicles), airdrop

Armament: Usually none

Dimensions: Length: 78 ft (23.75 m), Span: 95 ft, 9 in (29.2 m).

WEFT DESCRIPTION

Wings: High mounted and equally tapered from the engines to the blunt tips.

Engine(s): Two turboprops mounted in pods over the wings. Pods extend beyond the wings' leading and trailing edges.

Fuselage: Long tubular, upswept rear section with a solid rounded nose. Stepped cockpit.

Tail: Fin is unequally tapered with blunt tip and angular fairing. Flats are high mounted on the body, back tapered with blunt tips, and have a positive slant.

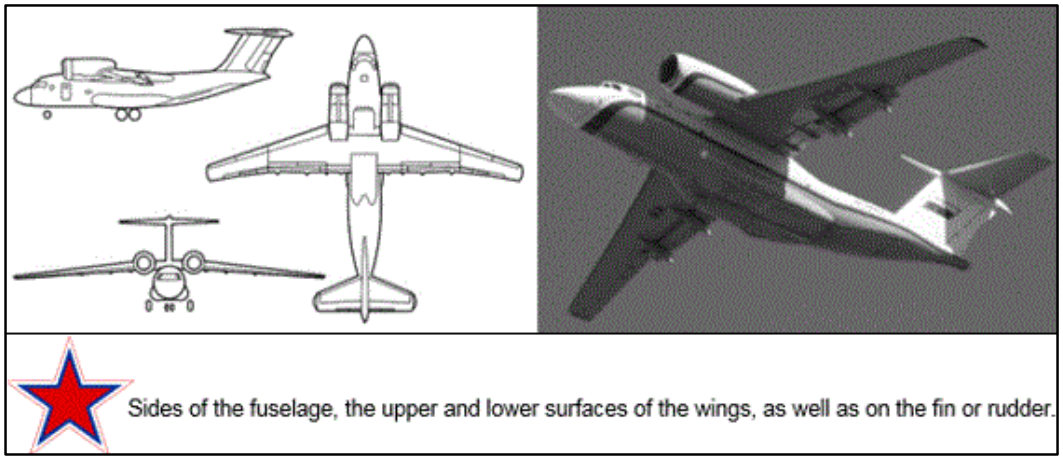

Figure D-5. AN-72 Coaler

GENERAL DATA:

Country of Origin: Russia

Similar Aircraft: C-160 Transall, G-222.

Crew: Three

Role: Medium-transport, STOL

Armament: None

Dimensions: Length: 87 ft, 2 in (26.56 m), Span: 84 ft, 9 in (25.84 m)

WEFT DESCRIPTION

Wings: High-mounted and back-tapered with blunt tips and a negative slant.

Engine(s): Two turbofans in long pods mounted on top of the wings. Round air intakes extend from the front of the wings' leading edges.

Fuselage: Circular with round, solid nose, upswept rear section, and a flush cockpit.

Tail: Swept-back, untapered fin. Back-tapered flats high-mounted on the fin forming a T.

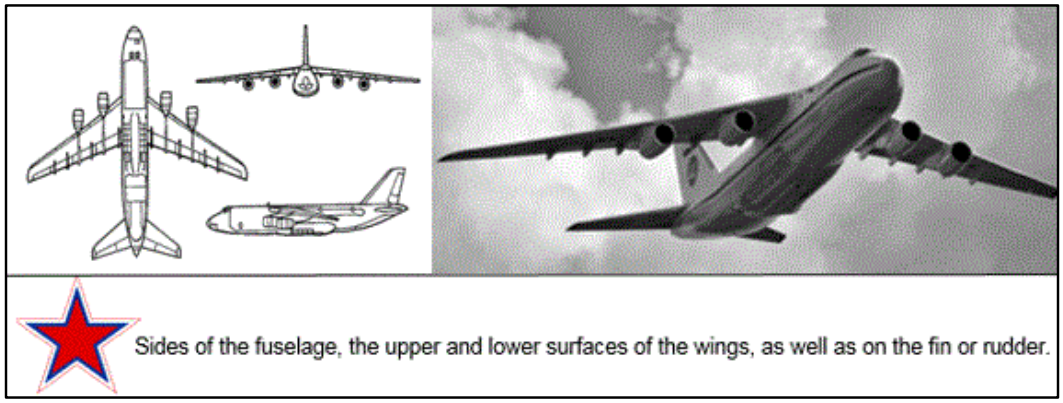

Figure D-6. AN-124 Condor

GENERAL DATA:

Country of Origin: Russia

Similar Aircraft: C-5B Galaxy, C-17A Globemaster III

Crew: Six or Seven with loadmaster

Role: Strategic transport

Armament: None

Dimensions: Length: 226 ft, 3 in (69 m), Span: 240 ft, 5 in (73.3 m)

WEFT DESCRIPTION

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

Engine(s): Four turbofans mounted on pylons under the wings.

Fuselage: Thick, oval, rounded nose and tapers to the rear. Stepped canopy.

Tail: Fin swept back and tapered with rounded tips. Flats swept back, tapered and mid mounted on the body.

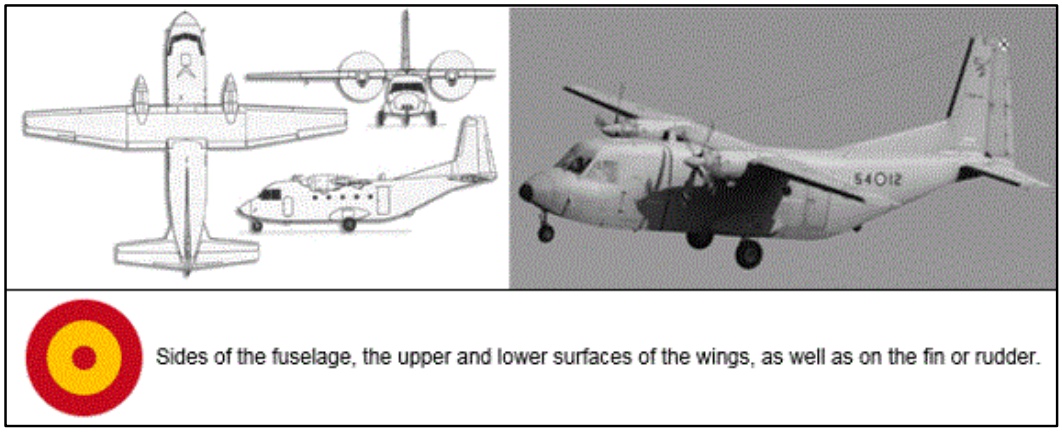

Figure D-7. C-212 Aviocar

GENERAL DATA:

Country of Origin: Spain

Similar Aircraft: C-160 Transall, G-222

Crew: Two

Role: STOL, light-utility transport (18 equipped troops, light tactical vehicles), airdrop

Armament: Usually none

Dimensions: Length: 49 ft, 9 in (15.18 m), Span: 62 ft, 4 in (19.12 m).

WEFT DESCRIPTION

Wings: High mounted and unequally tapered from mid wing to the square tips.

Engine(s): Two turboprops mounted in pods under the wings' leading edges.

Fuselage: Thick, cigar-shaped with flat bottom and upswept rear section. Stepped cockpit.

Tail: Fin is equally tapered with a square tip. Straight fairing in the leading edge. Flats are mid mounted on the body and tapered with square tips.

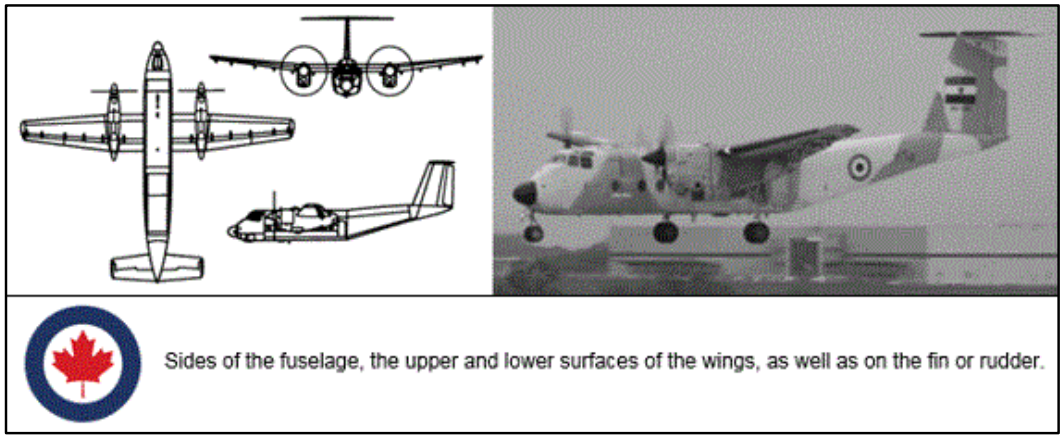

Figure D-8. C-8A Buffalo

GENERAL DATA:

Country of Origin: Canada

Similar Aircraft: C-7A Caribou

Crew: Three

Role: STOL transport, cargo (41 troops, 1/4-ton vehicles, and freight)

Armament: Usually none

Dimensions: Length: 79 ft (24.08 m), Span: 96 ft (29.26 m)

WEFT DESCRIPTION

Wings: High mounted, straight from body to engines, and equally tapered outboard of engines to the blunt tips.

Engine(s): Two turboprops mounted under the wings' leading edges.

Fuselage: Slab sided with solid, rounded nose. Stepped cockpit. Upswept rear section.

Tail: Fin slightly swept back and tapered with square tip. Flats equally tapered with blunt tips and high mounted on the fin forming a T.

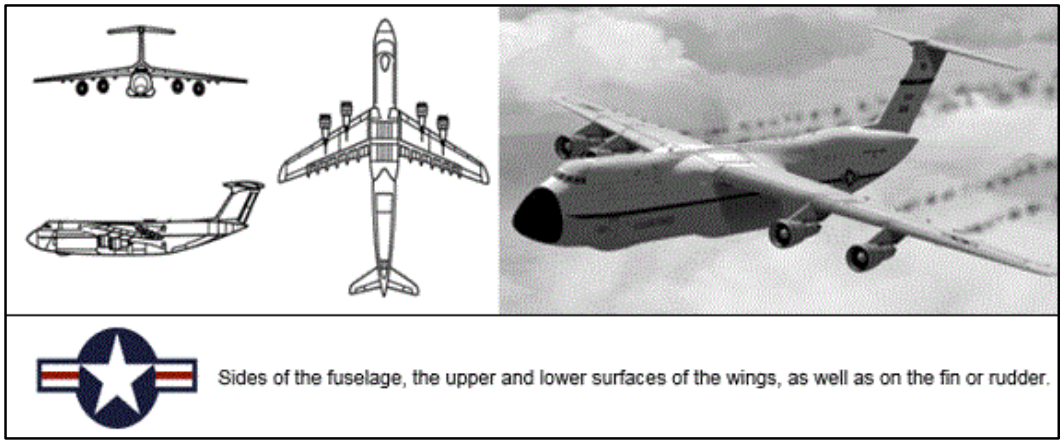

Figure D-9. C-5 Galaxy

GENERAL DATA:

Country of Origin: US

Similar Aircraft: C-17A Globemaster III, Il-76 Candid, An-124 Condor

Crew: Six

Role: Heavy-transport (345 equipped troops), heavy-cargo (armored vehicles, weapons, helicopters)

Armament: Usually none

Dimensions: Length: 247 ft, 10 in (75.54 m), Span: 222 ft, 8 in (67.88 m)

WEFT DESCRIPTION

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

Engine(s): Four turbofans, suspended on pylons, and extending forward of the wings' leading edges. Round air intakes.

Fuselage: Large, cigar shaped, and tapered to tail section. Slightly tapered, rounded nose. Stepped cockpit. Landing gear bulges at lower midsection. Upswept rear section.

Tail: Swept back, tapered tail flats and high mounted on a swept back, tapered tail fin forming a T.

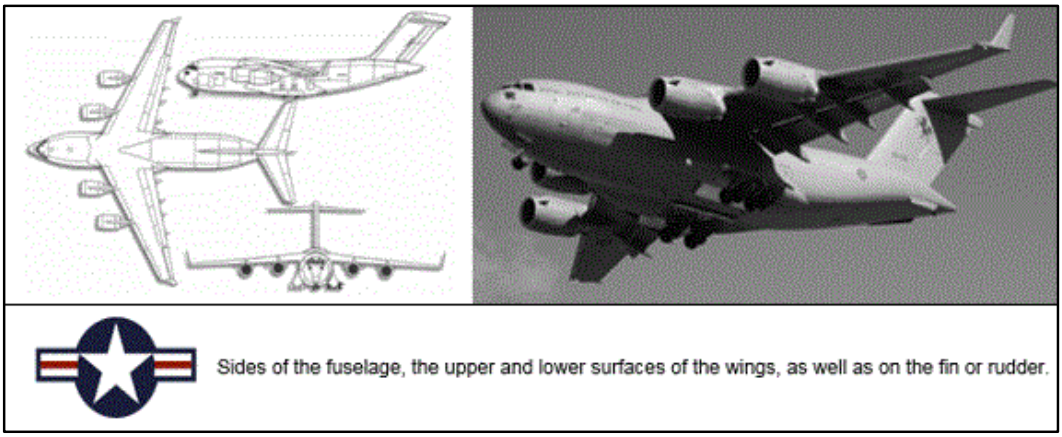

Figure D-10. C-17A Globemaster III

GENERAL DATA:

Country of Origin: US

Similar Aircraft: C-5 Galaxy, Il-76 Candid

Crew: Five (with loadmaster)

Role: Long-range and intra-theatre heavy cargo transport (troops, heavy equipment, helicopters)

Armament: None

Dimensions: Length: 174 ft (53.04 m), Span: 165 ft (50.29 m)

WEFT DESCRIPTION

Wings: High mounted, swept back, tapered with a negative slant. Winglets located at wing tips.

Engine(s): Four turbofans mounted on pylons under wings with round intakes.

Fuselage: Round and tapers to tail cone. Upswept rear section. Flush cockpit and a round nose.

Tail: Fin swept back and untapered. Flats swept back, tapered, mounted high on fin forming a T.

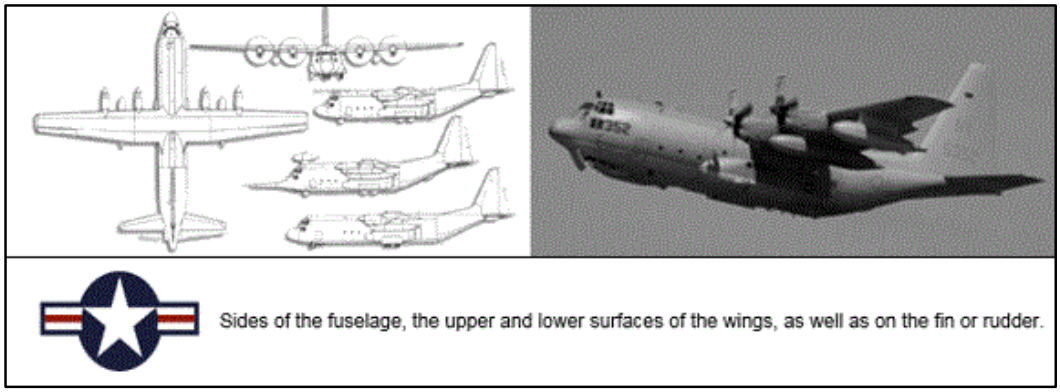

Figure D-11. C-130 Hercules/C-130J Super Hercules

GENERAL DATA:

Country of Origin: US

Similar Aircraft: An-12 Cub, C-160 Transall, G-222

Crew: Four

Role: Transport, cargo, airdrop, extraction, air refueling, recon, gunship

Armament: Usually none, except AC-130G gunship

Dimensions: Length: 97 ft, 9 in (29.78 m), Span: 132 ft, 7 in (40.41 m)

WEFT DESCRIPTION

Wings: High mounted with straight leading edges, forward tapered trailing edges and blunt tips.

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

Fuselage: Wide and circular with solid with a blunt nose. Stepped cockpit. Upswept rear section.

Tail: Flats equally tapered and high mounted on the body. Tall tail fin tapered with a blunt tip.

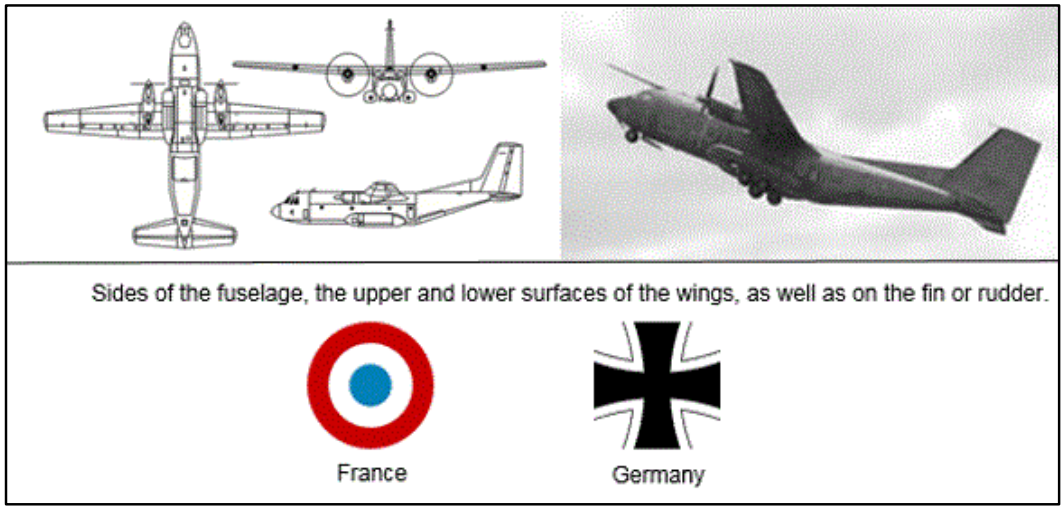

Figure D-12. C-160 Transall

GENERAL DATA:

Countries of Origin: France, Germany.

Similar Aircraft: G-222, Aviocar C-212, C-130 Hercules, An-12 Cub

Crew: Three

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

Armament: Usually none

Dimensions: Length: 106 ft, 3 in (32.4 m), Span: 131 ft, 3 in (40 m)

WEFT DESCRIPTION

Wings: High mounted and equally tapered outboard of engines with blunt tips.

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

Fuselage: Long, thick and tapered to the rear with round with a solid nose. Stepped cockpit and upswept tail section.

Tail: Flats mid mounted on thinned body, equally tapered with blunt tips. Fin is tall and tapered with a blunt tip and a fairing in the leading edge.

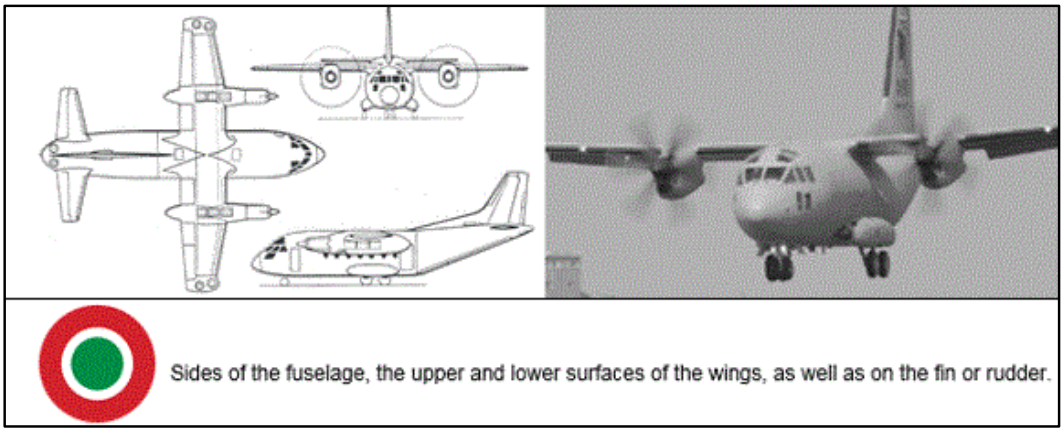

Figure D-13. G-222 Aeritalia

GENERAL DATA:

Country of Origin: Italy

Similar Aircraft: C-160 Transall, Aviocar C-212, C-130 Hercules, An-12 Cub

Crew: Three

Role: STOL transport, cargo (44 equipped troops)

Armament: Usually none

Dimensions: Length: 74 ft, 5 in (22.7 m), Span: 94 ft, 2 in (28.7 m)

WEFT DESCRIPTION

Wings: High mounted and equally tapered outboard of engines with blunt tips.

Engine(s): Two turboprops mounted beneath and extending beyond the wings' leading edges.

Fuselage: Short, round and tapered to the rear. Rounded nose and stepped cockpit. Upswept rear section.

Tail: Flats high-mounted on fuselage. Tapered leading edges with blunt tips. Fin is tall and back tapered with a blunt tip and fairing in the leading edge.

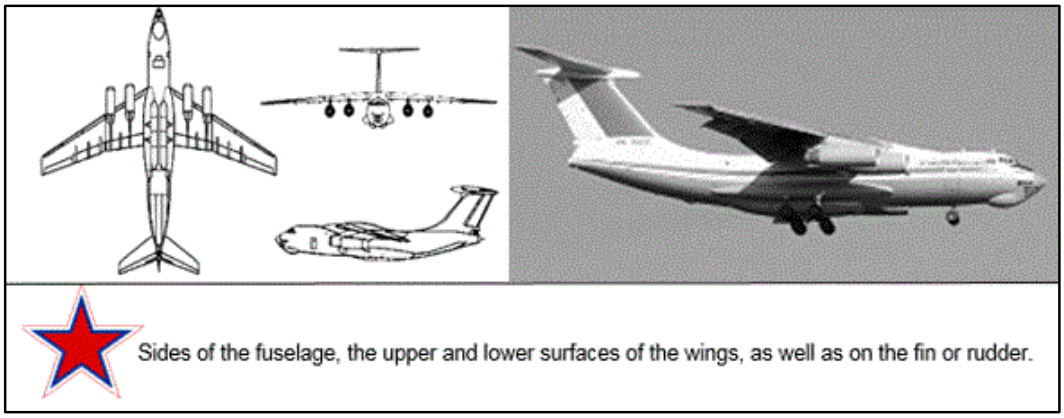

Figure D-14. IL-76 Candid

GENERAL DATA:

Country of Origin: Russia

Similar Aircraft: C-5 Galaxy, C-17A Globemaster III

Crew: Seven

Role: Heavy transport, cargo (tanks, guns, and other equipment)

Armament: Rear gun turret on military model

Dimensions: Length: 152 ft, 10 in (46.6 m), Span: 165 ft, 8 in (50.6 m)

WEFT DESCRIPTION

Wing: High mounted, swept back and tapered with blunt tips. Slight negative slant.

Engine(s): Four turbofans mounted on pylons under and extending beyond wings' leading edges.

Fuselage: Long, round and tapering to the rear. Round nose with radome on the chin. Bottom portion of nose glassed in. Flush cockpit.

Tail: Flats swept back, tapered and high mounted on a swept back, tapered tail fin forming a T.

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Appendix E

Utility Aircraft

This appendix shows several examples of utility type aircraft. There are literally hundreds of utility aircraft types that could be used in this function.

SPECIFIC PLATFORMS

E-1. Included are utility aircraft types manufactured specifically for military purposes, although other examples are shown of conversions from civilian to military or military to civilian uses. Table E-1 provides a list of Utility aircrafts.

E-2. General criteria for each utility aircraft platform is provided in the following illustrations. Figure E-1 provides a WEFT description for Utility Ai8rcraft. Refer to figures E-2 through E-8 (on pages E-2 through E-9).

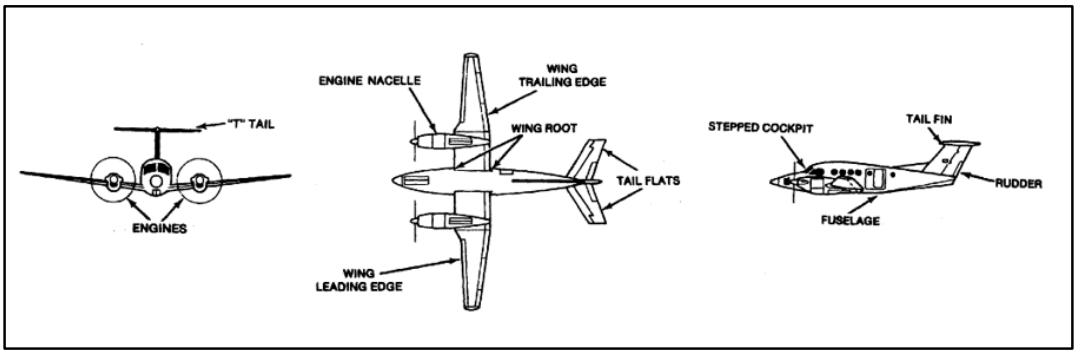

Figure E-1. WEFT description for Utility Aircraft

Table E-1. List of Utility Aircrafts

NAME OF AIRCRAFT	*COUNTRY OF ORIGIN*
AN-2 Colt	Russia, Poland
C-12 Huron/B200	US
C-23 Sherpa	United Kingdom
King Air	US
O-2 Skymaster	US
DO 128-2 Skyservant	Germany
PC-7 (Pilatus)	Switzerland
MV-22 Osprey	US

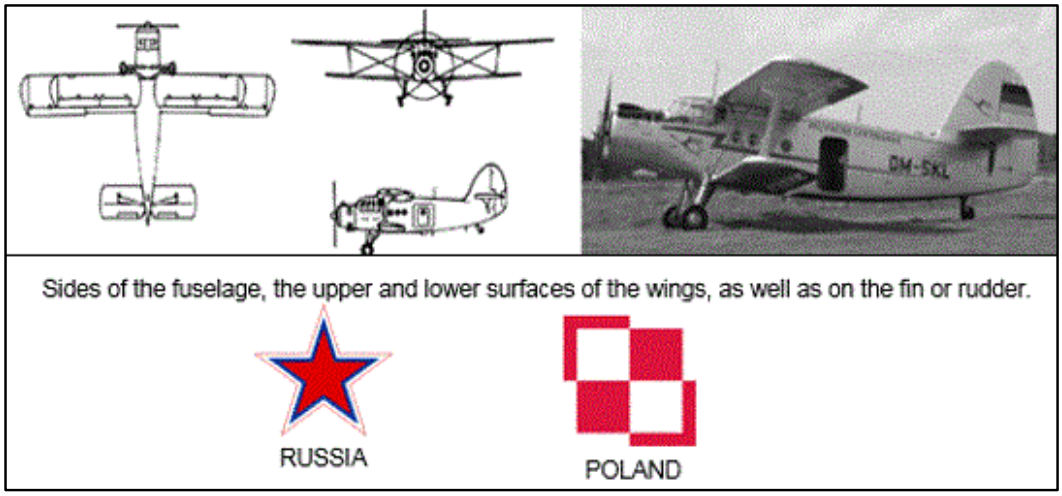

Figure E-2. AN-2 Colt

GENERAL DATA:

Country of Origin: Russia, Poland

Similar aircraft: U-6A Beaver, OV-10 Bronco

Crew: Two

Role: Light-transport (10 equipped troops), general utility

Armament: Usually none

Dimensions: Length: 41 ft 9 in (12.75 m), Span: 59 ft, 8 in (18.19 m)

WEFT DESCRIPTION

Wings: Biplane and rectangular shaped with curved tips. One high mounted and one low mounted (shorter), connected and braced by two struts.

Engine(s): One radial piston engine (some versions are turboprop) mounted in the nose.

Fuselage: Short and thick with solid, blunt nose. Stepped cockpit. Fixed landing gear.

Tail: Fin tapered with large, round tip. Flats are low mounted on the tail fin and rectangular shaped with curved tips. Swept back, tapered fin with square tip.

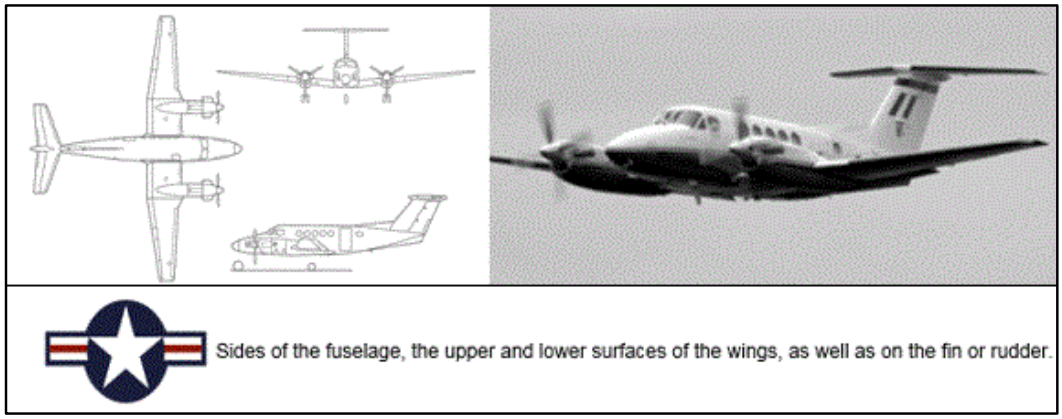

Figure E-3. C-12 Huron/B200

GENERAL DATA:

Country of Origin: US

Similar Aircraft: King Air, U-8F Seminole (Queen Air)

Crew: One or Two

Role: Utility, light-transport, surveillance

Armament: None

Dimensions: Length: 43 ft, 9 in (13.32 m), Span: 54 ft, 6 in (16.6 m)

WEFT DESCRIPTION

Wings: Low mounted, straight to engines, and equally tapered from engines to blunt tips. Positive slant.

Engine(s): Two turboprops mounted in and extending forward of the wings' leading edges.

Fuselage: Long, tubular, and tapered to the rear and nose. Stepped cockpit.

Tail: Swept back and tapered tail flats with blunt tips and high mounted on a swept back tail fin forming a T. Fairing in leading edge.

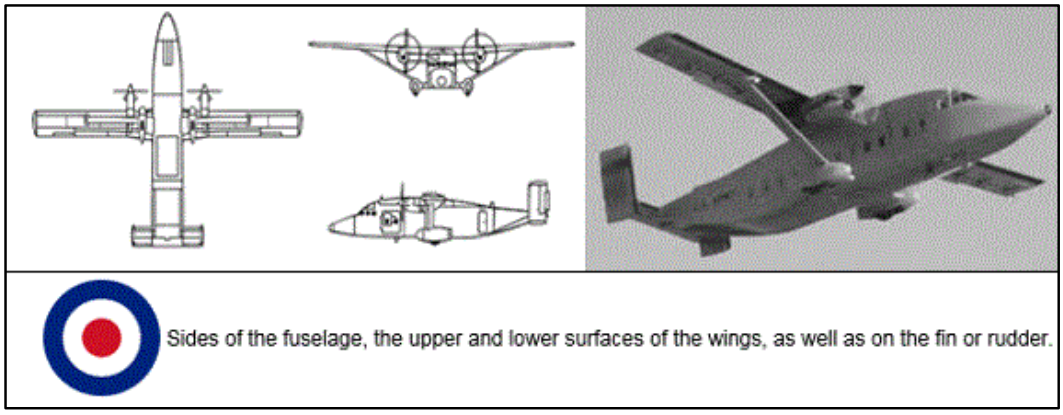

Figure E-4. C-23 Sherpa

GENERAL DATA:

Country of Origin: United Kingdom

Similar Aircraft: Aviocar C-212, Skyvan 3M

Crew: Two plus flight mechanic

Role: Utility transport (nine passengers, vehicles).

Armament: None

Dimensions: Length: 58 ft (17.7 m), Span: 74 ft, 8 in (22.76 m)

FT DESCRIPTION

Wings: High mounted and rectangular with blunt tips. Struts between wings and landing gear.

Engine(s): Twin turboprops mounted in pods under the leading edges of the wings.

Fuselage: Slab-sided. Rectangular from fuselage to tail. Rounded nose. Stepped cockpit.

Tail: Rectangular fins with blunt tips. Fins are mounted on the tips of the flats. Flat is rectangular and high mounted on the body.

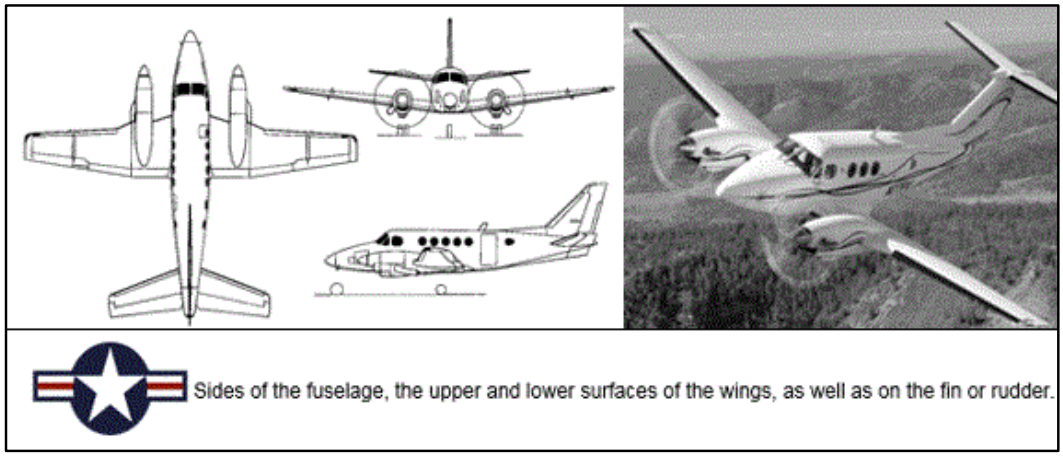

Figure E-5. King Air

GENERAL DATA:

Country of Origin: US

Similar Aircraft: C-12 Super King Air, U-8 Seminole (Queen Air)

Crew: Two

Role: Light-transport (16 seats, utility)

Armament: None

Dimensions: Length: 39 ft, 8 in (12 m), Span: 45 ft, 10 in (14 m).

WEFT DESCRIPTION

Wings: Low mounted and equally tapered outboard of engines with blunt tips. Wide wing roots with positive slant.

Engine(s): Two turboprops mounted in and extending forward of the wings' leading edges.

Fuselage: Long, tubular, and tapered tail and nose. Stepped cockpit.

Tail: Flats unequally tapered with blunt tips mid-mounted on body with a positive slant. Swept back and tapered fin with square tip.

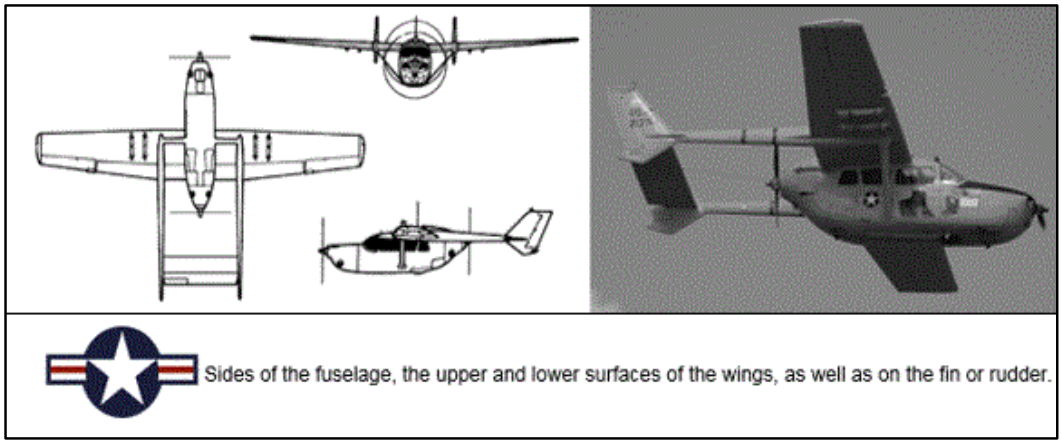

Figure E-6. O-2 Skymaster

GENERAL DATA:

Country of Origin: US

Similar Aircraft: None

Crew: Two

Role: Observation, liaison, forward air control, psychological warfare

Armament: Mini-guns, rockets

Dimensions: Length: 29 ft, 9 in (9.6 m), Span: 38 ft, 3 in (11.64 m)

WEFT DESCRIPTION

Wings: High mounted with straight leading edges and forward-tapered trailing edges from mid wing to blunt tips.

Engine(s): Two piston engines, one on the nose and one on the rear of the body.

Fuselage: Stubby, box like with propellers at each end. Stepped, glassed in cockpit. Rear of body upswept to tail booms.

Tail: Rectangular tail flat at end of twin tail booms. Swept back tail fins with blunt tips at tips of tail flat. Fins extend above and below tail flat.

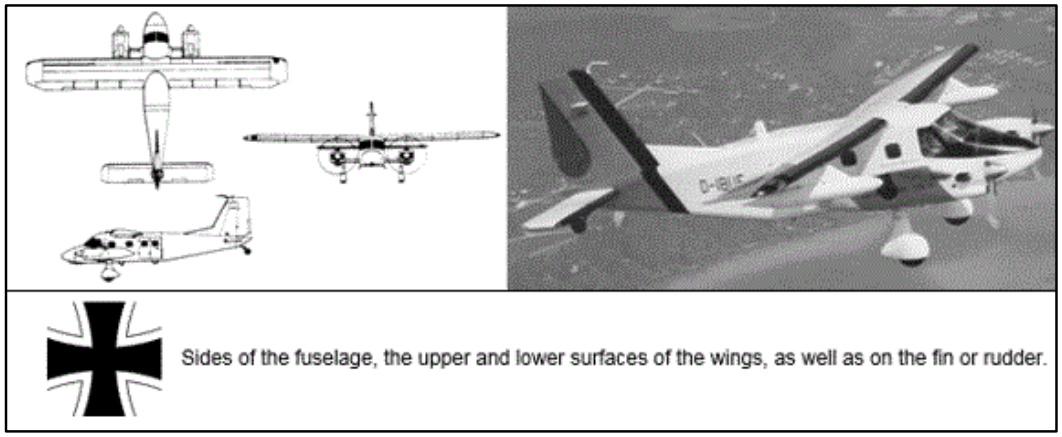

Figure E-7. DO 128-2 Skyservant

GENERAL DATA:

Country of Origin: Germany

Similar Aircraft: UV-18 Twin Otter

Crew: Two

Role: STOL light-transport, cargo (fourteen equipped troops)

Armament: Usually none

Dimensions: Length: 37 ft, 5 in (11.4 m), Span: 51 ft (15.56 m)

WEFT DESCRIPTION

Wings: High mounted and rectangular with square tips.

Engine(s): Two piston engines mounted on tips of stubby attachments on lower body. Some are equipped with turboprop engines.

Fuselage: Box like and tapered to the rear section. Rounded nose and stepped cockpit. Fixed wheel landing gear with streamlined covers.

Tail: Rectangular tail flats mid mounted on body with square tips. Fin is unequally tapered with a square tip.

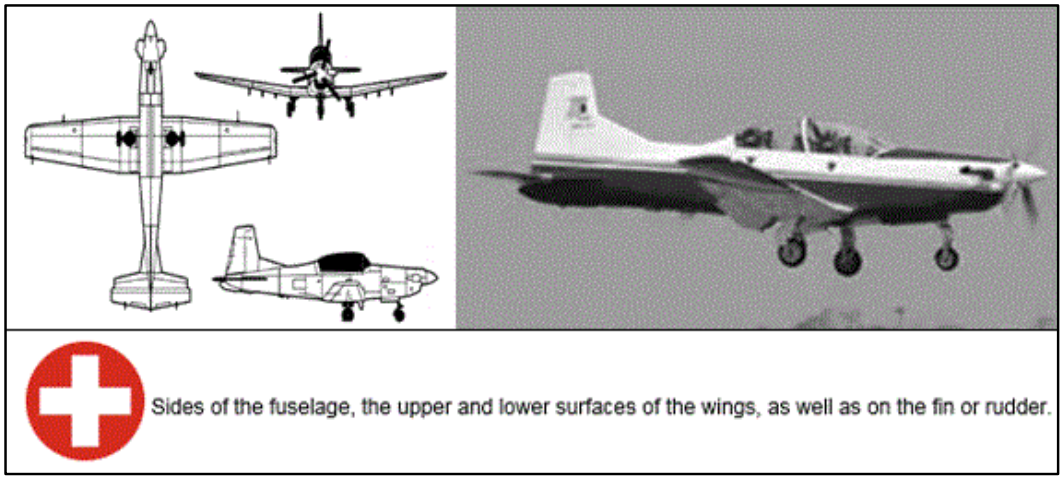

Figure E-8. PC-7

GENERAL DATA:

Country of Origin: Switzerland

Similar Aircraft: L-39 Albatross, SF.260W Warrior

Crew: Two-seat

Role: Turbo trainer, aerobatic, light attack

Armament: Six pylons for weapons

Dimensions: Length: 32 ft, 1 in (9.78 m), Span: 34 ft, 1 in (10.40 m)

WEFT DESCRIPTION

Wings: Low mounted, unequally tapered with blunt tips. Positive slant.

Engine(s): Single, turboprop mounted in the nose section. Air intake beneath a bullet nose.

Fuselage: Oval, tapers to front and rear.

Tail: Tapered tail fin with fairing and square tip. Flats high mounted and equally tapered with offset square tips.

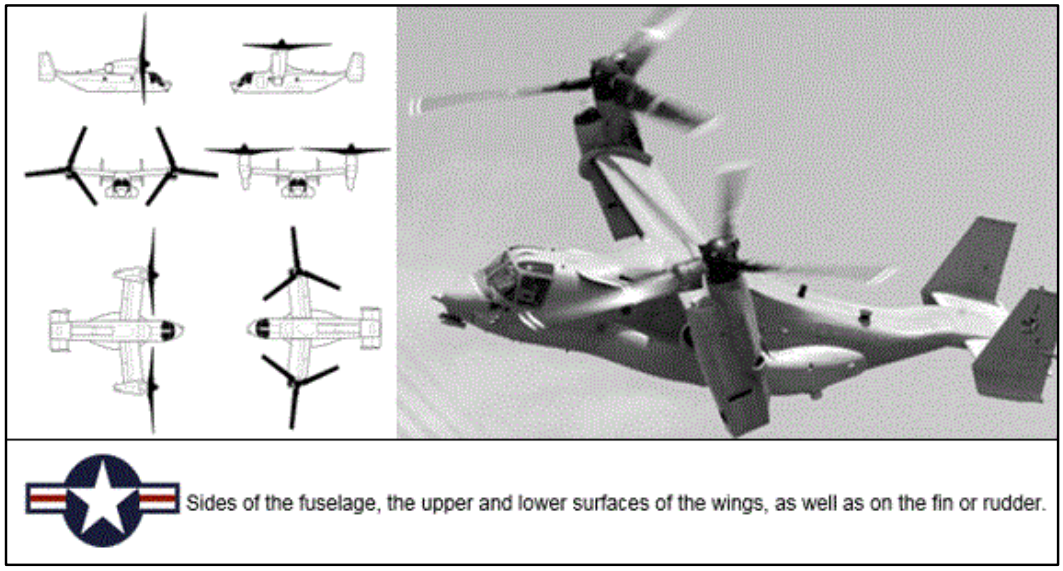

Figure E-9. MV-22 Osprey

GENERAL DATA:

Country of Origin: US.

Similar Aircraft: None.

Crew: Three (pilot, co-pilot, crew chief).

Role: Transport (24 equipped troops), Cargo, Rescue.

Armament: 12.7 mm cannon in nose.

Dimensions: Length: 62 ft., 7 in (19.08 m), Span (include nacelles): 50 ft., 11 in. (15.52 m), Rotor diameter: 38 ft. (11.58 m).

WEFT DESCRIPTION

Wings: High-mounted, constant-chord with slight forward sweep. Two, three- bladed prop-rotors mounted at tips of wings.

Engine(s): Two turboshaft engines. Each engine is housed in a streamlined nacelle at the end of the wing assembly.

Fuselage: Optimized for transport, upswept rear with loading ramp and landing gear sponsons. Twin fins of moderate sweepback.

Tail: Swept-back, dual tapered fins with square tips mounted on tail flat which are mid-mounted on the upswept fuselage tail.

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Appendix F

Unmanned Aircraft Platforms

This appendix shows examples of unmanned aircraft. Unmanned aircraft have become more crucial than ever in fighting from wars to forest fires. They are produced in a myriad of sizes and configurations and can perform reconnaissance, surveillance, command and control, and kinetic strike missions. Like the US and allies, adversaries have increased their use of unmanned aircraft due to the relatively low cost, low risk, and high pay-off. Due to the rapidly accelerating proliferation of unmanned aircraft, it is critical that Soldiers familiarize themselves with different unmanned aircraft platforms, both friendly and enemy.

SPECIFIC PLATFORMS

F-1. Unmanned aircrafts (see table F-1) will perform a variety of missions: CAS, reconnaissance, surveillance, intelligence, targeting, and acquisition. Figure F-1 provides a WEFT description of unmanned aircraft. There are many more unmanned aircraft than can be listed here see figure F-2 through figure F-21 (on pages F-3 through F-22). For this manual, unmanned aircrafts grouped together based on similarities and roles.

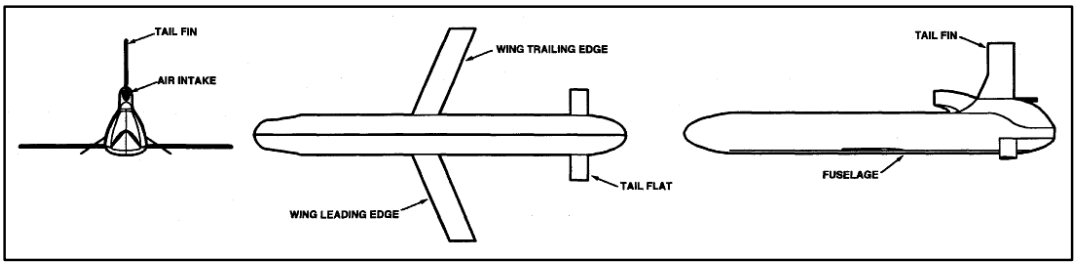


Figure F-1. WEFT description for Unmanned Aircraft

Table F-1. List of Unmanned Aircraft

NAME OF AIRCRAFT	*COUNTRY OF ORIGIN*
BTT-3 Banshee	United Kingdom
Brevel	France, Germany
Crecerelle	United Kingdom, France
D-4 NPU	China
Model 324 Scarab	US
Model 410	US
Mirach 26	Italy
Mirach 100 Meteor	Italy, Iraq, Libya
MQ-5B Hunter	US
MQ-8 Fire Scout	US
RQ-2 Pioneer	Israel, US
MQ-1 Predator	US
RQ-4B Global Hawk	US
RQ-7B Shadow	US
RQ-170 Sentinel	US
RQ-11B Raven	United Kingdom, US
MQ-9 Reaper	US
ScanEagle	US
Scout	Israel
SHMEL-1 YAK 061	Russia

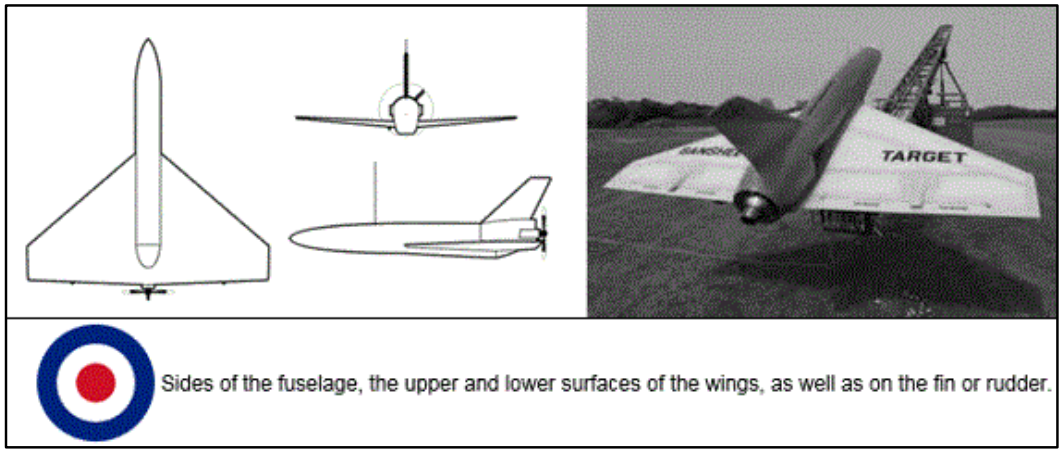


Figure F-2. BTT-3 Banshee

GENERAL DATA:

Country of Origin: United Kingdom

Similar Aerial Platform: Crecerelle, DR-3

Role: Target drone, reconnaissance

Armament: None

Dimensions: Length: 9 ft, 6 in (2.95 m), Span: 8 ft, 1 in (2.49 m)

WEFT DESCRIPTION

Wings: Low mounted and delta shaped. Wings have a positive slant.

Engine(s): Single jet in rear with a single exhaust. Prop driven engine with prop at the rear in the opposing position.

Fuselage: Round and tapers to the front. Blunt rear with jet engine, and a cone with rotary engine.

Tail: Tall, swept back fin. No flats.

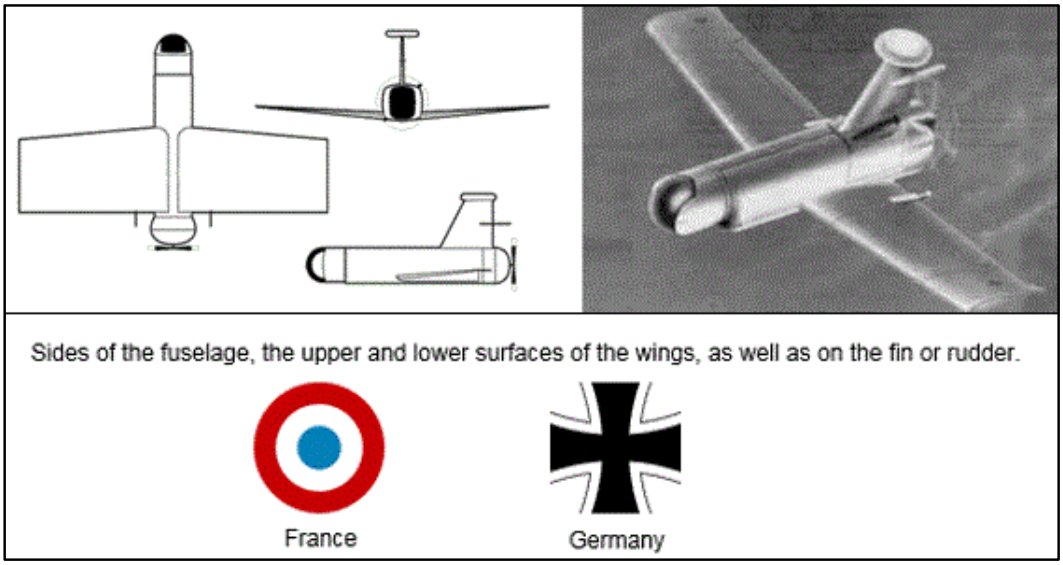


Figure F-3. Brevel

GENERAL DATA:

Country of Origin: France, Germany

Similar Aerial Platform: Taifun

Role: Recon, target locate/designate, and image assessment

Armament: None

Dimensions: Length: 7 ft, 5 in (2.3 m), Span: 11 ft, 1 in (3.4 m)

WEFT DESCRIPTION

Wings: Low mounted, back tapered leading and straight trailing edges with positive slant.

Engine(s): One piston engine mounted on rear of fuselage in the opposing position.

Fuselage: Round body. Rounded, glassed in nose section.

Tail: Back tapered fin with a small round radar dish on top. No flats.

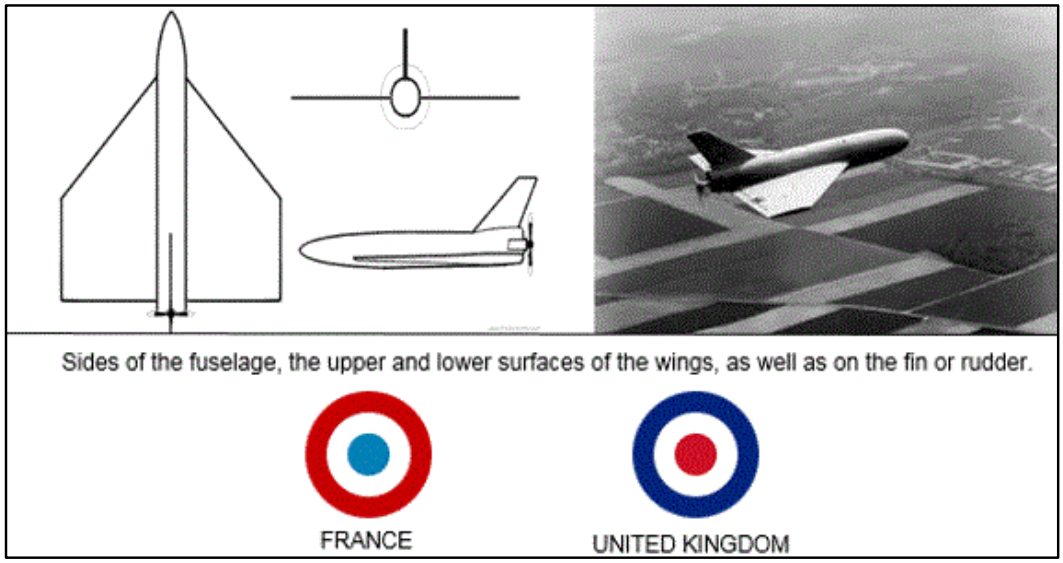


Figure F-4. Crecerelle

GENERAL DATA:

Country of Origin: United Kingdom, France

Similar Aerial Platform: Banshee, ASR-4 Spectre

Crew: None

Role: Reconnaissance, intelligence, surveillance, and target acquisition.

Armament: None

Dimensions: Length: 8 ft., 8 in (2.7 m), Span: 10 ft., 8 in (3.3 m)

WEFT DESCRIPTION

Wings: Low mounted, delta shaped with large, square tips.

Engine(s): Twin cylinder, two-cycle engine. Two bladed propellers in the opposing position.

Fuselage: Round, tapers to a round nose. Blunt rear.

Tail: Swept back and tapered tail fin with a square tip. No flats.

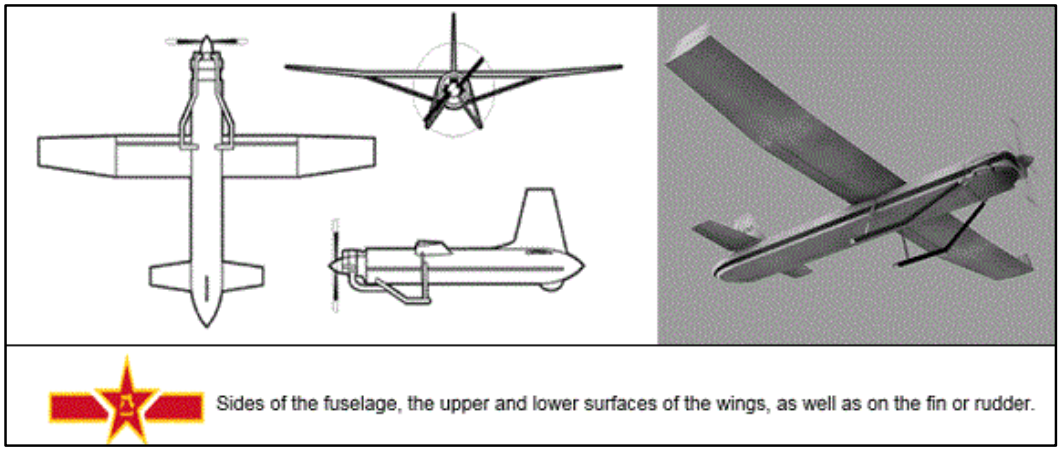


Figure F-5. D-4 NPU

GENERAL DATA:

Country of Origin: China

Similar Aerial Platform: MK-105 Flash. Predator

Role: Multirole, reconnaissance, surveillance and target

Armament: None

Dimensions: Length: 10 ft., 8 in (3.32 m), Span: 14 ft., 10 in (4.30 m)

WEFT DESCRIPTION

Wings: High mounted, straight to the midsection, tapered from mid wing to tips.

Engine(s): Single, prop driven engine in the nose section.

Fuselage: Round and tapers to front and rear with fixed landing pads.

Tail: Flats high mounted on body and equally tapered. Fin is equally tapered.

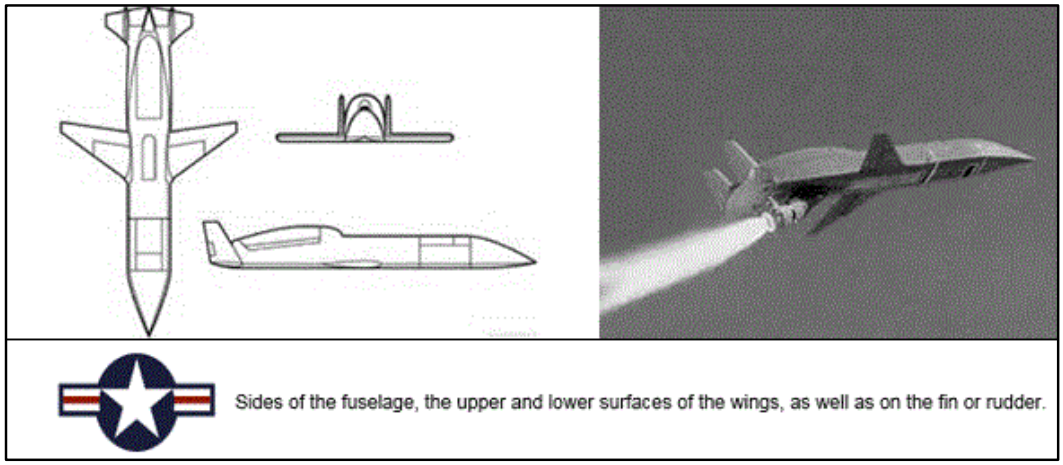


Figure F-6. Model 324 Scarab

GENERAL DATA:

Country of Origin: US

Similar Aerial Platforms: C-101

Role: Day and night reconnaissance

Armament: None

Dimensions: Length: 20 ft., 1 in (6.12 m), Span: 11 ft. (3.35 m)

WEFT DESCRIPTION

Wings: Low mounted, swept back, and tapered.

Engine(s): Turbojet hidden in aft belly compartment until launch.

Fuselage: Flat bottomed. Pointed nose and hump on aft top of craft.

Tail: Two swept-back and tapered fins mounted on unequally tapered flats.

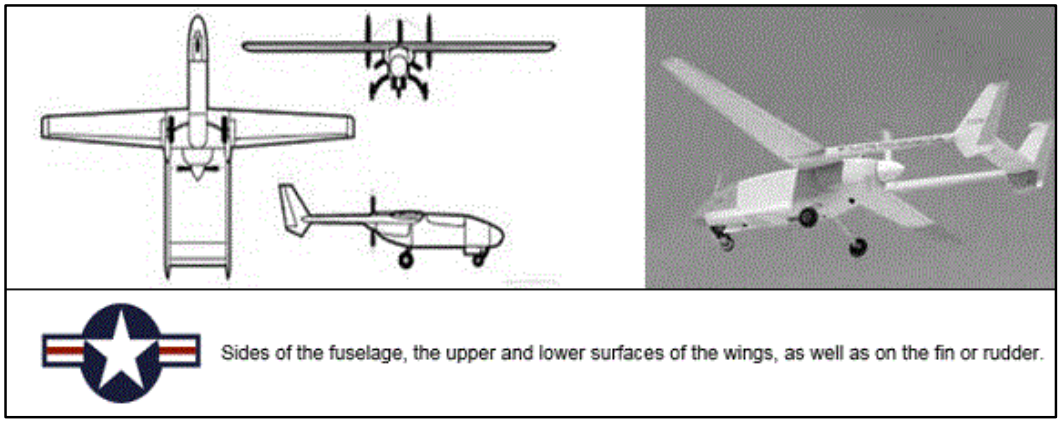


Figure F-7. Model 410

GENERAL DATA:

Country of Origin: US

Similar Aerial Platforms: Pioneer, Scout, MK-105 Flash

Role: Reconnaissance, early warning

Armament: None

Dimensions: Length: 21 ft., 6 in (6.60 m), Span: 31 ft., 3 in (9.55 m)

WEFT DESCRIPTION

Wings: High mounted, tapered with a blunt tip.

Engine(s): Four-cylinder turbo on rear of fuselage in the opposing position.

Fuselage: Round and tapers to the front and rear. Flat bottom. Fixed landing gear.

Tail: Tapered back fins mounted on booms. Rectangular flat between fins.

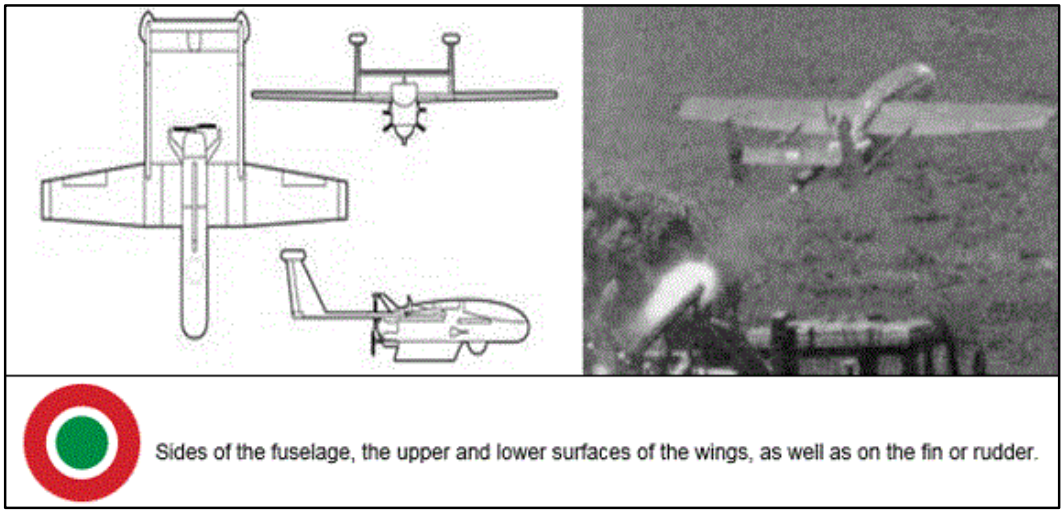


Figure F-8. Mirach 26

GENERAL DATA:

Country of Origin: Italy

Similar Aerial Platform: MK-105 Flash, Shaheen, Mastiff, Ranger

Role: Close range tactical mini UAV

Armament: None

Dimensions: Length: 12 ft, 6 in (3.85 m), Span: 15 ft, 5 in (4.73 m)

WEFT DESCRIPTION

Wings: High mounted, straight to mid wing, and tapered to square tips.

Engine(s): Small piston engine mounted on the rear of the body in the opposing position.

Fuselage: Rounded with curved spine. Long, wide belly fins. Sensors.

Tail: Thin tail booms to tall, swept-back fins. Rectangular flat between fins.

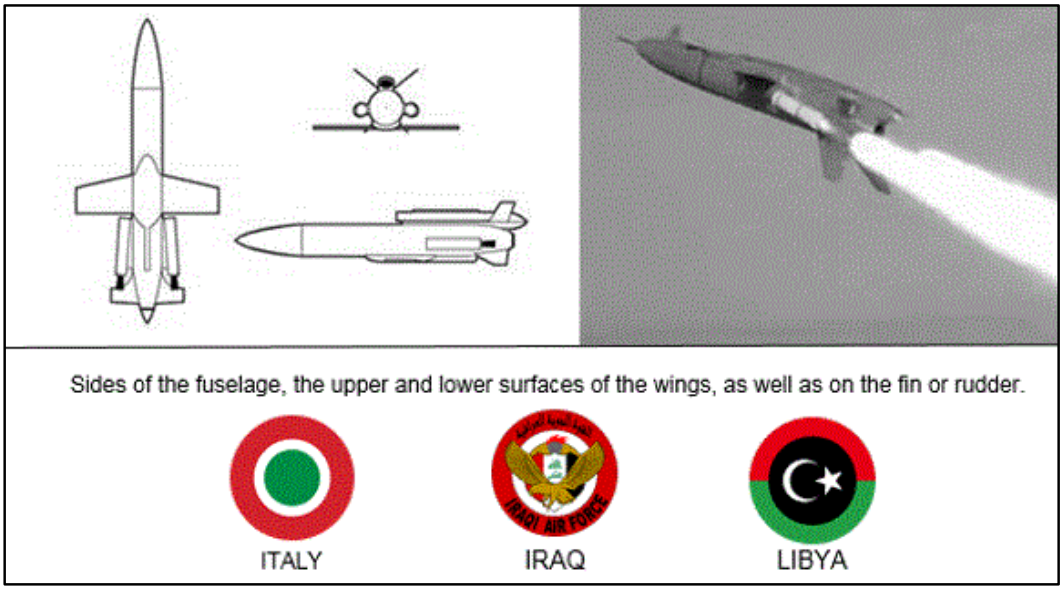


Figure F-9. Mirach 100 Meteor

GENERAL DATA:

Country of Origin: Italy, Iraq, Libya

Similar Aerial Platform: Mirach 150, MQ-2 Bigua, C.22, Marakub 100 (Iraq)

Role: Target drone, tactical cruise

Armament: HE warhead on cruise

Dimensions: Length: 13, ft., 5 in (4.126 m), Span: 5 ft., 9 in (1.804 m)

WEFT DESCRIPTION

Wings: Low mounted; back tapered and semi-delta with square tips.

Engine(s): Single jet on top rear. Oval intake and round exhaust.

Fuselage: Round, tapered to the front and rear. Two belly fins.

Tail: Back tapered V-type flats on sides of engine with a tail cone.

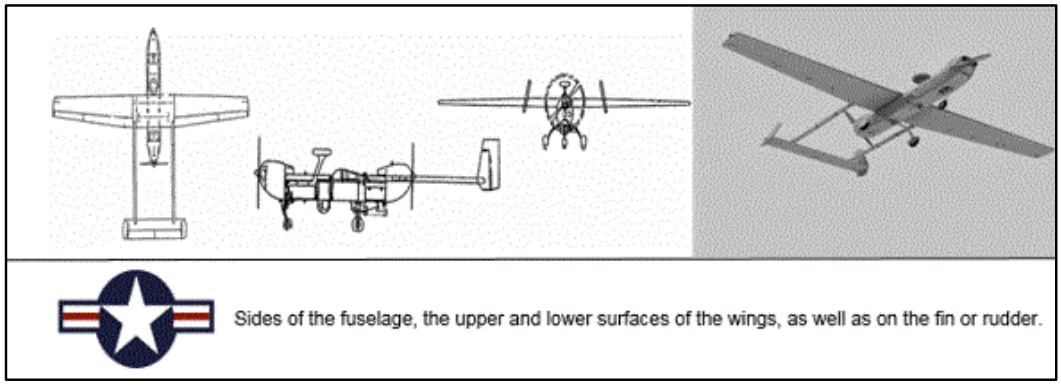


Figure F-10. MQ-5B Hunter

GENERAL DATA:

Country of Origin: US

Similar Aerial Platform: RQ-2 Pioneer, Scout

Role: Reconnaissance, surveillance, and target acquisition

Armament: None

Dimensions: Length: 23 ft. (7.01m), Span: 34 ft., 3 in (10.44 m)

WEFT DESCRIPTION

Wings: Straight high-mounted and tapered forward with square tips.

Engine(s): Two prop engines located in the nose section and rear of the fuselage.

Fuselage: Tubular fuselage tapered downward flat on the bottom of fuselage.

Tail: Thin tail booms to tall, swept-back fins. Rectangular flat between fins.

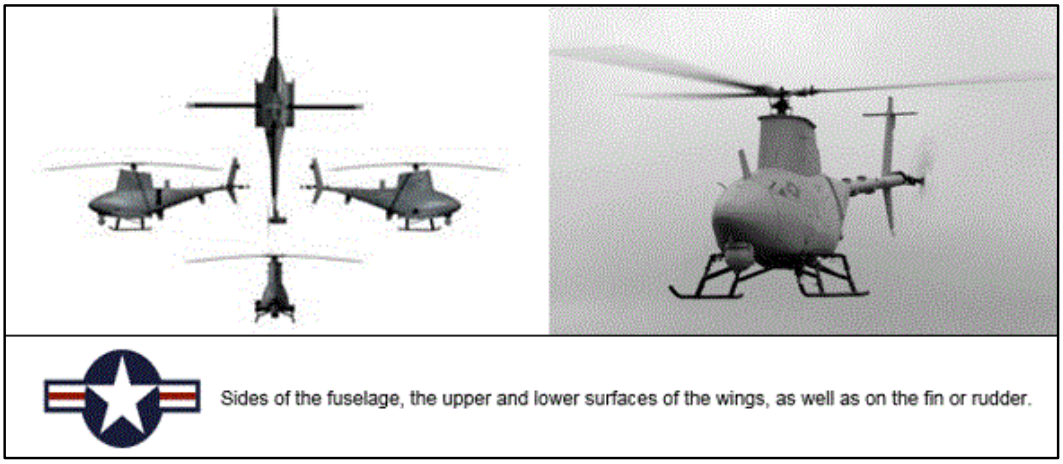


Figure F-11. MQ-8 Fire Scout

GENERAL DATA

Country of Origin: US

Similar Aerial Platform: None

Role: Reconnaissance, surveillance, and target acquisition

Armament: None

Dimensions: Length: 22 ft., 10.8 in (6.97 m)

Rotor diameter: 27 ft., 6 in. (8.38 m)

WEFT DESCRIPTION

Wings: Three-blade main rotor mounted on the top hump of the fuselage.

Engine(s): One turboshaft mounted in the center of the fuselage. Rectangular intake located at the rear left side of the fuselage. Single exhaust port on the lower right side of the fuselage.

Fuselage: Thin, oval body with a short, rounded nose. Mid-mounted, tubular tail boom.

Tail: Small flats are high-mounted, delta-shaped with blunt tips. Fin swept back tapered with square tip. Two blade rotor on the left.

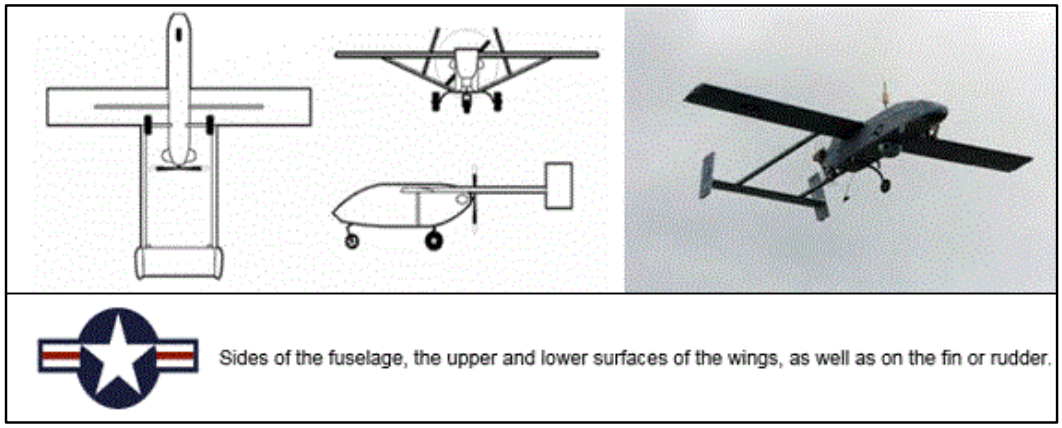


Figure F-12. RQ-2 Pioneer

GENERAL DATA:

Country of Origin: Israel, US

Similar Aerial Platform: Scout, hunter, Scout II

Role: Short-and medium range surveillance and reconnaissance

Armament: None

Dimensions: Length: 13 ft., 9 in (4.26 m), Span: 16 ft., 7 in (5.11 m)

WEFT DESCRIPTION

Wings: High-mounted and straight with square tips. Struts on wings attached to body.

Engine(s): Single, prop driven and mounted in fuselage rear in the opposing position.

Fuselage: Oval, slab-sided, tapers to a pointed nose and rear. Fixed landing gear.

Tail: Booms mounted to square fins that extend above and below a straight flat.

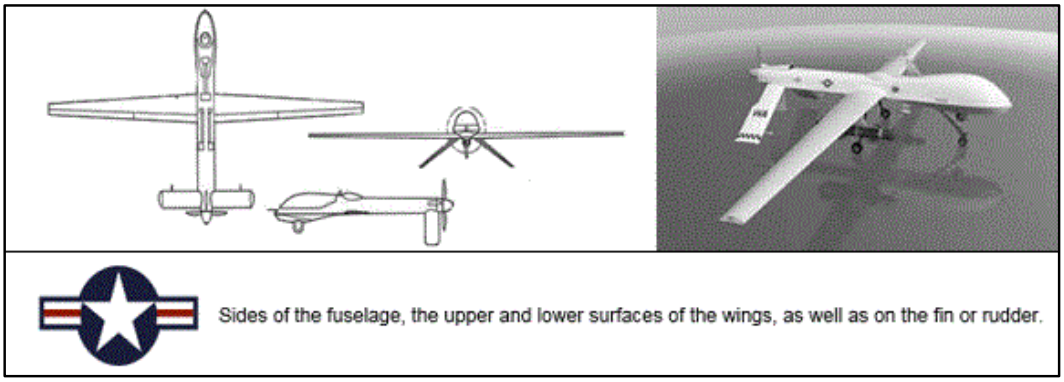


Figure F-13. MQ-1 Predator

GENERAL DATA:

Country of Origin: US

Similar Aerial Platform: D-4 NPU

Role: Reconnaissance, surveillance, targeting, and attack.

Armament: Hellfire Missiles

Dimensions: Length: 27 ft. (8.23 m), Span: 55 ft. (16.76 m)

WEFT DESCRIPTION

Wings: Low-mounted and sharply tapered with a slight positive slant.

Engine(s): Single, prop driven and mounted on rear in the opposing position.

Fuselage: Round, tubular. Bulging at the front one-third.

Tail: Low-mounted rectangular flats and sharp negative slant. No fin.

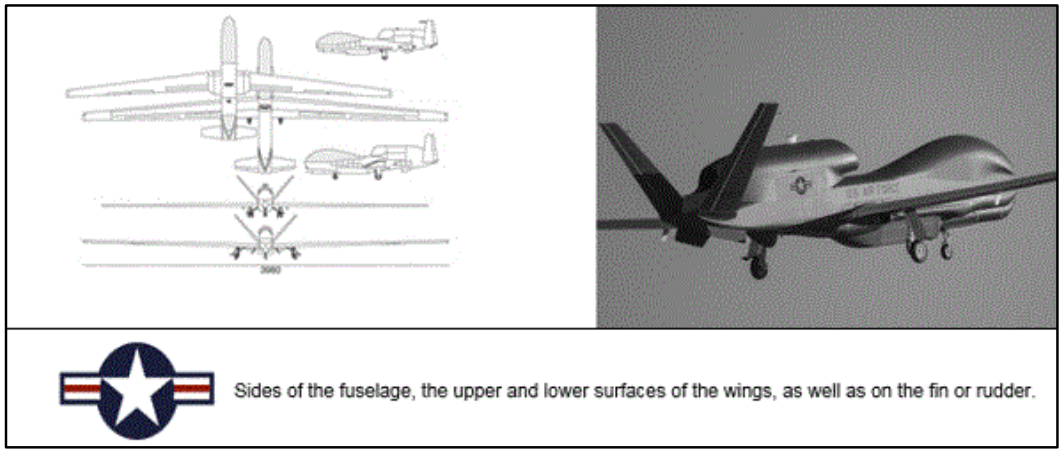


Figure F-14. RQ-4B Global Hawk

GENERAL DATA:

Country of Origin: US

Similar Aerial Platform: None

Role: Reconnaissance, surveillance, and targeting acquisition.

Armament: None

Dimensions: Length: 47 ft. (14.33 m), Span: 130 ft. (39.62 m)

WEFT DESCRIPTION

Wings: Low-mounted, swept-back with a slight positive slant.

Engine(s): Turbofan engine mounted top of the fuselage at the rear. Semi-circular intake and a round exhaust at the end of the fuselage.

Fuselage: Unique shape. Nose cone is bulged and the fuselage tapers at the rear.

Tail: Two low-mounted outward-angled tail fins back tapered with square tips. Two small under fuselage ventral strakes.

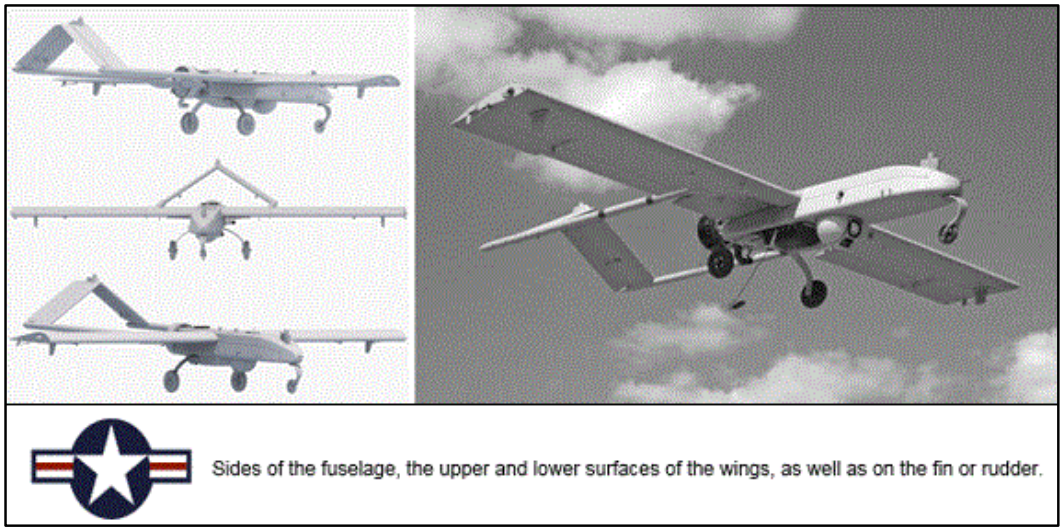


Figure F-15. RQ-7B Shadow

GENERAL DATA:

Country of Origin: US

Similar Aerial Platform: None

Role: Reconnaissance, surveillance, and targeting acquisition.

Armament: None

Dimensions: Length: 11 ft., 2 in. (3.40 m), Span: 14 ft. (4.27 m)

WEFT DESCRIPTION

Wings: Straight high-mounted to the rear of the fuselage.

Engine(s): Single, prop driven and mounted on rear in the opposing position.

Fuselage: Round, flat bottom with bubble sensor. Tapers down to front.

Tail: Booms mid-mounted to tail sections ends with an angle-up shape. No flats.

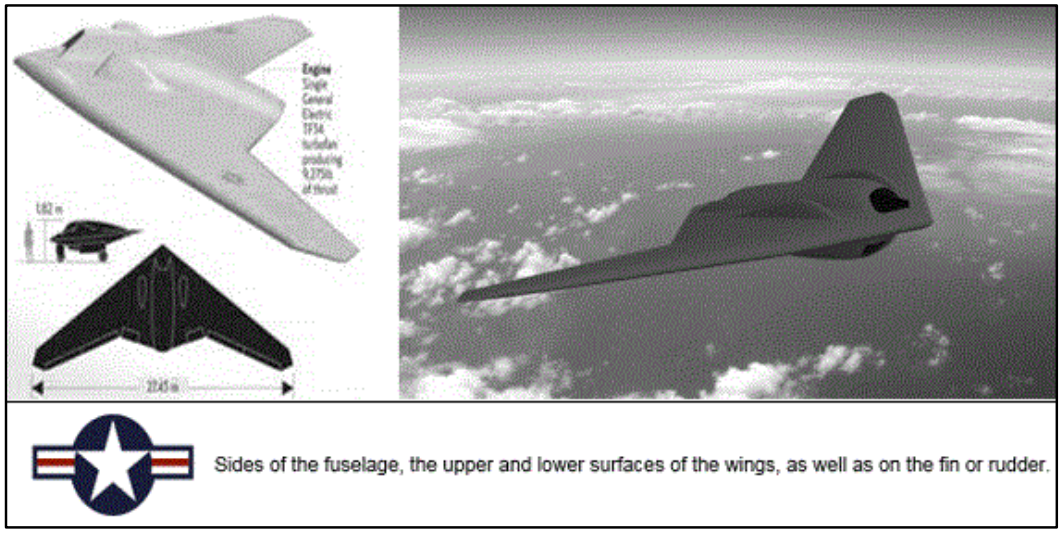


Figure F-16. RQ-170 Sentinel

GENERAL DATA:

Country of Origin: US

Similar Aerial Platform: None

Role: Close-range, day and night surveillance.

Armament: None

Dimensions: Length: 14 ft., 9 in. (4.5 m), Span: 65 ft., 7 in. (19.99 m)

WEFT DESCRIPTION

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

Engine(s): Electric turbofan mounted inside the body.

Fuselage: Sharp, pointed nose. Pyramid and faceted appearance.

Tail: No tail fins.

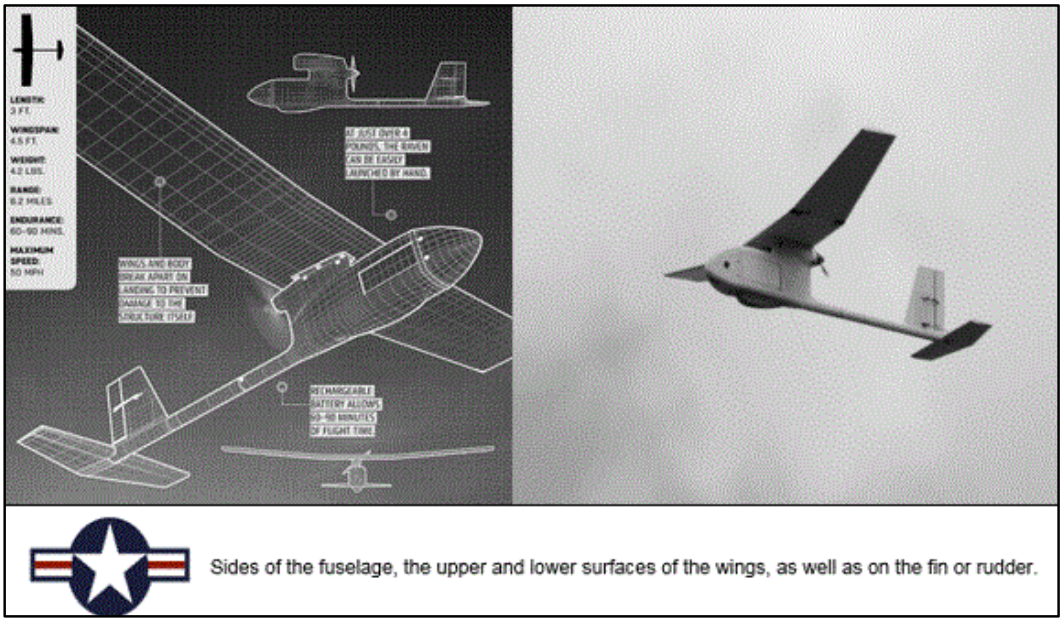


Figure F-17. RQ-11B Raven

GENERAL DATA:

Country of Origin: US

Similar Aerial Platform: None

Role: Reconnaissance and surveillance with low altitude operation.

Armament: None

Dimensions: Length: 3 ft. (914.4 mm), Span: 4 ft., 6 in. (1372 mm)

WEFT DESCRIPTION

Wings: High-mounted, positive slant and rectangular with blunt tips.

Engine(s): Electric motor with propeller mounted at rear fuselage in the opposing position.

Fuselage: Oval with round nose, single thin boom and modular package.

Tail: Back-tapered fin on boom. Flat rectangular and low mounted on fin.

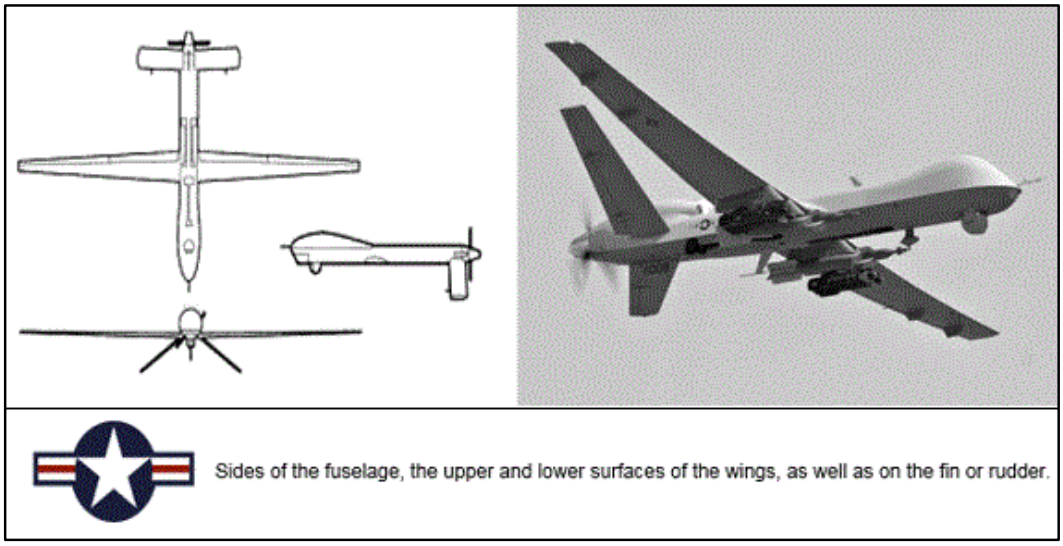


Figure F-18. MQ-9 Reaper

GENERAL DATA:

Country of Origin: US

Similar Aerial Platform: D-4 NPU

Role: Multi-roles.

Armament: Hellfire Missiles, bombs

Dimensions: Length: 36 ft. (11 m), Span: 66 ft. (20.1 m)

WEFT DESCRIPTION

Wings: Low-mounted and sharply tapered with a slight positive slant.

Engine(s): Single, prop driven and mounted on rear in the opposing position.

Fuselage: Round, tubular. Bulging at the front one-third.

Tail: Back tapered V-type flats on sides of engine with a tail fin on the bottom of the fuselage.

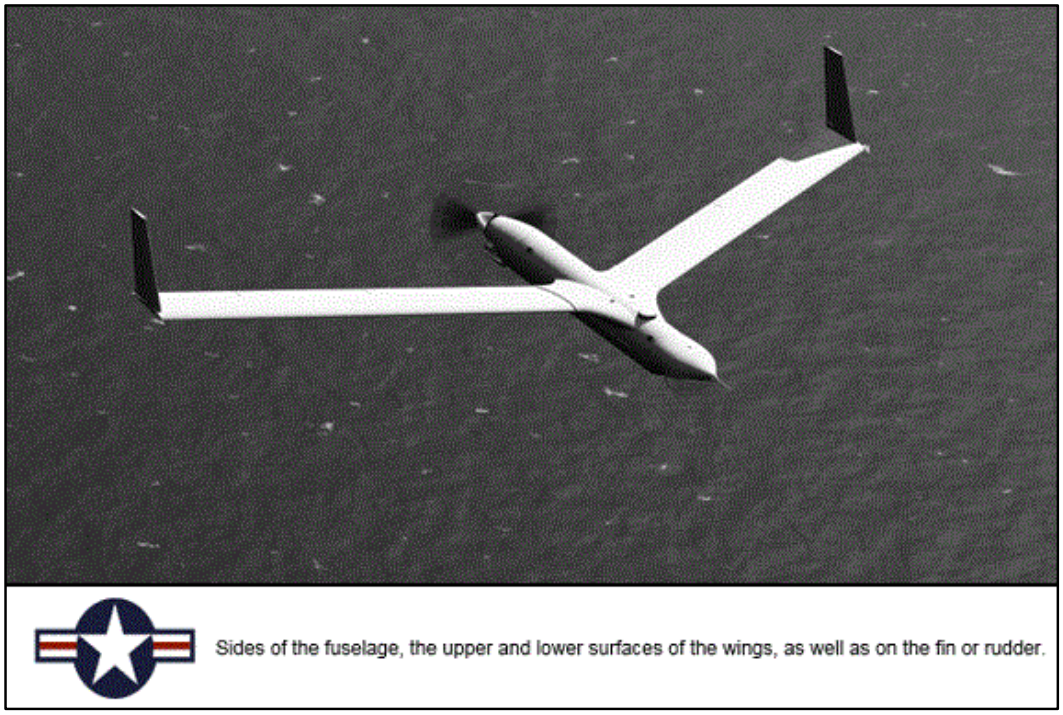


Figure F-19. ScanEagle

GENERAL DATA:

Country of Origin: US

Similar Aerial Platform: None

Role: Close-range, day and night surveillance.

Armament: None

Dimensions: Length: 4 ft. 6 in. (1.4 m), Span: 10 ft. 2.4 in. (3.1 m)

WEFT DESCRIPTION

Wings: High-mounted, positive slant and swept back with positive tapered slant tips.

Engine(s): Two-stroke engine with propeller mounted at tear fuselage in the opposing position.

Fuselage: Oval with pointed nose, single thin boom and modular package.

Tail: No tail fins or flats.

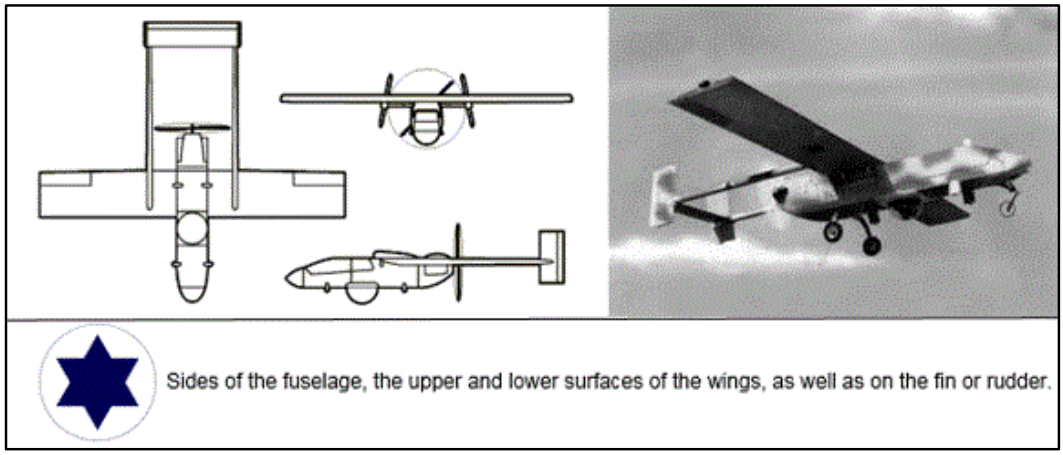


Figure F-20. Scout

GENERAL DATA:

Country of Origin: Israel

Similar Aerial Platform: Pioneer, Hunter, ADE RPV, Shahin, AL Yamamah, Seeker.

Role: Close-range surveillance and targeting.

Armament: None

Dimensions: Length: 12 ft., 7 in. (3.68 m), Span: 11 ft., 8 in. (3.60 m)

WEFT DESCRIPTION

Wings: High-mounted and rectangular with square tips.

Engine(s): One piston engine mounted on rear fuselage in the opposing position.

Fuselage: Round, flat bottom with bubble sensor. Tapers down to front.

Tail: High, thin tail booms to rectangular fins mounted on tips of rectangular flat.

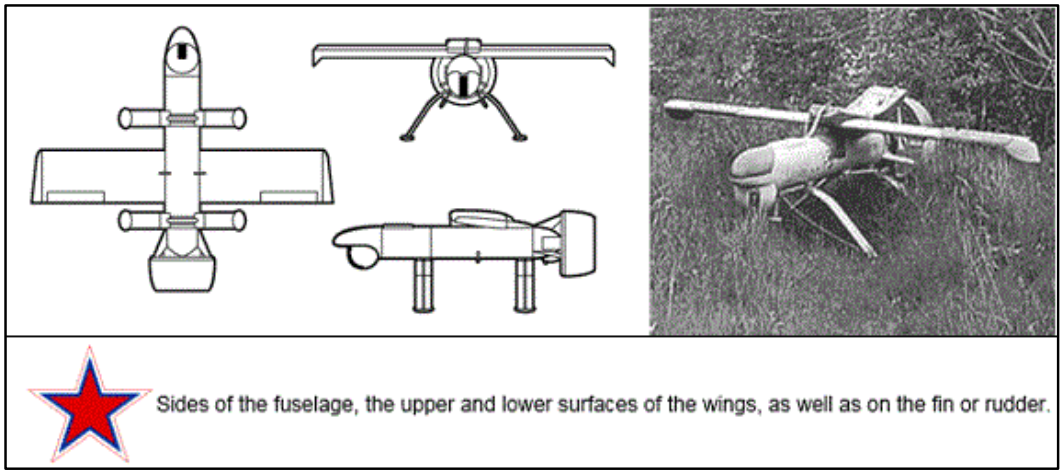


Figure F-21. Shmel-1 Yak-061

GENERAL DATA:

Country of Origin: Russia

Similar Aerial Platform: None.

Role: Remote terrain observation.

Armament: None

Dimensions: Length: 9 ft., 1 in. (2.78 m), Span: 10 ft., 6 in. (3.25 m)

WEFT DESCRIPTION

Wings: High-mounted and straight with blunt, negative slanted tips.

Engine(s): Prop-engine and has a round enclosure at the rear in the opposing position.

Fuselage: Round, bullet nose. Pads on feet of four curved legs for landing.

Tail: Three swept-back stabilizers on rear of craft forming the engine housing.

Appendix G

Rotary Wing Aircraft

This appendix covers rotary-wing aircraft. There are a large number of rotary-wing covered since nearly all countries have them in their inventory. Rotary-wings have been grouped together in this appendix because, with the exception of a few attack helicopters, most can be used in a variety of roles: CAS, attack, observation, heavy lift, cargo, transport, and surveillance.

SPECIFIC PLATFORMS

G-1. There are many rotary-wing configurations. Only a few rotary wings are similar in appearance and the differences make recognition of them easier for an observer. Figure G-1 provides the WEFT description for rotary wing aircraft. Table G-1 is a list of rotary wing aircraft on page G-2.

G-2. General criteria for each rotary wing platform is provided in the following illustrations. Refer to figures G-2 through G-32 (on pages G-3 through G-33).

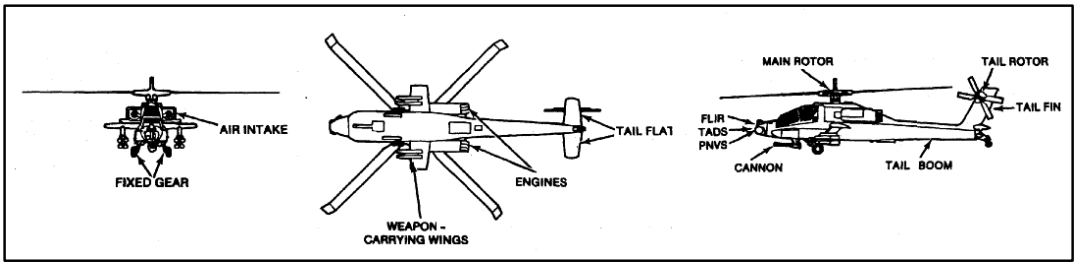


Figure G-1. WEFT description for Rotary Wing

Table G-1. List of Rotary Wing Aircraft

NAME OF AIRCRAFT	*COUNTRY OF ORIGIN*
AH-1F Cobra	US
AH-64 Apache	US
AH-6/MH-6 Little Bird	US
SA-316/SA-319 Alouette III	France
AS-332 Super Puma/AS-532 Cougar	France
BO 105	Germany
CH-47 Chinook	US
CH-53 Sea Stallion	US
SA365 Dauphin 2	France
MD500 Defender	US
SA-342M Gazelle	France, United Kingdom
Harbin Z-9	China
Hirundo A109	Italy
Ka-27 Helix	Russia
Ka-50 Hokum A/ Ka-52 Hokum B	Russia
WG-13 Lynx	United Kingdom
Agusta A129 Mangusta	Italy
Mi-2 Hoplite	Russia
MiI-17/Mi-8 Hip	Russia
Mi-24/25/35 Hind	Russia
Mi-26 Halo	Russia
Mi-28 Havoc	Russia
NH 90	France
OH-6A Cayuse	US
OH-58D Kiowa	US
PAH-2 Tiger/EC-665 Tiger	Germany, France, Spain
SA-330 Puma	France, United Kingdom
SH-3 Sea King	US
SA-321 Super Frelon	France
UH-60A Black Hawk	US
UH-72 Lakota	US

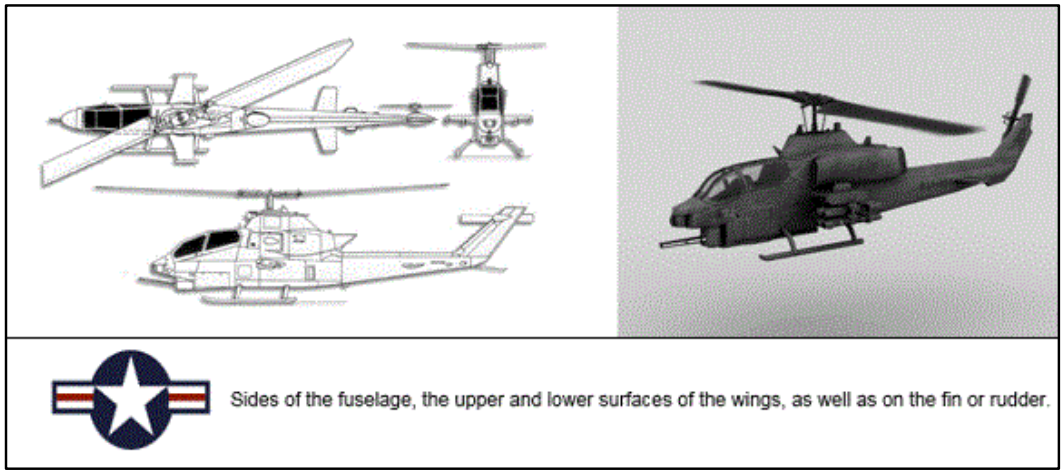


Figure G-2. AH-1F Cobra

GENERAL DATA

Country of Origin: US

Similar Aerial Platform: Mi-24 Hind, Mangusta A129, AH-64 Apache

Role: Attack helicopter

Armament: Cannon, grenade launcher, rockets, missiles, TOW missiles

Dimensions: Length: 44 ft, 7 in (13.6 m)

Rotor diameter: 44 ft, (13.42 m)

WEFT DESCRIPTION

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

Engine(s): One turboshaft mounted on top of the body forming a hump-like appearance. Single exhaust.

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

Tail: Small flats are mid-mounted, swept-back, tapered, blunt-tipped, and forward of the fin. Swept-back fin is tapered. Rotor on the right.

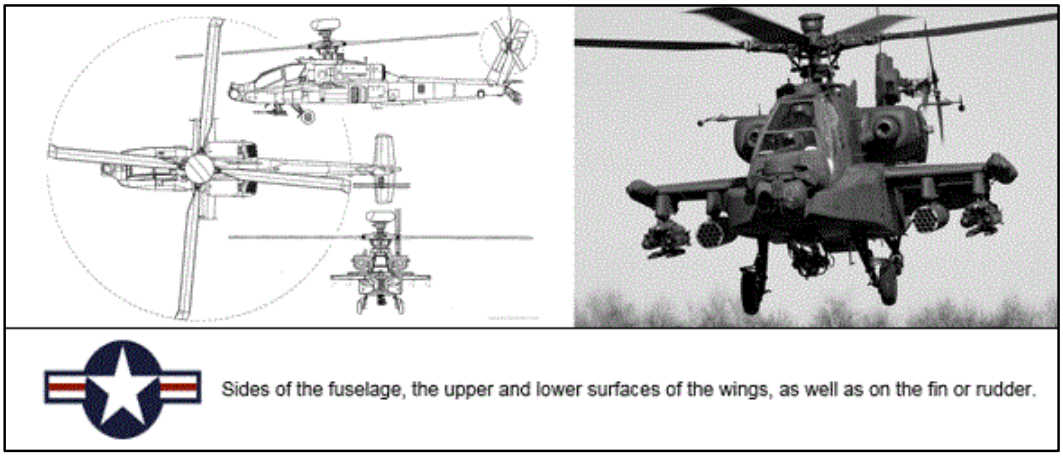


Figure G-3. AH-64 Apache

GENERAL DATA

Country of Origin: US

Similar Aerial Platform: Mi-28 Havoc, Mangusta A129, Mi-24 Hind, Ka-50 Hokum

Role: Advanced attack helicopter

Armament: 30-mm chain gun, missiles, rockets, Hellfire missiles

Dimensions: Length: 48 ft, 2 in (14.69 m)

Rotor diameter: 48 ft, (14.64 m)

WEFT DESCRIPTION

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

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

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

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

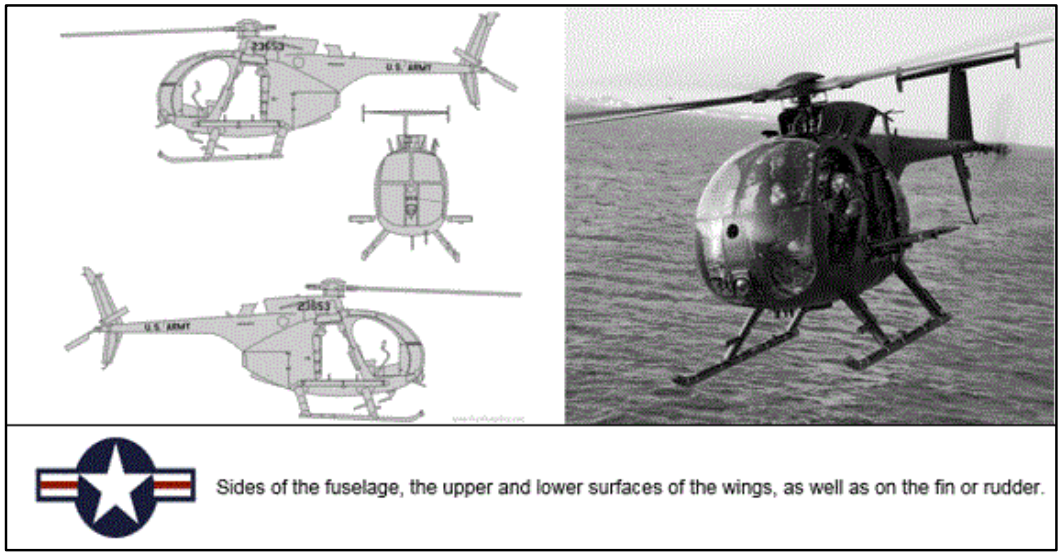


Figure G-4. AH-6/MH-6 Little Bird

GENERAL DATA

Country of Origin: US

Similar Aerial Platform: MD 500 Defender

Role: Light observation, air interdiction, forward air control, special patrol insertion/extraction

Armament: 30-mm chain gun, missiles, rockets

Dimensions: Length: 32 ft., 7.2 in (9.80 m)

Rotor diameter: 27 ft., 4.8 in. (8.30 m)

WEFT DESCRIPTION

Wings: Six-blade main rotor mounted above body midsection. Blades are squared tips.

Engine(s): Single turboshaft engine mounted in the rear of the fuselage. Exhaust port sits under the empennage base.

Fuselage: Large bubble-type framed glassed cockpit. Flat belly and fixed landing gear.

Tail: Fin boomerang-shaped, swept-back, and tapered. Flats back-tapered with small fins attached to the tips. Flats high-mounted on the fin forming a “T”. Four-blade tail rotor on lower left of tail boom.

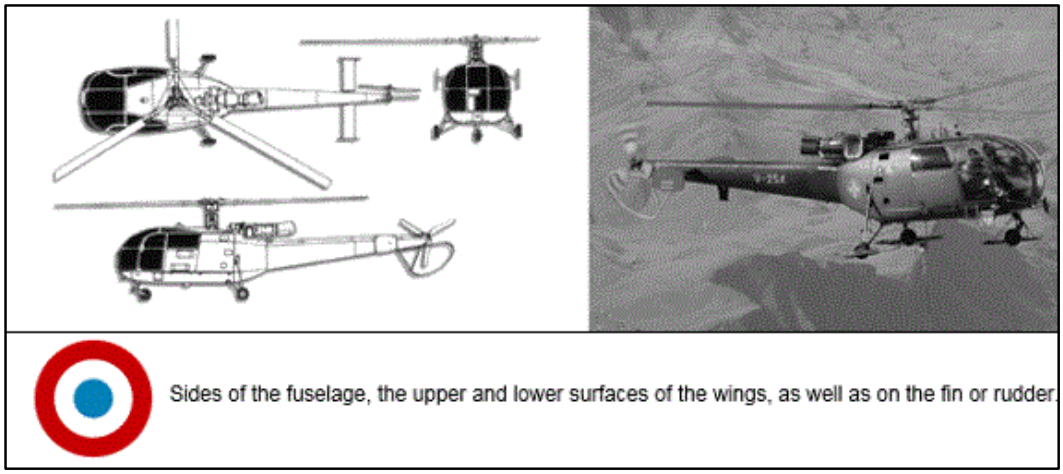


Figure G-5. SA-316/SA-319 Alouette III

GENERAL DATA

Country of Origin: France

Similar Aerial Platform: Alouette II, SA-342M Gazelle, Scout/Wasp, OH-13 BO 105

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

Armament: Machine guns, cannon, antitank missiles, rockets

Dimensions: Length: 32 ft, 10 in (10.02 m)

Rotor diameter: 36 ft, (11 m)

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 and rotor shaft.

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.

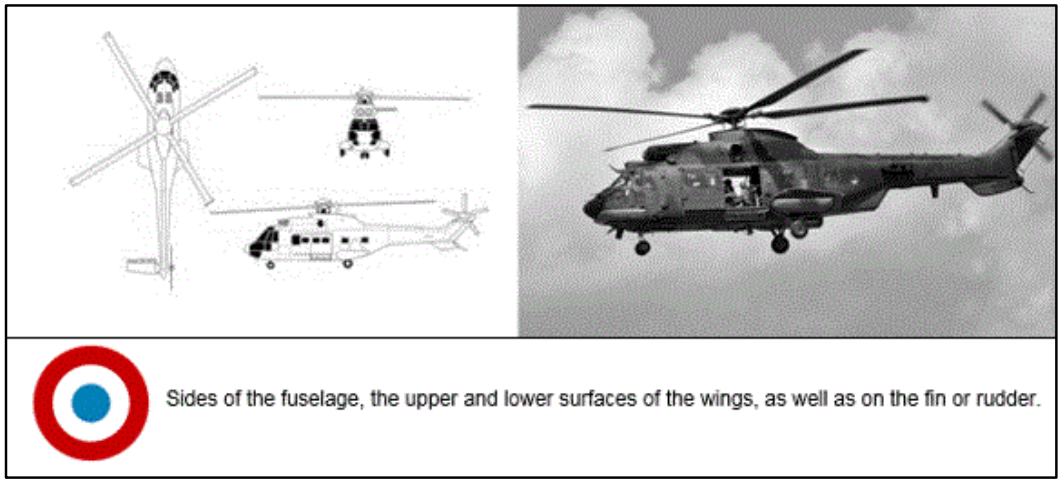


Figure G-6. AS-332 Super Puma/AS-532 Cougar

GENERAL DATA

Country of Origin: France

Similar Aerial Platform: Super Frelon, SH-3 Sea King, CH- 53 Sea, Stallion, Mi-8 Hip, UH-60 Black Hawk SA-330 Puma

Role: Armed transport (19 equipped troops)

Armament: Cannon, missiles, machine guns, rockets

Dimensions: Length: 61 ft. 4.2 in. (18.70 m)

Rotor diameter: 51 ft. 2.16 in. (15.6 m)

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-up, glassed-in cockpit with a more streamlined nose. Retractable landing gear.

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

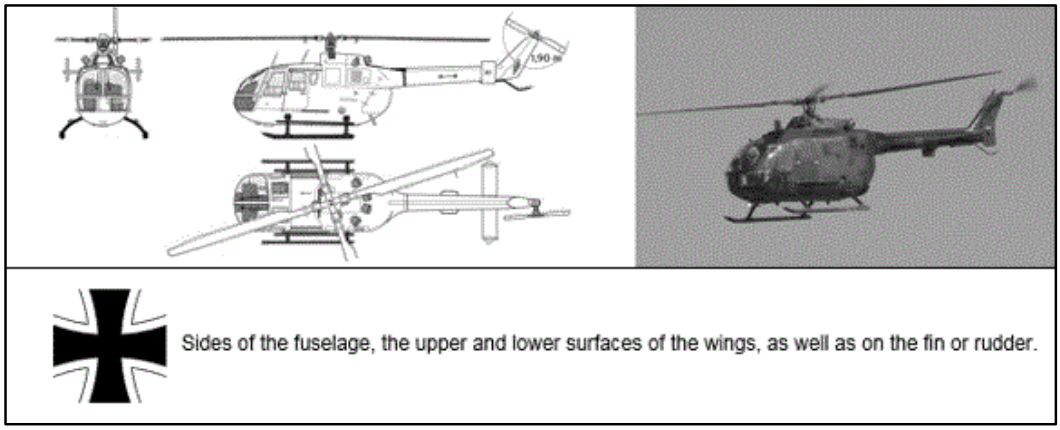


Figure G-7. BO-105

GENERAL DATA

Country of Origin: Germany

Similar Aerial Platform: OH-6 Cayuse, Defender 500MD, Alouette III, Mi-4 Hound.

Role: Observation, antitank utility

Armament: Hot antitank missiles

Dimensions: Length: 39 ft (11.84 m)

Rotor diameter: 32 ft, 3 in (9.84 m)

WEFT DESCRIPTION

Wings: Four-blade main rotor mounted above center of cabin. Antitank version has short, stubby, weapon-carrying outriggers on lower midsection.

Engine(s): Two turboshaft engines on top of fuselage.

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

Tail: Swept-back and tapered fin. Small rectangular fins mounted at the tips of the rectangular flats. Rotor on left.

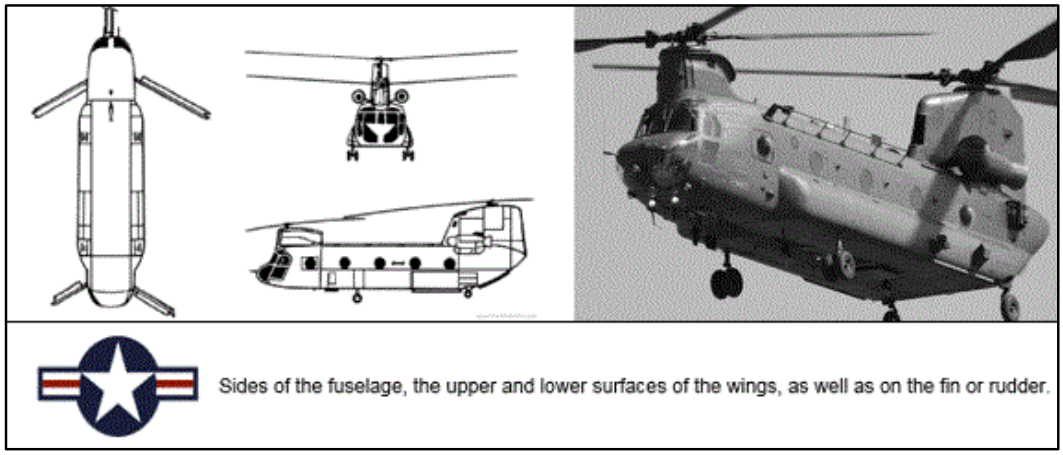


Figure G-8. CH-47 Chinook

GENERAL DATA

Country of Origin: US

Similar Aerial Platform: CH-46 Sea Knight

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

Armament: Usually none

Dimensions: Length: 51 ft (15.56 m)

Rotor diameter: 60 ft, (18.3 m)

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 front and rear. Glassed-in, stepped cockpit above a short, rounded nose. Fixed landing gear.

Tail: High, thick tail fin.

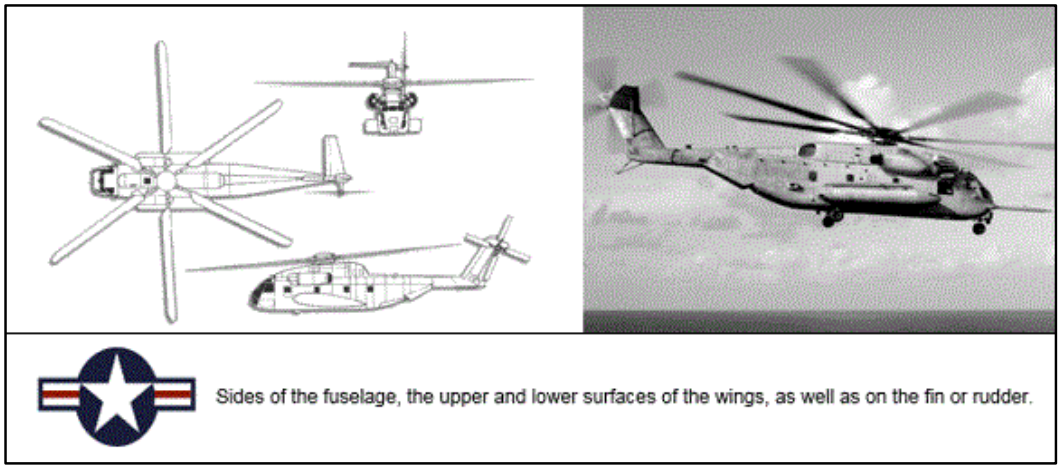


Figure G-9. CH-53 Sea Stallion

GENERAL DATA

Country of Origin: US

Similar Aerial Platform: SH-3 Sea King, Super Frelon, Mi-26 Halo

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

Armament: Usually none

Dimensions: Length: 67 ft (20.46 m)

Rotor diameter: 72 ft, 3 in (22.04 m)

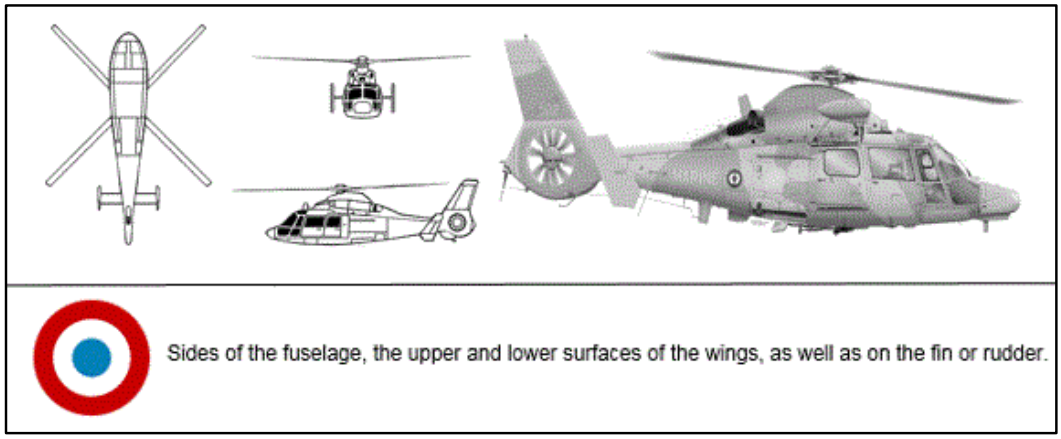
WEFT DESCRIPTION

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

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

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

Tail: One tapered flat on right side of swept-back fin. Rotor on left side of fin.



Sides of the fuselage, the upper and lower surfaces of the wings, as well as on the fin or rudder.

Figure G-10. SA365 Dauphin 2

GENERAL DATA

Country of Origin: France

Similar Aerial Platform: Lynx, SA-342M Gazelle, Hirundo A109

Role: Assault-transport (8 to 10 troops), utility, attack

Armament: Rockets, antitank missiles on SA 365M model

Dimensions: Length: 37 ft, 6 in (11.43 m)

Rotor diameter: 39 ft, 2 in (11.94 m)

WEFT DESCRIPTION

Wings: Four-blade main rotor. Weapons carrying platform on some models.

Engine(s): Two turboshafts mounted side by side on top of cabin. Air intake on side of motor hump. Exhausts at the rear of the hump.

Fuselage: Teardrop-shaped body. Tapered boom to the tail fin. Rounded nose and stepped-up cockpit. Retractable gear and flat bottom.

Tail: Flats with swept-back tips forward of the swept-back and tapered fin with blunt tip. Rotor is inside housing at the bottom of the fin.

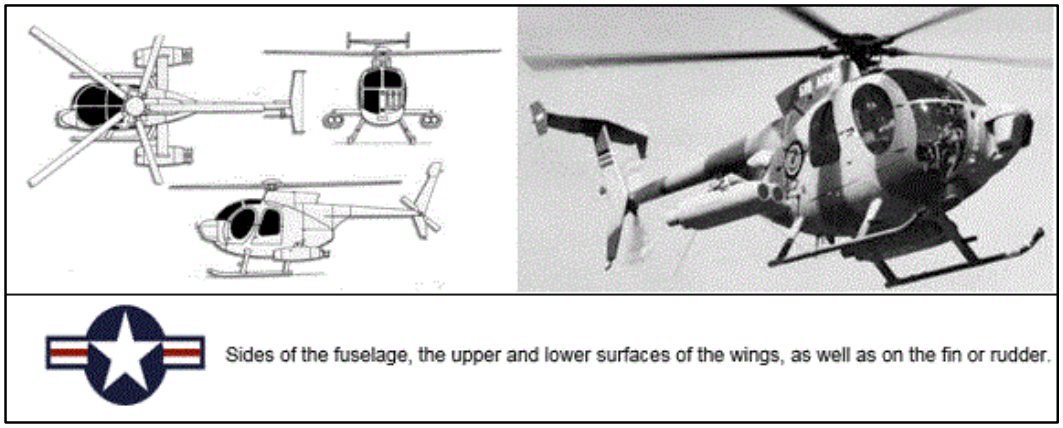


Figure G-11. MD 500 Defender

GENERAL DATA

Country of Origin: US

Similar Aerial Platform: OH-6 Cayuse, BO 105, Alouette II

Role: ASW, scout, antitank, multi-mission

Armament: Chain gun, missiles, TOW-capable

Dimensions: Length: 23 ft (7.02 m)

Rotor diameter: 26 ft, 4 in (8.04 m)

WEFT DESCRIPTION

Wings: Either four- or five-blade main rotor (depending on model). Weapons platform on lower rear body.

Engine(s): One mounted inside body. Air intakes on top of cabin. Blackhole exhaust.

Fuselage: One mounted inside body. Air intakes on top of cabin. Blackhole exhaust.

Tail: Fin boomerang-shaped, swept-back, and tapered. Flats back-tapered with small fins attached to the tips. Flats high-mounted on the fin forming a T. Rotor on lower left of tail boom.

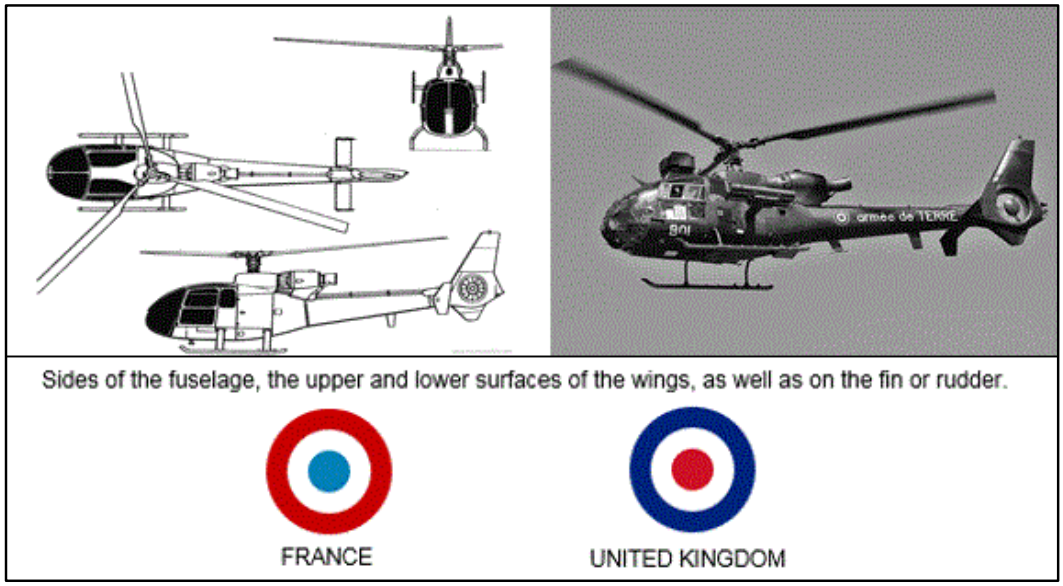


Figure G-12. SA-342M Gazelle

GENERAL DATA

Country of Origin: France, UK

Similar Aerial Platform: Alouette II, Alouette III, Scout/Wasp, OH-13 Sioux, Dauphin 2

Role: General utility, attack

Armament: Machine guns, rockets, missiles

Dimensions: Length: 39 ft, 3 in (11.98 m)

Rotor diameter: 34 ft, 5 in (10.6 m)

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: Tail fin swept-back and tapered with a square tip. Rectangular flats with small fins. Fan rotor housing is built into the lower tail.

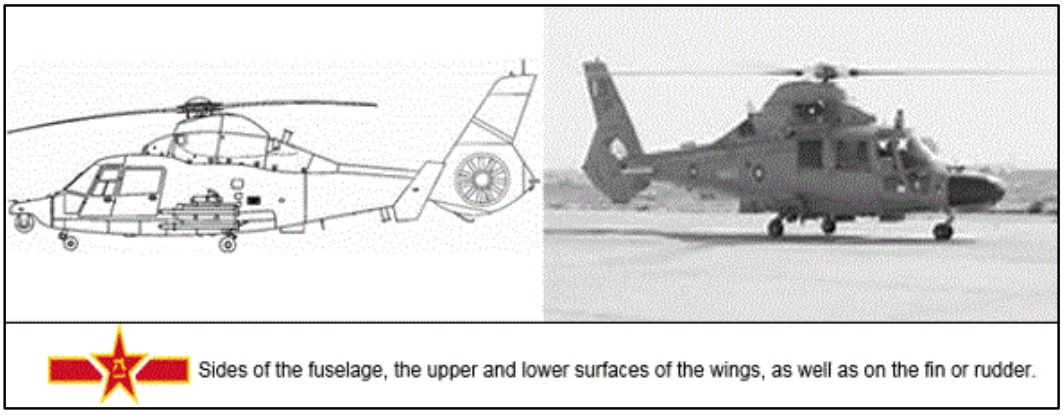


Figure G-13. Harbin Z-9 Lynx/AS 365 Super Lynx

GENERAL DATA

Country of Origin: China

Similar Aerial Platform: Lynx, SA-342M Gazelle, Hirundo A109

Role: Assault-transport (8 to 10 troops), utility, attack

Armament: Cannon, machine guns, missiles, rockets

Dimensions: Length: 37 ft., 6.36 in (11.44 m)

Rotor diameter: 39 ft., 4.44 in (12 m)

WEFT DESCRIPTION

Wings: Four-blade main rotor. Weapons carrying platform on some models.

Engine(s): Two turboshafts mounted side by side on top of cabin. Air intake on side of motor hump. Exhausts at the rear of the hump.

Fuselage: Teardrop-shaped body. Tapered boom to the tail fin. Rounded nose and stepped-up cockpit. Retractable gear and flat bottom.

Tail: Flats with swept-back tips forward of the swept-back and tapered fin with blunt tip. Rotor is inside housing at the bottom of the fin.

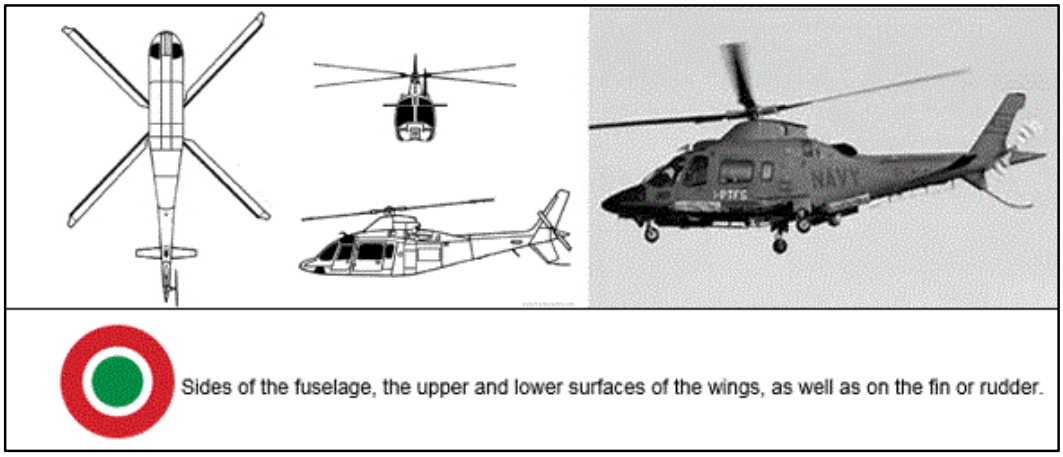


Figure G-14. Hirundo A109

GENERAL DATA

Country of Origin: Italy

Similar Aerial Platform: OH-58 Kiowa, UH-1 Iroquois, Lynx.

Role: Utility, ECM, ambulance, scout, attack, air defense, antitank

Armament: Machine guns, rockets, pods, HOT or TOW missiles

Dimensions: Length: 42 ft, 10 in (13.06 m)

Rotor diameter: 36 ft (11.02 m)

WEFT DESCRIPTION

Wings: Four-blade main rotor mounted on hump above the body midsection. Weapon- carrying platforms at bottom midsection.

Engine(s): Two turboshafts on top of fuselage. Exhaust ports protrude upward and to the rear.

Fuselage: Rectangular with flat belly. Retractable landing gear. Tapered, rounded nose section. Stepped cockpit. Upswept, tapered rear section.

Tail: Swept-back and tapered tail fin with angular tip. Swept-back and tapered belly fin with angular tip. Small rotor on left side attached to the tapered tail boom.

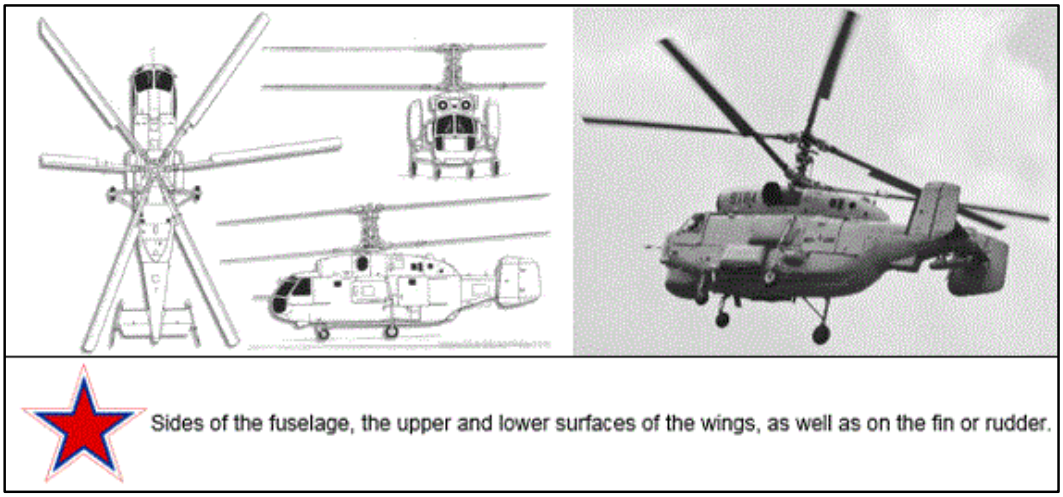


Figure G-15. Ka-27 Helix

GENERAL DATA

Country of Origin: Russia

Similar Aerial Platform: Ka-25 Hormone

Role: Multi-purpose military

Armament: Torpedos, Depth charges

Dimensions: Length: 37 ft (11.30 m)

Rotor diameter: (each) 52 ft, 2 in (15.90 m)

WEFT DESCRIPTION

Wings: Two, three-bladed, folding, counter rotating, coaxial rotors one above the other.

Engine(s): Two turboshaft engines located above cabin. Circular air intakes forward of rotor shafts. Single exhaust.

Fuselage: Rectangular shaped body with side-by-side dual control nose cockpit Short tail boom.

Tail: Tail flat mid-mounted on tail boom has two toed in tip fins and a central fin.

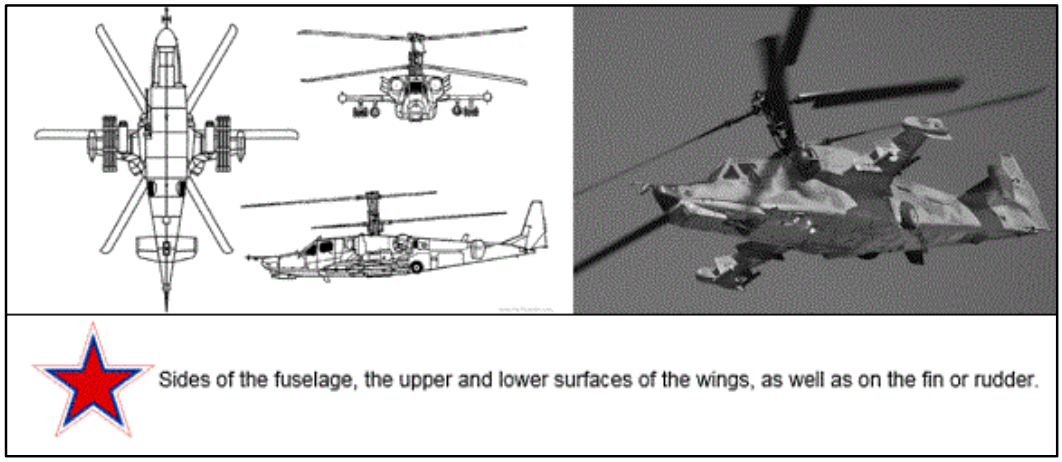


Figure G-16. Ka-50 Hokum A/Ka-52 Hokum B

GENERAL DATA

Country of Origin: Russia

Similar Aerial Platform: Hirundo A109, Mangusta A129, AH-64 Apache, AH-1F Cobra

Role: Anti-helicopter and gunship

Armament: Rocket packs, gun, AAMs

Dimensions: Length: 52 ft, 6 in (16 m)

Rotor diameter: (each) 47 ft, 7 in (14.5 m)

WEFT DESCRIPTION

Wings: Coaxial, contra rotating, three-blade main rotors, widely separated with swept- back tips. Equally tapered, short, stubby, weapon carrying wings with end plates.

Engine(s): Twin turboshafts mounted high on the fuselage above the stubby wings. Semicircular air intakes. Exhausts are turned outward.

Fuselage: Streamlined body tapers to the front and rear. Flat-bottomed except for underbelly gun pod and sensor. Flat plated glassed-in canopy.

Tail: Thick, tapering tail boom. Back-tapered tail fin with a square tip. Flats are high- mounted on the tail boom with end plates. Flats are located forward of the fin. No tail rotor.

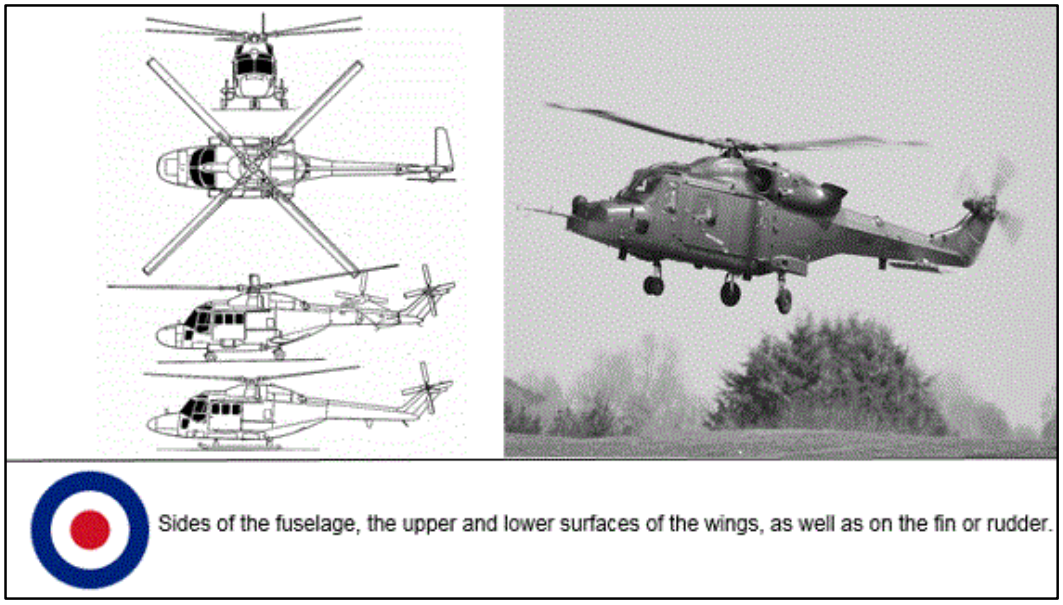


Figure G-17. WG-13 LYNX

GENERAL DATA

Country of Origin: United Kingdom

Similar Aerial Platform: OH-58 Kiowa, Hirundo A109, UH-1 Iroquois, Dauphin 2

Role: Utility, attack, antitank

Armament: Cannon, machine guns, rockets, missiles, HOT or TOW antitank missiles

Dimensions: Length: 39 ft, 6 in (12.06 m)

Rotor diameter: 42 ft (12.8 m)

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.

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

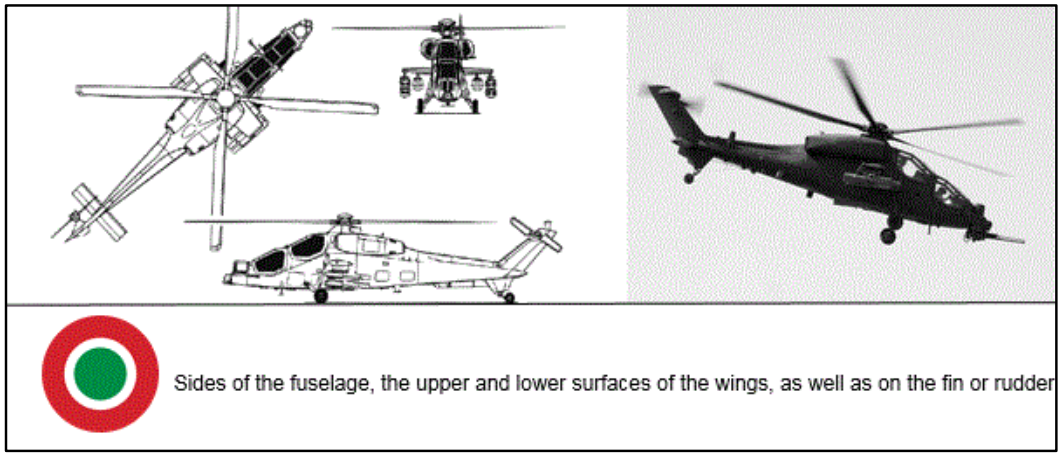


Figure G-18. Agusta A129 Mangusta

GENERAL DATA

Country of Origin: Italy

Similar Aerial Platform: AH-64 Apache, Mi-28 Havoc, Ka-50 Hokum

Role: Light-attack, anti-armor, scout

Armament: Gun pods; rockets; missiles; TOW-, Hellfire-, or HOT-capable

Dimensions: Length: 46 ft, 10 in (14.3 m)

Rotor diameter: 39 ft (12 m)

WEFT DESCRIPTION

Wings: Four-blade main rotor on top center of cabin. Weapon-carrying wings are short, stubby, and mid-mounted on the fuselage.

Engine(s): Two turboshaft engines mounted alongside the top of the fuselage. Semicircular air intakes.

Fuselage: Slender and tapered to the rear. Tandem cockpit, glassed-in and flat-plated. Tapered from cockpit to blunted nose. Fixed landing gear.

Tail: Boom tapers to the rear. High, swept-back fin with square tip. Flats unequally tapered with square tip. Belly fin with the rear landing wheel attached. Tail rotor on left side.

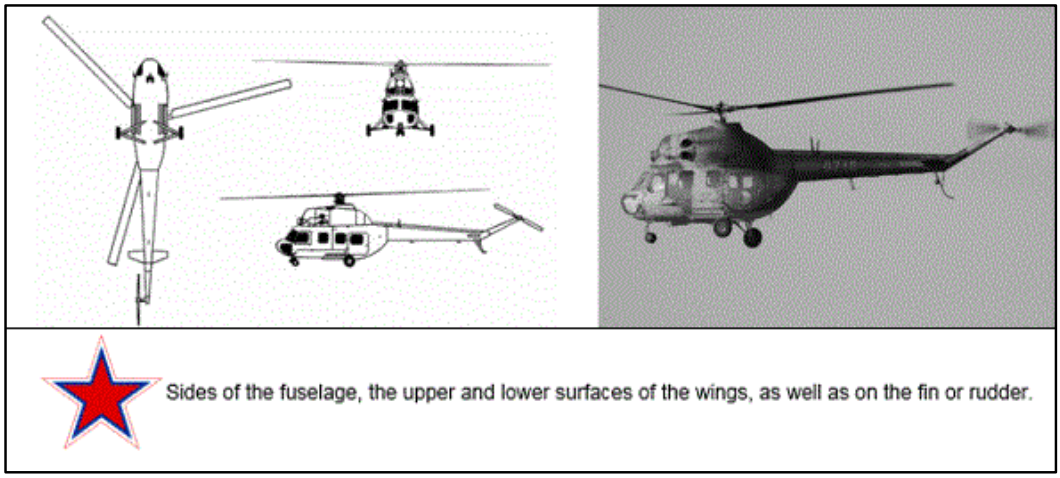


Figure G-19. Mi-2-Hoplite

GENERAL DATA

Country of Origin: Russia

Similar Aerial Platform: Hirundo A109, Mi-8 Hip

Role: Transport, cargo, reconnaissance, trainer, search and rescue, liaison, armed support

Armament: Rockets, missiles, machine guns

Dimensions: Length: 57 ft (17.4 m)

Rotor diameter: 47 ft, 6 in (14.6 m)

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. Oval exhausts on sides of engines.

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

Tail: Tapered tail boom. Small, unequally tapered flats. Thin, swept-back fin. Rotor is on the right.

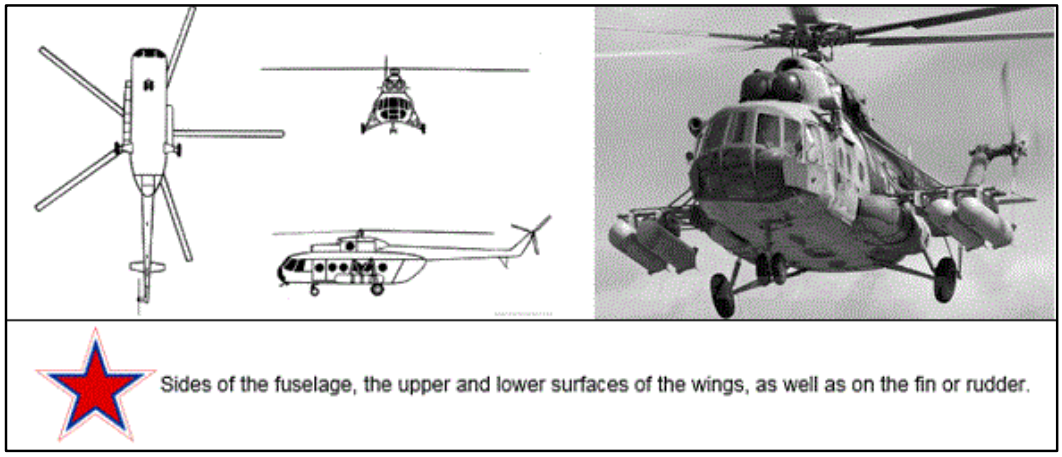


Figure G-20. Mi-17/Mi-8 Hip

GENERAL DATA

Country of Origin: Russia

Similar Aerial Platform: SA-330 Puma, Mi-2 Hoplite, Super Frelon

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

Armament: Rockets, antitank missiles, machine gun, bombs

Dimensions: Length: 61 ft (18.32 m)

Rotor diameter: 70 ft (21.3 m)

WEFT DESCRIPTION

Wings: Large, five-blade main rotor over the engine at the body midsection. Weapon- 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.

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.

Tail: Tail boom tapers to the small, swept-back, and tapered fin with rotor on top right or left. Small flats of the fin.

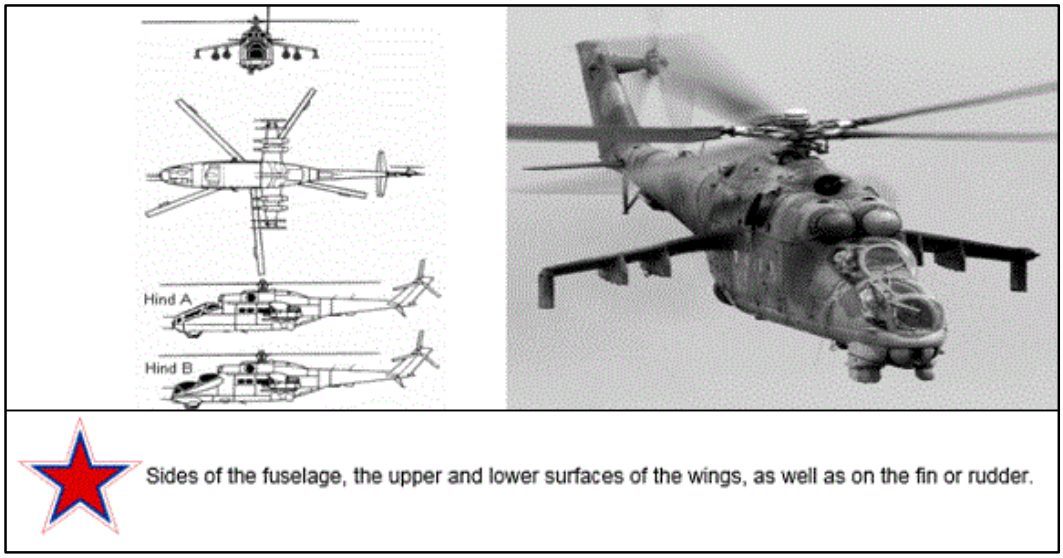


Figure G-21. Mi-24/25/35 Hind

GENERAL DATA

Country of Origin: Russia

Similar Aerial Platform: AH-1 Cobra,UH-60 Black Hawk, AH-64 Apache, Mangusta A129

Role: Assault, gunship, antitank

Armament: Missiles, guns, rockets

Dimensions: Length: 55 ft (16.78 m)

Rotor diameter: 55 ft, 6 in (17 m)

WEFT DESCRIPTION

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

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, and fuselage tapering at the rear to the tail boom.

Hind D: Large, oval-shaped body, nose modification with tandem bubble canopies, and a chin-mounted turret.

Tail: Swept-back, tapered fin with rotor on right on some models. Tapered flats on boom just forward of the fin.

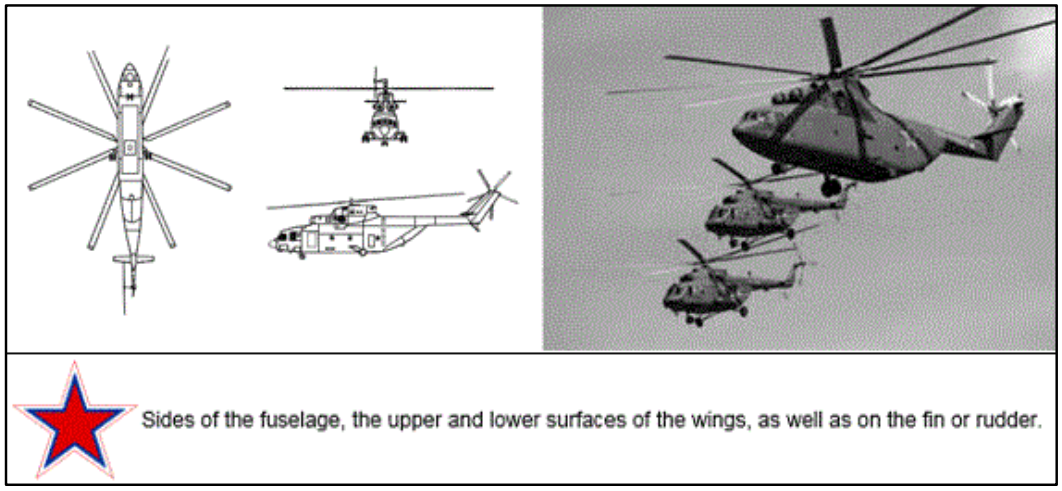


Figure G-22. Mi-26 Halo

GENERAL DATA

Country of Origin: Russia

Similar Aerial Platform: Mi-6 Hook

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

Armament: Usually none

Dimensions: Length: 111 ft. (33.8 m)

Rotor diameter: 105 ft. (32 m)

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-up cockpit. Fixed tricycle landing gear.

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

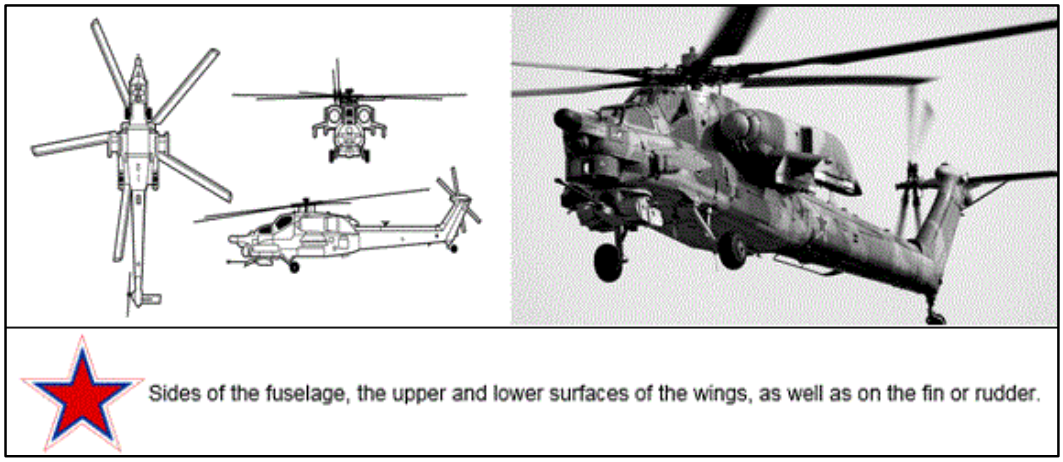


Figure G-23. Mi-28 Havoc

GENERAL DATA

Country of Origin: Russia

Similar Aerial Platform: Mangusta A129, AH-64 Apache, AH-1F Cobra

Role: Attack

Armament: AAMs, antitank missiles, cannon, rockets

Dimensions: Length: 57 ft. (17.4 m)

Rotor diameter: 56 ft. (17.04 m)

WEFT DESCRIPTION

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

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

Fuselage: Slender and 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. Flat high-mounted on the fin. Rotor mounted on right.

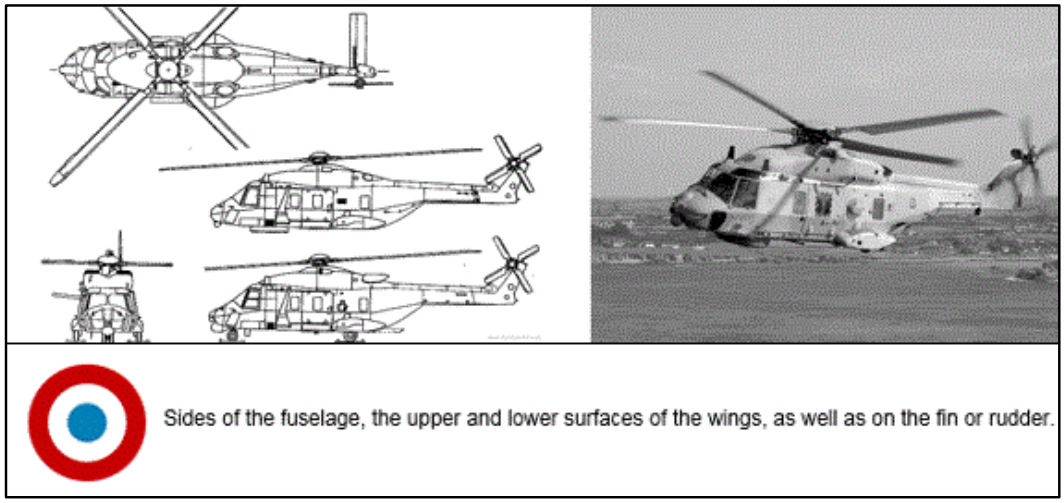


Figure G-24. NH90

GENERAL DATA

Country of Origin: France

Similar Aerial Platform:

Role: Medium transport/utility helicopter, Transport (20 troops)/cargo

Armament: None

Dimensions: Length: 52 ft., 11 in. (16.13 m)

Rotor diameter: 53 ft., 6 in. (16.30 m)

WEFT DESCRIPTION

Wings: Four-blade main rotor mounted above the body midsection seated low on the fuselage roof. Short, wide, tapered, carrying wings mounted to the rear of body midsection for retracting landing gear

Engine(s): Two turboshafts in pods mounted alongside the top of the fuselage. Two circular exhausts ports at the rear of the engines.

Fuselage: Rectangular shape fuselage with a short nose cone. Retractable landing gear.

Tail: Tapering tail boom to swept-back fin. Horizontal plane on the lower right of the tail fin. Four-blade rotor mounted on left.

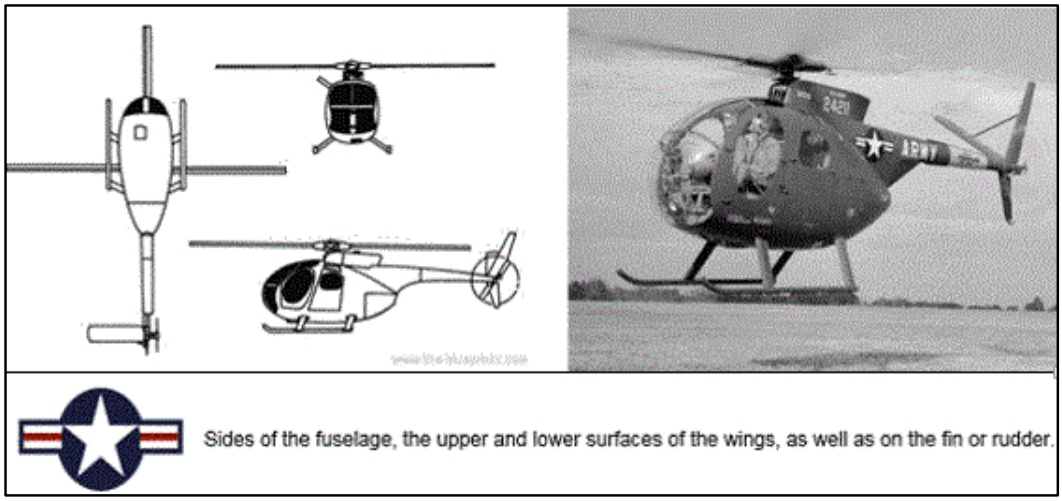


Figure G-25. OH-6A Cayuse

GENERAL DATA

Country of Origin: US

Similar Aerial Platform: Defender 500MD, BO 105

Role: Observation, liaison

Armament: Usually none. Hardware available for mini-gun mount

Dimensions: Length: 21 ft (6.4 m)

Rotor diameter: 26 ft (7.92 m)

WEFT DESCRIPTION

Wings: Four-blade main rotor mounted above the fuselage midsection.

Engine(s): One turboshaft located on the top rear of the fuselage.

Fuselage: Teardrop-shaped with round, glassed-in cockpit. Upswept rear section. Skid-type landing gear.

Tail: Y tail. Thin, tapering tail boom. Rotor on the left attached to the tail boom.

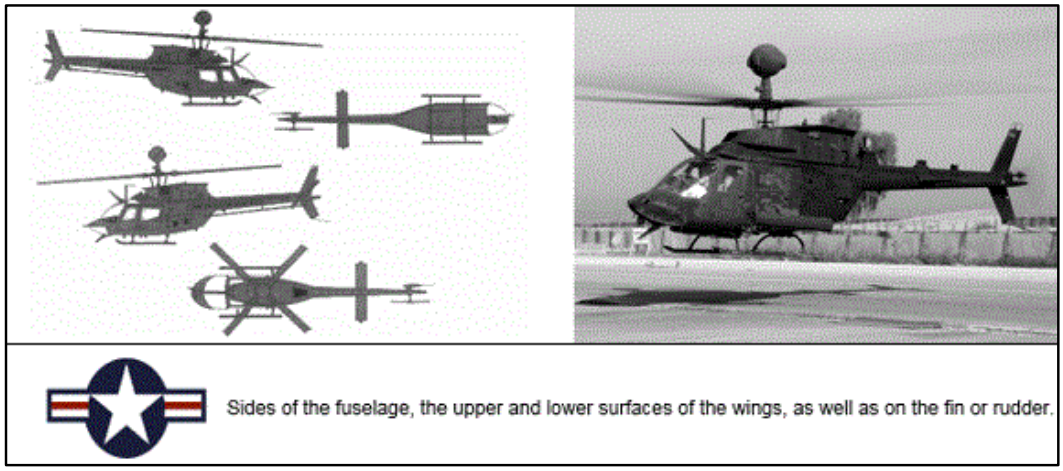


Figure G-26. OH-58D Kiowa

GENERAL DATA

Country of Origin: US

Similar Aerial Platform: Hirundo A109, Lynx, UH-1 Iroquois, UH-1N Model 212

Role: Utility, scout, observation

Armament: 7.62-mm, mini gun, .50 baliber machine gun, 2.75 rockets

Dimensions: Length: 31 ft (9.45 m)

Rotor diameter: 33 ft, 4 in (10.16 m)

WEFT DESCRIPTION

Wings: Four-blade main rotor on top of aircraft mid-section.

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

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

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

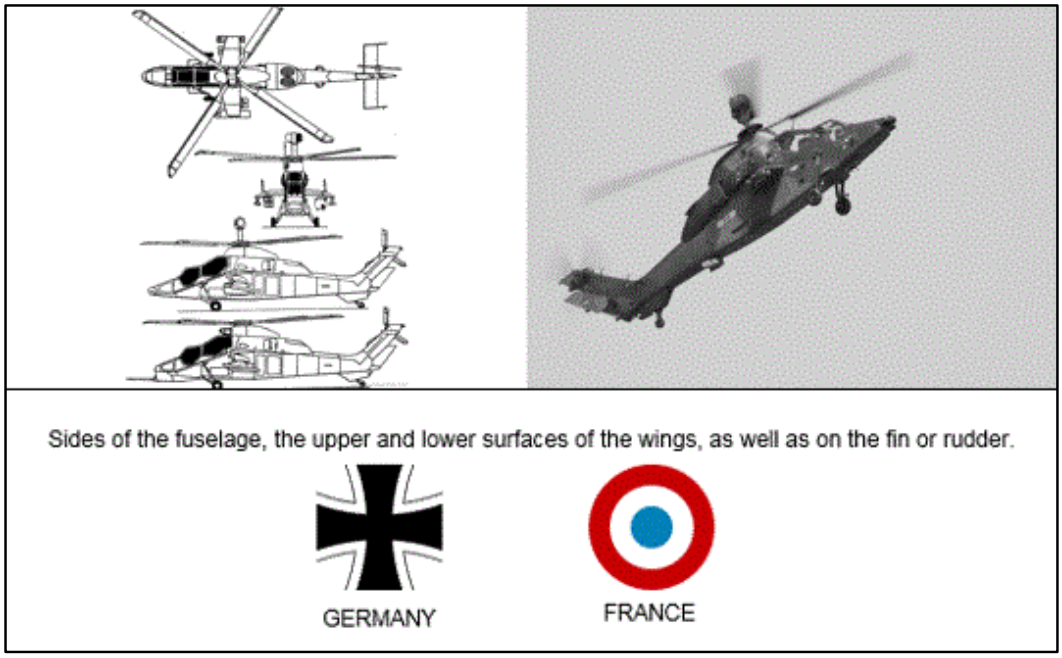


Figure G-27. PAH-2 Tiger/EC-665 Tiger

GENERAL DATA

Country of Origin: Germany, France

Similar Aerial Platform: AH-1 Cobra, AlH-64 Apache

Role: Scout, anti-tank, fire support, escort

Armament: 12.7-mm guns, rockets, missiles

Dimensions: Length: 49.21 ft (15 m)

Rotor diameter: 51.84 ft, 4 in (15.80 m)

WEFT DESCRIPTION

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

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

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

Tail: Mid-mounted, rectangular flat with two swept-back and tapered fins. A center tail fin with the tail rotor on the right.

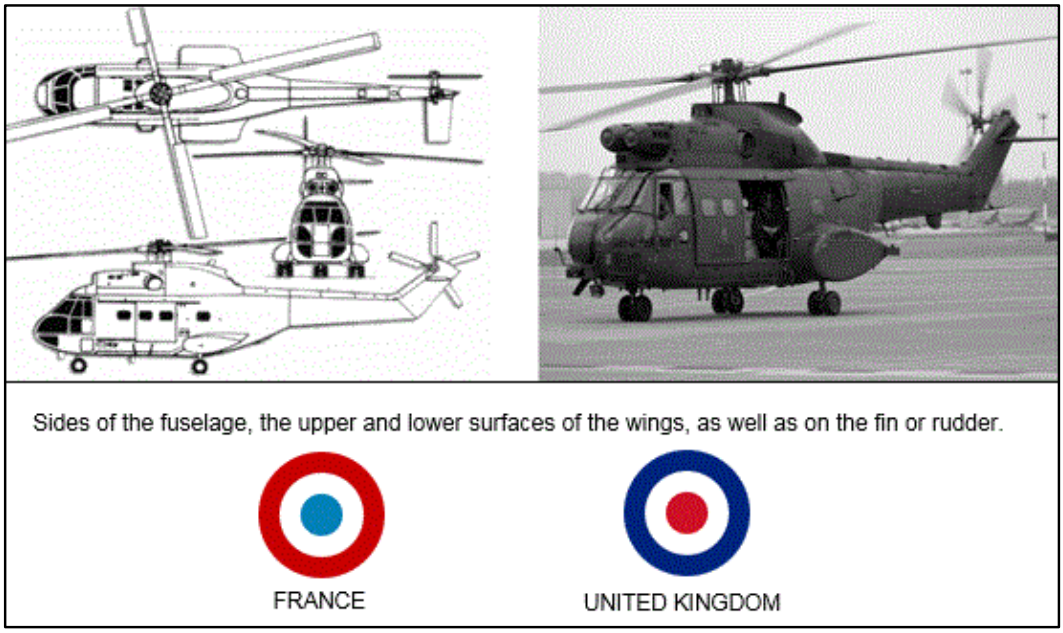


Figure G-28. SA-330 Puma

GENERAL DATA

Country of Origin: France, UK

Similar Aerial Platform: Super Frelon, SH-3 Sea King, CH- 53 Sea, Stallion, Mi-8 Hip, UH-60 Black Hawk

Role: Armed transport (16 equipped troops)

Armament: Cannon, missiles, machine guns, rockets

Dimensions: Length: 46 ft (14 m)

Rotor diameter: 49 ft (14.96 m)

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-up, glassed-in cockpit. Retractable landing gear.

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

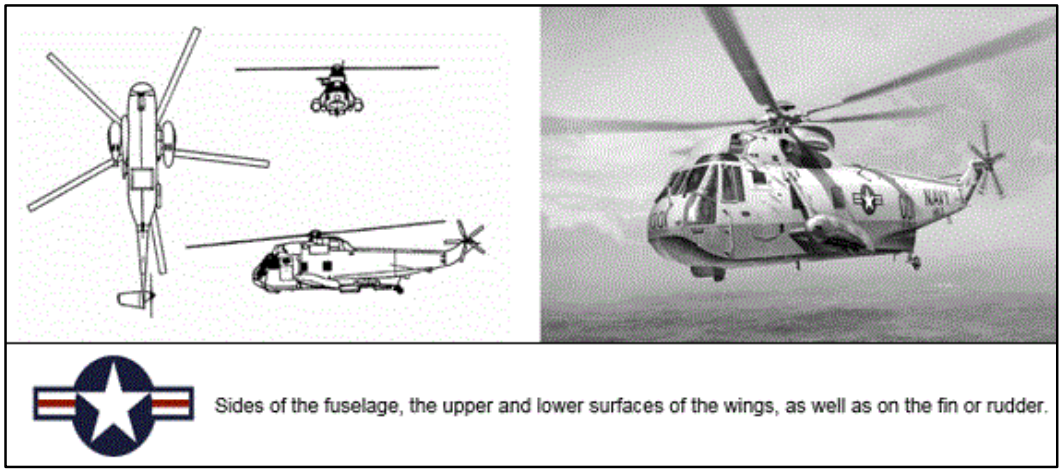


Figure G-29. SH-3 Sea King

GENERAL DATA

Country of Origin: US

Similar Aerial Platform: CH-53 Sea Stallion, Super Frelon, SA 330 Puma

Role: Amphibious assault-transport (30 equipped troops), antisubmarine, search and rescue

Armament: Homing torpedoes, depth charges, cannon, rockets, missiles

Dimensions: Length: 56 ft (16.97 m)

Rotor diameter: 62 ft (18.92 m)

WEFT DESCRIPTION

Wings: Large, five-blade main rotor on top of fuselage midsection.

Engine(s): Two turboshaft engines mounted on top of cabin. Circular air intakes above cockpit. Oval exhausts on sides of engines.

Fuselage: Long, thick, box-like with blunt nose. Tapered cockpit. Boat-hull shape. Upswept rear section. Retractable landing gear. Third wheel of landing gear is fixed.

Tail: Swept-back fin is tapered. Rotor on left side. Single flat is tapered with square tip mounted at the top right side of fin.

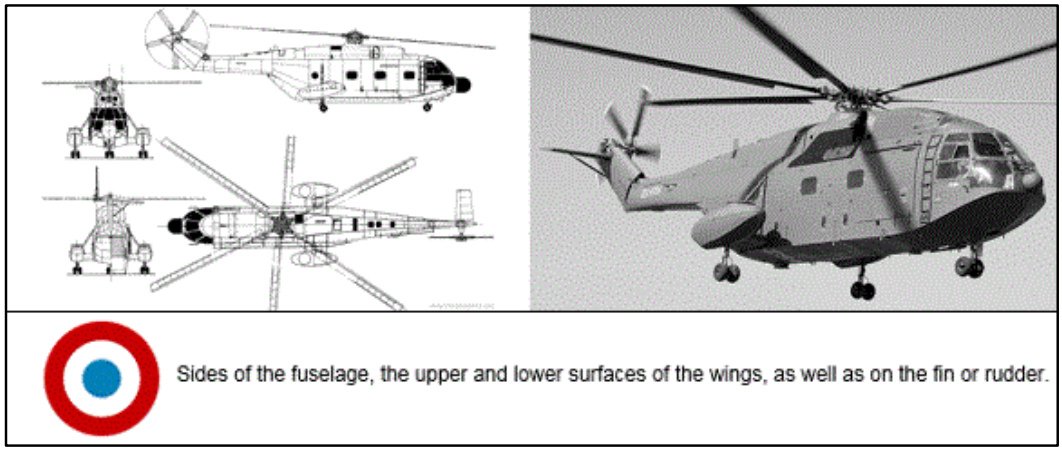


Figure G-30. SA-321 Super Frelon

GENERAL DATA

Country of Origin: France

Similar Aerial Platform: SA 330 Puma, SH-3 Sea King, CH-53 Sea Stallion, Mi-8 Hip

Role: Assault-transport (38 equipped troops), naval operations

Armament: Torpedoes

Dimensions: Length: 75 ft, 7 in (23.02 m)

Rotor diameter: 62 ft (18.92 m)

WEFT DESCRIPTION

Wings: Six-blade main rotor mounted above center of fuselage.

Engine(s): Three turboshafts. Two are mounted side-by-side atop the fuselage forward of main rotor; the third is behind the main rotor. Round air intakes above and behind cockpit.

Fuselage: Boat-hull type with stabilizing floats on either side of body. Nose is round with glassed-in cockpit. Upswept rear section. Fixed landing gear.

Tail: Boom tapers from main body to swept-back, tapered fin. Rotor on left. Single, tapered, and flat-mounted on the right side of fin.

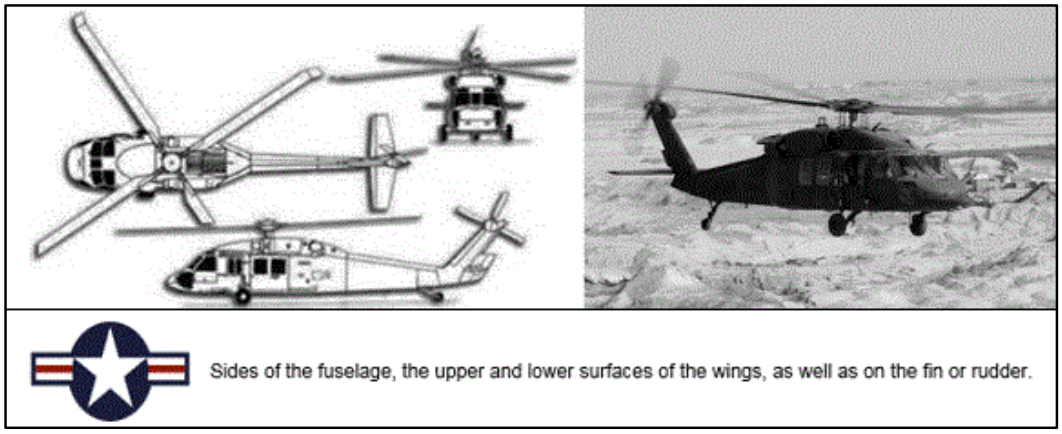


Figure G-31. UH-60A Black Hawk

GENERAL DATA

Country of Origin: US

Similar Aerial Platform: Hirundo A109, Mi-24 Hind, Mi-8 Hip, SA 330 Puma

Role: Assault-transport (11 equipped troops), multipurpose

Armament: Hellfire missiles, machine guns, rockets, mine dispensers

Dimensions: Length: 51 ft (15.25 m)

Rotor diameter: 53 ft, 8 in (16.9 m)

WEFT DESCRIPTION

Wings: Four-blade main rotor with swept-back tips mounted on top center of fuselage.

Engine(s): Two turboshaft engines within a hump on top of fuselage. Semicircular air intakes. Oval exhausts.

Fuselage: Slender, rectangular fuselage tapers to the rear. Rounded nose with stepped cockpit. Fixed landing gear.

Tail: Boom tapers to a high, swept-back fin with tail rotor on right. Large, unequally tapered flat mounted low on the fin.

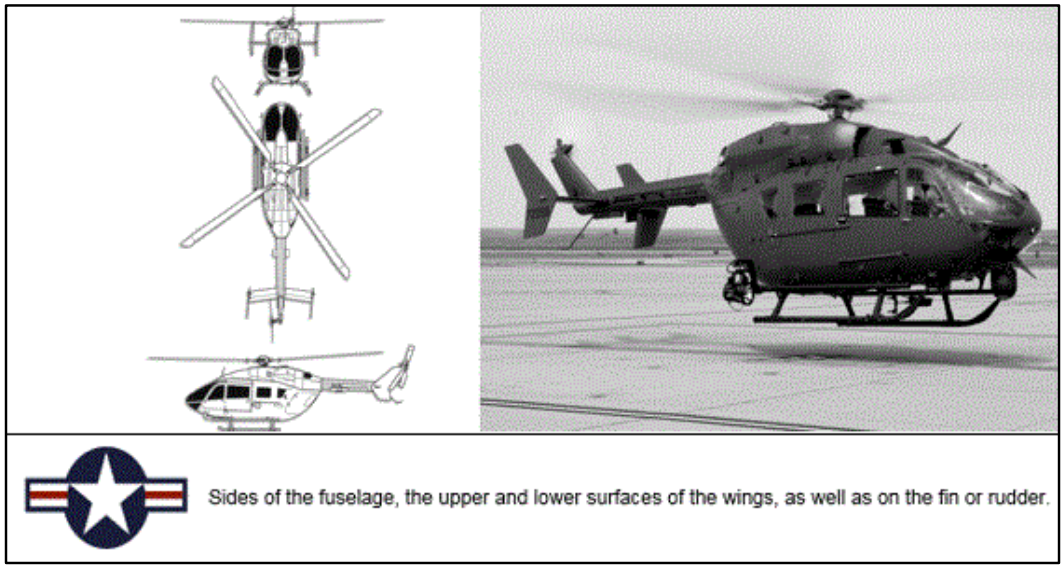


Figure G-32. UH-72 Lakota

GENERAL DATA

Country of Origin: US

Similar Aerial Platform: Hirundo A109, Mi-8 Hip, SA 330 Puma

Role: General support, counter-narcotics operations, personnel recovery, and medical evacuations (MEDEVAC)

Armament: None

Dimensions: Length: 42 ft. 7 in. (13.03 m)

Rotor diameter: 36 ft., 1 in (11 m)

WEFT DESCRIPTION

Wings: Four-blade main rotor mounted on top center of fuselage.

Engine(s): Two turboshaft engines within a hump on top of fuselage. Semicircular air intakes. Oval exhausts.

Fuselage: Conventional semi-monocoque. Fixed landing gear.

Tail: Single 2-bladed tail rotor mounted on the left-hand side of the tail assembly. Tail unit is mounted high with two non-moving stabilizers mounted below the tail rotor. Stabilizers mounted on the outside edges sway back.

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Glossary

SECTION I–ACRONYMS AND ABBREVIATIONS

CAS	close air support
FLIR	forward looking infrared
IFF	indentification, friend or foe
NCR	national capital region
TC	training circular
US	United States
USA	United States Army
UAS	unmanned aircraft systems
VACR	visual aircraft recognition
WCS	weapon control status
WEFT	wings, engine(s), fuselage, tail

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References

All URLs were accessed on 10 December 2016.

REQUIRED PUBLICATIONS

These sources must be available to the intended users of this publication.

ADRP 1-02, *Terms and Military Symbols*, 16 November 2016.

DOD *Dictionary of Military and Associated Terms*, March 2017

RELATED PUBLICATIONS

This section contains no entries.

RECOMMENDED READINGS

Pilot's Handbook of Aeronautical Knowledge, 2016,
https://www.faa.gov/regulations_policies/handbooks_manuals/aviation/phak/

Counterair Operations, 01 February 2016
https://doctrine.af.mil/download.jsp?filename=3-01-D02-AIR-Operations.pdf

PRESCRIBED FORMS

This section contains no entries.

REFERENCED FORMS

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DA Form 2028, *Recommended Changes to Publications and Blank Forms*

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