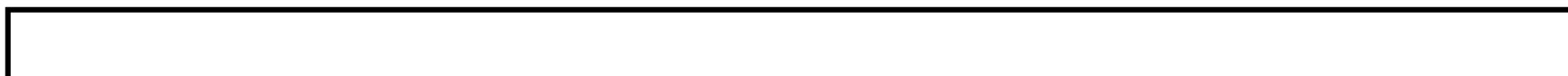


FM 3-01.80 (FM 44-80)

**HEADQUARTERS
DEPARTMENT OF THE ARMY**



VISUAL AIRCRAFT RECOGNITION



January 2006

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VISUAL AIRCRAFT RECOGNITION

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* This publication supersedes FM 44-80, dated 30 September 1996.

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PREFACE

This manual is primarily a ready reference to assist the ground observer in aircraft recognition and identification. It provides information on current operational aircraft of the United States and foreign countries, which may be observed worldwide in the combat area. It can be used as source material for personnel conducting unit training in visual aircraft recognition.

The procedures in this publication apply throughout the US Army. The data 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.

The provisions of this publication are the subject of international agreement QSTAG 699, Aircraft Recognition Training.

This publication applies to the Active Army, the Army National Guard (ARNG)/Army National Guard of the United States (ARNGUS), and the United States Army Reserve (USAR) unless otherwise stated.

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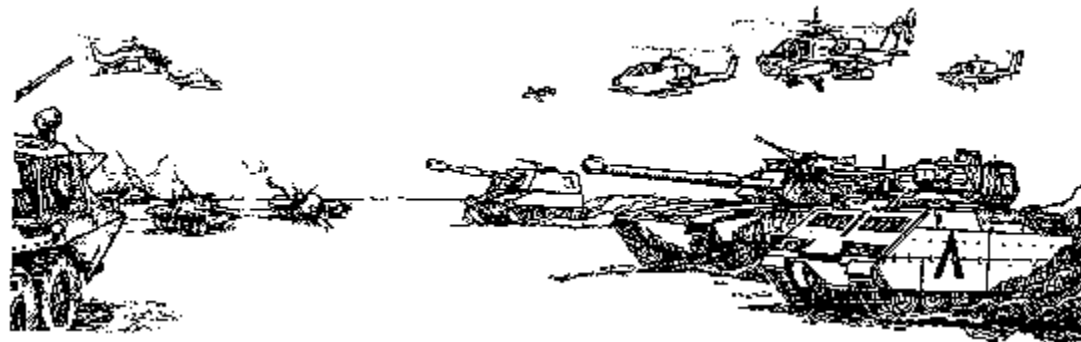
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ACKNOWLEDGEMENTS

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Chapter 1

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. Air platforms are as much a part of the battlespace as tanks and artillery. These aircraft, with their various roles and missions, add a vertical dimension. Their presence must be accepted and dealt with by every Soldier. On today's battlefield, a Soldier must be able to recognize and identify both friendly and threat aircraft. Since there may be many of each type, aircraft recognition training is necessary for every Soldier in the combat force.

REASONS FOR VISUAL AIRCRAFT RECOGNITION

1-1. The emphasis on visual aircraft recognition declined as a required skill for ground-based weapons crewmembers. Causes of the decline were due to the following:

- The substitution of guided missiles for large antiaircraft guns.
- The assumption that United States (US) forces would continue to maintain air superiority.
- The reliance upon electronic equipment for aircraft identification as hostile or friendly.

1-2. The need for visual aircraft recognition skills has become more critical since the development of:

- An analysis of past military actions shows aircraft losses to air defense guns and small arms. It has reestablished that the Soldier on the ground is capable of inflicting heavy losses on aircraft operating at low altitudes.
- Continued air superiority over every battlefield is not possible.
- Electronic identification has limitations and small units or individual Soldiers do not always have access to these devices.
- Visual recognition and identification of specific aircraft types and timely reporting provide the S2 and G2 shops additional information of a passive nature in the form of early warning, threat air capability, or information on a possible new tactical situation such as supply drops, defoliation, or photographic reconnaissance.

1-3. The provision of large numbers of air defense (AD) weapon systems to all divisional and some non-divisional ground combat forces generates additional emphasis on the need for visual aircraft recognition. Crew and team members 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.

1-4. Air defense personnel follow rules of engagement (ROE) and include hostile target criteria, identification, friend or foe (IFF), sensors, and air defense warnings in making their engagement decisions. Additionally, weapon control statuses (WCSs) apply to air defense systems in particular, and may be a part of the supported ground force standing operating procedures (SOP) as well.

1-5. The WCS sets the degree of control over the firing of AD weapon systems. During wartime, aircraft are fired on according to the WCS in effect. The WCSs 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, 1400 to 1500 hours” only applies to helicopters, and at that time of day.

AIR THREAT

1-6. The breakup of the former Soviet Union and restructuring into the Commonwealth of Independent States (CIS) does not diminish the fact that thousands of aircraft of many types that were manufactured by the former USSR are in the inventories of potential enemies of the US and its allies. Additionally, the CIS will maintain standing military forces that include these aircraft.

1-7. Aircraft manufactured by friendly countries can also be a threat in some areas of operation. For example, the A-4 Skyhawk and Mirage F1 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 to perform. Specific threat information in your area of operation is included in your unit's operation order and tactical SOP.

1-8. The major air threat to friendly ground forces in the forward area near the line of contact is unmanned aerial vehicles (UAVs) and helicopters. The threat will also consist of low-performance, close air support (CAS), and high-performance (leaker) ground-attack aircraft. These aircraft will conduct reconnaissance, surveillance, interdiction, antiarmor, and troop support missions.

1-9. Elements in the division and corps rear areas, especially nuclear-capable units, command and control, logistics facilities and reserve forces, can expect repeated attacks by high-performance aircraft. Fighter-bombers and ground-attack aircraft will also be used to attack convoys.

1-10. Expect attacks in the early morning. Pilots are rested and their aircraft are readied for the first sortie of the day. The danger of attack increases again near noon and in the early evening. However, surveillance for threat aircraft is a 24-hour mission. The enemy's order of battle, combat capability, readiness, and will to fight are some of the factors that will determine the times and rates of sorties.

1-11. 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 high-flying reconnaissance aircraft is of little or no threat when compared with UAVs, helicopters, or CAS aircraft.

1-12. 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 (FAAD) weapon systems. These hostile aircraft will seldom enter the engagement range since their normal operating altitudes are suitable only for air combat. Additionally, high-flying reconnaissance aircraft are not normally within the engagement range.

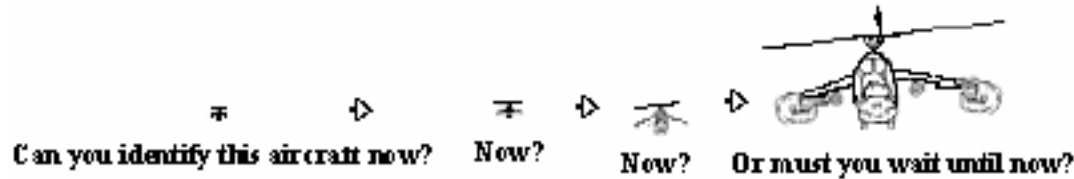
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Chapter 2

Factors That Affect Detection, Recognition, and Identification

This chapter covers early recognition and identification, aircraft confusion, physical factors, and search techniques. It also covers markings and camouflage, 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. Since detection, recognition and identification, are all visual processes, an aircraft must be detected, recognized and then identified at the farthest range possible, to make a timely engagement decision and or to report the aircraft. The task requires good, corrected if necessary, eyesight. The farther out an aircraft can be detected, recognized, and identified, the more time a gunner has to make an engagement decision. If the gunner is not going to engage the aircraft, then early recognition and identification will allow time to seek cover and or report the aircraft. The importance of early identification is demonstrated in the following illustration.

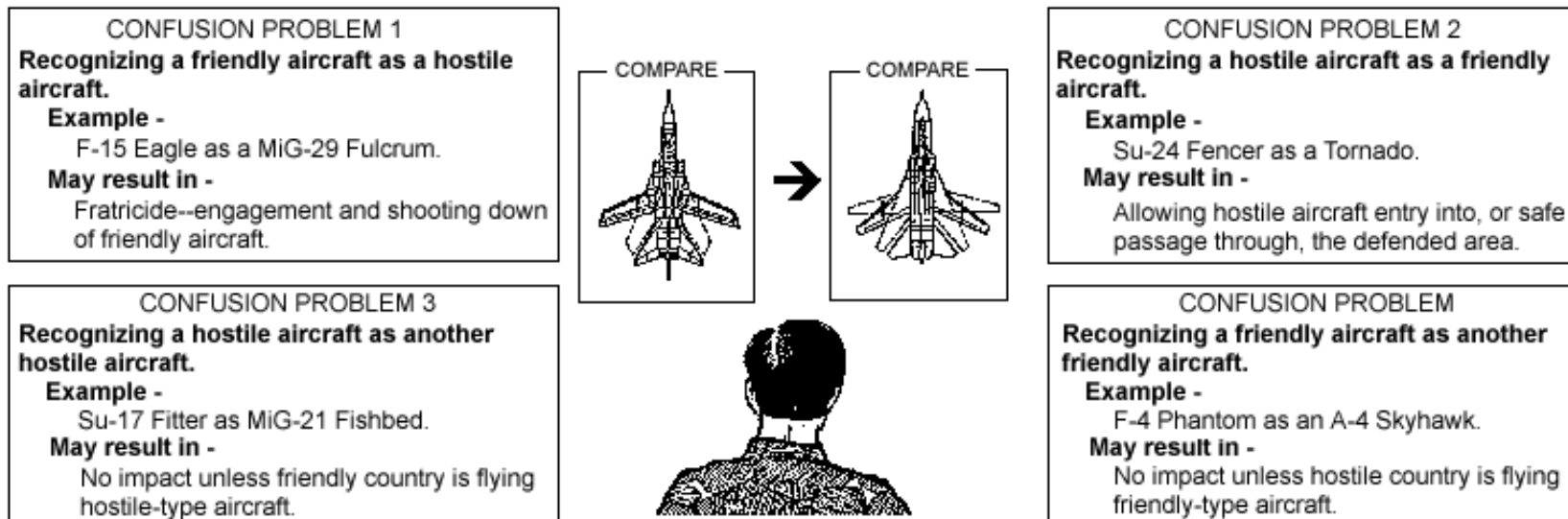


AIRCRAFT CONFUSION

2-1. Confusing one aircraft with another is a serious problem that must be dealt with throughout visual aircraft recognition (VACR) training. **Reduce the likelihood of confusion by comparing aircraft.** The following are the four types of confusion that can occur, of which the first two are the most dangerous:

- The first type is when a friendly aircraft is recognized and identified as hostile. In wartime, the mistake could cause fratricide (the engagement and shooting down of friendly aircraft).
- The second type of confusion is when a hostile aircraft is recognized and identified as friendly. During hostilities, this action might allow a hostile aircraft entry into, or safe passage through, the defended area.
- The third type of confusion is when a hostile aircraft is recognized and identified as another hostile aircraft. Actions taken against hostile aircraft in combat are the same, so generally there is no impact. However, this situation could have an impact if friendly countries were flying some aircraft types that are normally considered hostile.
- The fourth type of confusion is when a friendly aircraft is recognized and identified as another friendly aircraft. The actions taken in combat are the same, and there would be an impact only if a hostile country was using an aircraft type that is normally considered friendly.

2-2. When training aircraft recognition during peacetime, treat all incorrect answers the same, regardless of the type of confusion that caused the problem. Ensure that when a Soldier confuses one aircraft with any other aircraft, those aircraft are then paired in the next training session, so that the Soldier will learn not to confuse them. The following illustration shows confusion problems between similar aircraft.

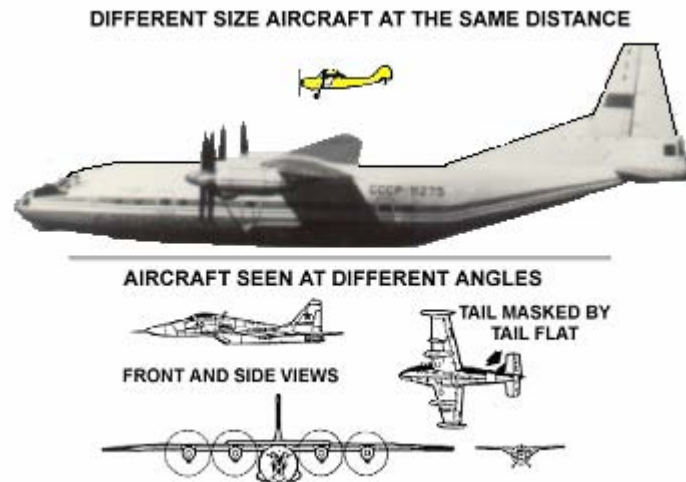


PHYSICAL FACTORS

2-3. Physical factors influence the ability to detect, recognize, and identify aircraft. Factors include size of the aircraft and viewing aspect, contrast with background, visibility conditions, terrain masking, and aircraft markings and camouflage.

SIZE OF AIRCRAFT AND VIEWING ASPECT

2-4. The range at which aircraft can be detected, recognized, and identified varies with the size of the aircraft. Large transports can be detected and recognized at a far greater range than smaller aircraft. Apparent size is much larger at broadside aspects than incoming or outgoing. The viewing aspect can also influence recognition and identification by masking features. Aircraft size and aspects are illustrated here.

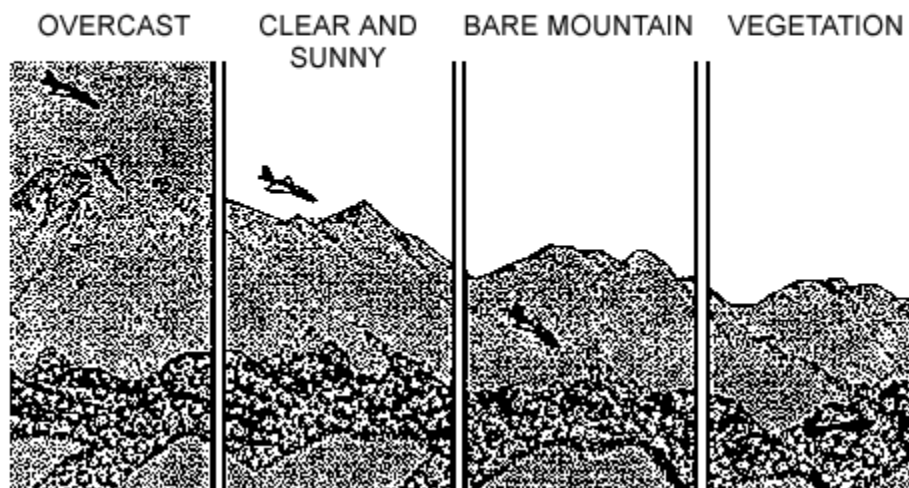


CONTRAST WITH BACKGROUND

2-5. Increased contrast between the aircraft and the background will improve the ability to detect, recognize, and identify aircraft. A black object against a white background may be visible for a great distance. When viewing the same object against a dark background, the range will not be as great. Smoke trails of some jet aircraft are valuable aids in detecting aircraft at long ranges under poor contrast conditions. Motion relative to the background also aids in detection. Aircraft hovering or moving at slow speeds are much more difficult to detect. The illustration below

demonstrates that detection, recognition, and identification ranges will increase on a clear, sunny day, and decrease when the sky is overcast or when the background is a bare mountain slope or vegetation.

BACKGROUND AND WEATHER CONTRAST CONDITIONS

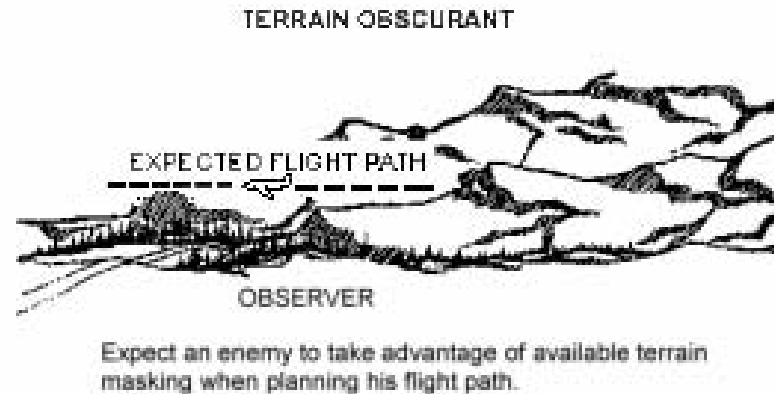


VISIBILITY CONDITIONS

2-6. Depending on their size and aspect, aircraft can be seen at long ranges in clear weather. For example, the F-4 Phantom II may be seen clearly at several kilometers, but when there is rain, snow, fog, dust, or haze, the visibility range is reduced, sometimes to zero. A cloud background can enhance visibility, but when a pilot is using clouds as a partial cover, the ground observer may have problems in recognition and identification as demonstrated in the following illustrations.

TERRAIN MASKING

2-7. Expect enemy pilots to preplan their flights and take advantage of available terrain masking, in order to avoid visual observation. Mountains, hills, vegetation, and other natural or man-made objects will limit the range of aircraft detection, recognition, and identification by masking the aircraft. The following illustration shows terrain obscurants.

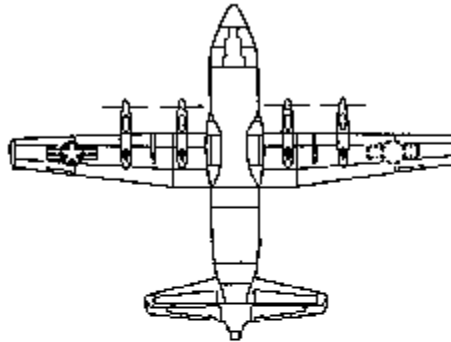


MARKINGS AND CAMOUFLAGE

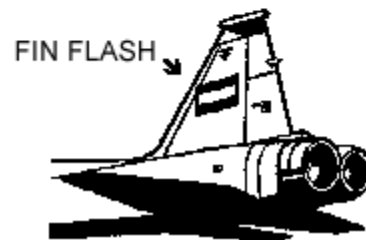
2-8. Nearly all countries have national markings and fin flashes on their aircraft. Some, especially in the Middle East, are very similar. Markings and fin flashes can be made smaller and in subdued colors, and therefore are not good recognition and identification features at any range, and particularly at the ranges that an engagement decisions must be made. Additionally, most combat aircraft are painted with various mission patterns. Camouflage schemes are also not good recognition and identification features because they can be changed. However, ground observers must deal with camouflage patterns because the patterns break up aircraft outlines, making aircraft more difficult to recognize and identify.

2-9. The wing presentation on US military aircraft and those of some other countries appears on the upper surfaces of the left wing and the under surfaces of the right wing. The wing surfaces of some aircraft display no national insignia or other markings. The following illustrations show examples of wing markings and tail markings. Some nations use a fin flash on their aircraft in addition to other markings.

WING MARKINGS

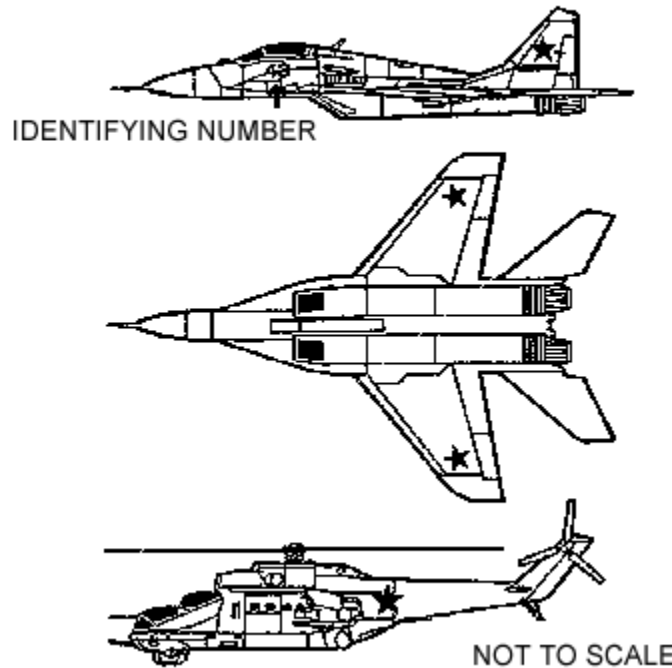


TAIL SHOWING FIN FLASH



2-10. On CIS aircraft, the basic marking is a red 5-point star which may or may not be thinly outlined in red and white, white only, or yellow. On fixed-wing aircraft, the star appears on the upper and lower surfaces of both wings and the tail fin. Identifying numbers may be painted on the fuselage. On helicopters, the star is normally painted on the fuselage. Combat aircraft markings will be very small to avoid compromise of the camouflage.

FIXED-WING AND HELICOPTER CIS MARKINGS



COLOR AND CAMOUFLAGE

2-11. Combat aircraft usually have a camouflage finish with the upper and side surfaces painted in a disruptive pattern of two or more shades as seen in the following illustration. This breaks up their form when viewed from above, and aids concealment when on the ground or flying low. The undersurfaces are painted in a light color to blend with the sky when viewed from below. Camouflage will vary in different theaters of operation. Greens and browns will be used in temperate climates. Sand and stone disruptive patterns are used for desert areas.

2-12. Light aircraft and helicopters will also be camouflage painted in most cases, but may be painted an overall drab color. The overall gray color of most fighter-interceptor aircraft is a camouflage scheme. US Navy aircraft are usually gray on top and white on the bottom. Other aircraft may be painted a two-tone gray.

COMBAT AIRCRAFT



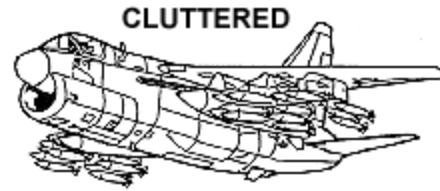
FIGHTER-INTERCEPTOR OVERALL GRAY COLORING



AIRCRAFT CLUTTER

2-13. Most combat aircraft will carry ordnance and fuel tanks under their wings or attached to their bodies. These attachments give the aircraft a cluttered appearance and may alter some recognition and identification features. However, remember that the external load can change with every mission flown. When training in visual aircraft recognition, aircraft are presented in their clean, uncluttered configuration. They are presented with landing gear retracted and without armament and external fuel tanks, unless they are permanent fixtures. Expect to see cluttered aircraft and learn to recognize and identify the total aircraft, so as not to be confused by the clutter. The following illustration shows examples of aircraft that have both a clean and cluttered appearance.

CLEAN APPEARANCE VERSES CLUTTERED APPEARANCE



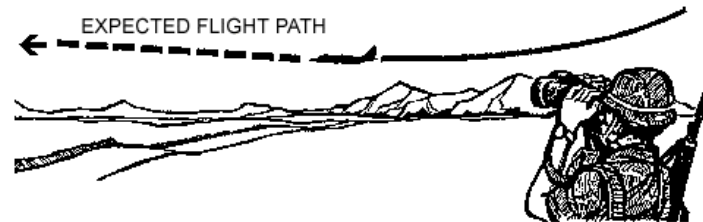
OBSERVER PROCEDURES AND TECHNIQUES

2-14. Since detection of an aircraft must occur before recognition and identification, detection must be as early as possible. The following procedures and techniques will help ground observers accomplish this task.

OBSERVER LOCATION

2-15. A key to successful detection is the observer's location. If tactically possible, have a clear line of sight on both the vertical and horizontal plane. Also, offset your position from the expected flight path to avoid the tail-on and nose-on aspects. The following illustration shows observer location and offset.

GROUND OBSERVER SITING AND OFFSET

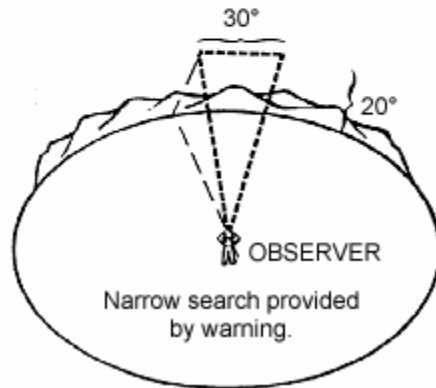
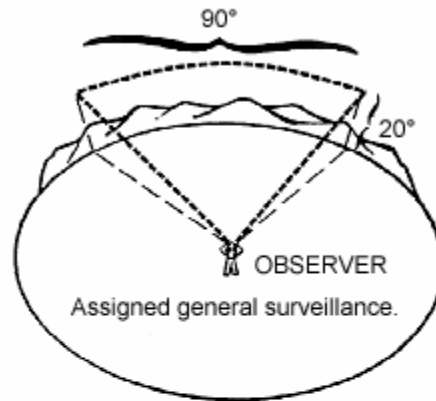


SEARCH SECTOR SIZE

2-16. The size of a search sector directly affects aircraft detection. Aircraft can be detected easier if the search sector is narrow. If assigned a sector size of 360 degrees, the chances of detecting aircraft are greatly reduced. When supported by an alert warning system, then a fairly large sector of about 90 degrees can be observed. After receiving a warning, narrow the search to about 30 degrees and center it on the aircraft's approach azimuth. Assigned sectors of search must be defined both horizontally and vertically. The following illustration shows sector relationships.

NOTE: Some AD systems require a more detailed search sector based on primary target lines.

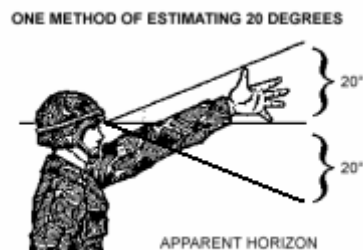
SECTOR SURVEILLANCE



ESTIMATION OF SEARCH LIMITS

2-17. Vertical search limits are also helpful in detecting aircraft. 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 aircraft. The correct upper limit of search is 20 degrees above the apparent horizon. The following illustration shows one method of estimating 20 degrees. 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.

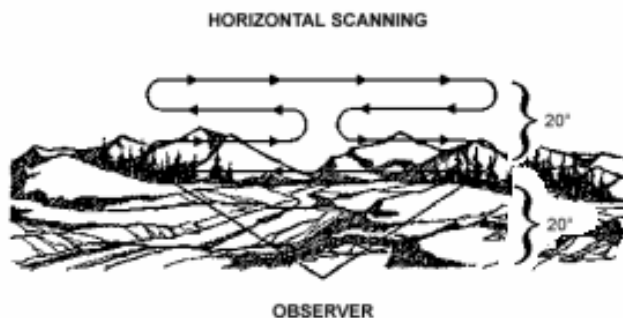


SYSTEMATIC METHODS OF SEARCH AND SCAN

2-18. There are two systematic methods of search and scan to look for aircraft in any type of terrain. The following two illustrations show horizontal and vertical search and scan methods.

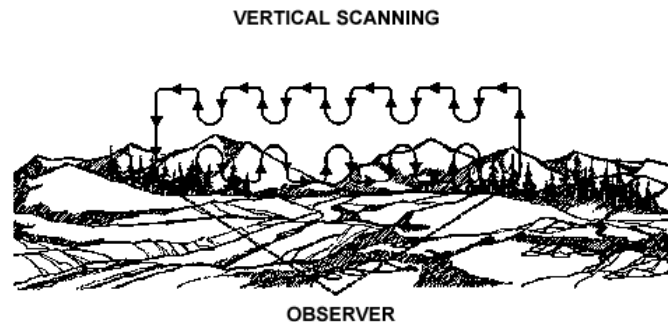
HORIZONTAL SEARCH AND SCAN

2-19. The observer should search from the horizon to 20 degrees above the horizon by moving his eyes in short movements across the sky, working his way up and across. The observer should continue the search and scan pattern to 20 degrees below the horizon to detect aircraft flying nap-of-the-earth.



VERTICAL SCAN AND SEARCH

2-20. The observer should search the sky using the horizon as a starting point and prominent terrain features as reference points by moving his eyes in short movements up the sky, then back down, continuing the movement across the terrain. The observer should scan in the same pattern to 20 degrees below the horizon to detect aircraft flying nap-of-the-earth.



2-21. With experience and above average vision, an observer may use nonsystematic methods of search that work best for him, such as a:

- Combination of the two systematic methods.
- Search of the horizon in the shape of an oval to 20 degrees above the horizon.
- General or random search of the horizon.

SEARCH TECHNIQUES

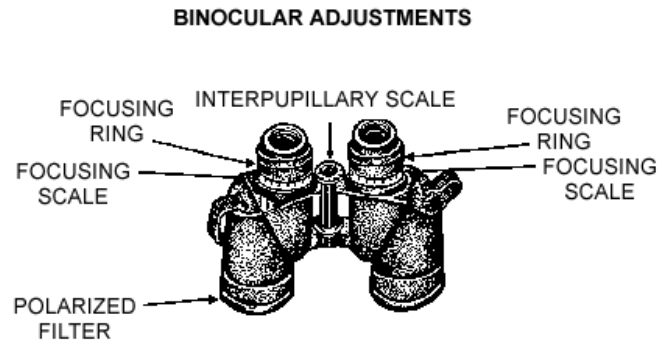
2-22. The following search techniques will help the observer in aircraft detection:

- When searching, especially above the horizon, the eyes will tend to relax and distant objects may become blurred. To prevent the blurring, focus the eyes frequently on a distant object, such as a terrain feature.
- The blinding effect of the sun can be shielded by extending the arm, blocking the glare as demonstrated in the illustration. Looking into the sun without shielding the eyes may damage them, and even a temporary blinding effect may cause the observer to miss aircraft.
- 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 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 its heading direction from a specific point such as a terrain feature.

USE OF BINOCULARS

2-23. After detecting an aircraft, use binoculars to recognize and identify it. The following illustration shows binocular points of adjustment.



INTERPUPILLARY ADJUSTMENT

2-24. The two monocles that make up a pair 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 to indicate the interpupillary distance 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 and record the scale setting, so that no time is lost when the field glasses need to be used again.

FOCAL ADJUSTMENT

2-25. Recognition and identification of a fast-moving aircraft must be completed within a few seconds of detection. Focal adjustments are performed as follows:

- Look through the glasses at a distant object with both eyes open.
- Place one hand over the lens of the right monocle and turn the focusing ring of the left monocle until the object is sharply defined.

- Uncover the right lens and cover the left one.
- Rotate the right focusing ring until the object is sharply defined.
- Uncover the left lens; the distant object should be clear to both eyes.
- Note the setting on the focusing scales and record for future reference.

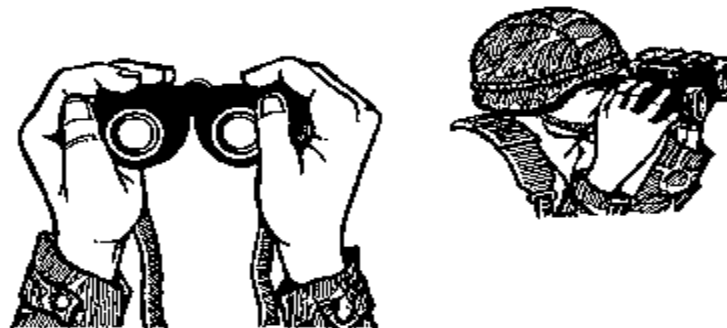
METHOD OF HOLDING BINOCULARS

2-26. 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 monoculars 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.

2-27. The following illustration shows correct hand positions when using binoculars.

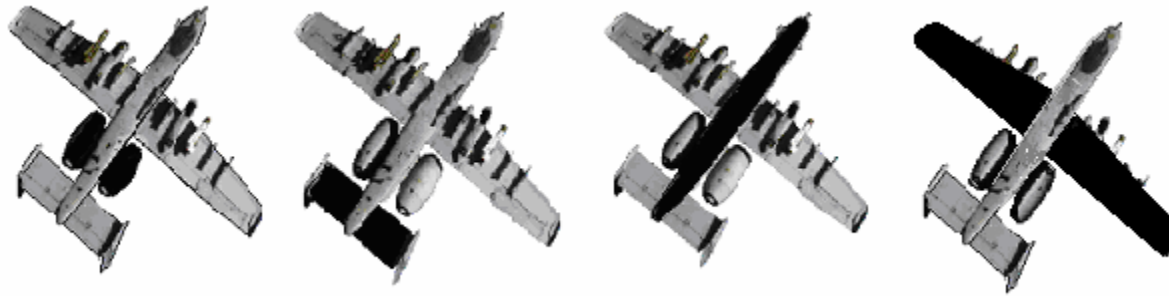
USING BINOCULARS



SPECIAL RECOGNITION CONSIDERATION

2-28. In addition to the factors affecting recognition for ground observers previously outlined, some air defenders will be equipped with the forward looking infrared (FLIR) subsystem which also presents recognition factors to be considered. 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 (WFOV) on the screen display, to a narrow field of view (NFOV) that provides greater detail of distant objects by enlarging their image.

2-29. 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, definition of shape and outline begins to appear and the gunner can distinguish between a jet, propeller-driven, or 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 wings, engines, fuselage, and tail (WEFT) skills to be able to identify specific aircraft in the FLIR environment.



Chapter 3

Description of Aircraft

This chapter shows the features of aircraft that make recognition and identification possible, and sorts out similar and dissimilar aircraft. Additionally, it shows examples of how aircraft are named and or numbered. All of the possible aircraft configurations are not covered in this chapter. When instructing aircraft recognition, an instructor or small unit leader can follow the descriptive methods used in the examples and derive his own descriptions for features or configurations that are not covered in the text.

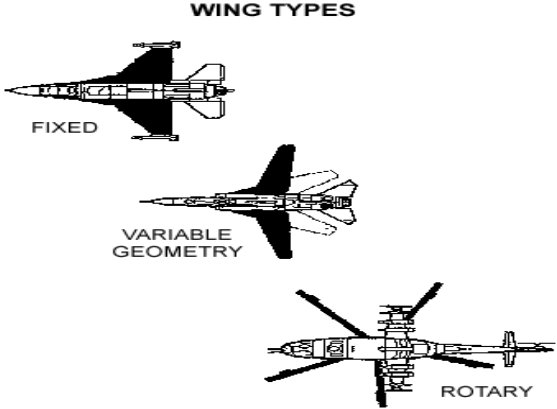
AIRCRAFT RECOGNITION AND IDENTIFICATION FEATURES

3-1. All aircraft are built with the same basic elements: wings to provide lift, engine(s) to provide motive power, a fuselage to carry the payload and controls, and a tail assembly which usually controls the direction of flight. These elements differ in shape, size, number, and position. The differences distinguish one aircraft type from another. An instructor can isolate the individual components for description and study as separate recognition and identification features, but it is the composite of these features that must be learned to recognize and identify an aircraft. The WEFT features illustration shows **wings**, **engine(s)**, **fuselage**, and **tail** features of aircraft. Allied countries may teach more or fewer features of aircraft in their recognition and identification programs, however, the VACR standardization agreement signed in 1984, set forth the below listed recognition features as those features to be taught.

WEFT FEATURES				
	WINGS	ENGINES	FUSELAGE	TAIL
1. Type	X	X		
2. Position/Location	X	X		X
3. Number	X	X		X
4. Slant	X			X
5. Shape	X	X	X	X
6. Taper	X			
7. Nose			X	
8. Intakes		X		
9. Rear			X	
10. Exhausts		X		
11. Mid			X	
12. Cockpit			X	

WINGS

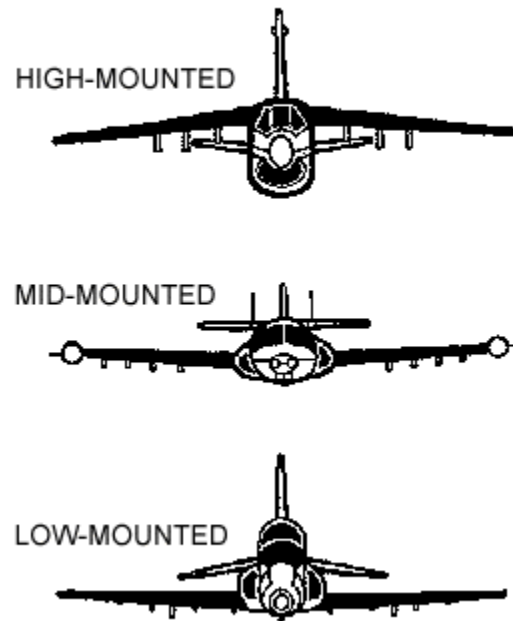
3-2. There are many variations in wing configurations. The three basic wing types are fixed, variable geometry, and rotary. The following illustration shows examples of wing types.



Fixed

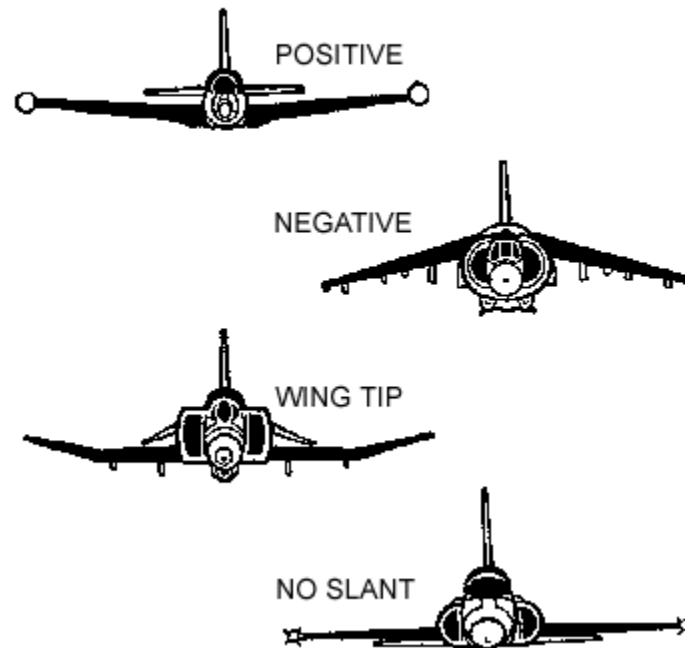
3-3. Fixed wings are attached permanently to the body of the aircraft and cannot be moved. Until the development of the helicopter, all aircraft had fixed wings. The usual three wing positions for fixed-wing aircraft are high-, mid-, and low-mounted (see the following illustration).

WING POSITIONS

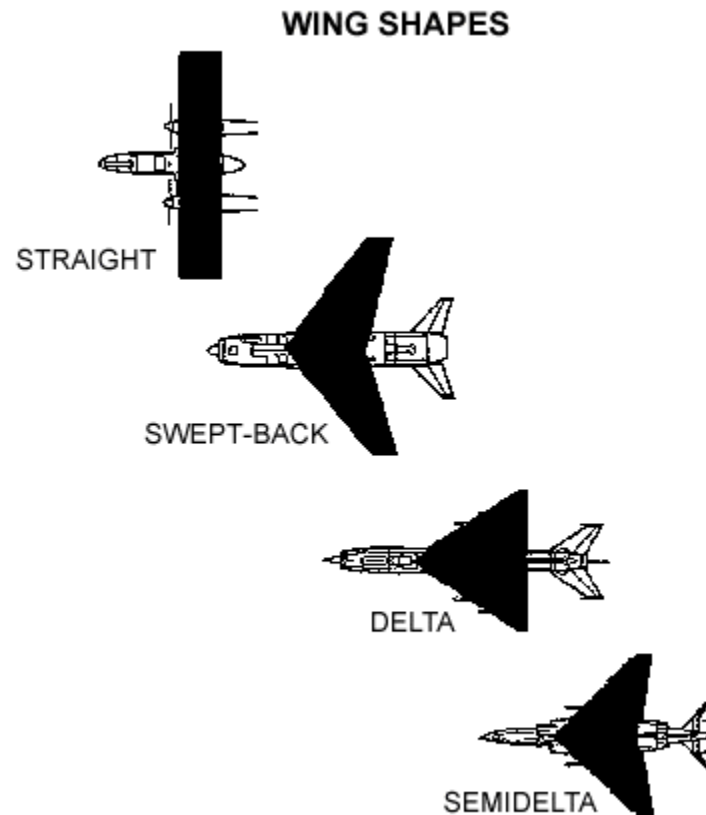


3-4. **Slant.** Slant is the vertical angle of the wing with respect to a horizontal line drawn through the fuselage. The following illustration shows examples of wing slants.

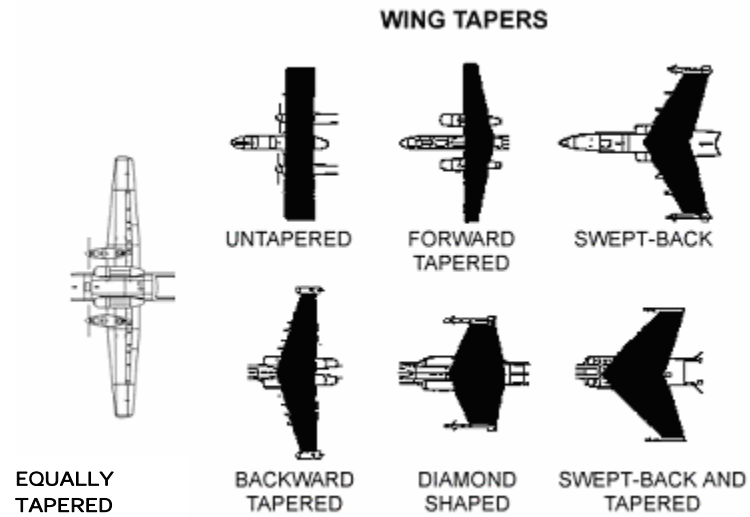
WING SLANTS



3-5. **Shape.** There are many variations and shapes of wings. There are four basic wing shapes: straight, swept-back, delta, and semi delta. The following illustration shows wing shapes.

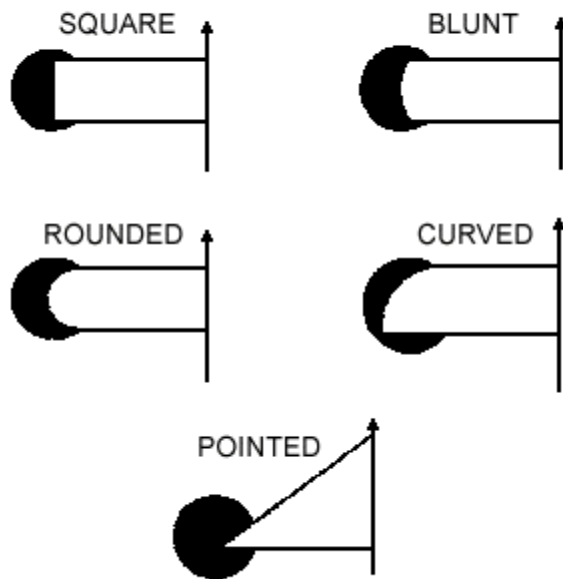


3-6. **Taper.** The gradual diminishing of the width of a wing from its base to the tip is wing taper. Aircraft may have the leading, trailing, or both edges of the wing tapered or the wing may be untapered (see the following illustration).



3-7. **Wing tip shapes.** Wing tip shapes are determined by the manner in which the leading and trailing edges of a wing meet. The following illustration shows wing tip shape classifications.

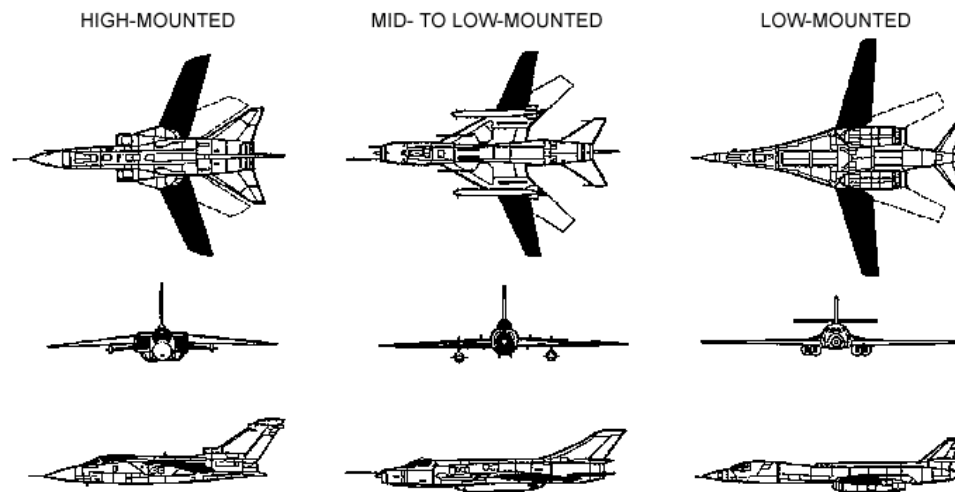
WING TIP SHAPE CLASSIFICATIONS



Variable Geometry

3-8. A relatively new aircraft design feature is variable geometry wings. In the swept position, the aircraft can increase its speed. Unswept wings allow the aircraft stability at low speeds. The following illustration shows three variable geometry wing positions and high-mounted, mid- to low-mounted, and low-mounted wing positions.

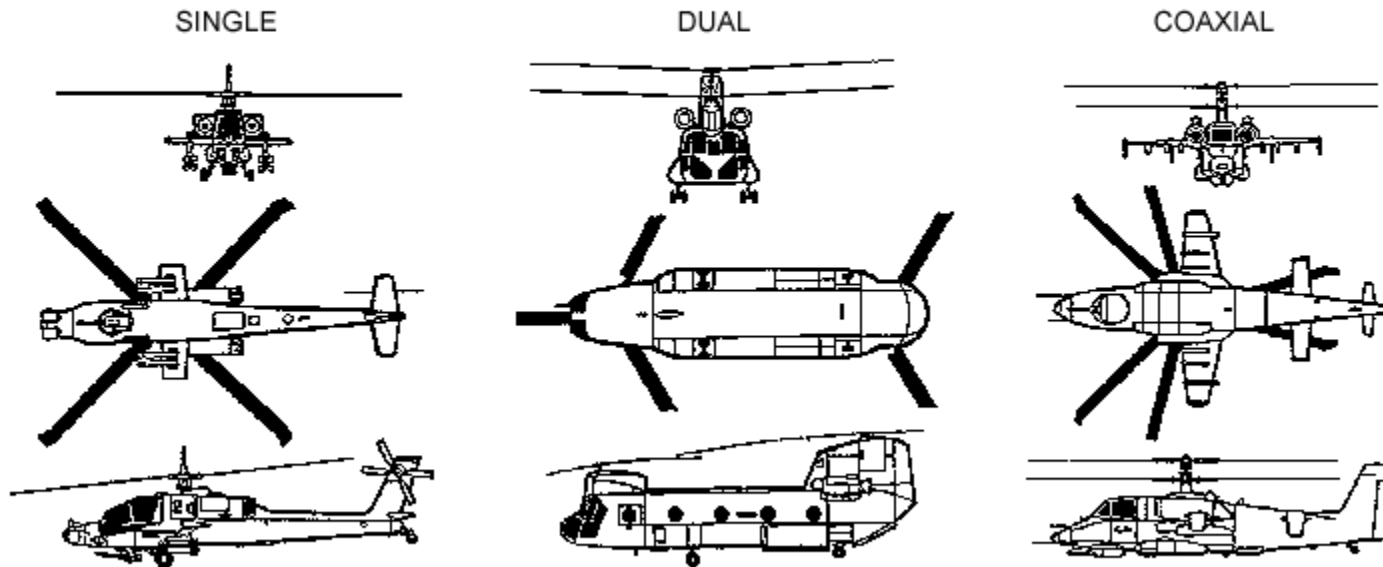
THREE VARIABLE GEOMETRY WING POSITIONS



Rotary

3-9. The main rotors of helicopters are airfoils and are classified as wings. Helicopters may have from two to eight main rotor blades. They may be mounted in several ways. The following illustration shows three examples of rotary-wing rotor mountings.

EXAMPLES OF ROTARY-WING MOUNTINGS

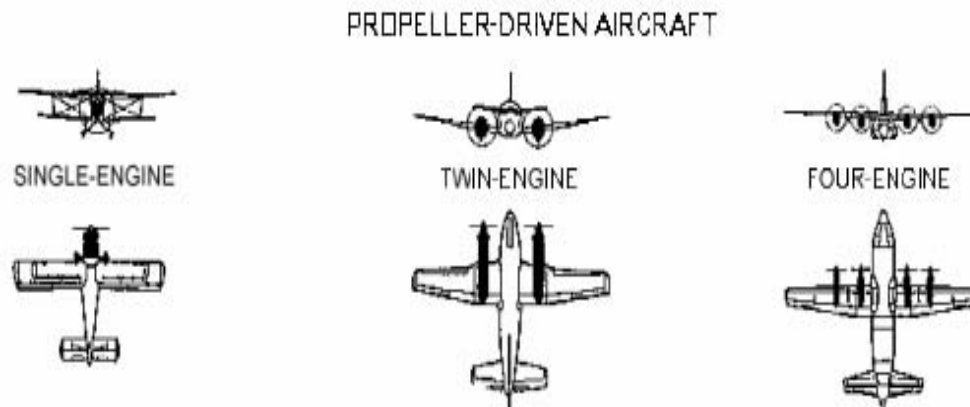


ENGINES

3-10. Recognition and identification features for aircraft engines are type, number, and location. Other features include the air intake and exhaust locations. Of significant interest is whether an aircraft is propeller-driven or jet-powered. Aircraft that have engines, which drive propellers, are propeller-driven. Those driven by reaction engines are jets.

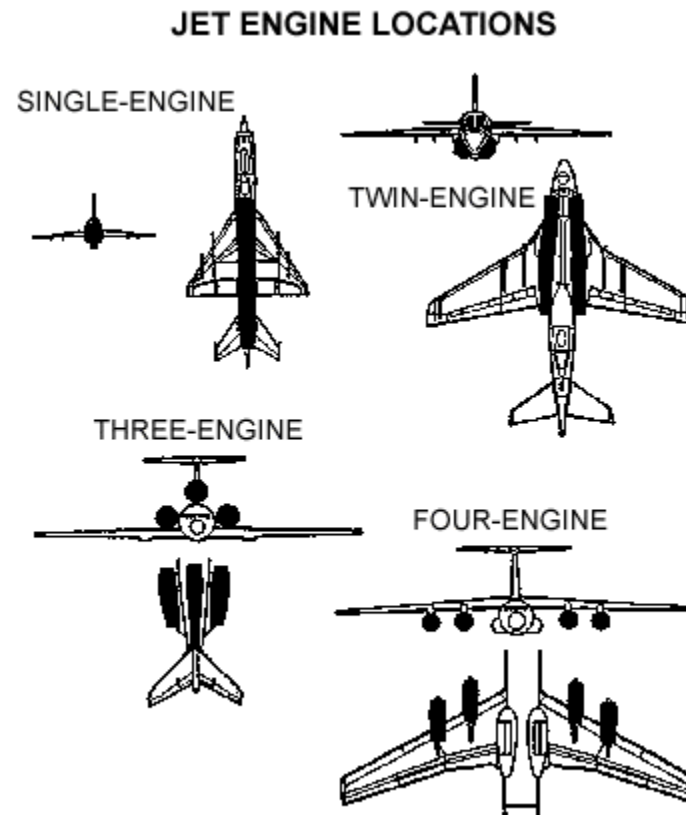
Propeller-driven

3-11. Aircraft engines, piston or turboprop, are located on the nose for single-engine aircraft and on the leading edges of the wings for most multiengine aircraft. The following illustration shows examples of propeller-driven aircraft.

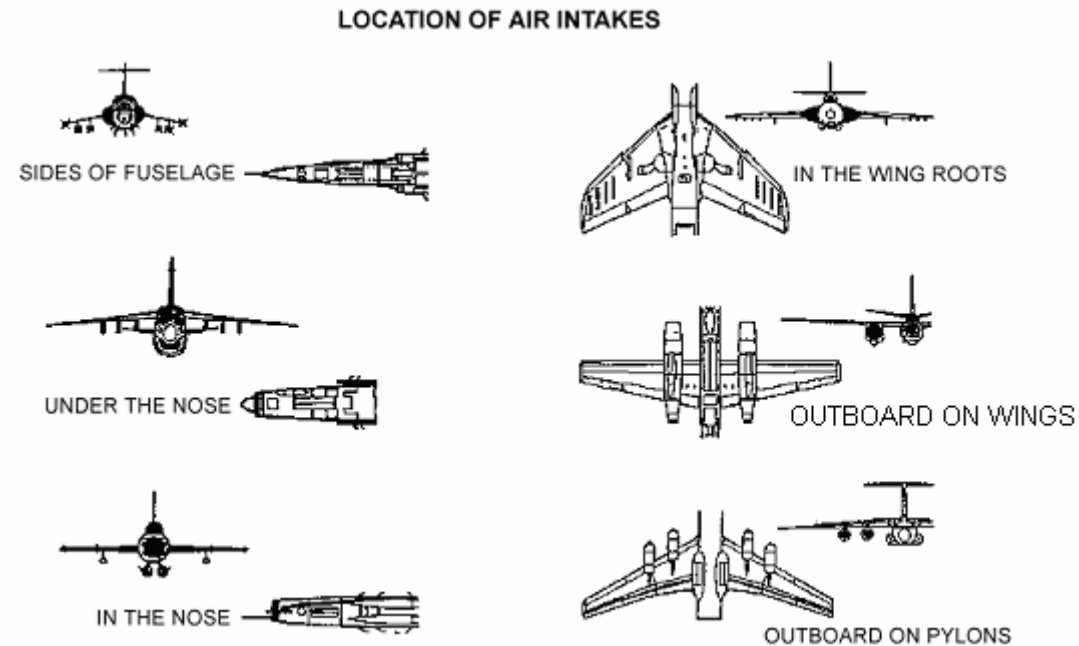


Jet-powered

3-12. Generally, single-engine jet aircraft have the engine mounted inside the rear section of the fuselage. The following illustration shows single-engine and multiengine positions.

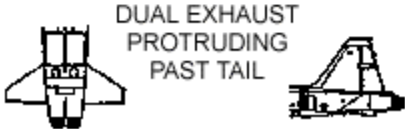
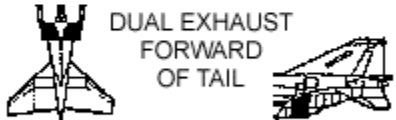
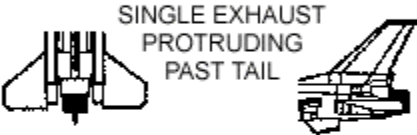
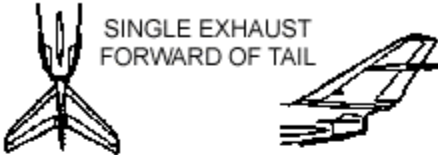


3-13. **Air intake locations.** The following illustration shows examples of jet intake locations for single-engine and multiengine jet aircraft.



3-14. **Exhaust number and location.** The following illustration shows examples of jet aircraft exhaust locations for single-engine and multiengine aircraft.

LOCATION AND NUMBER OF EXHAUSTS

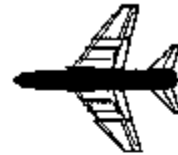


FUSELAGE

3-15. Like other features, the fuselage (body) comes in many shapes and sizes. There are three main sections of the fuselage: nose, mid, and rear. The cockpit or cabin is also a part of the fuselage, as well as special fuselage features. The following illustration shows four main configurations of aircraft fuselages.

FUSELAGE EXAMPLES

THICK
(WIDE)



RECTANGULAR
(BOXED)



TUBULAR
(ROUND)

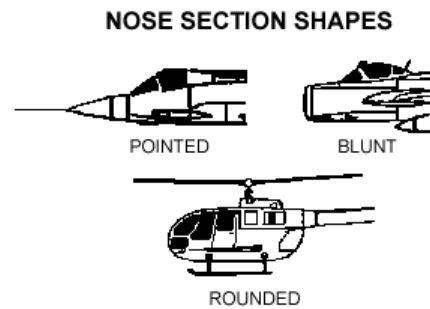


SLENDER
(TAPERED)



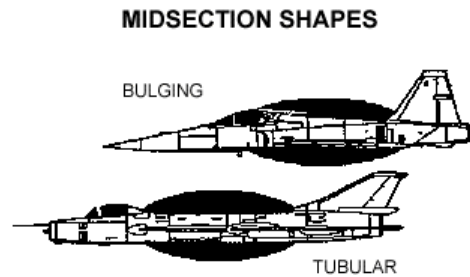
Nose

3-16. The front or forward portion of the aircraft is the nose section. The following illustration shows nose section shapes.



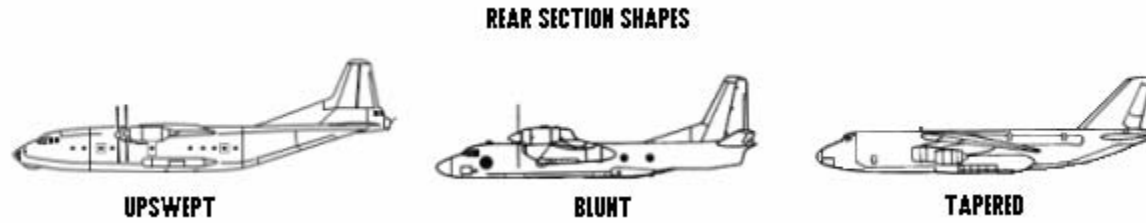
Midsection

3-17. The midsection does not include the wings, nose, or tail section. This is a good recognition and identification feature since it is generally the largest part of the aircraft. The following illustration shows examples of midsection shapes.



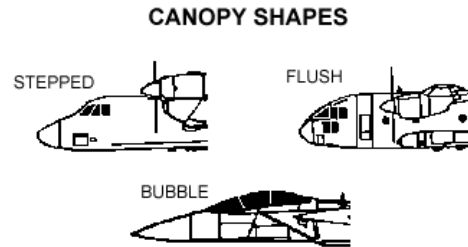
Rear

3-18. The rear of the fuselage where the tail assembly is attached is the rear section. Rear sections are classified by shape as shown in this illustration.



Canopy

3-19. 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.

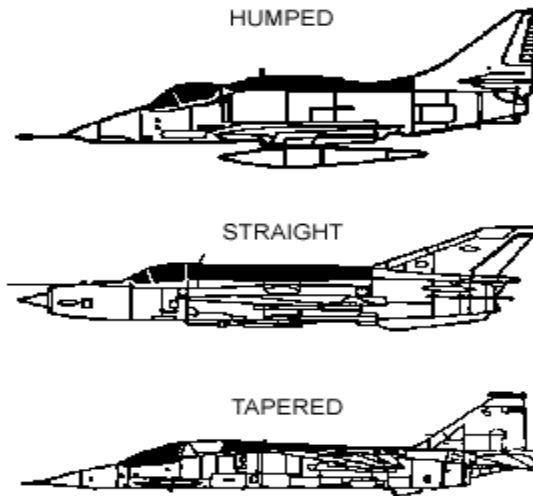


Special Fuselage Features

3-20. Sometimes aircraft have special features, usually attached or part of the fuselage. These special features will aid in distinguishing similar aircraft.

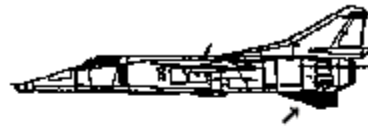
3-21. **Dorsal spines** do not appear on all aircraft. When they do, it generally will house avionic equipment. The following illustration shows three of the most common dorsal spines.

DORSAL SPINE EXAMPLES

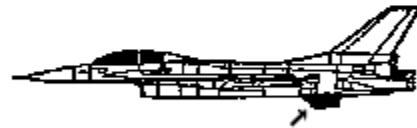


3-22. **Belly fins.** The correct name is ventral fins, but that is hard to remember. So call them belly fins. There may be one, two, or more (or there appear to be more on an aircraft). Belly fins are recognizable features on some aircraft. The following illustration shows two examples of belly fins.

BELLY FIN EXAMPLES



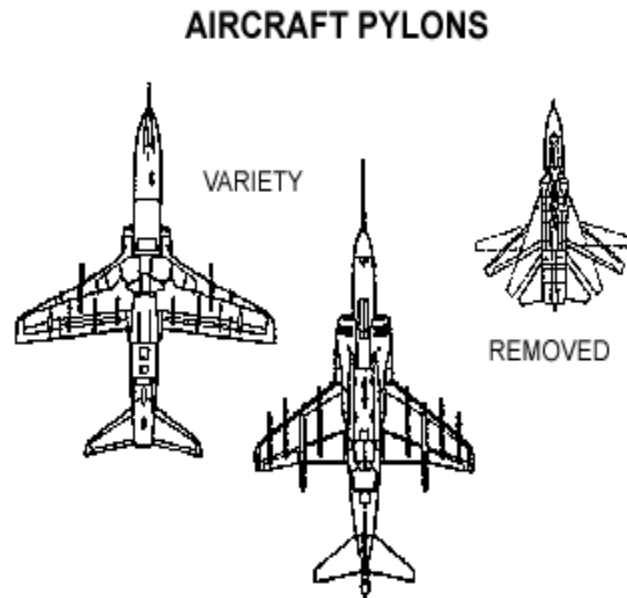
SINGLE BELLY FIN



DUAL BELLY FINS



3-23. **Pylons or hard points.** Ordnance or external fuel pods are attached to an aircraft by pylons. Ordnance type dictates the pylon shape. Pylons help identify aircraft. The following illustration shows two examples of aircraft with pylons and one aircraft with the pylons removed.



TAIL

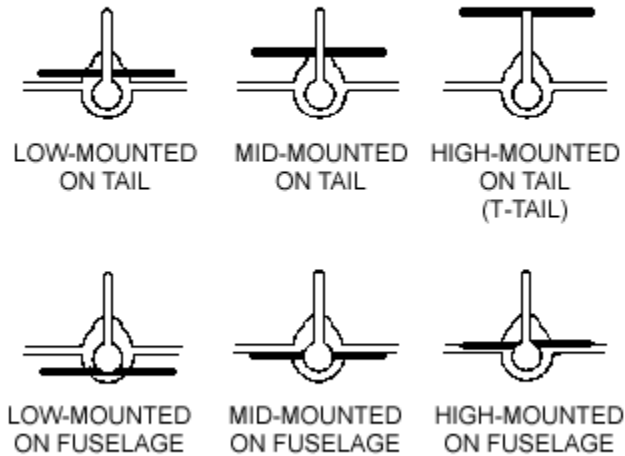
3-24. The tail structure consists of the tail flat and fin. Tail structures are classified according to the shape of flats and fins, number, and mounting.

Fixed-Wing Aircraft

3-25. The terms used to describe the fixed-wing tail flat(s) and fin(s) can also be applied to helicopter tails.

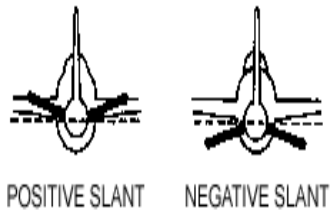
3-26. **Tail flat position.** Positions of the tail flat in relation to the fin and or fuselage are shown in the following illustration.

LOCATIONS OF TAIL FLATS



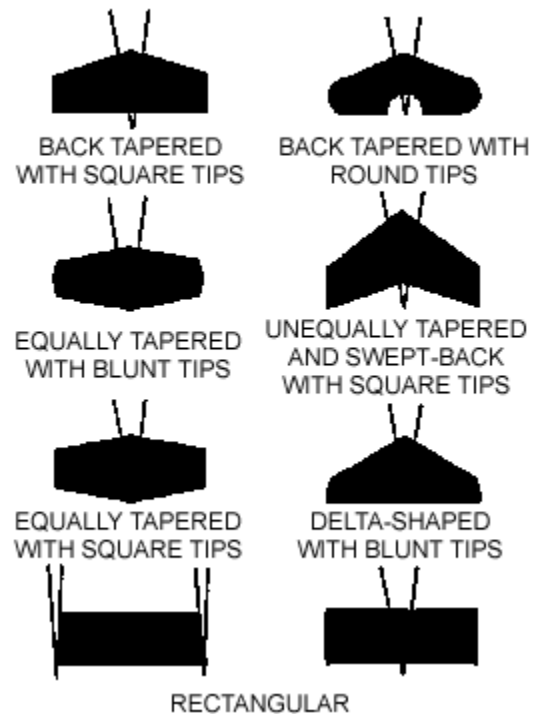
3-27. **Tail flat slant.** The vertical angle of the tail flat, with respect to a horizontal line drawn through the fuselage, is referred to as slant and is illustrated here.

POSITIVE AND NEGATIVE TAIL FLAT SLANT



3-28. **Tail flat shape and taper.** The shape of the tail flat is generally, but not always, the same shape as the wings on fixed-wing aircraft. When these shapes are not the same, you have a definite identification feature. Tail flats usually consist of only one element and are classified by the same method used to classify wings. There are many tail flat shapes. The following illustration shows eight examples.

SHAPE AND TAPER OF TAIL FLATS



3-29. **Number of fins.** 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.

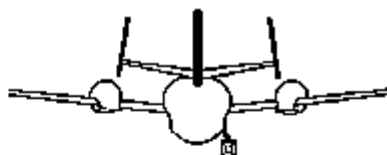
NUMBER OF AIRCRAFT TAIL FINS



SINGLE



DOUBLE

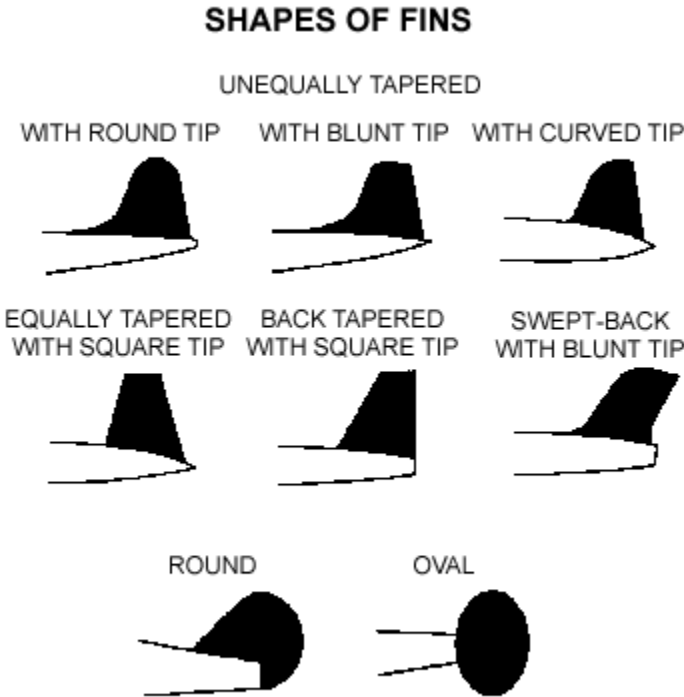


TRIPLE



QUADRUPLE
(WITH RADAR DISH)

3-30. **Fin Shapes.** There are many fin shapes. The following illustration shows eight examples of fin shapes.



ROTARY-WING AIRCRAFT (HELICOPTERS)

3-31. Rotary-wing aircraft have many tail configurations. Generally they are classified the same as fixed-wing aircraft. The difference is tail rotors. The following illustration shows two examples of tail rotors.

REAR ROTOR MOUNTINGS

ROTOR MOUNTED ON RIGHT SIDE
(SIDE AND BOTTOM VIEW)



ENCLOSED
ROTOR



TYPICAL AIRCRAFT TYPES

3-32. During the early stages of aircraft recognition training, separate features of aircraft are taught to describe and point out shapes, locations, and number of features that are peculiar to a particular type of aircraft as shown in the illustration below. Emphasis is placed on the features that discriminate among aircraft at a distance. Remember, however, that the end product or purpose is to identify the whole image of aircraft, not merely their parts. The following illustration shows a simple description of an aircraft. This format is used for all aircraft.

TYPICAL AIRCRAFT DESCRIPTION FORMAT

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



GENERAL DATA

Country of Origin. CIS (formerly USSR).
Similar Aircraft. MiG-23 Flogger B/E/G, F-111, Tornado, Su-24 Fencer.
Crew. One.
Role. Ground-attack, fighter.
Armament. Missiles, bombs, rockets, cannons.
Dimension. Length: 55 ft (16.6m).
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.

NAMES AND NUMERICAL DESIGNATIONS OF AIRCRAFT

3-33. All countries that build aircraft name and number their aircraft following a standard set of guidelines. Client, user, and licensed nations use either their own names and numbers or a combination to denote military aircraft. Three of the aircraft manufacturing countries are featured here as examples of the ways in which aircraft are named and or numbered.

United States

3-34. No standard system is used for naming US aircraft. Exceptions include helicopters of which many are named after Indian tribes: Kiowa, Apache, Iroquois, et cetera (but, then another helicopter is named after the Indian chief—Black Hawk—and yet another is named Cobra). Sometimes US aircraft share the names of former famous US aircraft and are identified by Roman numeral suffixes—the Thunderbolt II, Corsair II, and Phantom II are in this category. Some aircraft are not named—some tankers are examples of this practice.

3-35. The US uses standard letter-number designations that indicate the role of the aircraft and a series number. The letter A before the number denotes an attack aircraft, B for bomber, and C for cargo. The F-15 Eagle is a fighter (F) and 15 is the design number.

3-36. Letter suffixes are used to indicate both the model series, and in some cases, the aircraft's role. F-15E is a later model than the F-15C and the F-15E is also the designation of the ground-attack version of the Eagle. Prefix letters may also be added to the designation. An example is the OA-37 Dragonfly, the letter O prefix means that this attack aircraft has an additional role of observation. The following illustrations show designations and types of US aircraft.

US AIRCRAFT DESIGNATIONS

PREFIX	MEANING
A	ATTACK
B	BOMBER
C	CARGO
E	ELECTRONIC (COUNTERMEASURES)
F	FIGHTER
H	HELICOPTER
K	TANKER
O	OBSERVATION
P	PATROL
R	RECONNAISSANCE
S	STRATEGIC/SCOUT/SUBMARINE HUNTER
T	TRAINER
U	UTILITY
V	VERTICAL
X	EXPERIMENTAL
Y	PHOTOTYPE

US AIRCRAFT TYPES

DESIGNATION	TYPE OF AIRCRAFT
A-10	ATTACK
F-15	FIGHTER
KC-135	TANKER VERSION OF CARGO
KA-6	TANKER VERSION OF ATTACK
EA-6	ELECTRONICWARFARE VERSION OF ATTACK
AV-8	VERTICAL TAKEOFF VERSION OF ATTACK
P-2	PATROL
RF-41	RECONNAISSANCE VERSION OF FIGHTER
SR-71	STRATEGIC RECONNAISSANCE
0A-37	OBSERVATION VERSION OF ATTACK
UH-1	UTILITY HELICOPTER
AH-1	ATTACK HELICOPTER
CH-47	CARGO HELICOPTER
EF-111A	ELECTRONIC WARFARE FIGHTER-BOMBER
T-38	TRAINER
OH-58	OBSERVATION HELICOPTER

Commonwealth of Independent States

3-37. The CIS evolved from what used to be known as the USSR (Union of Soviet Socialist Republic). It is a consortium conformed along the lines of our North American Treaty Organization (NATO). It is made up of 14 communist countries.

3-38. The CIS, for the most part, does not officially name their aircraft. There are exceptions to this rule, for example the shuttle-carrying An-225 Mriya, and some spacecraft.

3-39. NATO names for CIS aircraft are based on a system widely adopted by all NATO nations. Examples of NATO names for CIS aircraft are Backfire, Cub, Fulcrum, and Havoc. The first letter in the name designates the type aircraft: B for bomber, C for cargo, F for fighter, and H for helicopter. Variations of the basic type are indicated by a letter suffix; for example, Flogger D, a ground-attack aircraft is different than the Flogger B, an interceptor. The Fitter C has movable wings as opposed to the Fitter A, which has fixed wings.

3-40. CIS aircraft do have letter numbers. The letters are abbreviations of names of people who were prominent in the design and or manufacture of the aircraft. The Su in Su-24 (Fencer) is taken from the name of P.O. Sukhoi who headed the team that designed the aircraft. The following illustrations show a sample of the scheme for designating aircraft in the CIS military and the types of aircraft produced.

CIS AIRCRAFT DESIGNATIONS

CIS	DESIGNER/ MANUFACTURER	NATO NAME
An-12	ANTONOV	CUB
IL-76	ILYUSHIN	CANDID
Mi-8	MIL	HIP
MiG-27	MIKOYAN-GUREVICH	FLOGGER
Su-17	SUKHOI	FITTER
Tu-22	TUPOLEV	BLINDER
Yak-28	YAKOVLEV	BREWER

TYPES OF CIS AIRCRAFT

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

UNITED KINGDOM

3-41. The UK system for designating aircraft is the opposite of that used by the US. The UK uses the name of the aircraft first, followed by the role letter or letters, and then the model. For example, the Lynx AH MK1 is an attack helicopter; the model has landing skids and is used by the British army. Conversely, the Lynx HAS MK2 is antisubmarine and performs other roles; the model has wheels and GEM-2 engines, search and tracking radars in a modified nose, and is used by the navy. The following illustration shows some of the role letters of UK aircraft.

UK AIRCRAFT DESIGNATIONS	
ROLE LETTERS	FUNCTIONS
AH	ARMY HELICOPTER
AL	ARMY LIAISON
B	BOMBER
C	TRANSPORT (CARGO)
F	FIGHTER
FGA	FIGHTER GROUND ATTACK
FG	FIGHTER GROUND ATTACK
FGR	FIGHTER GROUND RECONNAISSANCE
G	GROUND ATTACK
HAR	HELICOPTER AIR RESCUE
HC	HELICOPTER CARGO
O	OBSERVATION
R	RECONNAISSANCE
S	STRIKE

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Chapter 4

Instruction 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 medias used for instruction. All Soldiers are required to recognize a selected number of threat and friendly aircraft for survival and intelligence gathering. 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. These skills make it possible to discriminate between friendly and hostile aircraft by name and or number, and type, which will help avoid destruction of friendly aircraft, and at the same time, recognize, identify, and engage hostile aircraft.

TRAINING PROGRAM

4-1. 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. The VACR training program on CD incorporates all of these principles.

TRAINING METHODS, MANNER, AND STYLE

4-2. 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

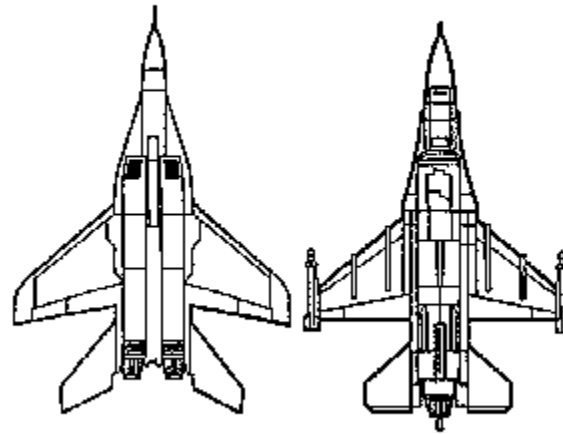
4-3. In the US military, the WEFT theory is the teaching method used to achieve an acceptable level of performance in VACR skills. Emphasize the aircraft's recognition and identification features that can be seen at a distance. Point out the characteristics of an aircraft that are similar to another aircraft, and also those features that make an aircraft unique. With the WEFT method, each aircraft is taught in its clean, uncluttered configuration. Aircraft speed, ceiling, and armament are not taught because they are not recognition or identification features.

AIRCRAFT COMPARISON

4-4. 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. Here are a few pointers when conducting comparison training:

- Introduce a new aircraft and point out the WEFT features for study.
- 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.
- Remember to always use comparison training. Single images of aircraft are used to introduce new aircraft, for reviews, and for testing. The Paired Comparison illustration shows an example.

PAIRED COMPARISON



SELECTING AIRCRAFT FOR TRAINING

4-5. 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 AD Soldiers must recognize.

2003 AIRCRAFT LIST

1-MiG-21 Fishbed
2-Mi-8 Hip
4-F-16 Fighting Falcon
4-C-130 Hercules
5-Mi-2 Hoplite
6-UH-60 Black Hawk
7-Tornado
8-Mirage F1
25-MiG-29 Fulcrum
26-F-5 Freedom Fighter
27-AH-64 Apache
28-F-15 Eagle
29-An-2 Colt
30-F-4 Phantom II
31-F-35 Joint Strike Fighter
32-UH-1 Iroquois
34-Mi-24 Hind D/E/F

9-Puma
10-A-10A Thunderbolt II
11-A-37 Dragonfly
12-F-14 Tomcat
14-CH-47 Chinook
14-Alpha Jet
15-AV-8B Harrier II
16-Su-25 Frogfoot
34-MiG-27 Flogger D/J
35- CH-46 Sea Knight
36-Typhoon
37-Jaguar
38-PAH-2 Tiger
39-CH-53 Sea Stallion
40-OH-58 Kiowa
41-Dauphin 2
42-Alouette III

17-Mirage III/5
18-BO 105
19-Defender 500
20-Lynx
21-Gazelle
22-F/A-18 Hornet
24-V-22 Osprey
24-AH-1 Cobra
44-Su-7/17/22 Fitter
44-An-12 Cub
45-Su-24 Fencer
46-Mi-6 Hook
47-Su-27 Flanker
48-F-22 Raptor
49-A-109 Hirundo
50-MiG-19 Farmer

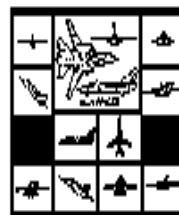
4-6. Depending on the theater of operation, a unit commander may select additional mission-essential aircraft to add to the list. The aircraft selected will be those aircraft that will most likely be seen; that is, aircraft operating below 10,000

feet where identification by visual means is possible. Teaching noncritical aircraft such as high-flying interceptors, uses up training time that would best be used to learn to recognize and identify highly critical forward area aircraft.

TRAINING AIDS

4-7. The primary training aid for visual aircraft recognition is the CD version. Another training aid is the 35-millimeter slide kit. There are 11 slides of each aircraft in a kit. The first is a three-view familiarization slide showing a head-on, side, and bottom view of the aircraft. Each of the remaining 10 slides shows the aircraft in a different heading and climb angle. Each numbered aircraft slide corresponds with the same number of any other aircraft in the kit. For example, the number 2 slide of any set always shows the head-on view of an aircraft. The following illustration shows the aircraft recognition training-visual, II slide kit (ART-V, II).

ART-V, II KIT, BOX AND SLIDE KIT



COMPUTER AIDED INSTRUCTION

4-8. VACR computer assisted instruction (CAI) software has been issued to all field and garrison units in a variety of formats. The current revised version with 97 aircraft that includes 15 UAVs and cruise missiles was issued in 1996. The CAI follows a well-established method of VACR training, but that is self-paced and or group instructed. The VACR CD program will have audio, as well as digitized films and photographs and includes wargaming skills.

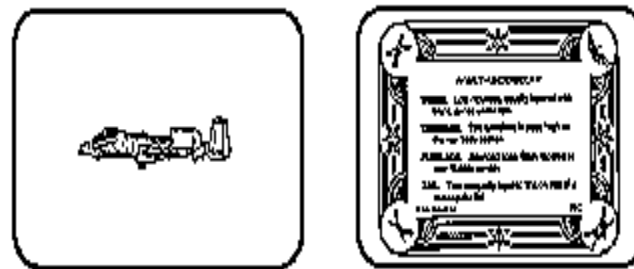
FLASH CARDS

4-9. Three decks of flash cards are supplemental aircraft recognition training aids. Aircraft represented in the flash cards are world-manufactured forward area combat aircraft. There are three cards of each aircraft with one card showing a head-on, one card showing the side, and the other card showing the bottom view of the aircraft. The reverse

sides of the cards are printed with the name and or number of the aircraft with the aircraft's WEFT characteristics. The three decks of cards can be intermixed for training.

4-10. Flash cards are particularly useful in the field for the squad leader to train his squad, for unsupervised individual study, coach and pupil method of study, and provide an excellent means for conducting on-the-spot checks of VACR proficiency. The following illustration shows the front and back of a typical flash card.

FRONT AND BACK VIEW OF A FLASH CARD



FUNDAMENTALS

4-11. 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

4-12. 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.

MOTIVATION TO LEARN

4-13. Motivation plays a major role in learning to recognize and identify aircraft. Because the subject is learned through repetitive memory drills, an extra effort is necessary to motivate yourself and others to learn VACR skills. Aircraft recognition is essential to job performance and should be presented in a manner that will cause good performance. VACR high-skill level success and recognition by peers of this attainment are sources of satisfaction and motivation.

ELIMINATION OF DISTRACTION

4-14. 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. While these subjects are necessary for most Soldiers, they should be taught or learned in firing doctrine or other classes. The primary goal or focus in a VACR class is the identification of specific aircraft.

SLIDE KIT TRAINING

4-15. Slides are very effective aids in training Soldiers aircraft recognition skills. Slide presentations allow the flexibility to mix aircraft for comparison training. One-on-one exchanges between the student and instructor reduce boredom and enhance the concentration that is essential to this type of training.

BEFORE TRAINING STARTS

4-16. 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 be working with two projectors and giving out volumes of information that Soldiers can understand and remember, so they must be highly skilled in VACR to teach the subject correctly.

SLIDE TRAINING CONCEPTS

4-17. Visual aircraft recognition training is accomplished by showing the Soldier aircraft imagery, and is based on individual features of an aircraft such as wing and tail shape. The Soldier studies the images using the WEFT theory, associates the images with the aircraft name and or number, and commits the aircraft to memory. When seeing the aircraft in flight or pictures of the aircraft, the Soldier can recognize the aircraft and state the aircraft's name and or number. Remember that it is the composite of features that make an aircraft recognizable.

4-18. Avoid recognition of the slides by presenting uncluttered aircraft views without visual clues such as background, cloud patterns, national insignia, ordnance loads, or extended landing gear that could lead to slide identification rather than aircraft recognition. Also avoid slide shows as a substitute for well-planned VACR training sessions.

PAIRING AIRCRAFT SLIDES

4-19. Use paired comparison training when teaching Soldiers new aircraft or when you are teaching discrimination between aircraft. To pair aircraft, arrange the aircraft in sets based on the degree of similarity, for example, the Tornado and Su-24 Fencer or the C-130 Hercules and An-12 Cub, whenever possible. When there is little or no similarity, pair the aircraft by type and primary roles. If Soldiers confuse one aircraft with another, then pair those two aircraft.

CLASSROOM PERSONNEL, FACILITIES, AND EQUIPMENT

4-20. One instructor and one assistant instructor are needed to present VACR training. Use a classroom that can be darkened. The following equipment is also required:

- Two 35-millimeter slide projectors with zoom lenses and a remote control.
- One rearview, reflecting, or matte-finished screen.
- Slide trays loaded with selected aircraft slides.
- The following illustration shows a typical facility.



LOADING SLIDE TRAYS

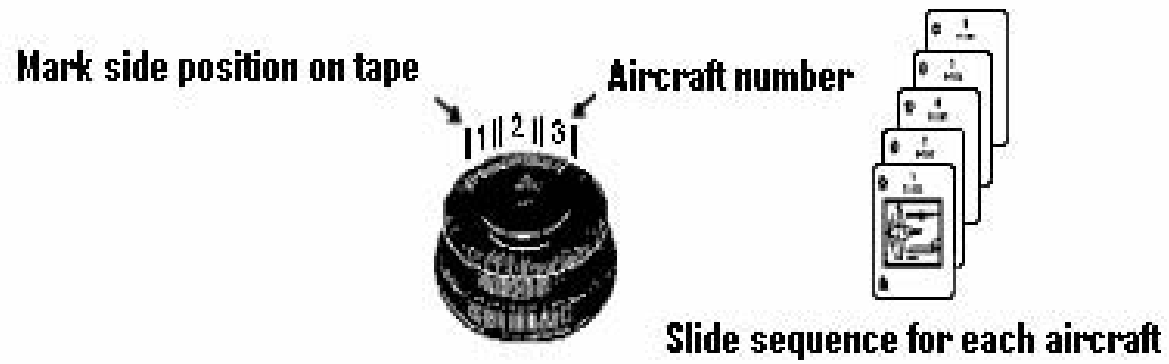
4-21. Prepare three slide trays for VACR training. One tray is the primary or teaching tray, another is the secondary or comparison tray, and the third is the review and or testing tray.

Primary (teaching) tray

4-22. Load the primary slide tray with the slides selected for the first aircraft to be taught. Load the three-view familiarization slide first, and then the selected views in their order of presentation. For this example, the three-view familiarization slide and then views 2, 6, 7, and 9 were selected as teaching slides. Next, place a blank slide after the last teaching slide. Place a blank between each set of slides loaded. Now load the primary slide tray with the second set

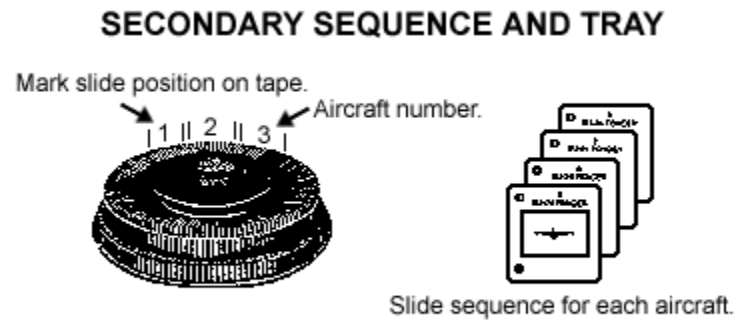
of slides chosen for the next aircraft to be taught. Load them the same way as the selections for the first aircraft. Continue to load the primary tray with the slides selected for all the aircraft to be taught.

PRIMARY SLIDE TRAY



Secondary slide tray

4-23. Load the secondary tray with the aircraft slides selected for comparison, as shown in the following illustration. The first slide is a blank to correspond with the three-view slide in the primary tray. The blank is followed by the views that match the slides in the primary tray. Slides 2, 6, 7, and 9 were selected and loaded in the teaching tray for the first aircraft, so the same heading and climb angle views must be selected and loaded for the comparison. Next, place two blanks between these sets so your slides in the secondary tray will continue to track the slides in the primary tray. Continue to load the secondary tray with the sets of slides selected for comparison.



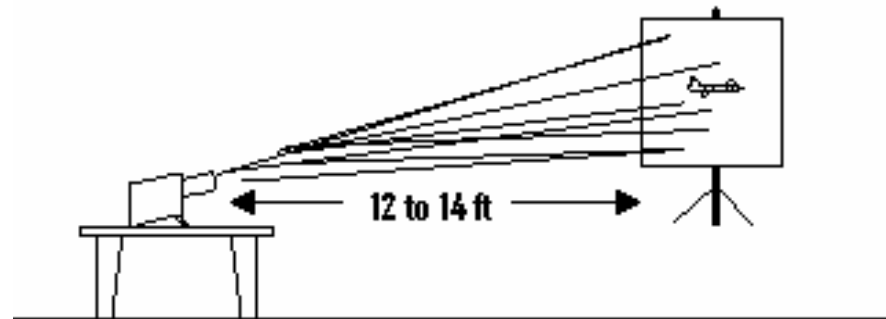
REVIEW AND OR TESTING TRAY

4-24. Select and load a third tray with slides for review and or testing.

ESTABLISHING IMAGE SIZE

4-25. Before beginning a class in VACR, adjust the distance between the projector and screen to get the correct image size as follows:

- Initially, locate the projector about 12 to 14 feet from the screen.
- Have the assistant instructor take a seat farthest from the screen.
- Project the image of an aircraft and increase or decrease the projector distance until the aircraft is barely identifiable by the assistant instructor. The image seen from the front row is about the same as that seen from the back row. This procedure is best suited for a class size of from 1 to about 30 students.



INTRODUCTION TO VACR

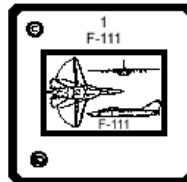
4-26. During the introduction to visual aircraft recognition, present the Soldier with the description of the components of aircraft that are important to recognition and a simple vocabulary for use in describing aircraft. As a minimum, the introduction will include the following:

- 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 WEFT.

SPECIFIC AIRCRAFT TRAINING

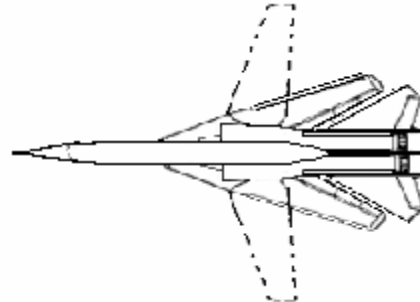
4-27. This is where the instructor presents all the aircraft selected for training. Introduce aircraft number one from the teaching tray. The first slide is the three-view familiarization slide (see the illustration). Point out the recognition features that can be seen in each of the three views. There is no slide exposure limit at this time.

THREE-VIEW SLIDE



AIRCRAFT TEACHING TECHNIQUE

4-28. 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. The following illustration shows an example of this teaching technique.



“Wings of the F-14 are high-mounted, variable swept-back, and tapered with blunt tips (the F-111’s wingspan changes in flight). The F-14’s two jet engines are mounted inside the fuselage. Air intakes are diagonally shaped, box-like, alongside the fuselage. The F-14 has dual exhausts. The fuselage is long, slender and box-like. The F-14’s body widens at the air intakes and continues through the rear section. The F-14 has a bubble canopy. Twin, large, swept-back tail fins that are tapered and slanted outward. Flats are mid-mounted on the fuselage.”

4-29. If this is the first aircraft taught, or if there has been a prolonged time lapse since the last aircraft recognition class, show the aircraft views selected. Then compare the aircraft after teaching the second aircraft.

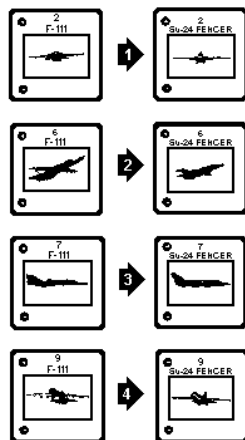
PRACTICE AND PERFORM

4-30. After planning, preparing, and presenting all the aircraft to be taught, proceed with the two final training functions of practice and perform which are accomplished through reviews and evaluations.

Comprehensive Reviews

4-31. 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 do it through self-study. Give reviews at the beginning of each training session and before a test

AIRCRAFT COMPARISON



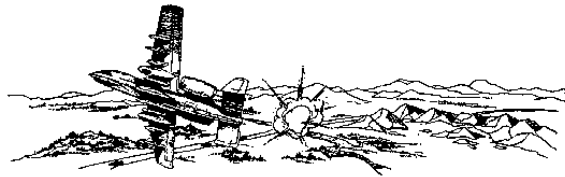
Performance Evaluations

4-32. 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 are met.

4-33. Degradation of skills in VACR is very high, so schedule formal reviews and tests often, and in short training sessions. Once a Soldier has become VACR proficient, anything more than two hours for review and testing will begin to bore the Soldier. 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 4 or 5 weeks. Add more time if needed.

Leader Guidance

4-34. 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.

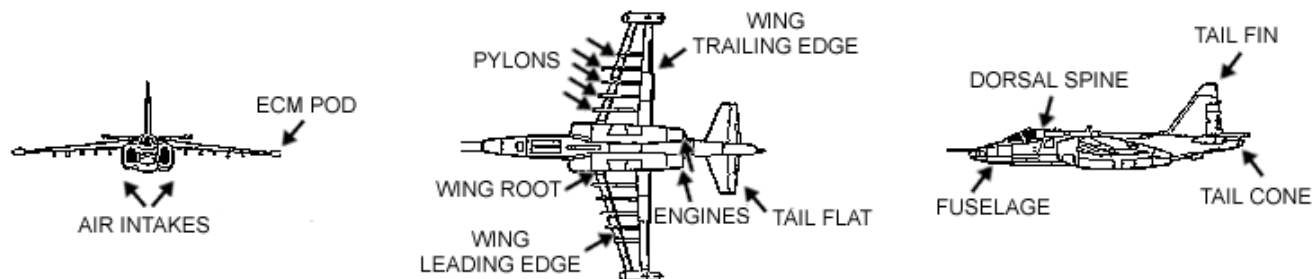


Chapter 5

Ground-Attack, Close Air Support, and Fighter-Bomber Aircraft

In this chapter, there are examples of both hostile and friendly ground-attack, CAS, and fighter-bomber aircraft. These aircraft will perform a variety of missions to include reconnaissance and interdiction in the forward areas. Most aircraft shown can and will perform several roles. For example, the F/A-18 Hornet and MiG-21 Fishbed are used in many roles, depending on the model and type of the aircraft. For the most part, all the aircraft depicted here will be seen performing missions over the modern battlefield. For each aircraft, there are line drawings, general data, WEFT descriptions, user countries, photographs, and aircraft manufacturer information. Line drawings are not to scale. The following illustration shows general-attack, CAS, and fighter-bomber aircraft WEFT description features.

WEFT DESCRIPTION FEATURES



A-10 THUNDERBOLT II (FAIRCHILD REPUBLIC)

GENERAL DATA

Country of Origin---USA.

Similar Aircraft-----None, but compares with the Su-25 FROGFOOT.

Crew-----One.

Role----- Close Air Support, 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.

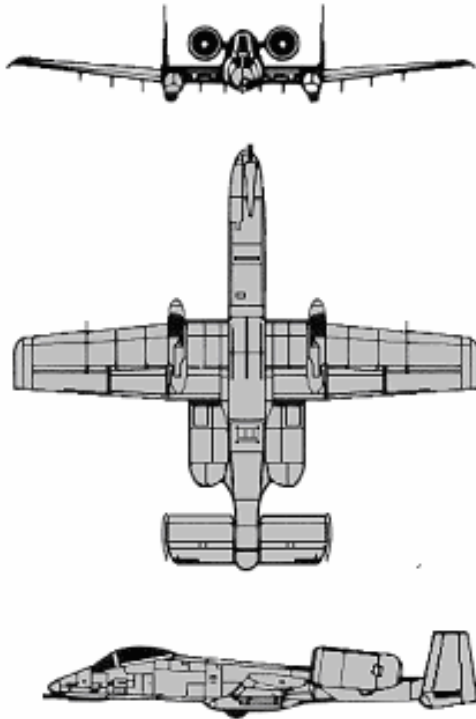
Engine(s)---Two turbojets mounted internally. Small semicircular air intakes and round exhausts are located in the wing roots.

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.

USER COUNTRIES

Chile, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Panama, Peru, South Korea, Thailand, Uruguay, USA, Vietnam.





First flown in 1972, 681 were built with only the USA using it. In addition to its “tank busting” 30-mm GAU-8 cannon, the aircraft carries a huge amount of ground-attack ordnance. Its crew also respectfully refers to the A-10A as “Warthog”.

A-37 DRAGONFLY (CESSNA)

GENERAL DATA

Country of Origin---USA.

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, minigun.

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).

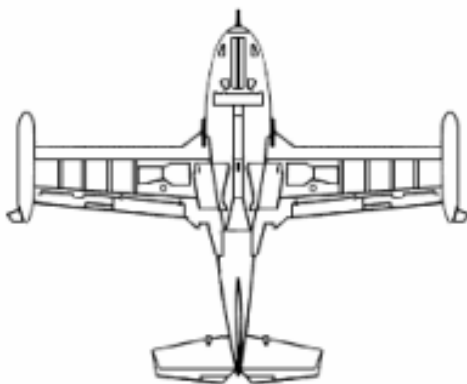
Engine(s)---Two turbojets mounted internally. Small semicircular air intakes and round exhausts are located in the wing roots.

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.

USER COUNTRIES

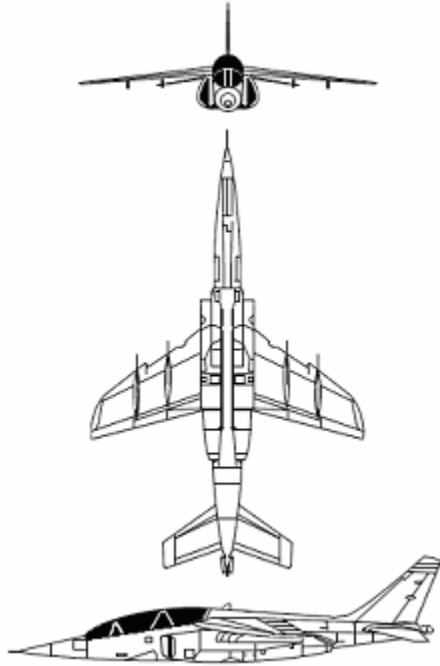
Chile, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Panama, Peru, South Korea, Thailand, Uruguay, USA, Vietnam.





The A-37 Dragonfly is a further development of the T-37 trainer. First flown in 1954, 577 were built and are being used by 14 countries. The A-37 is used for armed counter-insurgency operations from short unimproved airstrips.

ALPHA JET (DASSAULT-BREGUET, DORNIER)



GENERAL DATA

Countries of Origin.-- France, Germany.

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

Crew-----Two.

Role-----Light-attack, advanced trainer.

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 tip. Swept-back and tapered tail flats mid-mounted on the body with a negative slant and square tips.

USER COUNTRIES

Belgium, Cameroon, Egypt, France, Germany, Ivory Coast, Morocco, Nigeria, Portugal, Qatar, Togo.



Produced by Germany and France, 500 copies of the two seat Alpha Jet is employed as a light attack aircraft by Germany and as an advanced trainer by the French. The French Alpha Jet trainer has a round nose and the version used by Germany has a pointed nose.

AMX (AERITALIA, AERMACCHI, EMBRAER)

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).

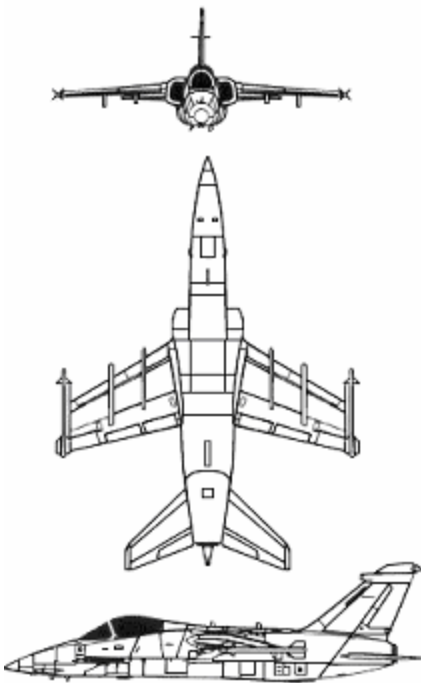
Engine(s)----One turbofan inside body. Two air intakes forward of the wing roots. Single exhaust.

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 with blunt tips. Swept-back and tapered fin with a blunt tip.

USER COUNTRIES

Brazil, Italy.





First flown in 1984, the AMX is produced in a single-seat, CAS, battlefield interdiction and reconnaissance aircraft, and as a two-seat trainer.

AV-8B HARRIER II (McDONNELL DOUGLAS Bae)

GENERAL DATA

Countries of Origin--- USA, UK.

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.

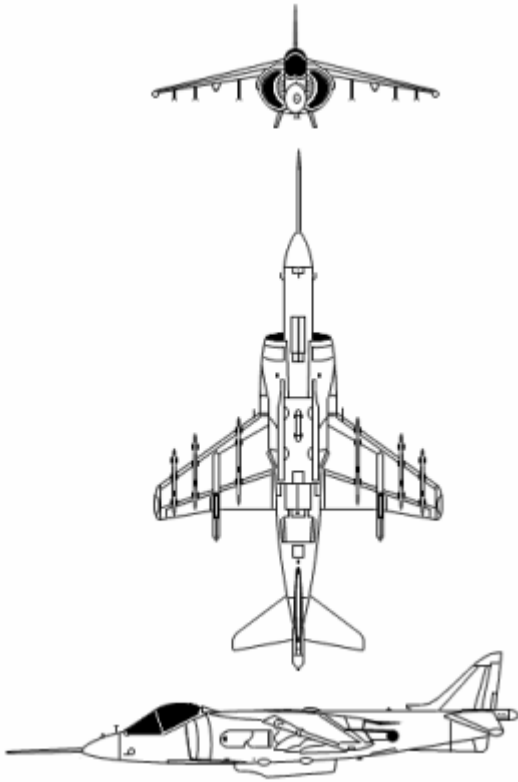
Engine(s)----One vectored thrust turbofan mounted in the body. Large, semicircular air intakes that give the body a rounded appearance from the head-on view.

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.

USER COUNTRIES

India, Italy, Spain, UK, USA.





The Harrier first flew in 1978 and 336 were built. It is used by five countries. The aircraft does not require an airstrip for takeoff and landing. It carries a large ordnance load, and its turnaround time between missions is very short.

DRAKEN (SAAB)

GENERAL DATA

Country of Origin---Sweden.

Similar Aircraft-----Hunter.

Crew----- One.

Role-----Fighter-attack, reconnaissance.

Armament----- Bombs, cannon, rockets, missiles.

Dimensions-----Length: 50 ft, 4 in (15.5 m).
Span: 30 ft, 10 in (9.5 m).

WEFT DESCRIPTION

Wings-----Mid-mounted, double-delta extending from the canopy to the tail section.

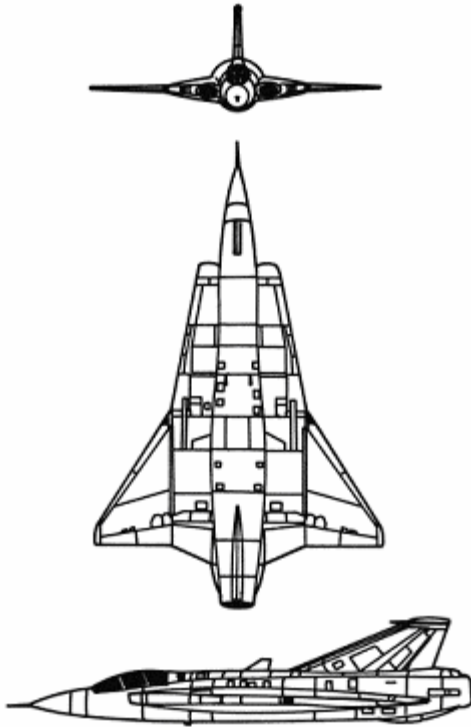
Engine(s)---One turbojet located inside the body. Oval air intakes in the leading edges of the wing roots. Large, single exhaust.

Fuselage---Tubular body blending into the delta wings. Long, pointed nose and a bubble canopy mounted forward of the air intakes.

Tail-----No tail flat. Large, swept-back, tapered tail fin with square tip mounted on the dorsal spine.

USER COUNTRIES

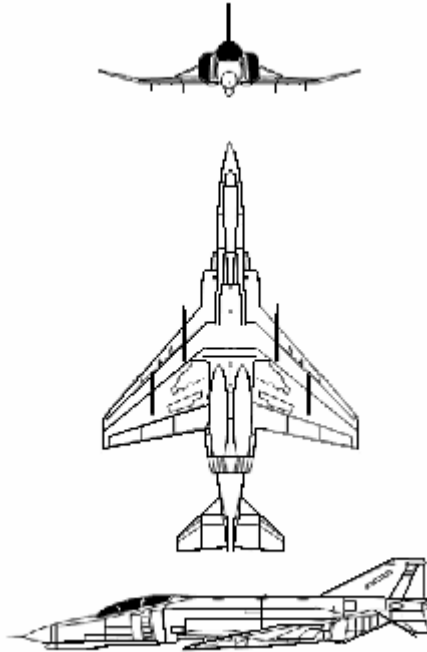
Austria, Denmark, Finland, Sweden.





The Draken was first flown in 1955. There are several versions of this aircraft and this type can operate from small airfields. Note the unusual double-delta wing.

F-4 PHANTOM II (McDONNELL DOUGLAS)



GENERAL DATA

Country of Origin-- USA.

Similar aircraft----- Jaguar.

Crew: ----- Two.

Role: ----- Fighter-bomber, CAS, ECM, and Reconnaissance.

Armament: ----- Cannon, Bombs, Rockets, and Missiles

Dimensions: ----- Length: 63ft (18.7 m).
Span: 38ft, 5 in (11.77 m).

WEFT DESCRIPTION

Wings----- Low-mounted, swept-back, and semi-delta with square tips. Positive slanted wing tips. There is a saw tooth in leading edges of the wings.

Engine(s)---Two engines inside the body with rectangular air intakes alongside the body in front of the wings. Twin exhausts beneath a large over hanging rear section.

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

Tail----- Flats are mid-mounted on the body, delta-shaped with a negative slant sharply back-tapered fin with a square tip.

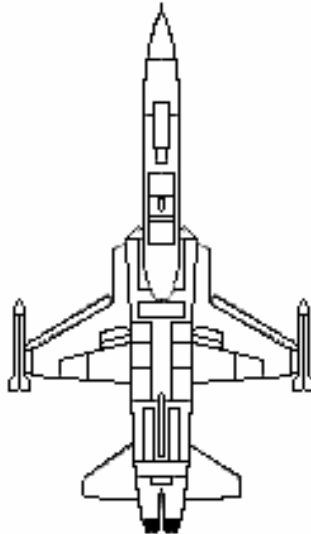
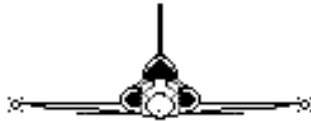
USER COUNTRY

Egypt, Germany, Greece, Iran, Israel, Japan, South Korea, Turkey, USA.



First flown in 1958, over 5000 F-4 Phantom II's were built and are being used by nine countries. The US Navy replaced the F4 with the F-14 Tomcat.

F-5 FREEDOM FIGHTER/TIGER II/T-38 TALON (NORTHROP)



GENERAL DATA

Country of Origin-- USA.

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.

USER COUNTRY

Bahrain, Brazil, Canada, Chile, Greece, Honduras, Indonesia, Iran, Jordan, Kenya, Malaysia, Mexico, Morocco, North Yemen, Norway, Philippines, Saudi Arabia, Singapore, South Korea, Spain, Sudan, Switzerland, Taiwan, Thailand, Tunisia, Turkey, Venezuela.



The F-5 Freedom Fighter and flew for the first time in 1959. Over 1,000 of these aircraft were built and are being used by 27 countries. The F-5F is a two-seat trainer/tactical version also called the Tiger II. The T-38 Talon is a look-alike advanced trainer.

F-16 FIGHTING FALCON (GENERAL DYNAMICS)

GENERAL DATA

Country of Origin-- USA.

Similar aircraft----- F/A-18 Hornet, MiG-29 Fulcrum, Mirage F1.

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. Two belly fins

USER COUNTRY

Bahrain, Belgium, Denmark, Egypt, Greece, , Indonesia, Israel, Netherlands, Norway, Pakistan, Portugal, South Korea, Singapore, Taiwan, Thailand, Turkey, USA, Venezuela.





First flown in 1974, over 3,464 were built and being used in 18 countries. The ever-increasing costs involved with the development of new combat aircraft caused the US Air Force to develop a requirement for a Lightweight, low-cost, highly maneuverable Mach 2 fighter.

F/A-18 HORNET (McDONNELL DOUGLAS)

GENERAL DATA

Country of Origin-- USA.

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.

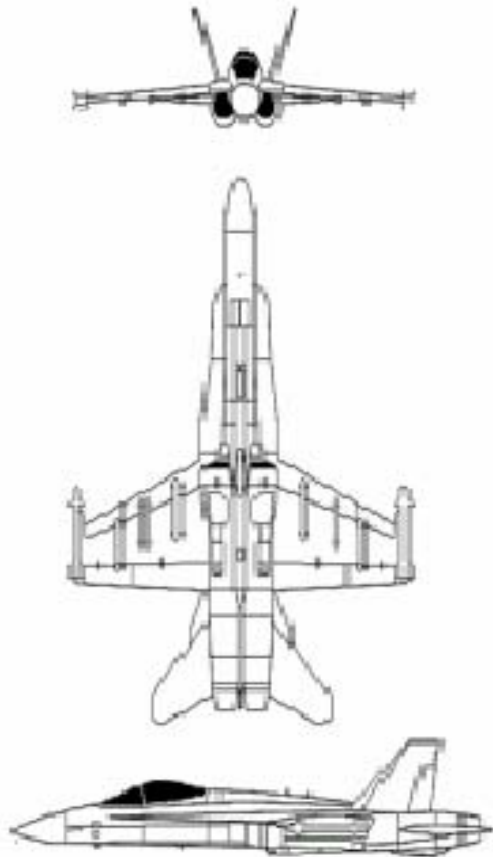
Engine(s)--Two turbofans mounted in the aircraft rear section. Oval air intakes under the wings.

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.

USER COUNTRY

Australia, Canada, Finland, Kuwait, Malaysia, Spain, USA.





The F/A-18 Hornet first flown in 1974 and over 1,458 were built. It is used by nine countries. It is the US Navy and Marine Corps/ frontline multimission fighter. This carrier-borne and land-based attack fighter was designed to replace the aging fleet of F-4 Phantom IIs and A-7 Corsair IIs.

F-35 JOINT STRIKE FIGHTER (MULTI-DEVELOPERS)

GENERAL DATA

Country of Origin-- USA.

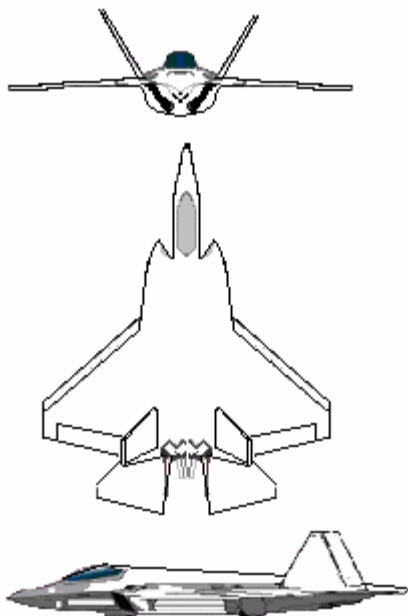
Similar aircraft----- F-16.

Crew----- One.

Role----- US Marine Corps fighter, strike.

Armament----- Cannon, Bombs, Missiles, Rockets.

Dimensions----- Length:
Span:



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.

USER COUNTRY

Australia, Canada, Finland, Kuwait, Malaysia, Spain, USA.



The F-35 first flew in 1998 and became the United States and United Kingdoms Joint Strike Fighter (JSF) on 26 October 2001. The USAF will use it to replace its aging F-16 and A-10 work force. The USMC, the USN and the Royal Navy will use the F-35 as a STOVL (Short Take-off & Vertical Landing) aircraft. It will replace the USMC's AV-8 Harriers and F/A-18 Hornets. Approximately 2,800 will be built.

F-117A NIGHT HAWK (LOCKHEED)

GENERAL DATA

Country of Origin—USA.

Similar aircraft----- None.

Crew----- One.

Role----- Defense suppression, precision bombing against high-priority targets.

Armament----- Bombs, missiles.

Dimensions----- Length: 65 ft 11 in (20.08 m).
Span: 43 ft, 4 in (13.2 m).

WEFT DESCRIPTION

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

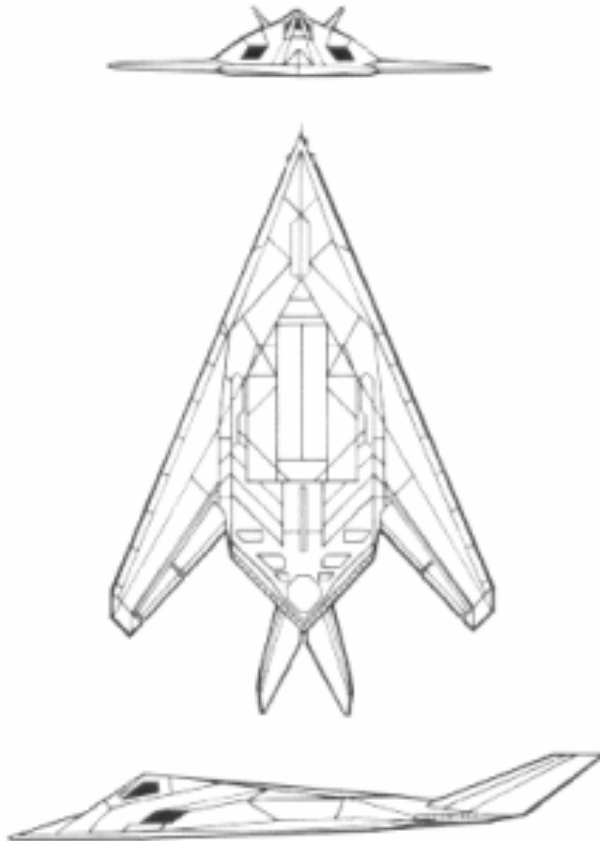
Engine(s)-----Two turbofans mounted inside the body. Rectangular, over wing air intakes. Narrow slotted “platypus” exhausts.

Fuselage-----Sharp, pointed nose. Pyramid and faceted appearance. Stepped up cockpit.

Tail-----Sharply swept-back and tapered, V-configured tailfins with square tips.

USER COUNTRY

USA.





The F-117A Night Hawk, used by the USA, first flew in 1981. Presently, over 563 have been built. It is primarily a ground-attack aircraft. Its radar-evading capability allows it to strike a target undetected by the enemy.



FANTANA, Q-5 (NANCHANG)

GENERAL DATA

Country of Origin --People's Republic of 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.

USER COUNTRIES

Bangladesh, North Korea, Pakistan, People's Republic of China.



First flown in 1958. Over 1,000 were built and used by four countries. Upgraded versions of the Chinese-built Fantan A are still in production today.

GALEB/JASTREB (SOKO)

GENERAL DATA

Country of Origin-- Yugoslavia.

Similar aircraft----- M.B. 326, M.B. 339A.

Crew----- One.

Role----- Light-attack.

Armament----- Machine guns, bombs, rockets.

Dimensions----- Length: 34 ft (10.36 m).
Span: 34 ft, 4 in (10.48 m).

WEFT DESCRIPTION

Wings-----Low-mounted and slightly tapered. Fuel tanks are generally mounted at the square tips.

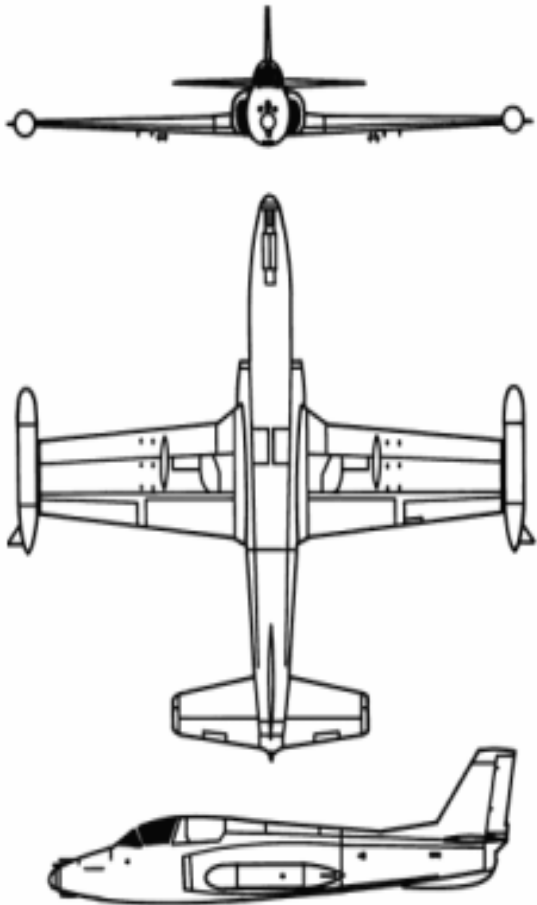
Engine(s)--One turbojet inside body. Semicircular air intakes alongside the body extending from the rear of, and below, the canopy.

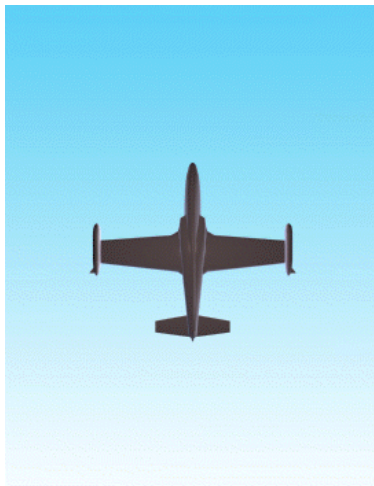
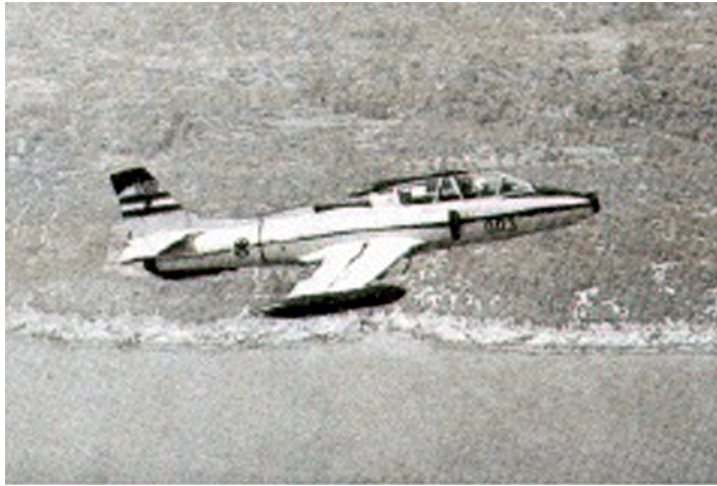
Fuselage---Rounded, tapered to the rear, and round nose. Bubble canopy. Rear of canopy is flush with the dorsal spine.

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

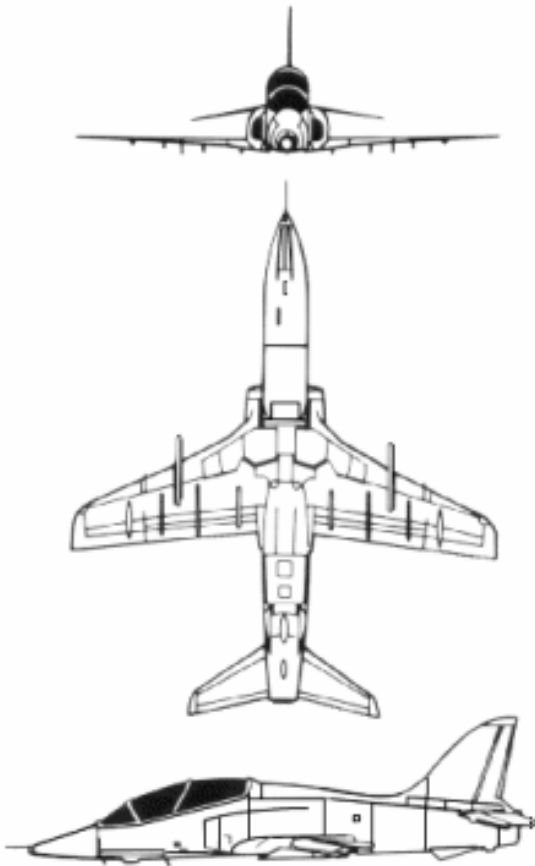
USER COUNTRIES

Bosnia-Herzegovina, Burma(Super Galeb), Libya, Yugoslavia, Zambia.





First flown in 1961. Five countries use this aircraft. The Galeb is the standard Yugoslav air force basic trainer. It is equipped with two machine guns. Jastreb is a single-seat attack version equipped with three machine guns and eight underwing hard points for ordnance.



HAWK (BAe)
GENERAL DATA

Country of Origin – UK.

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.

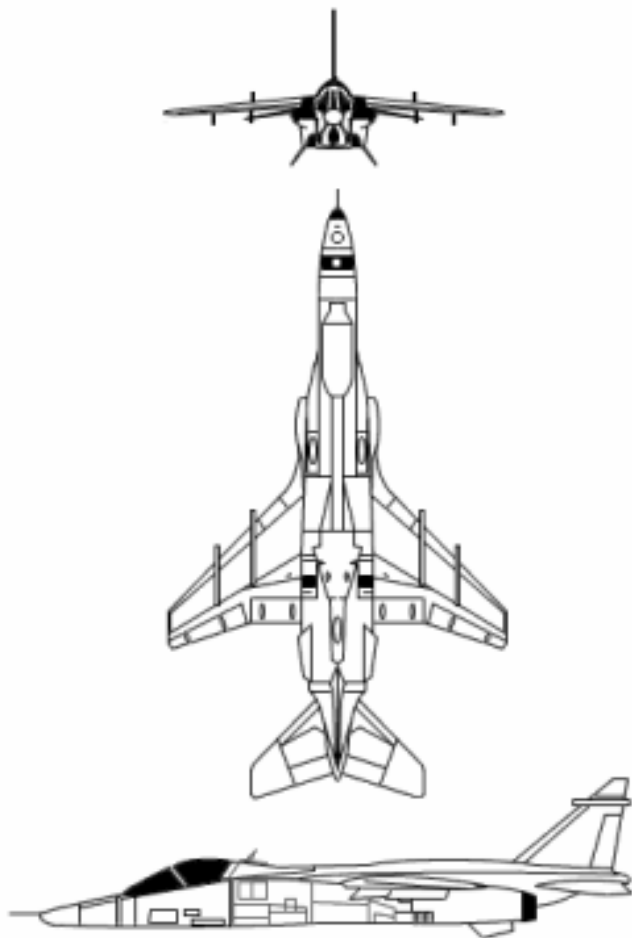
Tail-----Flats are high-mounted on the fuselage, swept-back, and tapered. Swept-back and tapered fin with a curved tip.

USER COUNTRY

Brunei, Finland, Indonesia, Kenya, Kuwait, Malaysia, Oman, Saudi Arabia, South Korea, United Arab Emirates, UK, USA (T-45 Goshawk).



Through a continuing update and modernization program, the 20-year old Hawk is still known as one of the world's best advanced trainers and light-attack aircraft. 175 were built and being used by 13 countries.



JAGUAR (BREGUET, BAe)

GENERAL DATA

Countries of Origin—France, UK.

Similar aircraft----- F-4 Phantom II, 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.

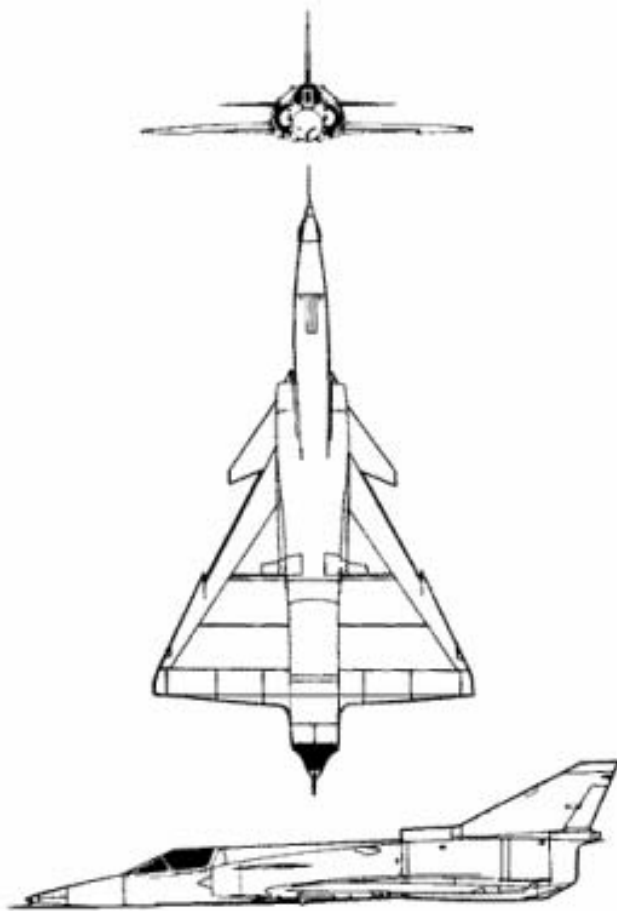
Tail-----Tail flats and fin are swept-back and tapered with square tips. Flats are mid-mounted on the fuselage with a negative slant.

USER COUNTRIES

Ecuador, France, India, Nigeria, Oman, UK, Pakistan, Portugal, Singapore, South Korea, Taiwan, Thailand, Turkey, USA, Venezuela.



First flown in 1968, it was delivered to the RAF in 1973. 573 were built and are used by 15 countries. Some versions of the Jaguar have over wing hard points for air-to-air missiles. Destined to be replaced by the RAFALE.



KFIR (IAI)

GENERAL DATA

Country of Origin--Israel.

Similar aircraft----- Mirage III/5, Mirage 2000, Viggen.

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. Semicircular 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.

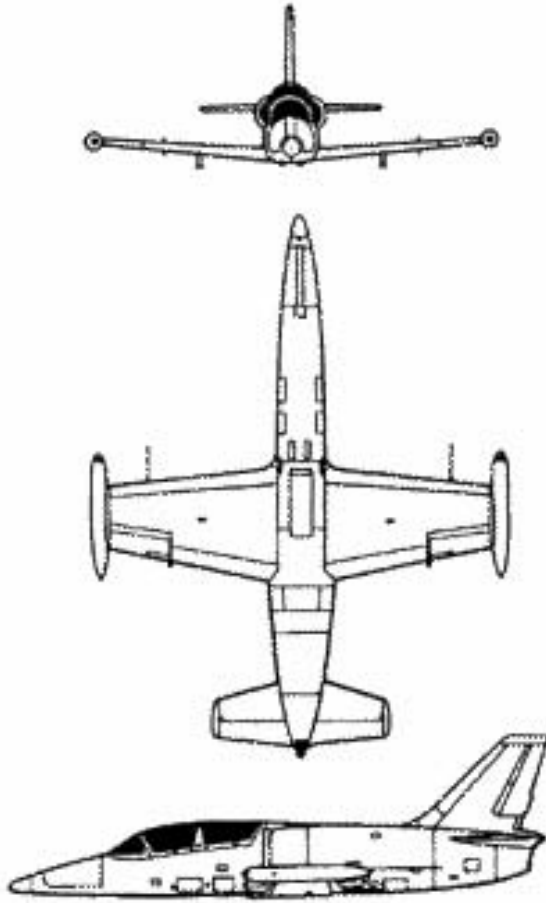
Tail----- No tail flats. Fin is swept-back and tapered with a prominent step in the leading edge.

USER COUNTRIES

Colombia, Ecuador, Israel, USA.



The Kfir (which means lion cub) is basically a redesigned Mirage 5. First flown in 1973, it is used by four countries. One redesign feature is the canard mounted on the air intake, which gives the designation of C-2 thru 7. The C stands for canard; there is no C-1.



L-39 ALBATROSS (AERO)

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.

USER COUNTRIES

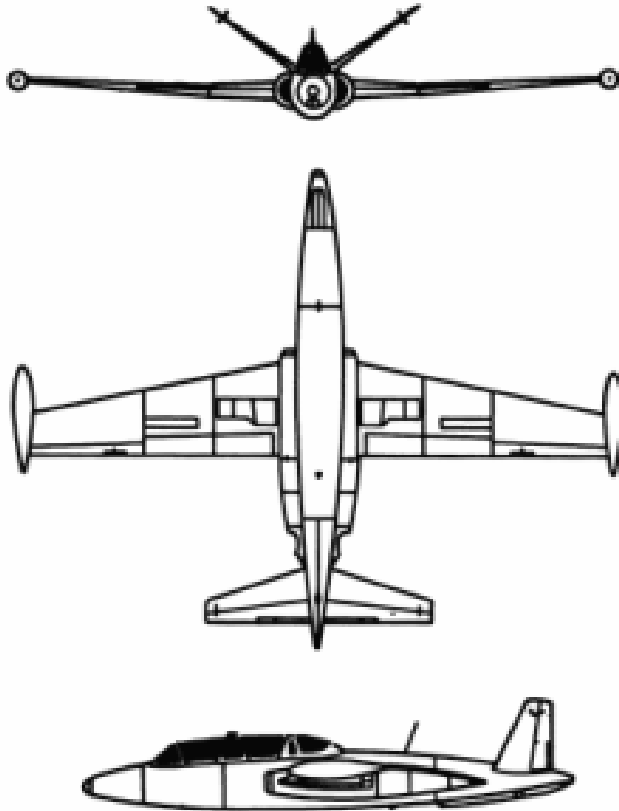
Algeria, Czech Republic, Egypt, Libya, Lithuania, Nicaragua, Nigeria, Romania, Slovakia.



The L-39 Albatross succeeds the L-29 Maya/Delfin. First flown in 1968. There have been more than 1,650 produced and is in use by 11 countries. The aircraft is the standard jet trainer for former Warsaw Pact countries.

MAGISTER CM-170 (AEROSPATIALE)

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.

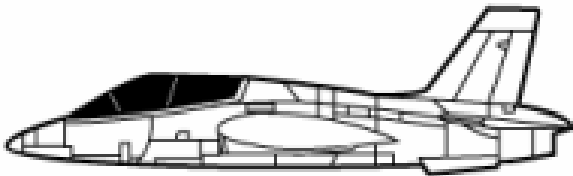
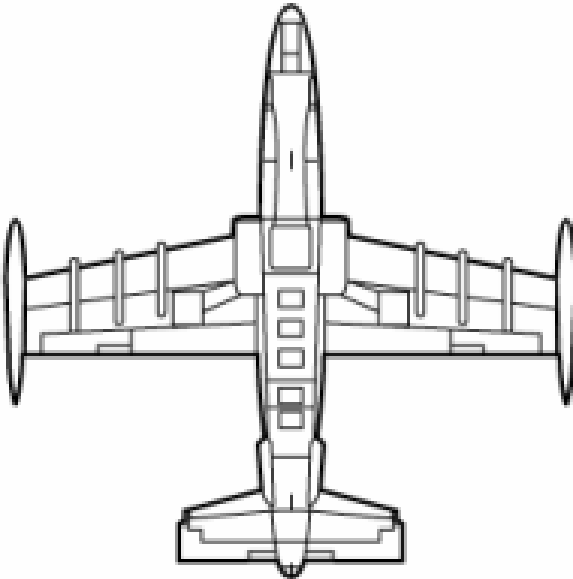
Tail----- V-shaped tail fins that also serve as tail flats, back-tapered with blunt tips.

USER COUNTRY

Belgium, Cameroon, Gabon, Libya, Morocco, Senegal, Togo.



The Magister is a two-seat basic trainer, light-attack aircraft that was first flown in 1951. It is used by seven countries. Good recognition features include a long bubble canopy and a V-tail



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 protudes 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.

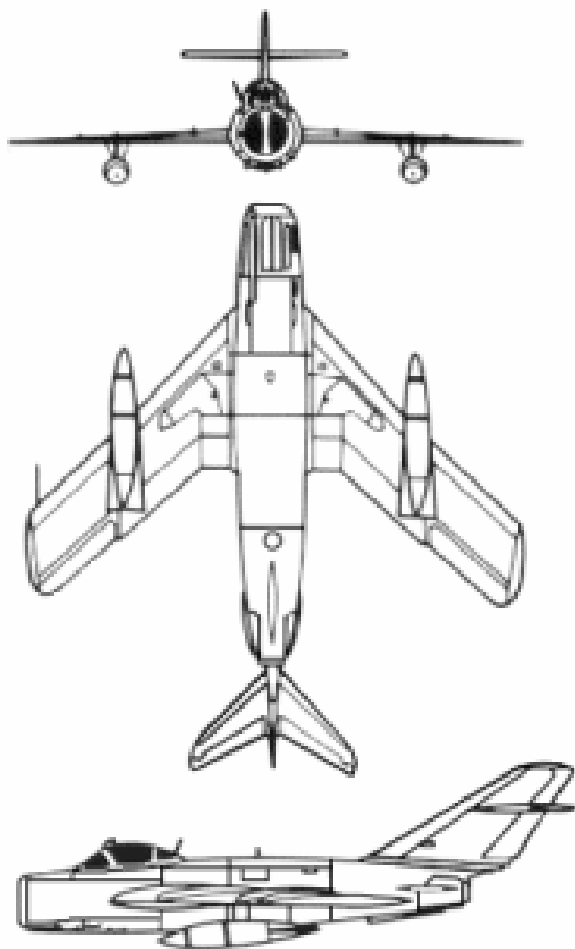
USER COUNTRY

Argentina, Ghana, Italy, Malaysia, New Zealand, Nigeria, Peru, United Arab Emirates.



The M.B. 339A, a two-seat aircraft, was first flown in 1976. 183 of them are being used by six countries. Another version, the M.B. 339K, is a single-seat aircraft.

MiG – 17 FRESCO (MIKOYAN-GUREVICH)



GENERAL DATA

Country of Origin—CIS (formerly USSR).

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..

USER COUNTRIES

Afghanistan, Albania, Algeria, Angola, Congo, Cuba, Ethiopia, Guinea Republic, Guinea-Bissau, Madagascar, Mali, Mongolia, North Korea, (J-5), North Yemen, People's Republic of China (J-5), Romania, Sri Lanka, Somalia South Yemen, Sudan, Tanzania, Vietnam.



The MiG-17 Fresco was first flown in 1950 and over 6,000 were built. It is used by 21 countries. It is very similar to the older MiG-15 Fagot. Some models of the Fresco have three 23-millimeter cannons mounted in the fuselage.

MiG – 21 FISHBED (MIKOYAN-GUREVICH)

GENERAL DATA

Country of Origin--CIS (formerly USSR).

Similar aircraft----- Fitters, all models, Mirage III/5.

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.

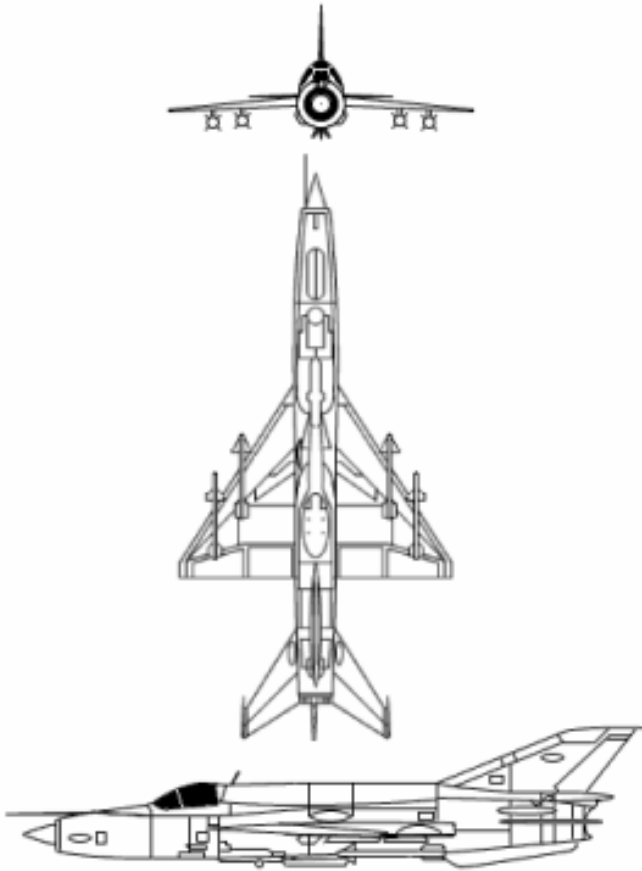
Engine(s)---One turbojet inside the body. Small round air intake in the nose. Single exhaust.

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.

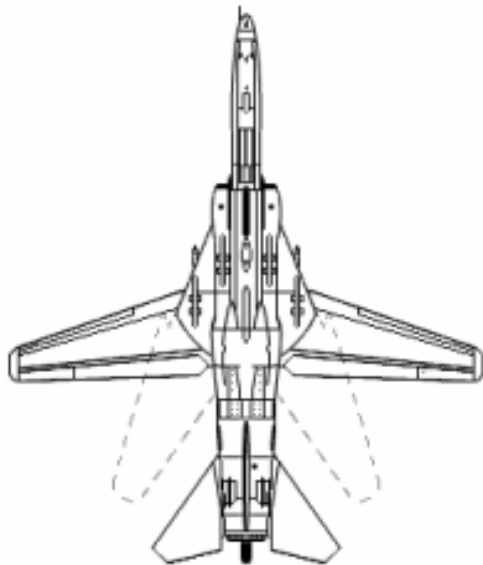
USER COUNTRIES

Afghanistan, Albania (J-7), Algeria, Angola, Azerbaijan, Bangladesh, Bulgaria, Burma, Cambodia, Congo, Croatia, Cuba, Czech Republic, Egypt, Ethiopia, Finland, Germany, Gunea Republic, Hungary, India, Iran, Kazakhstan, Laos, Libya, Madagascar, Mali, Mongolia, Mozambique, Nigeria, North Korea, North Yemen, Pakistan (J-7), People's Republic of China (J-7), Poland, Romania, Slovakia, South Yemen, Sri Lanka, Sudan, Syria, Tanzania, Vietnam, Yugoslavia, Zimbabwe.





The MiG-21 Fishbed is undoubtedly the most widely distributed combat aircraft in the world. Including all of the variants, more than 10,000 of this agile aircraft have been produced and distributed. It is used by 46 countries.



MiG – 27 FLOGGER (MIKOYAN-GUREVICH)

GENERAL DATA

Country of Origin—CIS (formerly USSR).

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.

USER COUNTRIES

Belarus, CIS, India, Kazakhstan.



The MiG-27 Flogger D/J was first flown in 1967 and over 2,000 of them were built. They are flown by four countries. The MiG-27 Flogger M, named Bahadur (Valiant), is built in India and still being manufactured today.



MiG – 29 FULCRUM (MIKOYAN-GUREVICH)

GENERAL DATA

Country of Origin—CIS (formerly USSR).

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.

Dimensions----- Length: 50 ft 10 in (15.6 m).
Span: 33 ft, 7 in (10.26 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)---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.

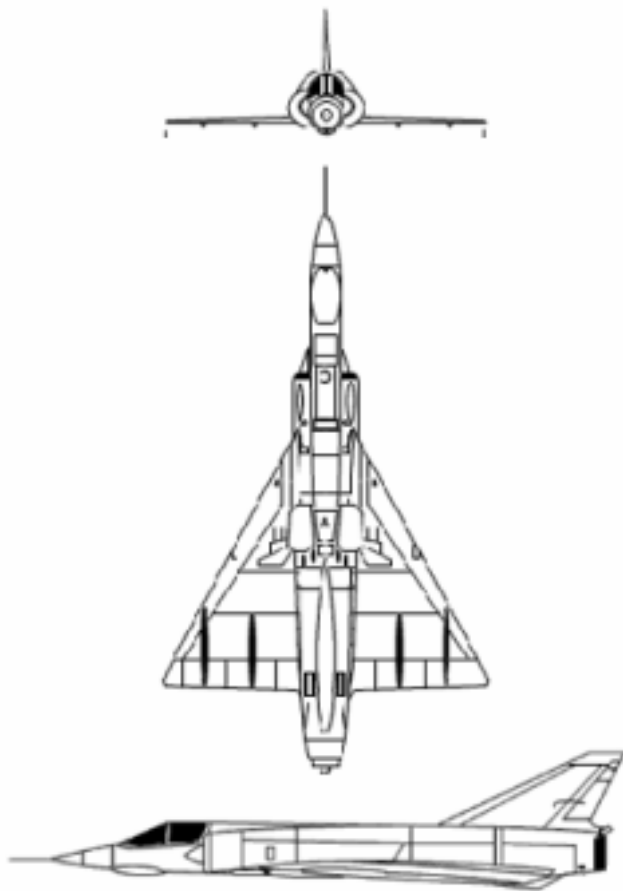
Tail----- Swept-back, tapered fin with square tip. Flats are mid-mounted on the fuselage, delta-shaped with square tips, and a slight negative slant. Two belly fins.

USER COUNTRY

Bahrain, Belgium, Denmark, Egypt, Greece, Indonesia, Israel, Netherlands, Norway, Pakistan, Portugal, Singapore, South Korea, Taiwan, Thailand, Turkey, USA, Venezuela.



First flown in 1977. Only 120 copies of this aircraft were and used by 17 countries. The deployment of the MiG-29 Fulcrum in the mid-1980s evened out the playing field with the United States.



MIRAGE III/5 (DASSAULT-BREGUET)

GENERAL DATA

Country of Origin -- France.

Similar aircraft----- Kfir, Viggen, 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). 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.

USER COUNTRY

Bahrain, Belgium, Denmark, Egypt, Greece, Indonesia, Israel, Netherlands, Norway, Pakistan, Portugal, Singapore, South Korea, Taiwan, Thailand, Turkey, USA, Venezuela.



Both the Mirage III and Mirage 5 have been built in very large numbers and are in service in 18 countries. The two airframes are basically the same, except the Mirage 5 has a longer nose.

MIRAGE FI (DASSAULT-BREGUET)

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.

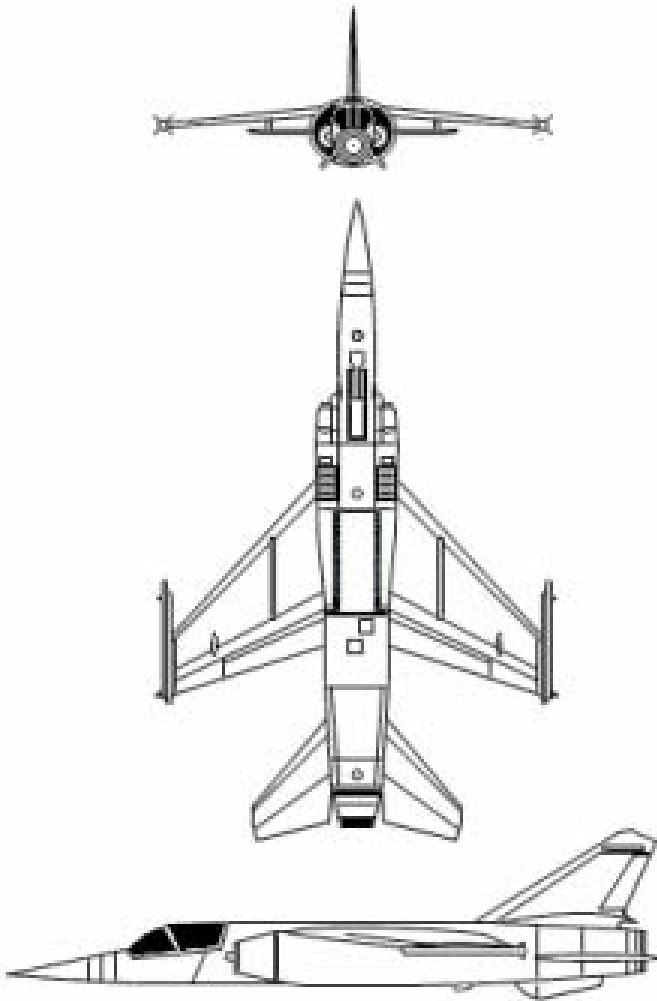
Engine(s)-- One turbojet in the body. Semicircular air intakes alongside the body forward of the wing roots. Single exhaust.

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.

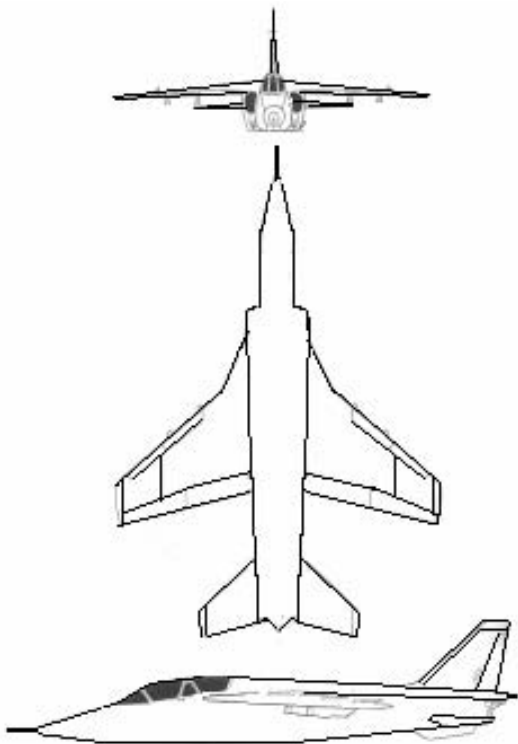
USER COUNTRY

France, Greece, Iran, Jordan, Kuwait, Libya, Morocco, Qatar, South Africa, Spain.





The Mirage F1 first flew in 1966. Before production ended in 1992 more than 700 aircraft were built and delivered. It is used by 11 countries. Among these 700 aircraft were numerous versions of a single-seat, multipurpose, attack fighter and a two-seat trainer.



ORAO, J-22 (SOKO/AVIOANE)

GENERAL DATA

Country of Origin-- USA.

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

Crew----- One; and F-16B = Two.

Role----- Multirole 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. Two belly fins.

USER COUNTRY

Bahrain, Belgium, Denmark, Egypt, Greece, Indonesia, Israel, Netherlands, Norway, Pakistan, Portugal, Singapore, South Korea, Taiwan, Thailand, Turkey, USA, Venezuela.



The J-22 Orca (Eagle) first flew in October 1983 and is used by 18 countries. The J-22 is also known as the IAR-93A in Romania.



SF.260W (SIAI-MARCHETTI)

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.

USER COUNTRY

Brunai, Burkina Faso, Burundi, Chad, Libya, Nicaragua, Philippines, Singapore, Sri Lanka, Tunisia, United Arab Emirates, Zambia.



The SF.260 was first produced in 1964, built for civilian and military users. 12 countries use this aircraft. The military version, SF.260W warrior, entered production in 1972.

Su – 7B FITTER A (SUKHOI)

GENERAL DATA

Country of Origin-----CIS (formerly USSR).

Similar Aircraft-----MiG-21 Fishbed, Su-7 Fitter.

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.

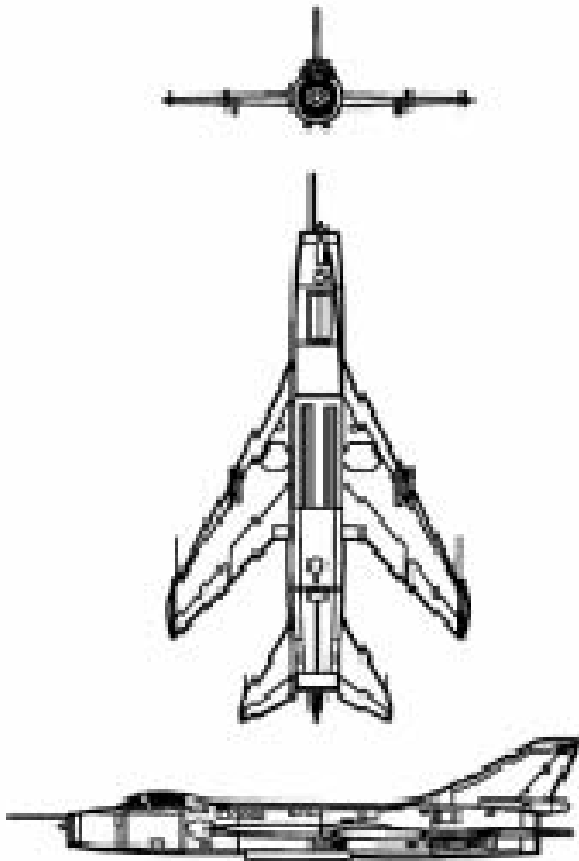
Engine(s)-----One turbojet in the fuselage. Circular air intake in the nose. Large, single exhaust.

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.

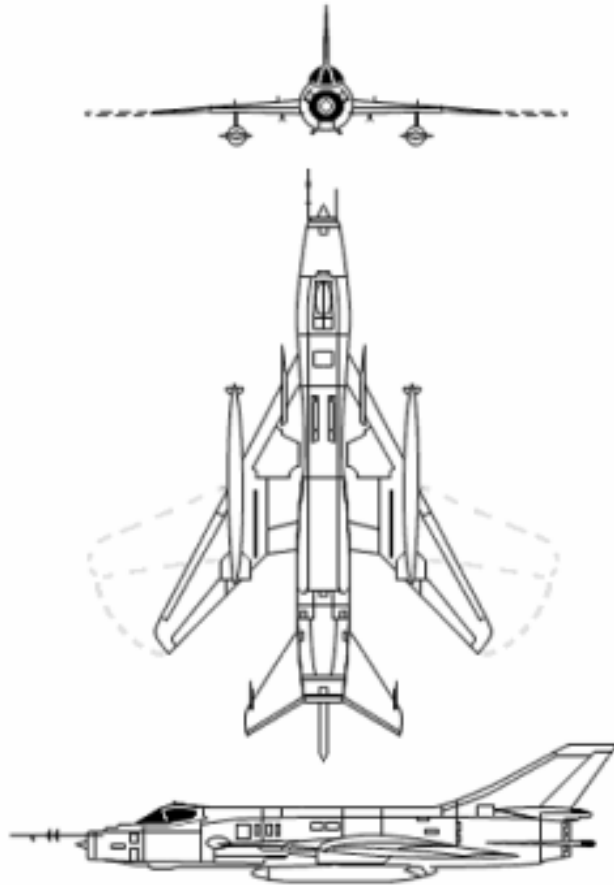
USER COUNTRIES

Afghanistan, Algeria, Azerbaijan, Belarus, Bulgaria, CIS, Czech Republic, Germany, Hungary, Iran, Libya, North Yemen, Peru, Poland, Slovakia, South Yemen, Syria, Vietnam.





The Su-7B Fitter first flew in the early 1960's and 19 countries use it. Good recognition features of the Fitter are the wide wing roots and a long, tubular body.



Su-17,20,22 Fitter (SUKHOI)

GENERAL DATA

Country of Origin----- CIS (formerly USSR).

Similar Aircraft----- MiG-21 Fishbed, Su-7 Fitter.

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. Circular air intake in the nose. 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.

USER COUNTRIES

Afghanistan, Algeria, Azerbaijan, Belarus, Bulgaria, CIS, Czech Republic, Germany, Hungary, Iran, Libya, North Yemen, Peru, Poland, Slovakia, South Yemen, Syria, Vietnam.



The Su-17 Fitter with its variable sweep wings, first flew in 1966. Over 1,000 were built and is in use by 19 countries. It was developed from the fixed-wing Su-7B. Export versions of this aircraft are designated Su-20 and -22. The export versions can be distinguished by a deeper dorsal spine.

Su-24 FENCER (SUKHOI)

GENERAL DATA

Country of Origin----- CIS (formerly USSR).

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

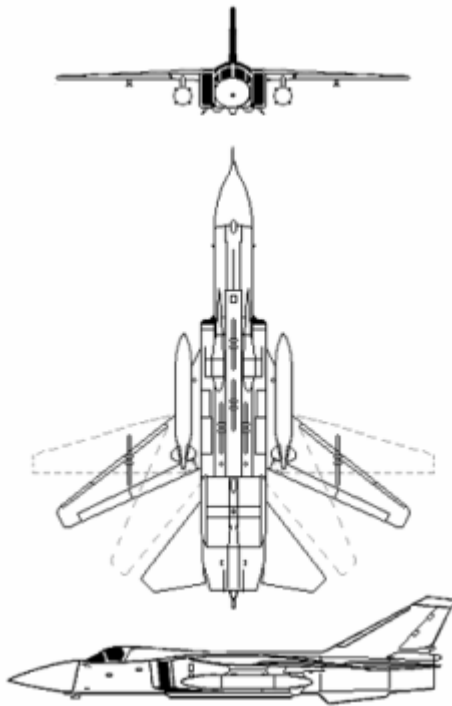
Engine(s)----Twin turbofans. Air intakes are tapered away from the body, rectangular-shaped, and mounted on the body forward of the wings' leading edges. Twin exhausts.

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

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

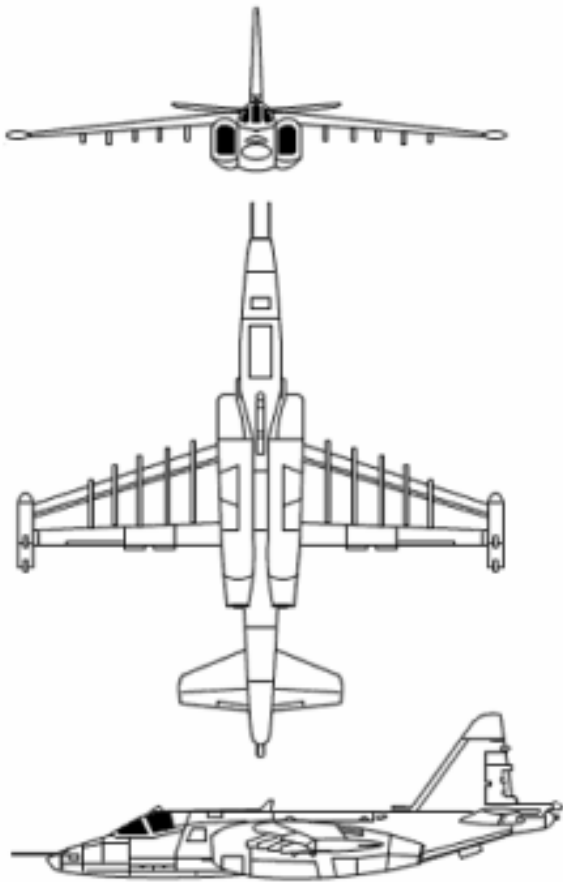
USER COUNTRIES

Azerbaijan, Belarus, CIS, Iran, Kazakhstan, Libya, Syria, Ukraine.





The Su-24 Fencer first flew in 1970. Over 900 were built and are being used by eight countries. It fills the same role and has the same basic performance as the Western-built F-111 Aardvark and Tornado strike fighters.



Su-25 FROGFOOT (SUKHOI)

GENERAL DATA

Country of Origin-----CIS (formerly USSR).

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. Semicircular air intakes forward of the wings' leading edges. Exhausts to the rear of the wings' trailing edges.

Fuselage----Long, slender, rounded nose. Body tapers to the rear 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.

USER COUNTRIES

Angola, Azerbaijan, Belarus, Bulgaria, CIS, Czech Republic, Georgia, Hungary, Iran, North Korea, Slovakia, Ukraine.



The Su-25 Frogfoot, which became a combat-proven aircraft in Afghanistan, is deployed by 13 countries as a CAS aircraft.



TORNADO IDS (AERITALIA, MDD, BAe)

GENERAL DATA

Countries of Origin-----Italy, Germany, UK.

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

USER COUNTRIES

Germany, Italy, Saudi Arabia, UK.



The Tornado first flew in 1974. 992 were built and are being used by four countries. There are currently three versions of the Tornado: the IDS which is an interdiction strike AC; the ECR, electronic combat and reconnaissance; and the ADV, air defense variant.



VIGGEN AJ-37 (SAAB)

GENERAL DATA

Country of Origin-----Sweden.

Similar Aircraft-----Kfir, Mirage III/5.

Crew----- One; trainer = Two.

Role-----Multirole, fighter.

Armament-----Cannon, gun pods, missiles, rockets, bombs.

Dimensions-----Length: 53 ft, 6 in (16.4 m).
Span: 34 ft, 9 in (10.7 m).

WEFT DESCRIPTION

Wings-----Main wings are low-mounted, delta-shaped, extending from the body midsection to the exhaust. Small, clipped delta wings forward of the main wings and high-mounted on the body.

Engine(s)---One turbofan in the body. Semicircular air intakes just forward and below the secondary wings. Large, single exhaust.

Fuselage----Short and wide with pointed, solid nose. Bubble canopy. Small belly fin.

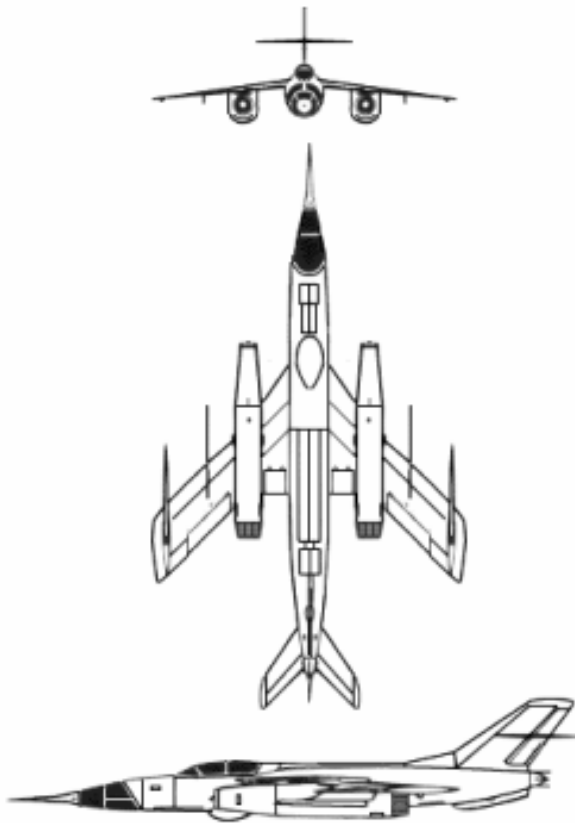
Tail----- No tail flats. Large, unequally tapered fin with a small, clipped tip.

USER COUNTRY

Sweden.



The Viggen first flew in 1971 and is operated by the Swedish Air Force. The Viggen has STOL capabilities that can operate from unprepared strips and roads.



Yak – 28 BREWER (YAKOVLEV)

GENERAL DATA

Country of Origin-----CIS (formerly USSR).

Similar Aircraft-----Il-28 Beagle.

Crew-----Two.

Role----- Fighter-bomber, reconnaissance, ECM.

Armament----- Bombs, cannons, rockets.

Dimensions-----Length: 70 ft (21.36 m).
Span: 41 ft (12.06 m).

WEFT DESCRIPTION

Wings----- High-mounted, swept-back, and untapered from the engines to the large blunt tips. Wide wing roots.

Engine(s)----Two turbojets in pods under the wings. Pods extend well beyond the wings' leading and trailing edges.

Fuselage----- Long with pointed, glazed nose and is tapered to the rear section. Bubble canopy. Belly fin under the rear section.

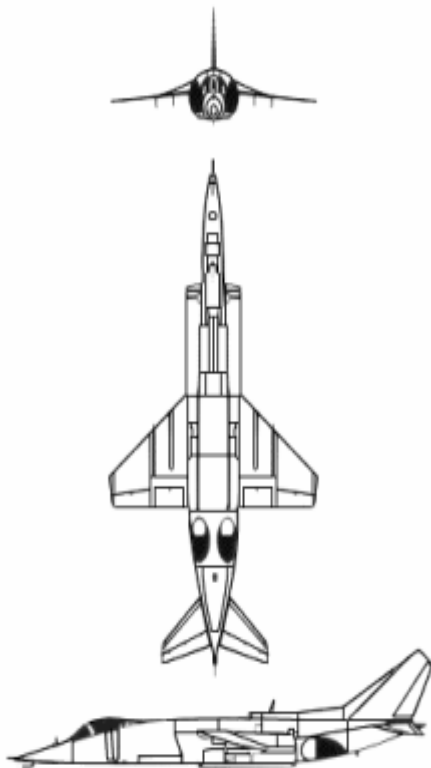
Tail----- Fin swept-back and tapered with a blunt tip. Tail flats mid-mounted on the tail fin, swept-back, and tapered with blunt tips.

USER COUNTRY

CIS, Ukraine.



The Yak-28 first entered service in the early 1960s. Today, there are four variants still in service, the Yak-28 attack version; the Yak-28P Firebar all-weather interceptor; the Yak-28R multi-sensor reconnaissance aircraft; and the Yak-28 U dual control trainer.



Yak-38 FORGER (YAKOVLEV)

GENERAL DATA

Country of Origin----- CIS (formerly USSR).

Similar Aircraft-----AV-8B Harrier II, Fantan A, Mirage F1.

Crew----- One; Forger B = Two.

Role----- VSTOL, fighter, strike, attack.

Armament-----Cannon, bombs, rockets, and missiles.

Dimensions----- Length: 52 ft, 6 in (16 m).
Span: 24 ft, 7 in (7.5 m).

WEFT DESCRIPTION

Wings-----Mid-mounted, delta-shaped with blunt tips and a negative slant.

Engine(s)----One turbo and two lift jets. Two exhausts on the bottom of the rear fuselage. Large, semicircular air intakes below the cockpit well forward of the wings.

Fuselage-----Long with pointed nose and tapered tail section. Bubble canopy.

Tail-----Swept-back and tapered tail fin with square angular tip and a small step in the leading edge. Flats are mid-mounted on the body, swept-back, and tapered with a negative slant.

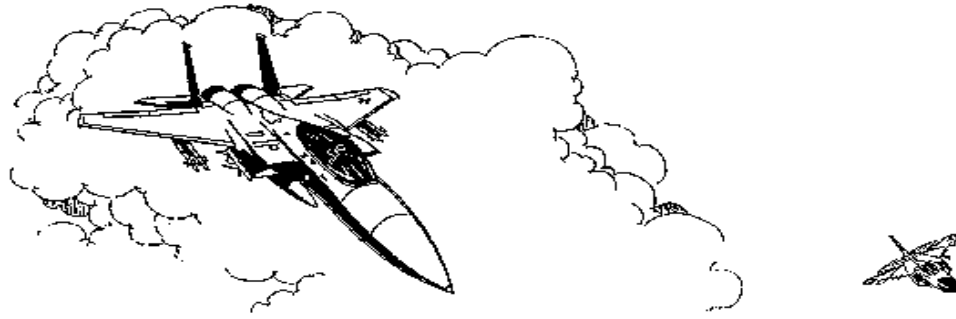
USER COUNTRY

CIS.



Production of the Yak-38 Forger began in 1975 making it the world's second operational VSTOL aircraft, after the Harrier series.

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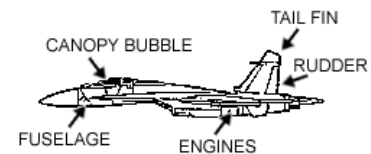
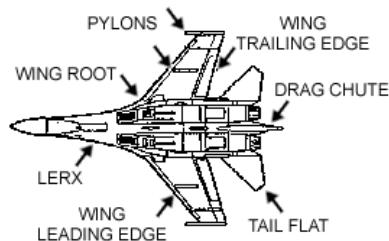
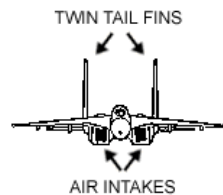


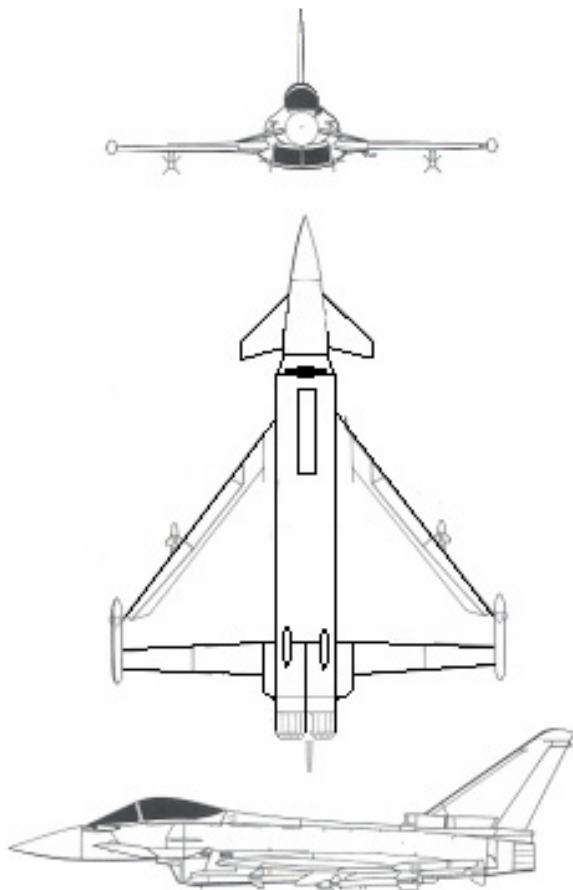
Chapter 6

Air Superiority and Interceptor Aircraft

This chapter shows examples of fighter aircraft. 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 aircraft have ground-attack capabilities. Their inclusion in this manual is for Soldier interest and to cover likely aircraft present in a theater of operation. For each aircraft, there are line drawings, general data, WEFT descriptions, user countries, photographs, and aircraft manufacturer information. Line drawings are not to scale. The following illustration shows fighter aircraft WEFT description features.

WEFT DESCRIPTION FEATURES





EURO FIGHTER TYPHOON (MULTI NATIONAL)

GENERAL DATA

Country of Origin---Germany, Italy, Spain, UK.

Similar aircraft----- A-37 VIGGEN.

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, 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.

USER COUNTRY

Germany, Italy , Spain, UK.



The EUROFIGHTER TYPHOON is the name given to a multi-role fighter that was first delivered to the air forces of the UK and Italy in June 2002. By 2010, 620 Typhoons are to be delivered.

F-14 TOMCAT (GRUMANN)

GENERAL DATA

Country of Origin-- USA.

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.

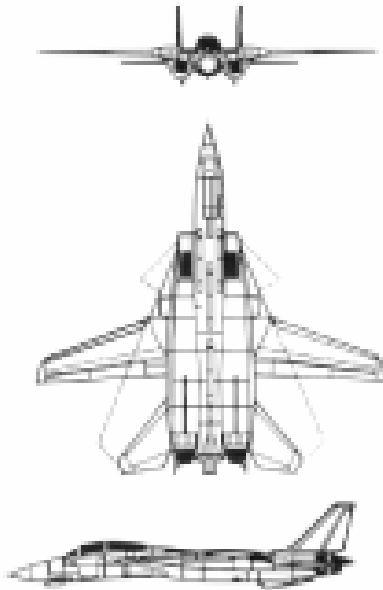
Engine(s)---Two turbofans in the fuselage. Diagonally shaped, box-like air intakes alongside the fuselage. Dual exhausts.

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.

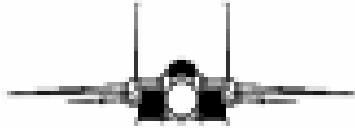
USER COUNTRIES

IRAN, USA.





The U.S. Navy's F-14 Tomcat made its maiden flight in December 1970. The F-14 replaced the Navy's aging fleet of F-4 Phantom II's. The Tomcat is an all-weather, carrier-based aircraft used by two countries.



F-15 EAGLE (McDONNELL DOUGLAS)

GENERAL DATA

Country of Origin-- USA.

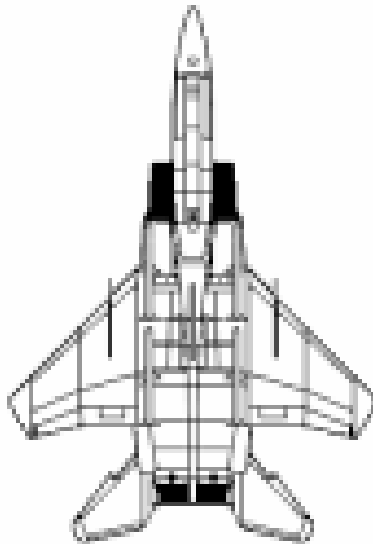
Similar aircraft----- F-14 Tomcat, Su-24 Fencer, Tornado, MiG-29 Fulcrum, Su-27 Flanker.

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, semidelta 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 sawtooth in the leading edges.



USER COUNTRY

Israel, Japan, Saudi Arabia, USA.



Since its first flight in 1972 , there have been 815 F-15 Eagles deployed in 15 countries. Both single and two-seat versions of the F-15 fill air superiority fighter and ground-attack roles. This truly formidable fighter is losing the peacetime popularity contest to the F-16 Fighting Falcon.

**F – 22 RAPTOR (LOCKHEED-MARTIN)
ATF (Advanced Tactical Fighter)**



GENERAL DATA

Country of Origin----- USA.

Similar Aircraft-----F-15 Eagle. F-14 Tomcat. Su-27 Flanker.

Crew----- One.

Role----- Stealth. Air Superiority Fighter (primary), ground-attack.

Armament----- 20mm Gatling gun. Air-to- Air missiles, JDAM.

Dimensions----- Length: 18.9m.
Span: 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, canted in, 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.

USER COUNTRY

United States.



The F-22 Raptor is the U.S. Air Force's Advanced Tactical Fighter (ATF), first flown in 1990 with 750 aircraft expected to be built. It is destined to replace the F-14 Tomcat.



GRIPEN JAS-39 (SAAB)

GENERAL DATA

Country of Origin-- Sweden.

Similar aircraft----- Viggen.

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 type, widens at air intake. Pointed nose. Bubble canopy.

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

USER COUNTRY

Sweden, South Africa.



The GRIPEN, first flew in 1988. 89 delivered in July 2000, with 250 expected to be delivered in the next 20 years. Two countries will use this aircraft.

MiG-19 FARMER (MIKOYAN-GUREVICH)

GENERAL DATA

Country of Origin—CIS (formerly USSR).

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. Wide wing roots.

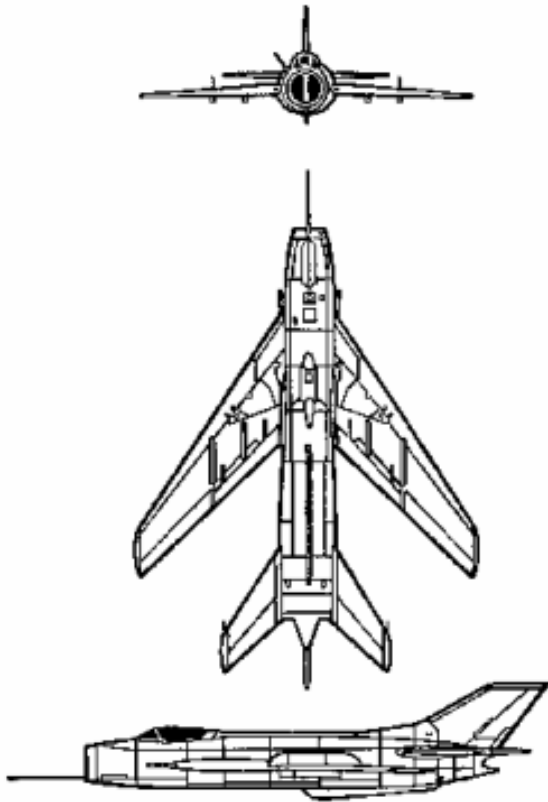
Engine(s)--Two turbojets mounted inside the body. Single, round intake in the nose. Dual exhausts.

Fuselage----Long, tube-shaped, and tapers slightly to the blunt nose and widens to the exhausts. Bubble canopy 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.

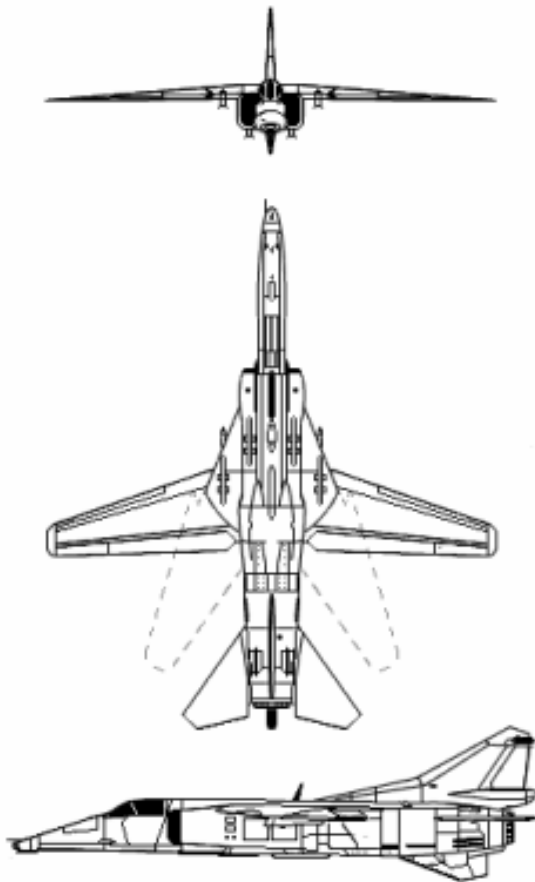
USER COUNTRIES

Albania (J-6), Bangladesh (J-6), Cambodia (F-6), Cuba, Egypt, North Korea (J-6), Pakistan (J-6), People's Republic of China (J-6), Sudan, Tanzania, Zambia.





The MiG-19 Farmer was the first supersonic fighter built in the former USSR. About 2,000 have been built and are being used by 11 countries.



MIg-23 FLOGGER (MIKOYAN-GUREVICH)

GENERAL DATA

Country of Origin—CIS (formerly USSR).

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

Crew----- One; MiG-23U and -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, and 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.

USER COUNTRIES

Afghanistan, Algeria, Angola, Belarus, Bulgaria, CIS, Cuba, Czech Republic, Germany, Ethiopia, Hungary, India, Kazakhstan, Libya, North Korea, Poland, Romania, South Yemen, Sudan, Syria, Ukraine, Vietnam



The Flogger B is a standard interceptor. The aircraft is used in Eastern Europe and the Middle East countries. Other versions of this aircraft are: C—two seater; G—improved interceptor; and E—export.

MiG – 31 FOXHOUND (MIKOYAN-GUREVICH)

GENERAL DATA

Country of Origin—CIS formerly (USSR).

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 underwing 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.

USER COUNTRY

CIS.





The MiG-31 Foxhound is a further development of the Foxbat, with wing and fuselage modifications. Foxhound has a look-down and shoot-down capability.

MIRAGE 2000 (DASSAULT-BREGUET)

GENERAL DATA

Country of Origin—France.

Similar aircraft----- Mirage III/5, Kfir, Viggen.

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.

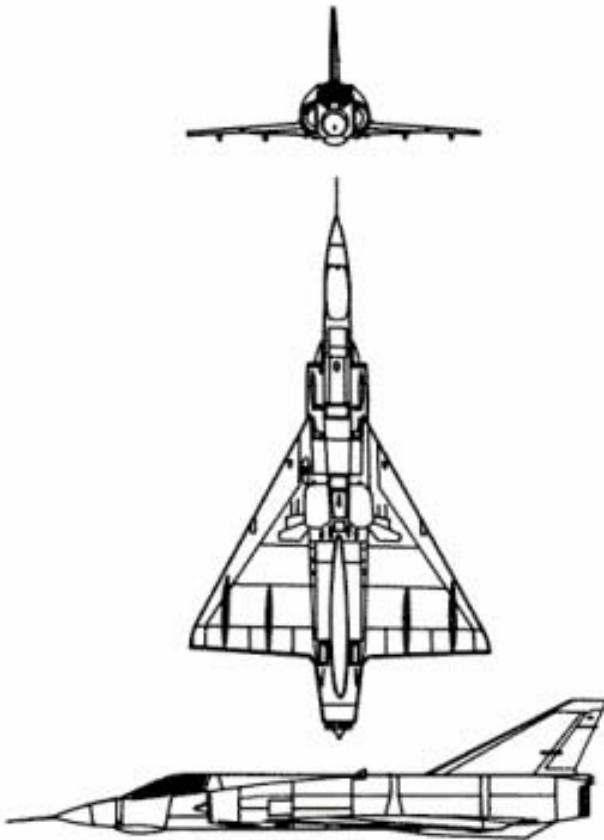
Engine(s)--One turbofan mounted in the fuselage. Semicircular air intakes alongside the fuselage forward of the wings. Large, single exhaust protrudes past the tail.

Fuselage---Tube-shaped with pointed nose and bubble canopy.

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

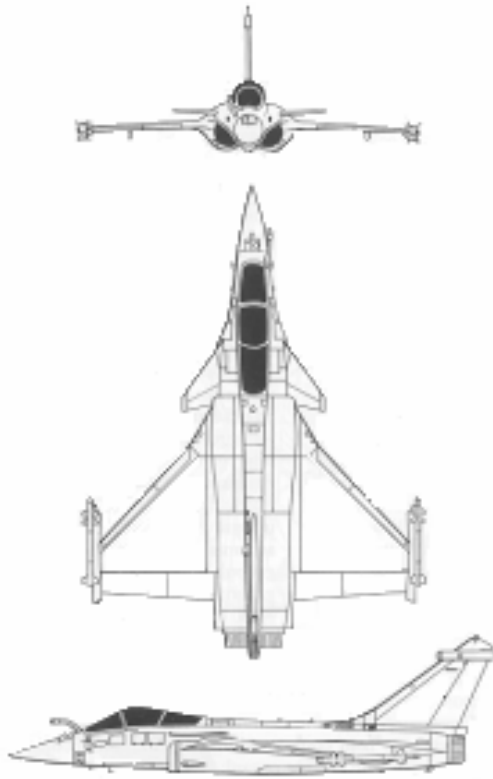
USER COUNTRIES

Egypt, France, Greece, India, Peru, Qatar, United Arab Emirates.





The Mirage 2000 is very similar to the Mirage III/5. First flown in 1979..612 were built and are being used by eight countries. There is a two-seat version of this aircraft, the 2000N (Penetration), which has nuclear standoff capability.



RAFALE (DASSAULT)

GENERAL DATA

Country of Origin—France.

Similar aircraft----- A-37 Viggen, 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 wing tips.

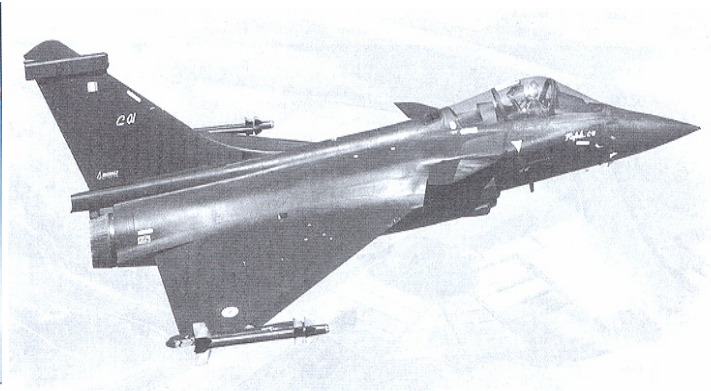
Engine(s)--Two turbofans in the fuselage. Semi-oval air intakes on either side of fuselage bottom. Dual exhaust.

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. Two belly fins.

USER COUNTRY

France.



The Rafale will eventually replace the French Jaguars, Crusaders and Super Etendards. First flew in 1998, with 61 aircraft used by France. The first French naval squad was equipped with the Rafale in September 2002.

Su-15 FLAGON (SUKHOI)

GENERAL DATA

Country of Origin—CIS (formerly USSR).

Similar aircraft----- MIG-21 Fishbed.

Crew----- One; Flagon C = Two.

Role----- Interceptor, air superiority.

Armament----- Missiles, gunpack.

Dimensions----- Length: 68 ft (20.7 m).
Span: 34 ft, 5 in (10.5 m).

WEFT DESCRIPTION

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

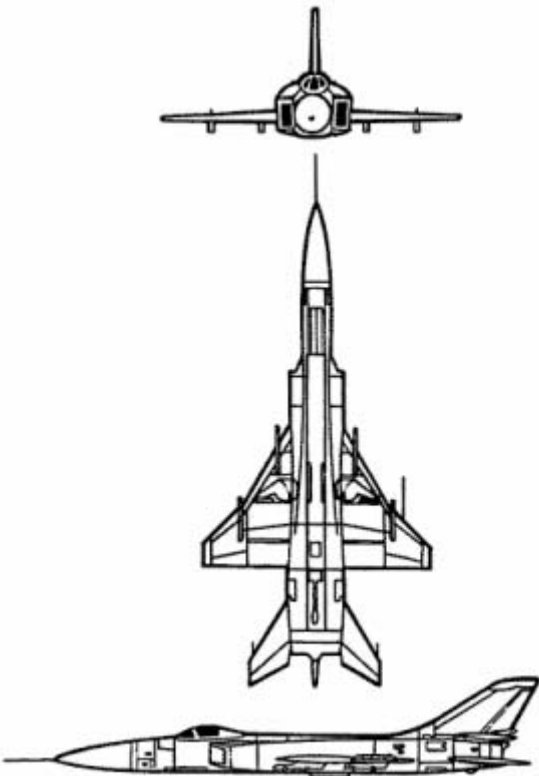
Engine(s)-----Two turbojets in the fuselage. Two exhausts.

Fuselage----- Rectangular from the air intakes to the tail. Bullet-shaped nose and a bubble canopy.

Tail----- Swept-back and, tapered fin with square tip. Flats are swept-back, tapered, and mid-mounted on the fuselage.

USER COUNTRY

CIS, Georgia, Ukraine.





The Su-15 Flagon was built and first flown in 1950. It is a very formidable aircraft and has several upgrades. This all-weather aircraft was built in large numbers. Its speed is in excess of Mach 2.4 and carries large missiles on the outboard portion of the wings.

Su-27 FLANKER (SUKHOI)

GENERAL DATA

Country of Origin—CIS (formerly USSR).

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. Semidelta with square tips.

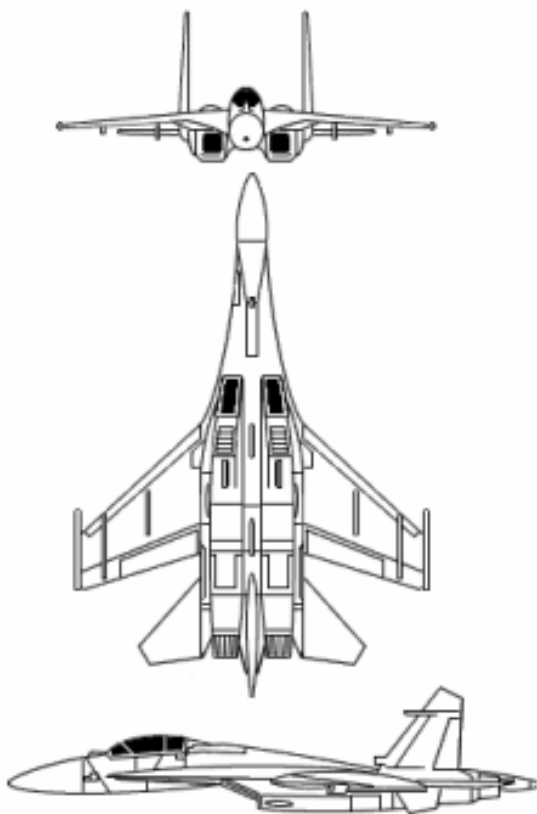
Engine(s)---Two turbojets in the fuselage. Square, diagonally-cut air intakes mounted under the wings alongside the fuselage.

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

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

USER COUNTRIES

Belarus, CIS, Germany, People's Republic of China, Ukraine.





The Su-27 Flanker first flew in 1977. 760 aircraft are to be built by 2005 and will be used by eight countries. The Su-27 is the Chinese answer to the United States' F-15 Eagle and the F-16 Fighting Falcon.



TORNADO ADV (BAe)

GENERAL DATA

Country of Origin—UK.

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

Crew----- Two.

Role----- Air Defense Variant Interceptor.

Armament----- Missiles, Cannon.

Dimensions----- Length: 59 ft 3 in (18.06 m).
Span: 45 ft, 7 in 13.9 m).

WEFT DESCRIPTION

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

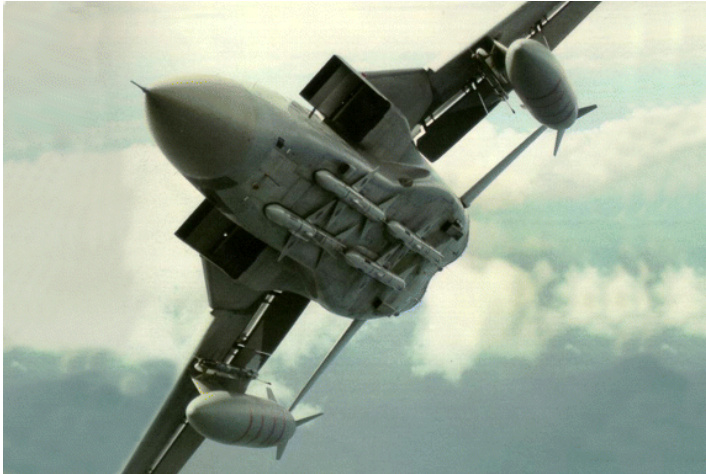
Engine(s)--- Two turbofans inside body. Air intakes diagonal and box-like alongside the fuselage forward of the wing roots. Twin exhausts.

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

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

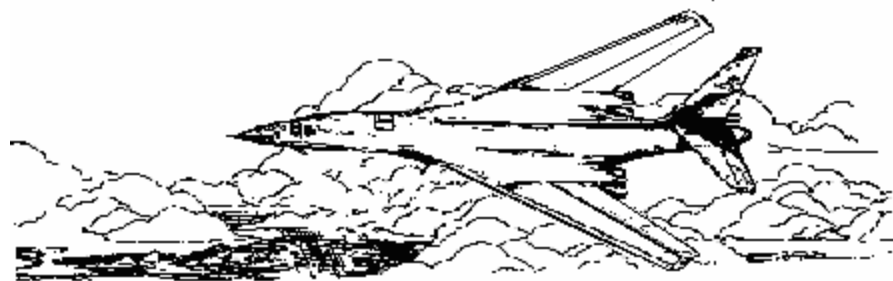
USER COUNTRY

UK, Saudi Arabia.



The Tornado ADV first flew in 1974. 992 were built and are being used by two countries. This aircraft and the Tornado IDS in Chapter 5 have basically the same airframe and differ in that the ADV has a four foot longer fuselage to accommodate air-to-air missiles and radar equipment.

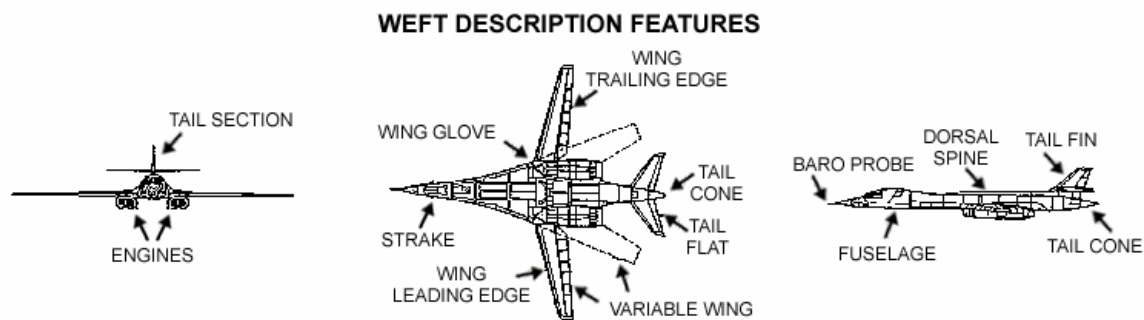
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Chapter 7

Bomber Aircraft

This chapter includes bomber aircraft used by several countries. Modern bomber aircraft can fly at low altitudes for very long distances. Armament for these lethal machines has been modernized to include air-launched cruise missiles and short-range attack missiles, in addition to a huge assortment of nuclear and non-nuclear munitions. Although these bombers normally operate at high altitudes, they may operate at low altitudes where observers will be able to detect and recognize them. For each aircraft, there are line drawings, general data, WEFT descriptions, user countries, photographs, and aircraft manufacturer information. Line drawings are not to scale. The following illustration shows bomber aircraft WEFT description features.



B-1B LANCER (ROCKWELL INTERNATIONAL)

GENERAL DATA

Country of Origin—USA.

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.

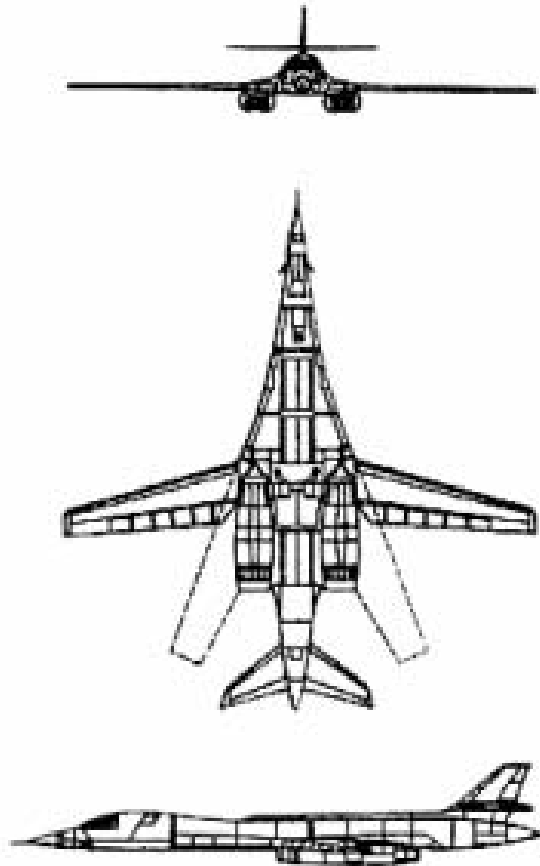
Engine(s)---Four turbofans: two side-by-side pods on each side of the fuselage square air intakes under the wings. Four exhausts.

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

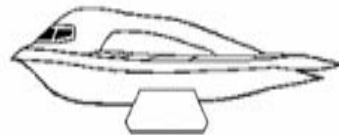
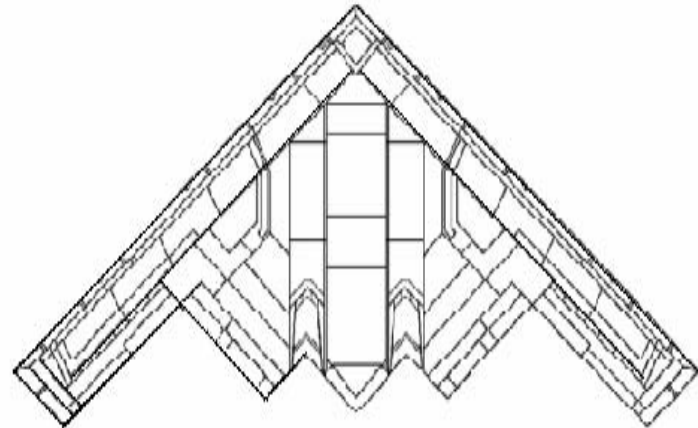
USER COUNTRY

USA.





The B-1B Lancer is a long-range, low-level, supersonic, multirole, strategic bomber. The B-1B is capable of carrying conventional and nuclear weapons in large numbers.



B-2 SPIRIT (NORTHROP)

GENERAL DATA

Country of Origin-- USA.

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 leading edges, "double-V" trailing edges and square tips.

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

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

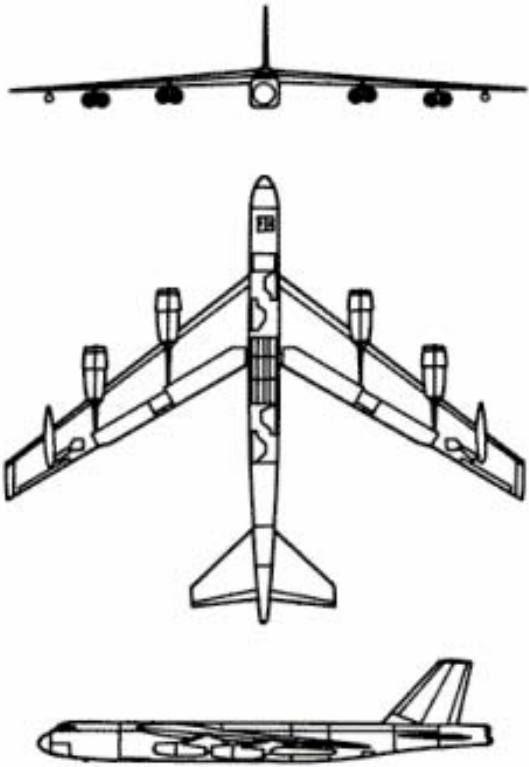
Tail-----No tail flats or fins.

USER COUNTRY

USA.



Development of the B-2 started in 1978, with a testbed since 1987. 16 B-2s were produced through 1995. Future orders for this aircraft are on hold.



B-52 STRATOFORTRESS (BOEING)

GENERAL DATA

Country of Origin—USA.

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.

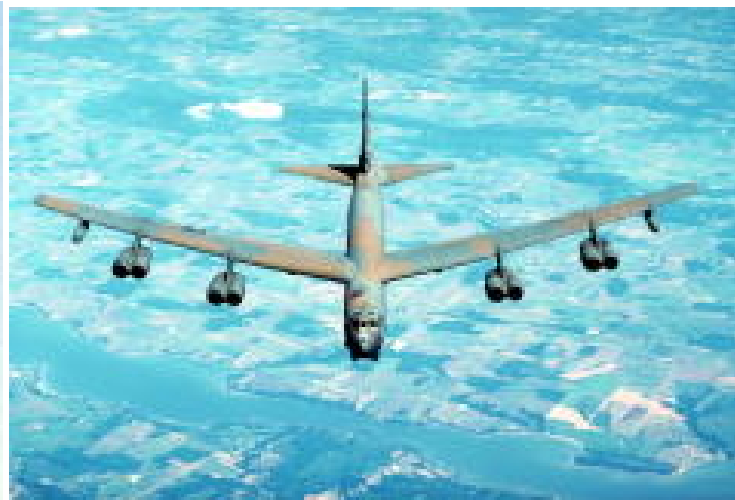
Engine(s)---Eight turbofans suspended in four pairs from pylons beneath the wings. Engines extend forward of the wings' leading edges.

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

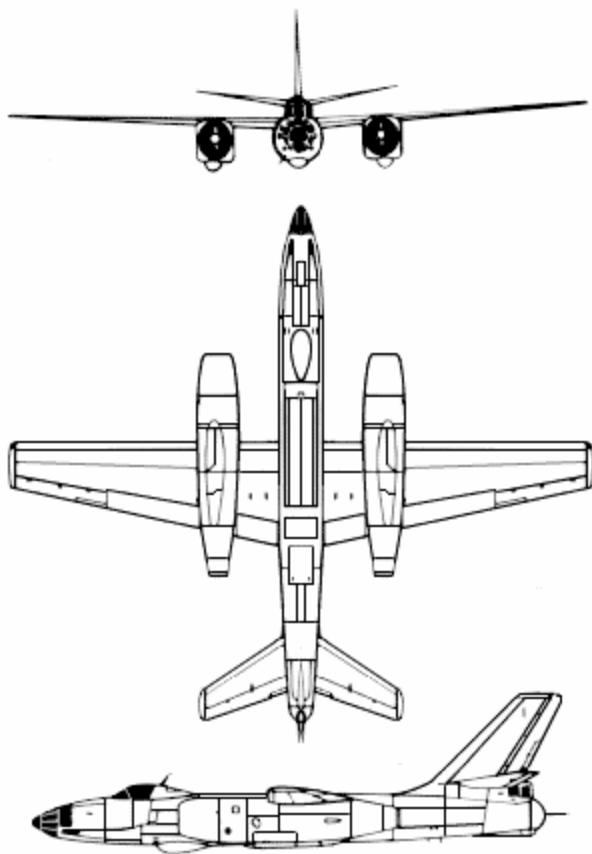
Tail-----Swept-back, and tapered fin with square tip. Flats mid-mounted on fuselage, swept-back, and tapered with blunt tips.

USER COUNTRY

USA.



Originally designed as a strategic, high-altitude nuclear bomber, the B-52 Stratofortress has undergone numerous improvements to ensure that its operational capabilities meet changing defense needs.



IL-28 BEAGLE (ILYUSHIN)

GENERAL DATA

Country of Origin-----CIS (formerly USSR).

Similar Aircraft----- Yak-28 Brewer.

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.

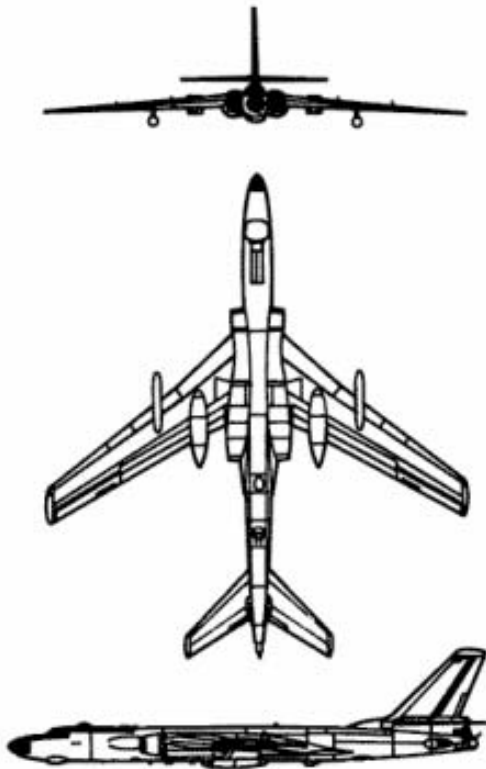
Tail-----Fin is swept-back and tapered with a blunt tip. Flats are low-mounted on the fin, swept-back, and tapered with blunt tips. A glassed-in tail gunner compartment is to the rear of the tail.

USER COUNTRIES

Egypt, North Korea (H-5), People's Republic of China (H-5).



The IL-28 Beagle first entered service in 1950 and stayed in production for many years. The IL-28 remained in service with the Soviet Air Force into the late 1980s. More than 300 Beagles are still operational, with a number of ex-Soviet allies and clients.



Tu-16 BADGER (TUPOLEV)

GENERAL DATA

Country of Origin----- CIS (formerly USSR).

Similar Aircraft-----None in this manual.

Crew----- Six.

Role----- Strategic bomber, ELINT, ECM.

Armament----- Bombs, missiles, cannon.

Dimensions-----Length: 114 ft (34.8 m).
Span: 108 ft (32.9 m).

WEFT DESCRIPTION

Wings-----Mid-mounted, swept-back, and tapered with blunt tips. Fences on top of wings. Landing gear pods extend beyond wings' trailing edges.

Engine(s)---Two turbojets mounted in wing roots extend beyond the leading and trailing edges of the wing root. Round air intakes.

Fuselage----Long, slender, and bulging where the engines are mounted and tapered to the tail. Round, glassed-in nose. Stepped cockpit.

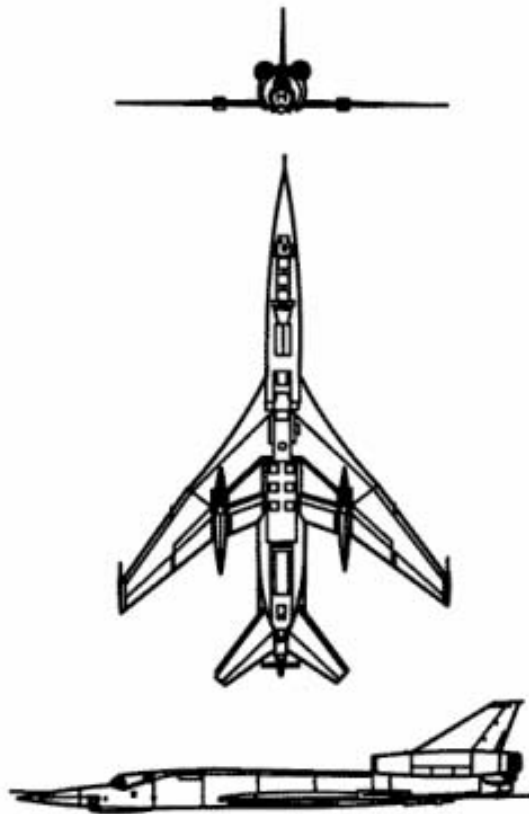
Tail-----Swept-back, tapered fin and flats with blunt tips. Flats low-mounted on the fin. Tail gunner compartment.

USER COUNTRIES

CIS, Egypt, People's Republic of China (H-6), Ukraine.



The Tu-16 Badger entered service in the mid-1950s as a bomber. It is currently operated as an ELINT gathering aircraft in the maritime role.



Tu-22 BLINDER (TUPOLEV)

GENERAL DATA

Country of Origin-----CIS (formerly USSR).

Similar Aircraft-----None in this manual.

Crew-----Three.

Role-----Bomber, reconnaissance, ELINT.

Armament-----Bomber, missiles, cannon.

Dimensions-----Length: 133 ft (40.5 m).
Span: 91 ft (27.75 m).

WEFT DESCRIPTION

Wings-----Low-mounted, swept-back, and tapered with square tips. Wide wing root. Landing gear pods extend beyond wings' trailing edges.

Engine(s)--Two turbojets low-mounted on the tail fin. Round air intakes.

Fuselage---Tube-shaped with solid, pointed nose. Stepped cockpit.

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

USER COUNTRIES

CIS, Libya, Ukraine.



The Blinder has an unusual military design with two large turbofan engines mounted above the fuselage and sharply swept-back wings. The Tu-22 was first flown in 1960.



Tu-26 BACKFIRE (TUPOLEV)

GENERAL DATA

Country of Origin----- CIS (formerly USSR).

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 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.

USER COUNTRIES

CIS, Ukraine.



There are some 360 Tu-26 Backfires currently in service. At the SALT-2 treaty talks, this variable-wing, medium bomber was referred to as the Tu-22M.

Tu-95 BEAR (TUPOLEV)

GENERAL DATA

Country of Origin-----CIS (formerly USSR).

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.

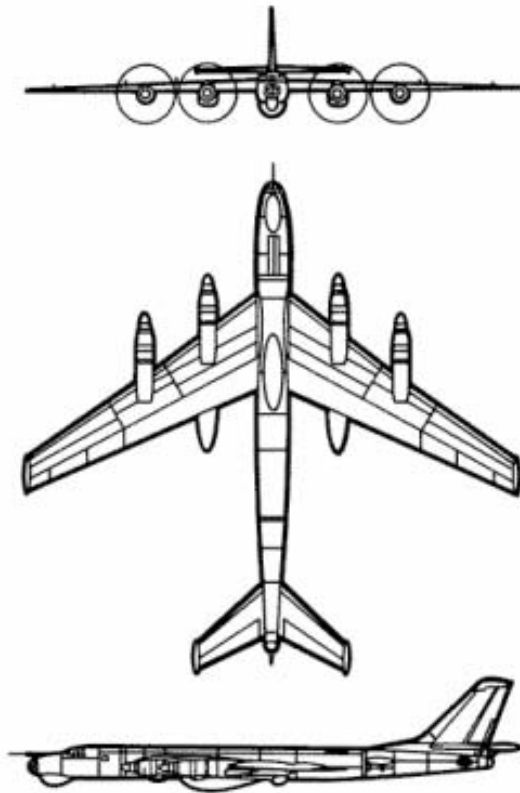
Engine(s)--- Four turboprops with contrarotating propellers located on the wings. Engine nacelles extend well beyond the wings' leading edges.

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.

USER COUNTRIES

CIS, India (Bear F), Ukraine.





The Bear is a propeller-driven aircraft. It carries a large amount of ordnance (to include cruise missiles) and its mission is strategic. For recognition purposes, the Bear is unique in that it has swept wings, but has contrarotating propellers.



Tu-160 BLACKJACK (TUPOLEV)

GENERAL DATA

Country of Origin----- CIS (formerly USSR).

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.

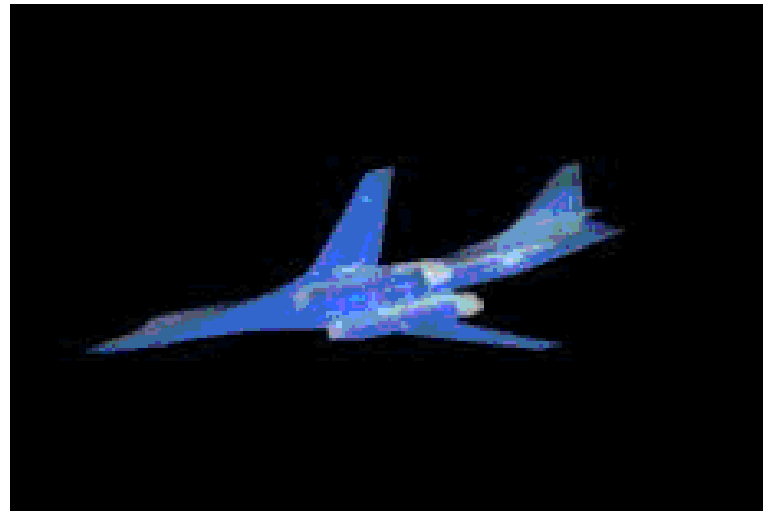
Engine(s)---Four turbofans mounted in pairs under the fixed-center section. Square intakes. Exhausts extend behind the wings' trailing edges.

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.

USER COUNTRY

CIS.



The Tu-160 Blackjack is a long-range strategic bomber that first entered service with the CIS air force in 1988. It is believed that there are 60 Blackjacks currently in service.

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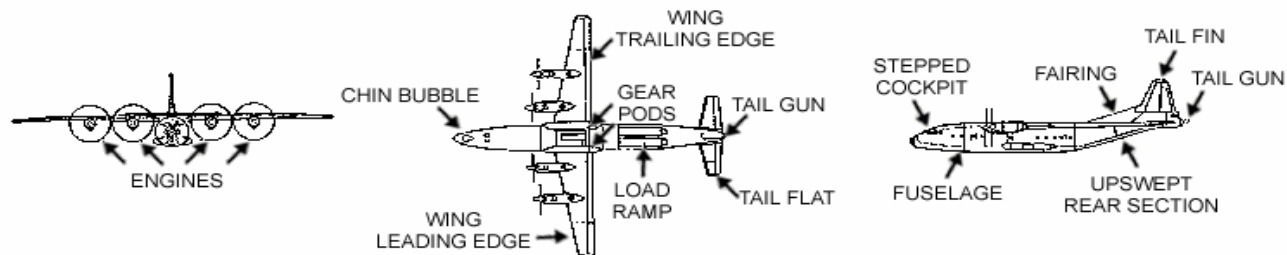


Chapter 8

Cargo and Transport Aircraft

This chapter 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. Modern cargo and transport aircraft are manufactured with high-mounted straight wings which allow greater lift and better control at low speeds and altitudes. For each aircraft, there are line drawings, general data, WEFT descriptions, user countries, photographs, and aircraft manufacturer information. Line drawings are not to scale. The following illustration shows cargo and transport aircraft WEFT description features.

WEFT DESCRIPTION FEATURES



An-12 CUB (ANTONOV)

GENERAL DATA

Country of Origin-----CIS (formerly USSR).

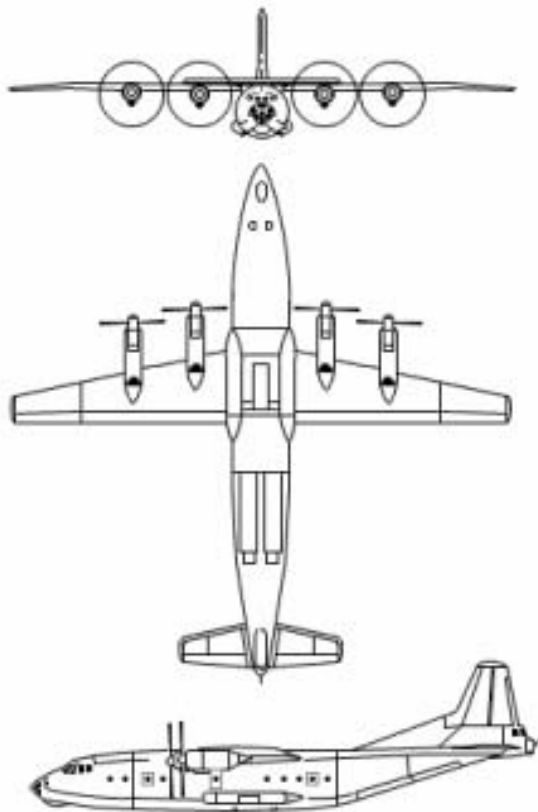
Similar Aircraft-----C-130 Hercules, C-160 Transall, G.222.

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.

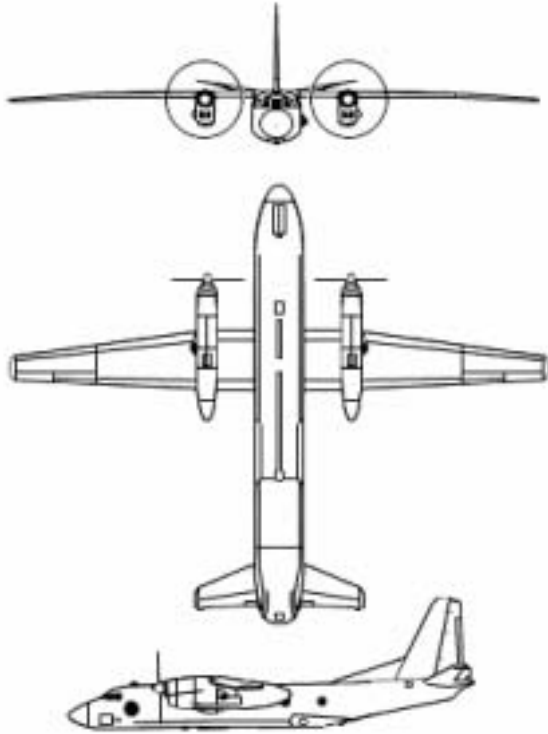
USER COUNTRIES

Angola, Afghanistan, Bulgaria, CIS, Czech Republic, Egypt, Ethiopia, India, People's Republic of China (Y-12), Poland, Slovakia, South Yemen, Sri Lanka, Syria (Y-12), Yugoslavia.



Over 900 An-12 Cubs were built before production ended in 1973. Large numbers of the Cub are still in service with the CIS air force.

An-24 COKE, An-26 CURL (ANTONOV)



GENERAL DATA

Country of Origin----CIS (formerly USSR).

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.

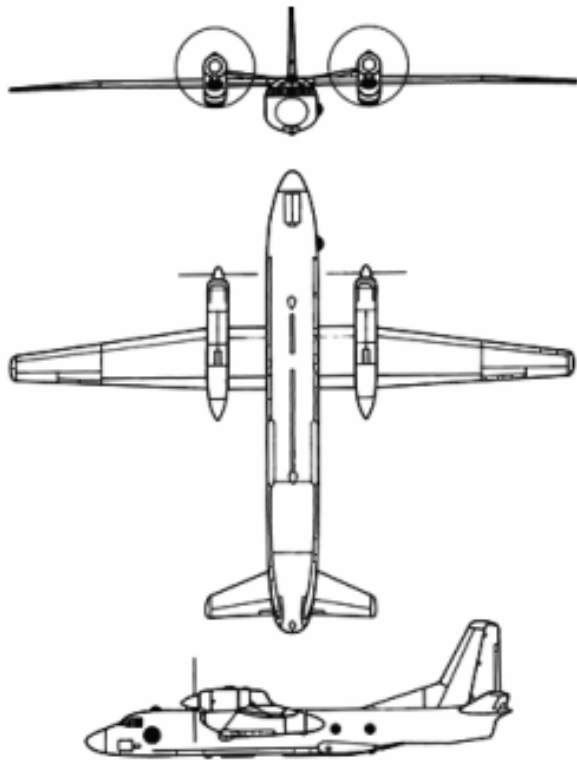
Tail-----Fin is back-tapered with a blunt tip and angular fairing. Flats are high-mounted on the body, back-tapered with blunt tips, and have a positive slant.

USER COUNTRIES

Afghanistan, Angola, Bangladesh, Benin, Bulgaria, Cambodia, Cape Verde, Congo, CIS, Cuba, Czech Republic, Ethiopia, Germany, Hungary, Laos, Libya, Madagascar, Mali, Mongolia, Mozambique, Nicaragua, North Korea, People's Republic of China (Y-7), Poland, Romania, Slovakia, Somalia, South Yemen, Syria, Vietnam, Yugoslavia, Zambia.



The An-24 Coke first entered service in 1962. More than 1,100 of this versatile transport aircraft were built before production ended in 1978. The Coke's replacement, the An-26 Curl, has many of the same WEFT features as the Coke.



An-32 CLINE (ANTONOV)

GENERAL DATA

Country of Origin-----CIS (formerly USSR).

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 and 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.

USER COUNTRIES

CIS, Cuba, India, Mongolia, Peru.



The An-32 Cline is a direct development of the An-24 Coke. Major recognition differences of the Cline are the engines mounted over the wings, and a large belly fin beneath the tail section.

An-72 COALER (ANTONOV)

GENERAL DATA

Country of Origin----- CIS (formerly USSR).

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.

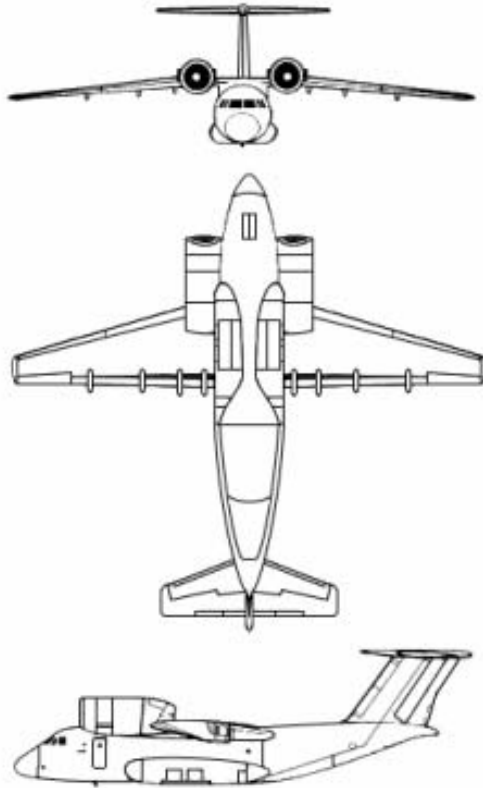
Engine(s)--- Two turbofans in long pods mounted on top of the wings. Round air intakes extend from the front of the wings' leading edges.

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.

USER COUNTRY

CIS.





The An-72 Coaler is designed as a short takeoff and landing aircraft which can operate from unprepared airfields.

An-124 CONDOR (ANTONOV)



GENERAL DATA

Country of Origin-----CIS (formerly USSR).

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.

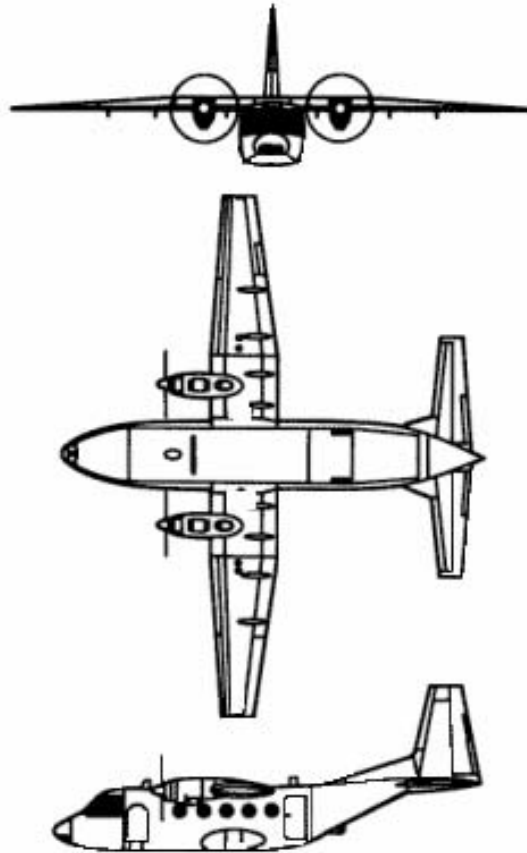
Tail-----Fin swept-back and tapered with rounded tips. Flats swept-back, tapered, and mid-mounted on the body.

USER COUNTRY

CIS.



The Condor is one of the largest military cargo aircraft in the world. It is larger than the C-5B Galaxy, but smaller than the An-225 Mriya (NATO named Cossack) that carries the space shuttle.



AVIOCAR C-212 (CASA)

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 midwing 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.

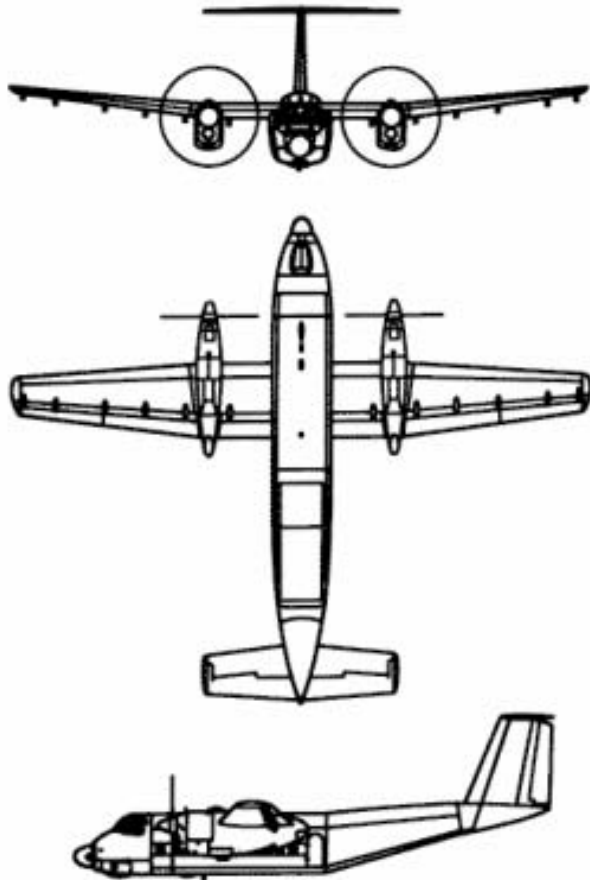
Tail-----Fin is equally tapered with a square tip. Straight fairing in the leading edge. Flats are mid-mounted on the body and tapered with square tips.

USER COUNTRIES

Angola, Chad, Equatorial New Guinea, Ghana, Mexico, Nicaragua, Panama, Paraguay, Portugal, Saudi Arabia, Somalia, South Africa, Spain, Sudan, Venezuela.



This STOL utility transport is used for both military and civilian purposes. More than 300 Aviocars have been built and exported. Series 200 has replaced Series 100.



BUFFALO, C-8A (DE HAVILLAND CANADA)

GENERAL DATA

Country of Origin-----Canada (DHC-5, CC-115).

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 is slightly swept-back and tapered with square tip. Flats are equally tapered with blunt tips and high-mounted on the fin forming a T.

USER COUNTRIES

Abu Dhabi, Brazil, Cameroon, Canada, Ecuador, Egypt, Ethiopia, Honduras, Kenya, Mauritania, Mexico, Oman, Peru, Sudan, Tanzania, Togo, United Arab Emirates, USA, Zaire, Zambia



The Buffalo was originally named the Caribou II. Note the T tail, engines, and wing shape when distinguishing the Buffalo from the Caribou.

C-5 GALAXY (LOCKHEED)

GENERAL DATA

Country of Origin----- USA.

Similar Aircraft-----C-17A Globemaster III, C-141 Starlifter, 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.

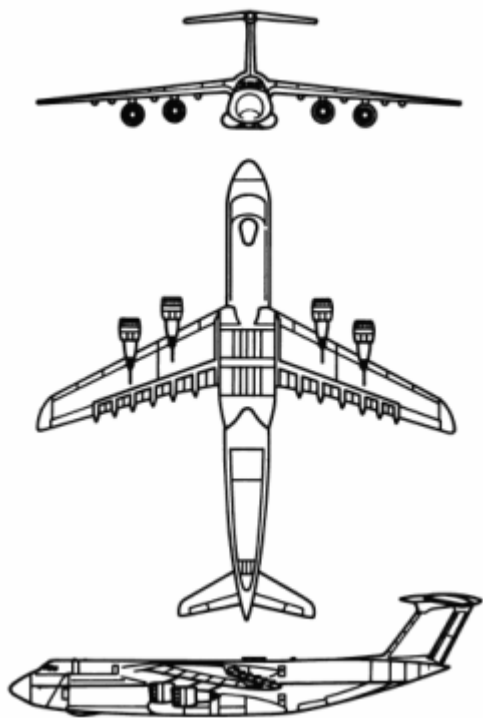
Engine(s)--Four turbofans, suspended on pylons, and extending forward of the wings' leading edges. Round air intakes.

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.

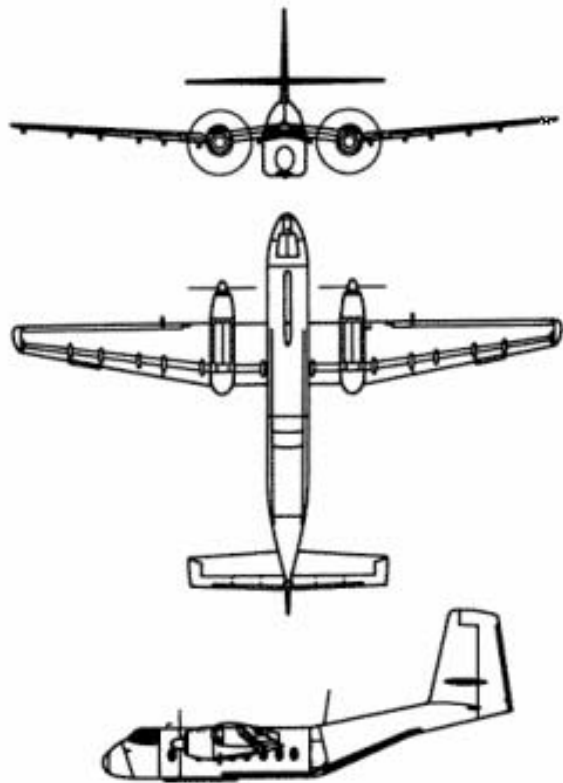
USER COUNTRY

USA.





The C-5 Galaxy is one of the world's largest military transports. The aircraft was first flown in 1968 and entered service as the C-5A in 1970. The current production model is the C-5B.



CARIBOU, C-7A (DE HAVILLAND CANADA)

GENERAL DATA

Country of Origin----Canada (DHC-4A, CC-108).

Similar Aircraft----- Buffalo C-8A, DHC-5.

Crew-----Three.

Role----- STOL utility transport (32 equipped troops, 1/4-ton trucks).

Armament----- Usually none.

Dimensions-----Length: 72 ft, 7 in (22.14 m)
Span: 95 ft, 2 in (29.16 m).

WEFT DESCRIPTION

Wings----- High-mounted with straight leading edge and forward-tapered trailing edge from engines to the blunt tips.

Engine(s)--Two piston engines mounted in wings' leading edges. Engine nacelles extend beyond leading edges.

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

Tail-----Flats mid- to low-mounted on tail fin and tapered with blunt tips. Large fin tapered with blunt tip.

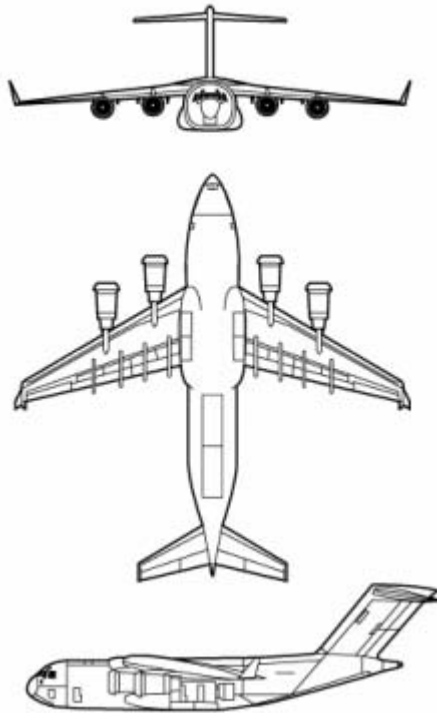
USER COUNTRIES

Ecuador, India, Malaysia, Spain, Thailand, USA.



The Caribou was first flown in 1958 as the DHC-4A. The US Army acquired 159 CV-2, designated Caribous, which later transferred to the US Air Force and were redesignated C-7A.

C-17A GLOBEMASTER III (McDONNELL DOUGLAS)



GENERAL DATA

Country of Origin-----USA.

Similar Aircraft-----C-5 Galaxy, Il-76 Candid, C-141B Starlifter.

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, negative slant. Winglets at wing tips.

Engine(s)-- Four turbofans mounted on pylons under wings. Round intakes.

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

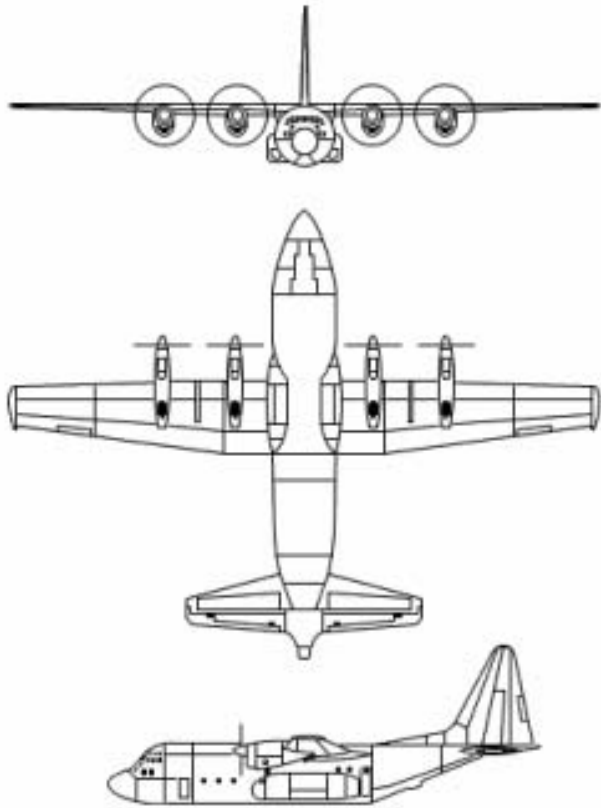
Tail----- Fin swept-back and untapered. Flats swept-back, tapered, mounted high on fin forming a "T".

USER COUNTRIES

USA.



The C-17A Globemaster III is a heavy-lift cargo and troop transport plane that can accommodate three Apache helicopters with straight-in-loading.



C-130 HERCULES (LOCKHEED)

GENERAL DATA

Country of Origin--USA.

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, 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.

USER COUNTRIES

Algeria, Argentina, Australia, Belgium, Bolivia, Brazil, Cameroon, Canada, Chile, Colombia, Denmark, Ecuador, Egypt, France, Greece, Honduras, Indonesia, Iran, Israel, Italy, Japan, Jordan, Libya, Malaysia, Mexico, Morocco, New Zealand, Niger, Nigeria, Yemen, Norway, Oman, Pakistan, Peru, Philippines, Portugal, Saudi Arabia, Singapore, Africa, Korea, Spain, Sudan, Sweden, Taiwan, Thailand, Turkey, UAE, UK, USA, Venezuela, Vietnam, Zaire.



First produced in 1955, there have been more than 70 models and variants of the C-130 Hercules built. Enjoying one of the most successful stories in aviation history, the 2,100th C-130 was delivered in mid-1995.

C-141 STARLIFTER (LOCKHEED)

GENERAL DATA

Country of Ori----- USA.

Similar Aircraft-----Candid, C-5A Galaxy, C-17A Globemaster III.

Crew-----Four.

Role-----Transport, cargo (154 equipped troops, tactical vehicles, and weapons).

Armament-----Usually none.

Dimensions----- Length: 168 ft, 4 in (51.30 m).
Span: 160 ft (48.76 m).

WEFT DESCRIPTION

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

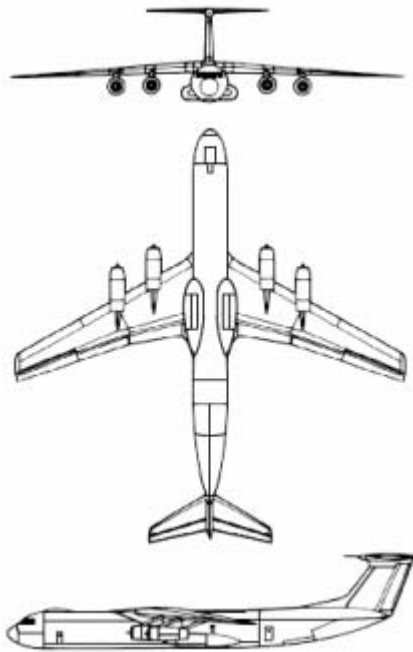
Engine(s)---Four turbofans suspended from pylons under the wings. Engines extend forward of the wings' leading edges.

Fuselage-----Cigar-shaped and tapered to the rear. Solid, rounded nose and flush cockpit. Landing gear bulges at lower midsection.

Tail-----Swept-back and tapered flats mounted high on a swept-back and tapered tail fin forming a T. Small fairing in leading edge of the fin.

USER COUNTRY

USA.





The C-141 Starlifter became operational with the US Air Force in April 1965. Production ended three years later with a total of 284 C-141s. All surviving Starlifters have since been upgraded to the C-141B standard, with an extended fuselage.

C-160 TRANSALL (AEROSPATIALE, MBB)

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.

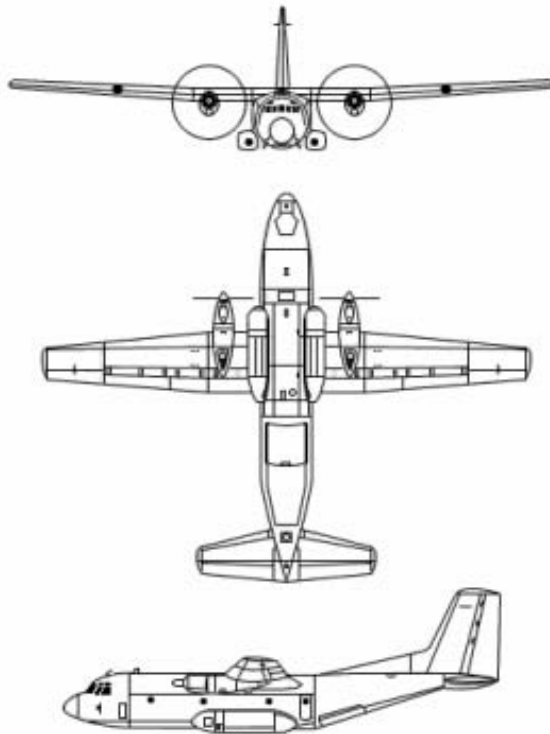
Engine(s)---Two turboprops mounted under and extend beyond wings' leading edges.

Fuselage---Long, thick, and tapered to the rear with round, 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.

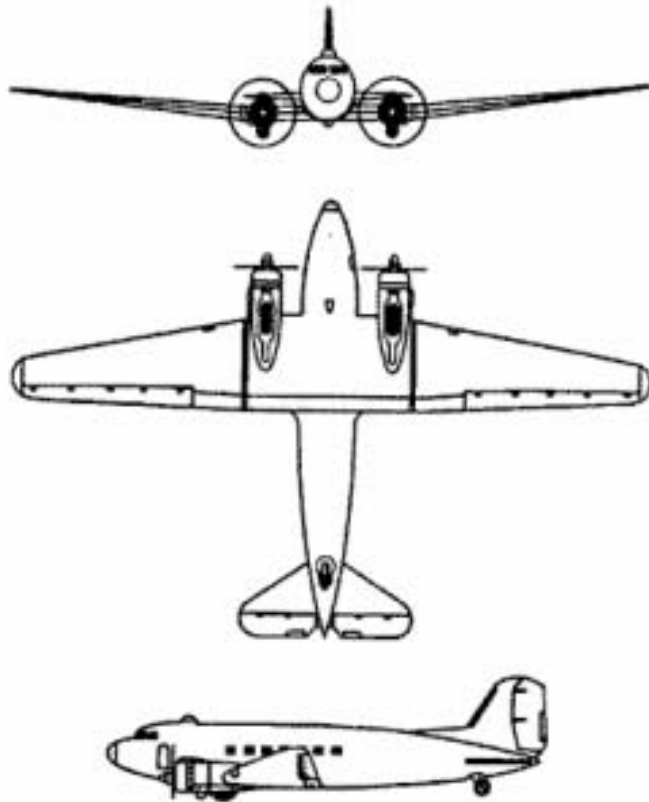
USER COUNTRIES

France, Germany, South Africa, Turkey.





The Transall C-160 first flew in 1963. Production was completed in 1972, however; in 1977 the program was reinstated to produce a “new generation” C-160 for France. The last of these new generation aircraft entered service in 1987.



DC-3 DAKOTA (DOUGLAS)

GENERAL DATA

Country of Origin---- USA.

Similar Aircraft-----I1-14 Crate.

Crew-----Five.

Role----- Medium-transport, cargo (35 equipped troops).

Armament----- Usually none except modified gunship.

Dimensions-----Length: 64 ft, 5 in (19.63 m).
Span: 95 ft (28.96 m).

WEFT DESCRIPTION

Wings----- Low-mounted with unequally tapered leading and trailing edge. Has rounded tips and positive slant.

Engine(s)--Two piston engines mounted in the wing's leading edges. There are also turboprop versions.

Fuselage----Club-shaped and tapered to the rear. Solid, round nose and a stepped cockpit.

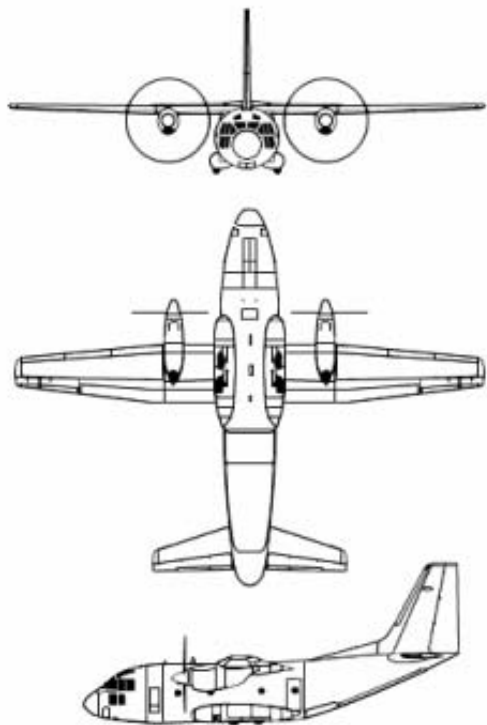
Tail-----Fin tapered with a rounded tip. Flats are mid-mounted on the body, with round tips.

USER COUNTRIES

Angola, Argentina, Bolivia, Burkina Faso, Burundi, Central Africa Republic, Chad, Colombia, Congo, Dominican Republic, El Salvador, Greece, Guatemala, Haiti, Indonesia, Israel, Japan, Mexico, Mozambique, Papua New Guinea, Paraguay, Rwanda, South Africa, Taiwan, Thailand, Turkey, Venezuela, Zambia.



The DC-3 was first flown in 1935. About 13,000 of these aircraft were built, including approximately 2,000 built in Russia and Japan. More than 700 are still in use worldwide.



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.

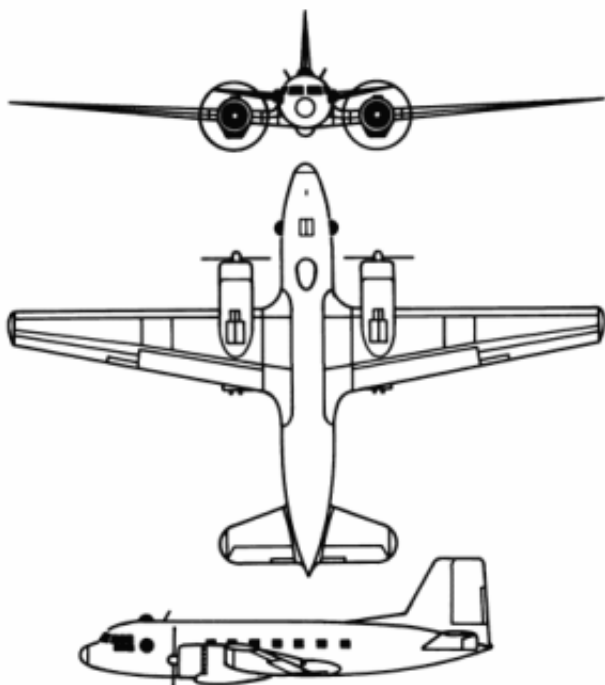
Tail-----Flats high-mounted on fuselage. Tapered leading edges with blunt tips. Fin is tall and back-tapered with a blunt tip and fairing in the leading edge.

USER COUNTRIES

Italy, Libya, Somalia, United Arab Emirates, Nigeria, Venezuela.



The first production G.222 flew in 1975. Production of the G.222 continued into the early 1990s with several of the aircraft being built.



IL-14 CRATE (ILYUSHIN)

GENERAL DATA

Country of Origin-----CIS (formerly USSR).

Similar Aircraft-----DC-3 Dakota.

Crew-----Five.

Role-----Medium-transport, cargo (five equipped troops).

Armament----- Usually none.

Dimensions-----Length: 73 ft, 2 in (22.3 m).
Span: 104 ft (31.70 m).

WEFT DESCRIPTION

Wings----- Low-mounted and have straight leading edges and forward-tapered trailing edges with blunt tips.

Engine(s)---Two piston engines mounted in and extending beyond the wings' leading edges.

Fuselage---Long, cigar-shaped, and tapered to the rear section. Rounded, solid nose and stepped cockpit.

Tail-----Flats mid-mounted on body and back-tapered with rounded tips. Large fin, tapered, with a square tip and a small fairing in the leading edge.

USER COUNTRIES

Afghanistan, Albania, Bulgaria, CIS, Chad, Cuba, Czech Republic, North Korea, People's Republic of China, Poland, Romania, South Yemen, Vietnam.



Approximately 3,600 IL-14 Crates were produced for both military and civilian use. The Crate has been widely exported to other countries.



IL-76 (ILYUSHIN)

GENERAL DATA

Country of Origin-----CIS (formerly USSR).

Similar Aircraft-----C-141B Starlifter, 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. Rounded 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.

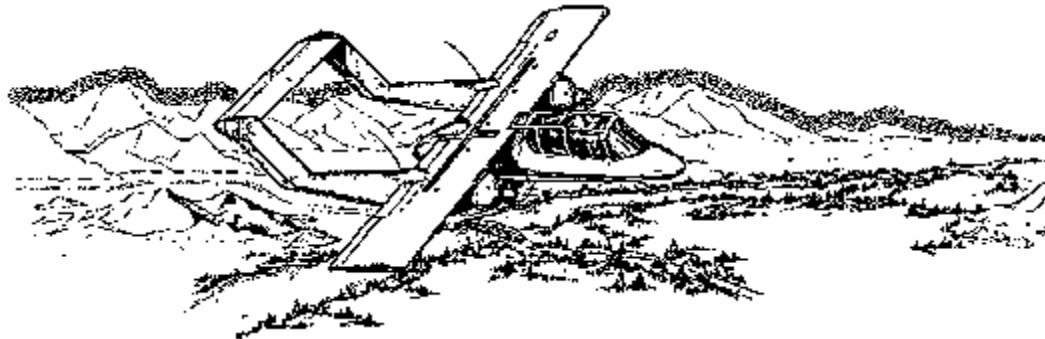
USER COUNTRIES

CIS, Cuba, India, Libya, Syria.



The IL-76 Candid entered service with the former Soviet air force in 1974. In addition to the Candid, other versions of the aircraft include the Il-78 Midas tanker and the A-50 Mainstay airborne early warning platform.

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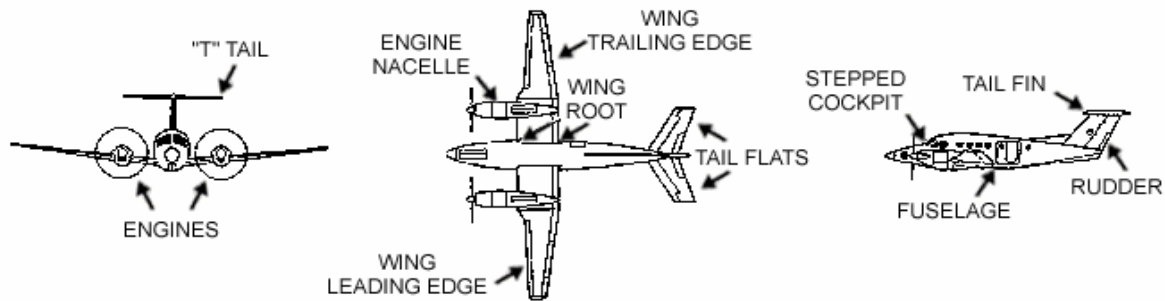


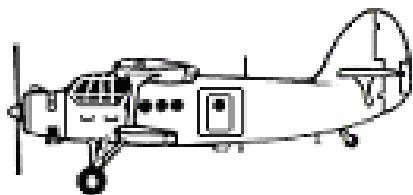
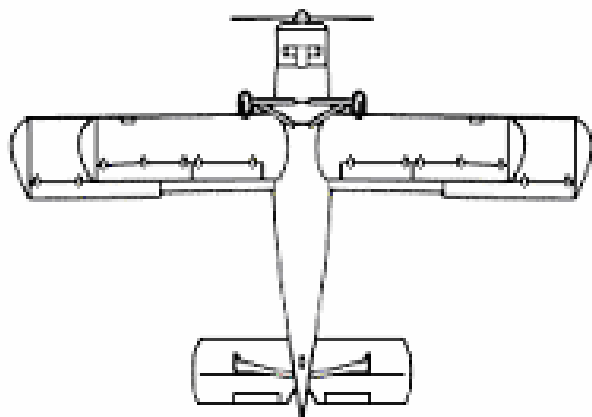
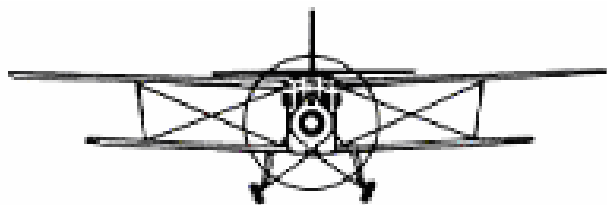
Chapter 9

Utility Aircraft

This chapter shows several examples of utility type aircraft. There are literally hundreds of aircraft types that could be used in this function. Included are utility types manufactured specifically for military purposes, although other examples are shown of conversions from civilian to military or military to civilian uses. For each aircraft, there are line drawings, general data, WEFT descriptions, user countries, photographs, and aircraft manufacturer information. The following illustration shows utility aircraft WEFT description features. Line drawings are not to scale.

WEFT DESCRIPTION FEATURES





An-2 COLT (ANTONOV)

GENERAL DATA

Country of Origin—CIS (formerly USSR), 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.

USER COUNTRIES

Afghanistan, Albania (Y-5), Angola, Benin, Bulgaria, Cambodia, CIS, Cuba, Germany, Laos, Mali, Mongolia, Nicaragua, North Korea, people's Republic of China (Y-5), Poland, Romania, Tanzania, Vietnam.



First flown in 1947 as a light transport aircraft, the An-2 Colt remained in production into the mid-1980s. During this period, more than 15,000 Colts were produced in Russia, Poland, and China.

C-12 SUPER KING AIR, B200 (BEECHCRAFT)

GENERAL DATA

Country of Origin-----USA.

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

Crew----- One or Two.

Role-----Utility, light-transport, surveillance.

Armament-----Usually 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.

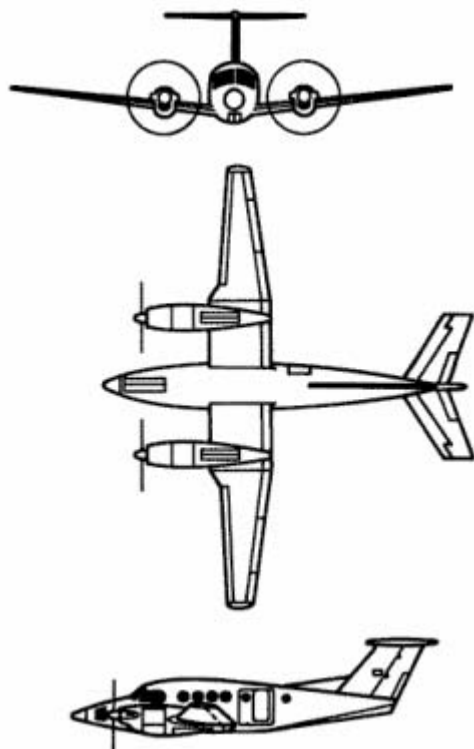
Engine(s)--Two turboprops mounted in and extending forward of the wings' leading edges.

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.

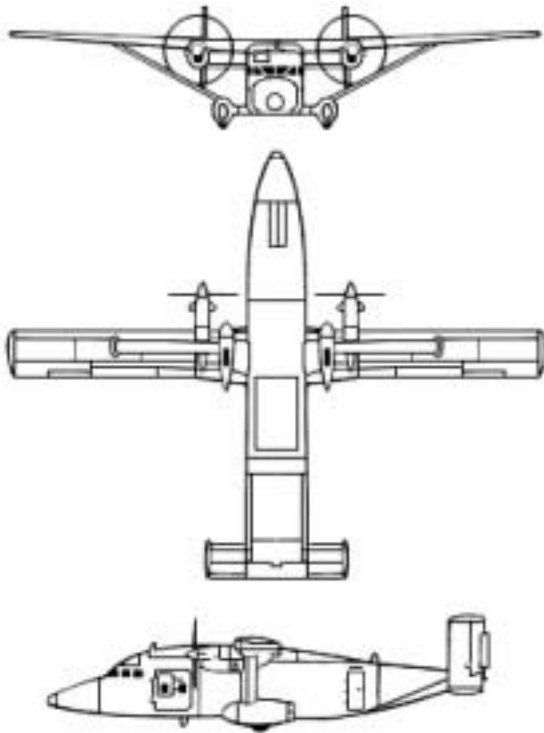
USER COUNTRIES

Algeria, Argentina, Bolivia, Greece, Guatemala, Guyana, Ireland, Ivory Coast, Peru, Sri Lanka, Thailand, Uruguay, USA, Venezuela.





The Super King Air, B200 was first flown in 1972. It is in civilian service as a feeder-liner, executive aircraft, and is designated by the US Air Force, US Navy, and US Army as the C-12A/C/D, UC-12B, and RU-21J.



C-23 SHERPA (SHORTS)

GENERAL DATA

Country of Origin-----UK.

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).

WEFT 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----Slabsided. Rectangular from fuselage to tail. Rounded nose. Stepped cockpit.

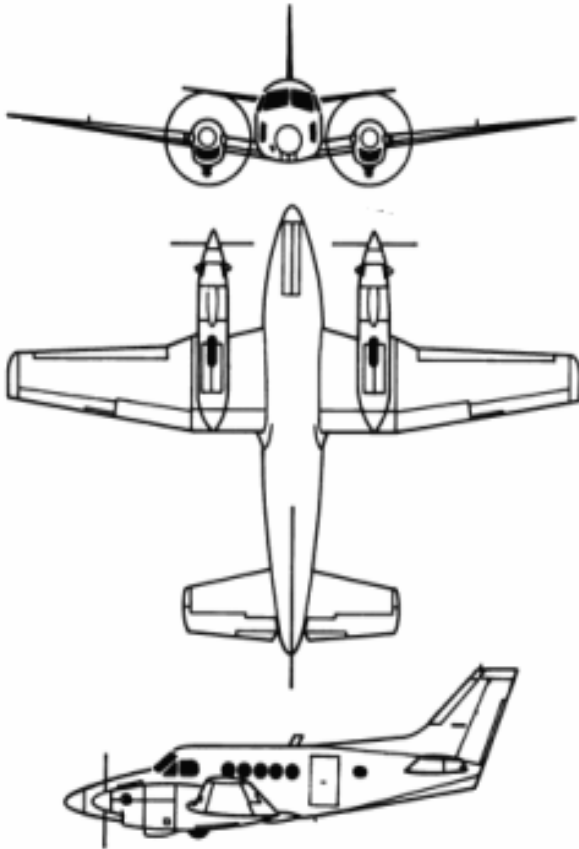
Tail----- Rectangular fins with blunt tips. Fins are mounted on the tips of the flats. Flat is rectangular and high-mounted on the body.

USER COUNTRIES

Thailand, UK, USA.



Designed as a utility transport aircraft, almost 200 of the military and civilian versions of the C-23 Sherpa have been built since it first flew in 1974.



KING AIR (BEECHCRAFT)

GENERAL DATA

Country of Origin----USA.

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

Crew-----Two.

Role-----Light-transport (16 seats, utility).

Armament-----Usually 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. 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.

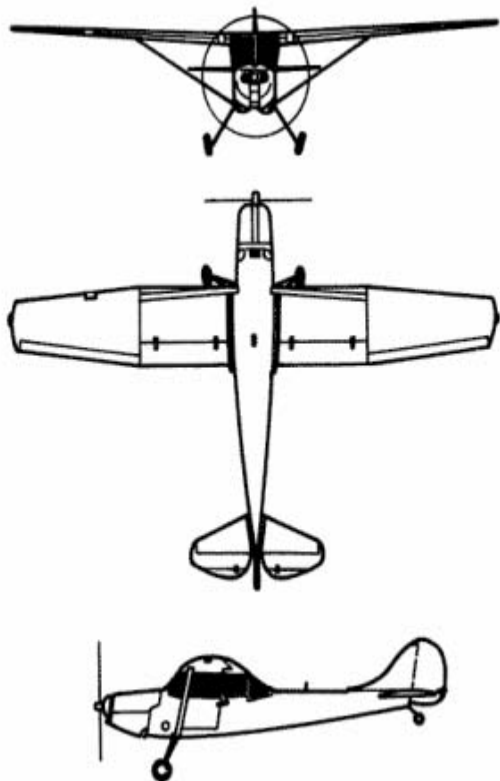
Tail----- Flats unequally tapered with blunt tips mid-mounted on body with a positive slant. Swept-back and tapered fin with square tip.

USER COUNTRIES

Argentina, Bolivia, Chile, Israel, Jamaica, Japan, Mexico, Morocco, Peru, Sweden, Thailand, USA, Venezuela.



The King Air is based on the Queen Air, but with a pressurized fuselage. There are several models; the USAF advanced trainer is the T-44. More than 1,400 King Airs have been built and are in use in many countries.



O-1 BIRDDOG (CESSNA)

GENERAL DATA

Country of Origin----USA.

Similar Aircraft-----S.F. 260W.

Crew-----One.

Role-----Light-reconnaissance, liaison, training.

Armament-----Normally unarmed.

Dimensions----- Length: 25 ft, 10 in (7.9 m).
Span: 36 ft (11 m).

WEFT DESCRIPTION

Wings-----High-mounted, straight to midwing, and unequally tapered from midwing to blunt tips.

Engine(s)--One piston engine mounted in nose.

Fuselage---Cigar-shaped and tapered to the rear section. Blunt nose. Stepped, glassed-in cockpit. Fixed landing gear.

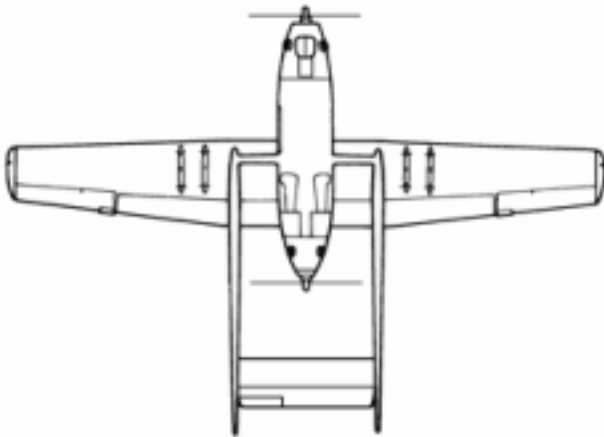
Tail-----Fin is rounded. Flats mounted high on the body and are round and butterfly-shaped.

USER COUNTRIES

Austria, Indonesia, Italy, Norway, Pakistan, South Korea, Taiwan, Turkey, Thailand, USA.



First flown in 1950, the O-1 Bird Dog was built for the US Army as a light-reconnaissance, liaison, and training aircraft. More than 3,400 were built. O-1s are in large-scale service in many countries.



O-2 SKYMASTER (CESSNA)

GENERAL DATA

Country of Origin----- USA.

Similar Aircraft-----None.

Crew-----Two.

Role-----Observation, liaison, forward air control, psychological warfare.

Armament-----Miniguns, 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 midwing 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.

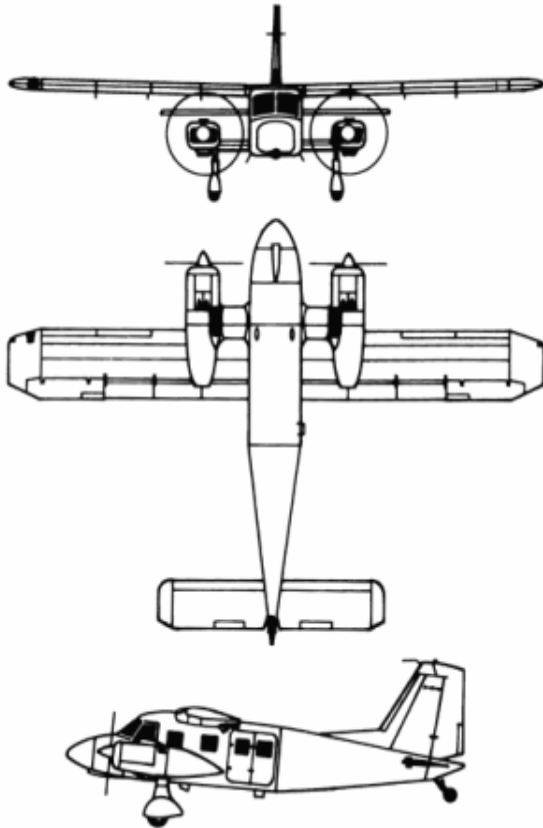
Tail-----Rectangular tail flat at end of twin tail booms. Swept-back tail fins with blunt tips at tips of tail flat. Fins extend above and below tail flat.

USER COUNTRIES

Central African Republic, Chad, Costa Rica, Dominican Republic, El Salvador, Ethiopia, Guinea-Bissau, Iran, Jamaica, Mauritania, Nicaragua, Niger, Portugal, Sri Lanka, Togo, USA, Venezuela.



First flown in 1961, the O-2 entered production in 1963. The Skymaster is unusual because it has an engine on each end of its fuselage. The aircraft is employed in forward air controller and psychological warfare missions.



DO 128-2 SKYSERVANT (DORNIER)

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.

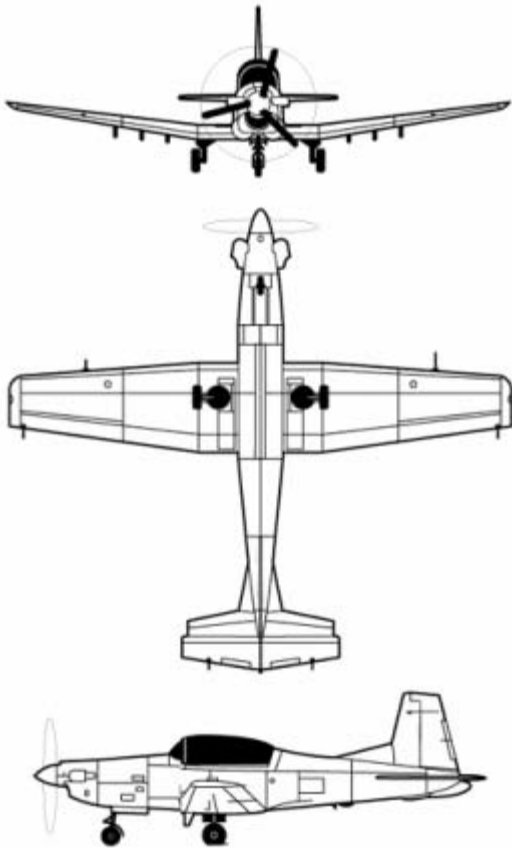
Tail-----Rectangular tail flats mid-mounted on body with square tips. Fin is unequally tapered with a square tip.

USER COUNTRIES

Angola, Benin, Cameroon, Germany, India, Israel, Kenya, Malawi, Morocco, Niger, Nigeria, Oman, Rwanda, Somalia, Spain, Sweden, Turkey, Zambia.



The DO 28D was first flown in 1966 and is a STOL utility transport serving in several nations' air forces. The DO 128-2 Skyservant and DO 128-6 turboprop-powered aircraft are now being produced. All models of the Skyservant are similar in appearance.



PC-7 (PILATUS)

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.

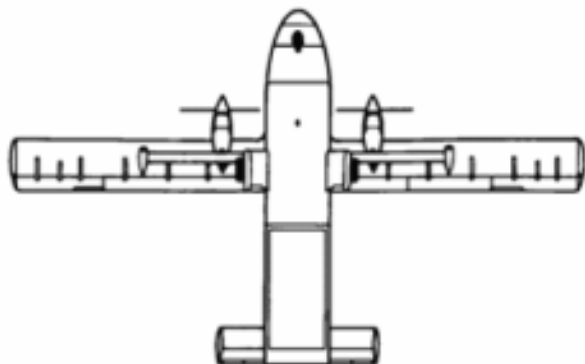
Tail-----Tapered tail fin with fairing and square tip. Flats high-mounted and equally tapered with offset square tips.

USER COUNTRIES

Abu Dhabi, Angola, Austria, Bolivia, Burma, Chile, France, Guatamala, Iran, Malaysia, Mexico, Netherlands, Switzerland.



The PC-7 is a trainer/aerobatic aircraft and can also be used as a light attack aircraft.



SKYVAN 3M (SHORTS)

GENERAL DATA

Country of Origin-----UK.

Similar Aircraft-----C-23 Sherpa.

Crew----- One.

Role-----STOL transport, cargo (twenty equipped troops), airdrop.

Armament-----Usually none.

Dimensions-----Length: 40 ft (12.22 m).

Span: 65 ft (19.8 m).

WEFT DESCRIPTION

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

Engine(s)----Two piston or turboprop engines mounted under and extending beyond the wings' leading edges.

Fuselage-----Thick, box-like, and flat-bottomed. Rounded nose with flush cockpit. Fixed landing gear. Upswept rear section.

Tail-----Twin rectangular tail fins with blunt tips mounted on the tips of a rectangular flat. Fins extend above and below the flat.

USER COUNTRIES

Austria, Botswana, Ghana, Guyana, Indonesia, Japan, Malawi, Mauritania, Mexico, Nepal, North Yemen, Oman, Singapore, South Africa, UK, USA.



The Skyvan was first flown in 1963 and was equipped with piston engines. It has since been fitted with turboprops. Skyvans are used by military, paramilitary, and civilian services.

U-6A BEAVER (DEHAVILLAND CANADA)

GENERAL DATA



Country of Origin-----Canada (DHC-2).

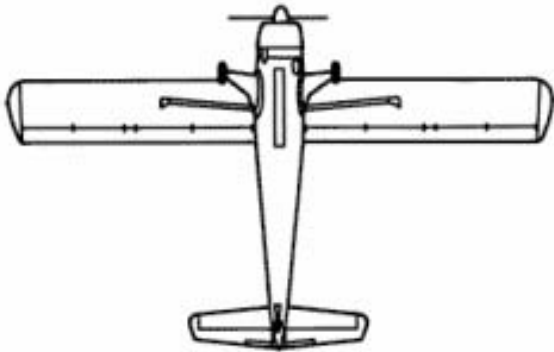
Similar Aircraft----- An-2 Colt.

Crew-----Two.

Role-----Light-cargo, transport (five equipped troops).

Armament----- Usually none.

Dimensions----- Length: 30 ft, 4 in (9.24 m).
Span: 48 ft (14.64 m).



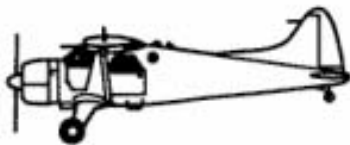
WEFT DESCRIPTION

Wings-----High-mounted and rectangular with blunt tips.

Engine(s)---One piston engine in nose section. Later models have a turboprop engine.

Fuselage----Club-shaped fuselage with blunt nose and sharply tapered tail section. Stepped cockpit.

Tail-----Flats high-mounted on body and equally tapered with blunt tips. Fin is rounded.

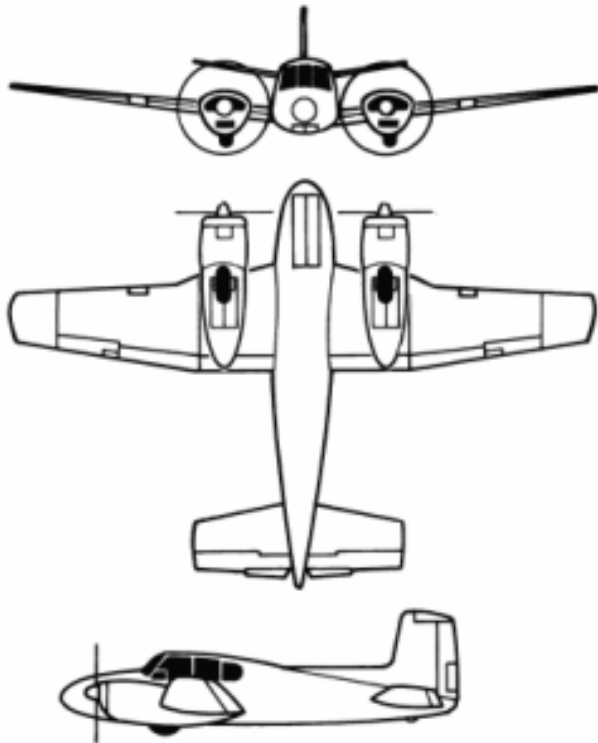


USER COUNTRIES

Canada, Colombia, Haiti, USA.



Approximately 1,700 Beavers have been built since 1947; of those, about 970 went to the US Army and the US Air Force as U-6As. A later development, MK III, has a turboprop engine which changes the configuration of the nose significantly.



U-8F SEMINOLE, QUEEN AIR (BEECHCRAFT)

GENERAL DATA

Country of Origin-----USA.

Similar Aircraft-----C-12 Super King Air, King Air.

Crew-----Two.

Role-----Light-transport (eight equipped troops).

Armament-----Usually none.

Dimensions----- Length: 35 ft, 6 in (10.82 m).
Span: 50 ft, 3 in (15.32 m).

WEFT DESCRIPTION

Wings-----Low-mounted and unequally tapered with blunt tips. Wide wing roots. Positive slant.

Engine(s)-- Two piston engines mounted in and extending beyond the wings' leading edges.

Fuselage----Short, thick, round, and tapered to rear section. Tapered nose. Stepped cockpit.

Tail-----Tapered tail flats with blunt tips and high-mounted on body with positive slant. Swept- back tail fin with a square tip.

USER COUNTRIES

Argentina, Colombia, Dominican Republic, Israel, Japan, Mexico, Pakistan, Peru, Thailand, USA, Venezuela.



The Queen Air is in service both as an executive aircraft and a feeder liner. A model used by the US Army is the B-80, as shown here.

UV-18A TWIN OTTER (DE HAVILLANDCANADA)

GENERAL DATA



Country of Origin--- USA.

Similar Aircraft----- C-12 Super King Air, King Air.

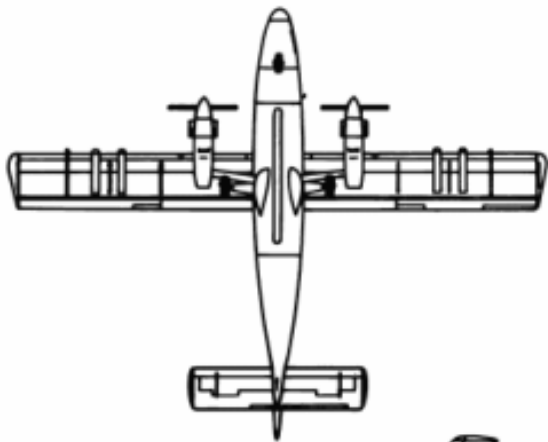
Crew-----Two.

Role-----Light-transport (eight equipped troops).

Armament-----Usually none.

Dimensions-----Length: 35 ft, 6 in (10.82 m).

Span: 50 ft, 3 in (15.32 m).



WEFT DESCRIPTION

Wings-----Low-mounted and unequally tapered with blunt tips. Wide wing roots. Positive slant.

Engine(s)--Two piston engines mounted in and extending beyond the wings' leading edges.

Fuselage---Short, thick, round, and tapered to rear section. Tapered nose. Stepped cockpit.

Tail-----Tapered tail flats with blunt tips and high-mounted on body with positive slant. Swept-back tail fin with a square tip.

USER COUNTRIES

Argentina, Colombia, Dominican Republic, Israel, Japan, Mexico, Pakistan, Peru, Thailand, USA, Venezuela.



The DHC-6 Twin Otter, first flown in 1964, is a general-purpose civilian and military aircraft that can operate from short, rough airfields. US Army and US Air Force Twin Otters have been redesignated UV-18A and UV-18B.

V-22 OSPREY (BELL-BOEING)

GENERAL DATA

Country of Origin—USA.

Similar aircraft----- None.

Crew----- Three on flight deck.

Role----- Transport (12 equipped troops), Cargo, Rescue.

Armament-----12.7mm cannon in nose.

Dimensions----- Length-----62 ft 7 in (19.08 m).
Wing Span (incl 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.

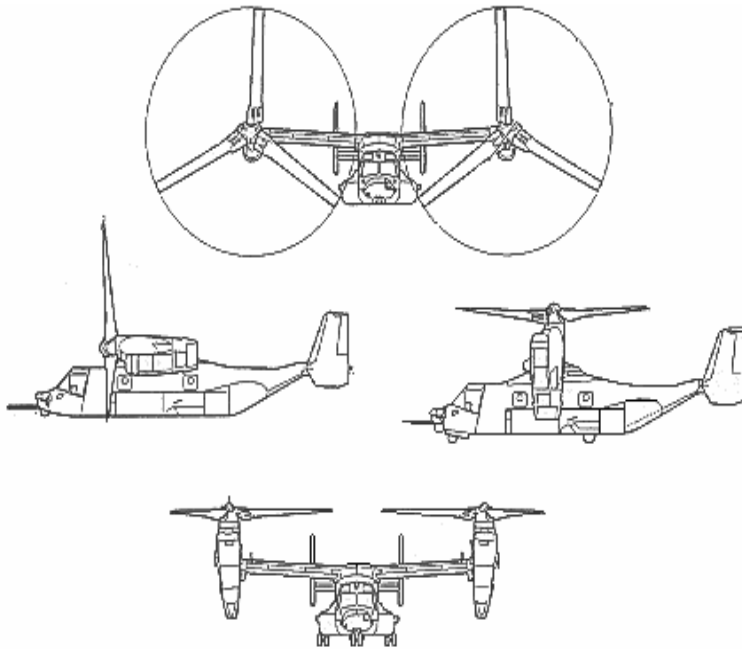
Engine(s)--Two exhaust.

Fuselage---Optimised 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.

USER COUNTRY

USA.





The Osprey is the first TILT-ROTOR aircraft to be purchased by the US. Plans call for 458 Ospreys with the US Marines receiving 360, Navy - 48, and Air Force - 50. Each aircraft cost \$80 million.

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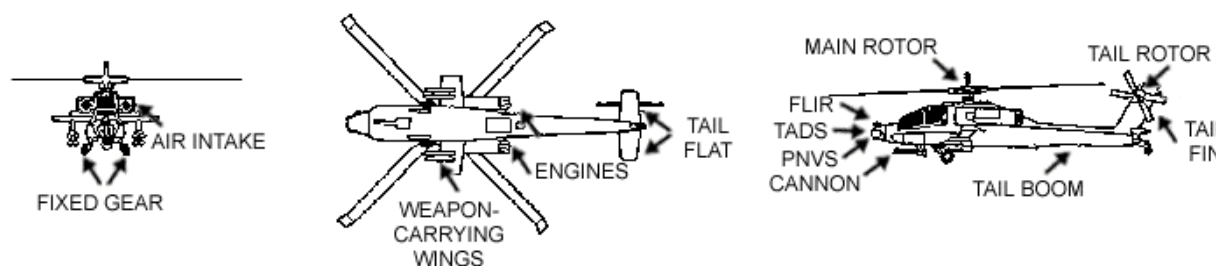


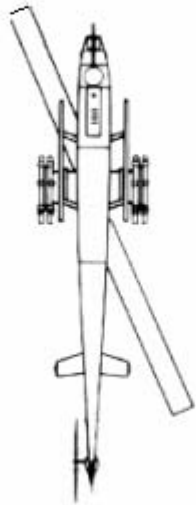
Chapter 10

Helicopter Aircraft

This chapter covers helicopter (rotary-wing) aircraft. There are a large number of helicopters covered since nearly all countries have them in their inventory. Helicopters have been grouped together in this chapter because, with the exception of a few attack helicopters, most can be used in a variety of roles: attack, observation, heavy lift, cargo, transport, and surveillance. There are many helicopter configurations. Only a few helicopters are similar in appearance and the differences make recognition of them easier for an observer. For each aircraft, there are line drawings, general data, WEFT descriptions, user countries, photographs, and aircraft manufacturer information. The following illustration shows helicopter aircraft WEFT description features. Line drawings are not to scale.

WEFT DESCRIPTION FEATURES





AH-1F COBRA (BELL)

GENERAL DATA

Country of Origin----USA.

Similar Aircraft----- Mi-24 Hind, Mangusta A129, AH-64 Apache.

Crew----- Two.

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.

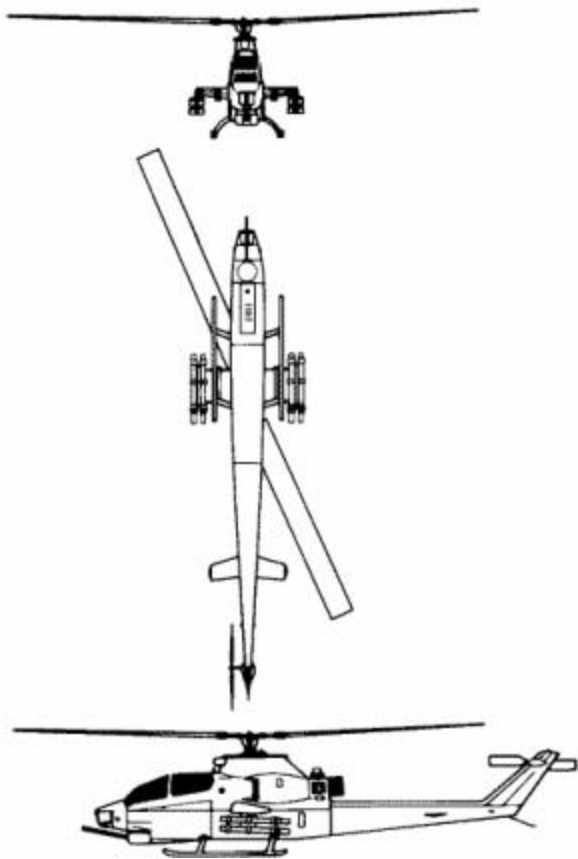
Tail-----Small flats are mid-mounted, swept-back, tapered, blunt-tipped, and forward of the fin. Swept-back fin is tapered. Rotor on the right

USER COUNTRIES

Bahrain, Iran, Israel, Japan, Jordan, South Korea, Pakistan, Taiwan, Thailand, Turkey, USA.



The AH-1F Cobra is a fully upgraded TOW version of the previously designated AH-1S. Other models of the AH-1 have also been converted to AH-1Fs.



AH-1W SUPER COBRA (BELL)

GENERAL DATA

Country of Origin---USA.

Similar Aircraft----- Mi-24. Hind, Mangusta A129, AH-64 Apache.

Crew-----Two.

Role-----Attack helicopter.

Armament-----Missiles, rockets, cannon, Hellfire and TOW missiles.

Dimensions-----Length: 47 ft (14.32 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)---Two turboshaft engines mounted on top rear of cabin. Two exhausts just above the tail boom.

Fuselage----Thin, oval body with short, pointed nose. Stepped, glassed-in canopy and tapered rear section. Low-mounted, tubular tail boom.

Tail-----Small flat is mid-mounted, swept-back, tapered, and square-tipped. Fin is swept-back and tapered. Rotor is on the right.

USER COUNTRIES

Iran, South Korea, USA.



In the United States, SuperCobras are operated by the USMC. Other twin-engined Cobras are designated AH-1J SeaCobra and AH-1T Improved SeaCobra. The SeaCobra's fuselage is longer than the Army's AH-1S Cobra.

AH-64 APACHE (HUGHES)

GENERAL DATA

Country of Origin-----USA.

Similar Aircraft-----Mi-28 Havoc, Mangusta A129, Mi-24 Hind, Ka-50 Hokum.

Crew-----Two.

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.

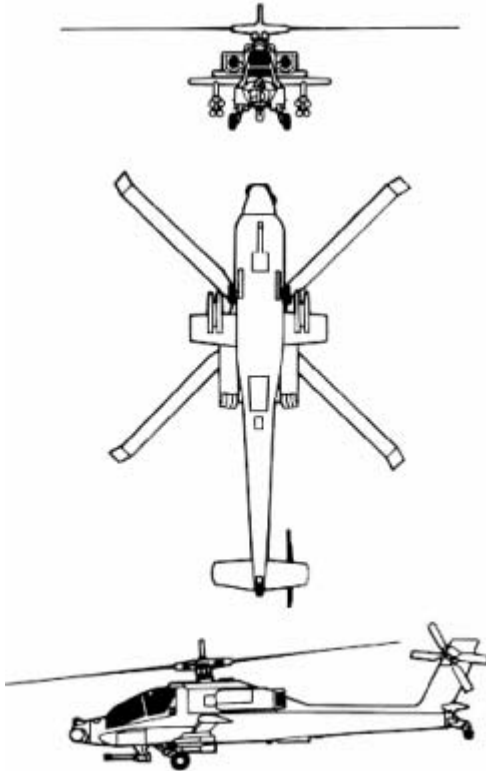
Engine(s)----Two turboshaft engines mounted high and outside the fuselage and to rear of the cockpit.

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.

USER COUNTRIES

Israel, Saudi Arabia, Egypt, Greece, Kuwait, South Korea, United Arab Emirates, UK, USA.





The AH-64 Apache advanced attack helicopter was first delivered to the US Army in 1984. Since that time, more than 1,000 of this highly effective attack helicopter have been produced.

ALOUETTE II (AEROSPATIALE)

GENERAL DATA

Country of Origin--France.

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

Crew----- One.

Role-----Observation, liaison, light-attack.

Armament----- Machine gun, rockets, missiles.

Dimensions----- Length: 33 ft, 8 in (10.28 m).
Rotor diameter: 36 ft (11 m).

WEFT DESCRIPTION

Wings----- Three-blade main rotor high-mounted to the rear of the cockpit.

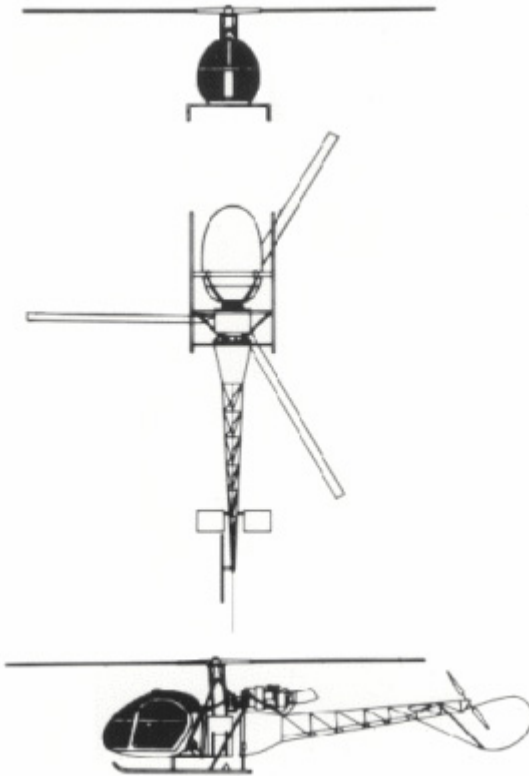
Engine(s)---- One turboshaft high-mounted on the fuselage to the rear of the cockpit and main rotor shaft. Upturned exhaust.

Fuselage-----Oval, transparent, bubble cockpit. Tadpole-like appearance. Fixed-skid landing gear. Tail boom is open framework.

Tail----- Small, rectangular, square-tipped flats forward of a small, right side-mounted rotor. No fin. Rotor guard.

USER COUNTRIES

Algeria, Belgium, Djibouti, Ecuador, France, Germany, India (Cheetah), Indonesia, Pakistan (Lama), Portugal, Togo, Tunisia, Turkey.





First produced in 1957, the Alouette II has gone through a series of upgrades. All of the aircraft of this type are similar, including the SA-315B Lama which is equipped with the Alouette II airframe and the Alouette III engine.

ALOUETTE III (AEROSPATIALE)

GENERAL DATA

Country of Origin---France.

Similar Aircraft-----Alouette II, Gazelle, Scout/Wasp, OH-13 Sioux, BO 105.

Crew-----One.

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.

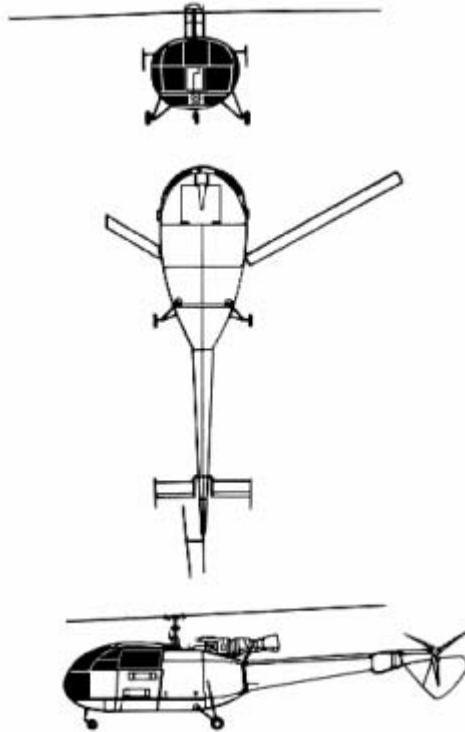
Engine(s)-----One turboshaft above and to the rear of the cockpit and rotor shaft.

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.

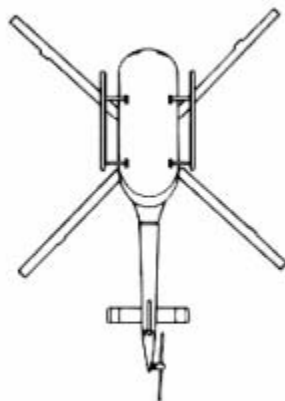
USER COUNTRIES

Algeria, Angola, Argentina, Austria, Burkina-Faso, Burma, Burundi, Cameroon, Chile, Congo, Dominican Republic, Ecuador, El Salvador, France, Gabon, Ghana, Greece, Guinea-Bissau, India (Chetak), Ireland, Ivory Coast, Libya, Malawi, Malaysia, Malta, Mexico, Nepal (Chetak), Netherlands, Nicaragua, North Yemen, Pakistan, Peru, Portugal, Romania, Rwanda, South Africa, Senegal, South Korea, Spain, Suriname, Switzerland, Togo, Tunisia, United Arab Emirates, Venezuela, Zaire.





With the first production Allouette III flying in 1961, more than 1,400 were built before production ended in the late 1980s.



BO 105 (MDD)

GENERAL DATA

Country of Origin----Germany.

Similar Aircraft-----OH-6 Cayuse, Defender 500MD, Alouette III, Mi-4 Hound.

Crew-----Two.

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.

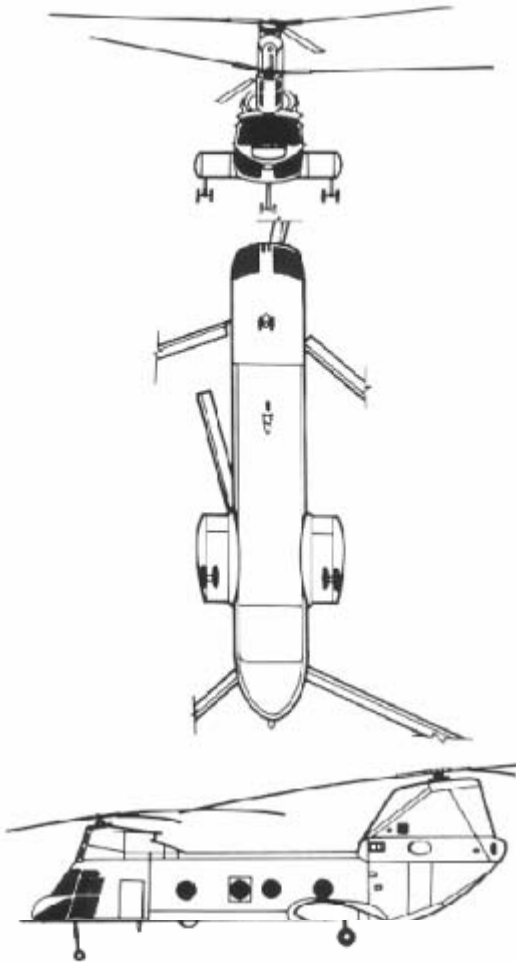
Tail-----Swept-back and tapered fin. Small rectangular fins mounted at the tips of the rectangular flats. Rotor on left.

USER COUNTRIES

Bahrain, Brunei, Chile, Colombia, Germany, Indonesia, Mexico, Netherlands, Nigeria, Philippines, USA.



The military version of the BO 105 include the antitank version with weapon-carrying outriggers and the scout version which has a mast-mounted sight above the main rotor.



CH-46 SEA KNIGHT (BOEING VERTOL)

GENERAL DATA

Country of Origin---USA.

Similar Aircraft-----CH-47 Chinook.

Crew-----Three.

Role-----Transport, cargo (25 equipped troops), assault.

Armament-----Usually none.

Dimensions-----Length: 45 ft (13.68 m).
Rotor diameter: 51 ft (15.56 m).

WEFT DESCRIPTION

Wings----- Two three-blade main rotors, one above the nose section and cabin on a hump; the other on top of high, thick tail fin.

Engine(s)---Two turboshafts located inside the lower part of the tail fin.

Fuselage----Short and thick with flat bottom and upswept tail section. Glassed-in cockpit. Landing gear pods on bottom rear of body.

Tail----- High, thick tail fin with oval exhaust ports on the sides.

USER COUNTRIES

Japan (KV-107), USA.



The CH-46 Sea Knight first entered service in 1959. Although production ended in the US in the early 1970s, a derivation known as the KV-107 is currently being built under license in Japan.

CH-47 CHINOOK (BOEING VERTOL)

GENERAL DATA

Country of Origin----USA.

Similar Aircraft-----CH-46 Sea Knight.

Crew-----Two on flight deck.

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

Armament-----Usually none.

Dimensions----- Length: 51 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.

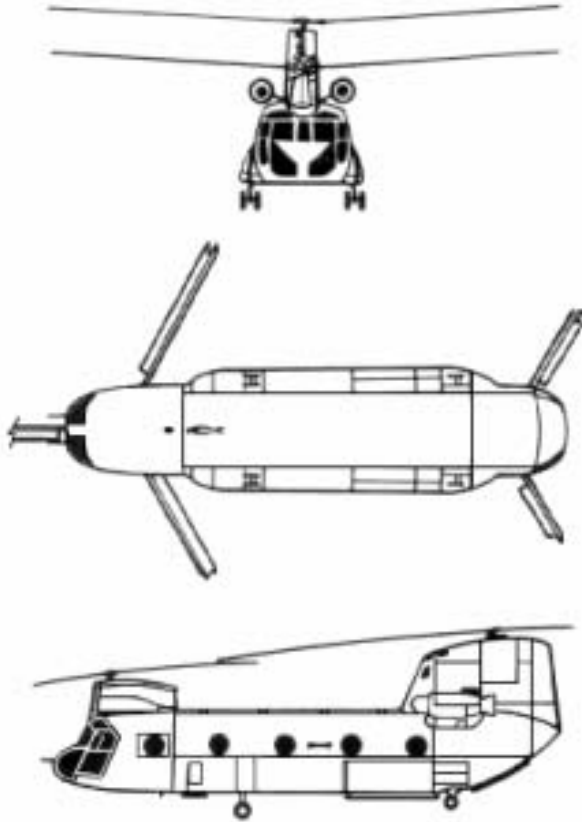
Engine(s)---Two turboshafts in pods, one on each side of thick tail fin.

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.

USER COUNTRIES

Argentina, Australia, Canada, Egypt, Greece, Iran, Italy, Japan, Libya, Morocco, UK, USA.





Current versions of the CH-47 Chinook are being produced under license in Italy and Japan, in addition to the CH-47D and MH-47E being produced in the United States.

CH-53 SEA STALLION (SIKORSKY)

GENERAL DATA

Country of Origin---USA.

Similar Aircraft----- SH-3 Sea King, Super Frelon, Mi-26 Halo.

Crew----- Two on flight deck.

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.

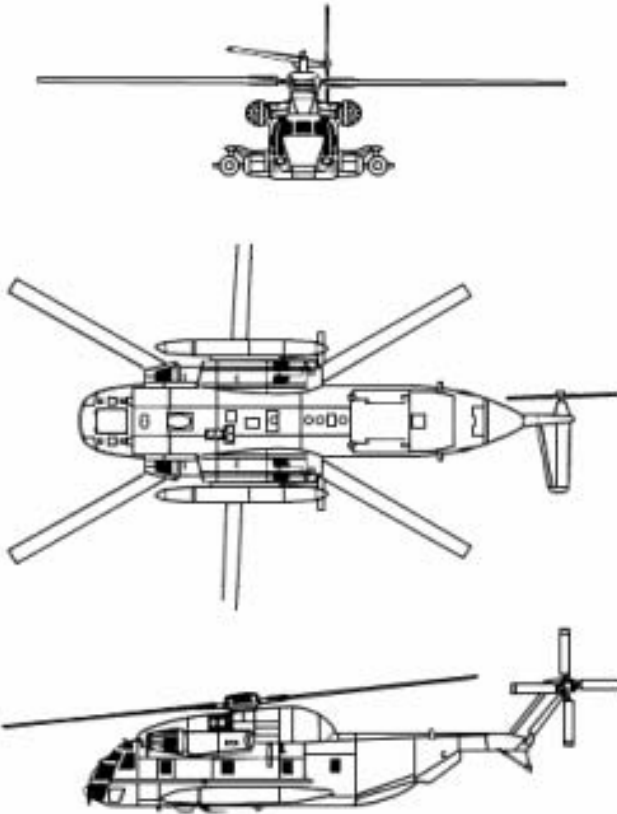
Engine(s)--Two turboshafts mounted high and outside the body midsection.

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.

USER COUNTRIES

Germany, Iran, Israel, USA.





A number of variants of the CH-53 are currently in service. The CH-53 is used by the USMC. The CH-53, RH-53, and MH-53 are used by the US Navy, whereas the HH-53 is in service with the USAF. The Sea Stallion is also flown by other countries.

DAUPHIN 2 (AEROSPATIAL)

GENERAL DATA

Country of Origin----France.

Similar Aircraft-----Lynx, Gazelle, Hirundo A109.

Crew-----Normally two. Three with crew chief.

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.

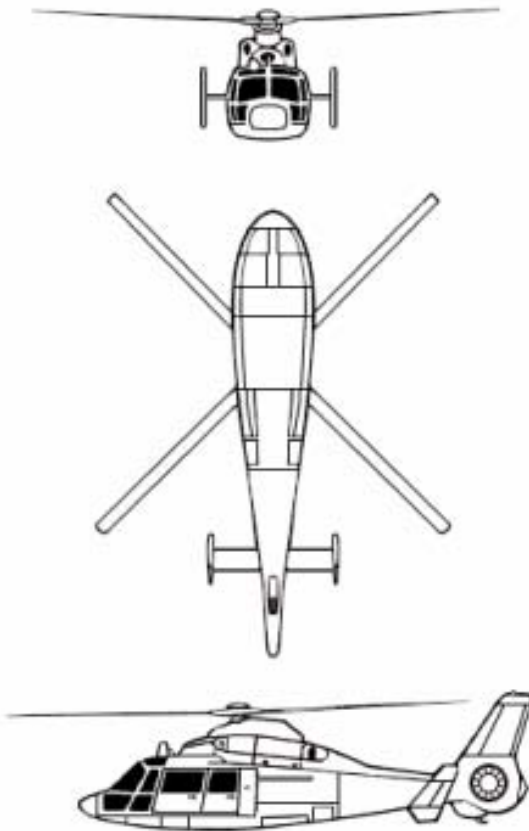
Engine(s)--Two turboshafts mounted side by side on top of cabin. Air intake on side of motor hump. Exhausts at the rear of the hump.

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.

USER COUNTRIES

France, People's Republic of China (Z-9), USA.





The Dauphin 2 is the military version of the Dauphin series. It is a complete redesign of the civilian Dauphin with only tail similarities remaining. The Dauphin 2 also has retractable landing gear as opposed to the fixed gear on the civilian Dauphin.

DEFENDER 500 (McDONNELL DOUGLAS)

GENERAL DATA

Country of Origin--USA.

Similar Aircraft----OH-6 Cayuse, BO 105, Alouette II.

Crew----- One.

Role----- ASW, scout, antitank, multimission.

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.

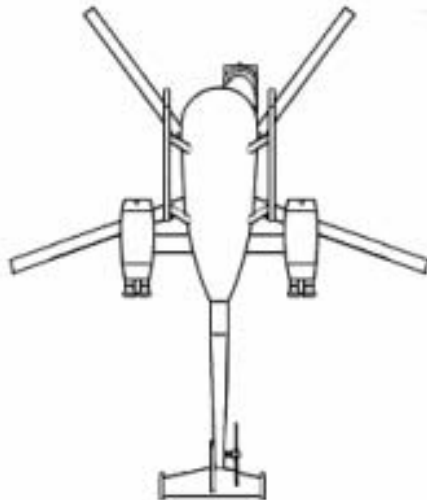
Engine(s)--One mounted inside body. Air intakes on top of cabin. Blackhole exhaust.

Fuselage---Teardrop-shaped. Round, glassed-in cockpit. Landing skids.

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.

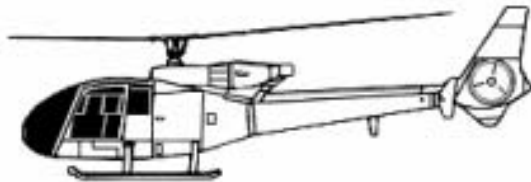
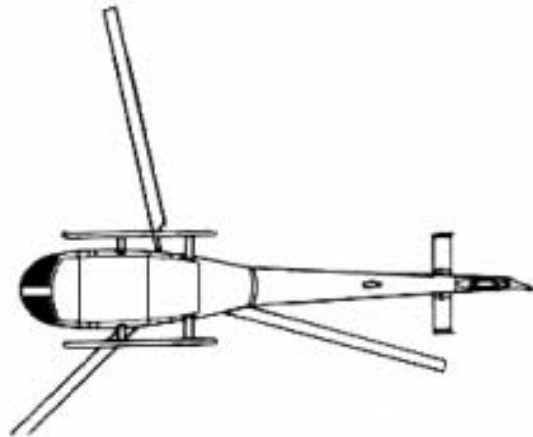
USER COUNTRIES

Argentina, Bahrain, Bolivia, Colombia, Costa Rica, Denmark, Dominican Republic, El Salvador, Honduras, Indonesia, Israel, Jordan, Kenya, North Korea, South Korea, Spain, Taiwan, USA.





The Defender 500 series helicopters are direct descendants of the OH-6 Cayuse. Included in the series are the 500M TOW, scout, ASW, and multirole Defender II versions.



GAZELLE (AEROSPATIALE, WESTLAND)

GENERAL DATA

Countries of Origin-----France, UK.

Similar Aircraft-----Alouette II, Alouette III, Scout/Wasp, OH-13 Sioux, Dauphin 2.

Crew-----One.

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.

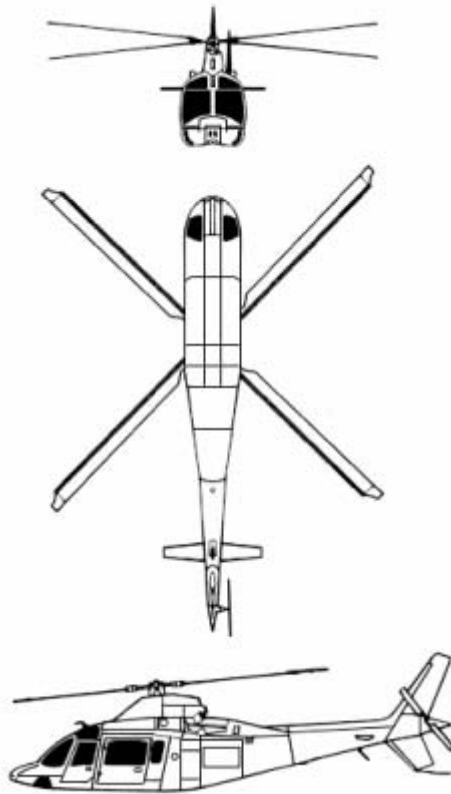
Tail-----Tail fin swept-back and tapered with a square tip. Rectangular flats with small fins. Fan rotor housing is built into the lower tail.

USER COUNTRIES

Angola, Burundi, Cameroon, Chad, Cyprus, Ecuador, Egypt, France, Gabon, Kenya, Kuwait, Lebanon, Morocco, People's Republic of China, Qatar, Rwanda, Senegal, Syria, UK, Yugoslavia.



The Gazelle was designed to be the successor to the Alouette II and made its maiden flight in April 1967. It remained in production until 1992.



HIRUNDO A109 (AGUSTA)

GENERAL DATA

Country of Origin--- Italy.

Similar Aircraft----- OH-58 Kiowa, UH-1 Iroquois, Lynx.

Crew-----One or Two.

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.

USER COUNTRIES

Argentina, Greece, Italy, Mexico, UK, Venezuela.



Several military versions of the Hirundo A109 have been developed for army, naval, and patrol use. A good recognition feature of the aircraft is the large ventral fin mounted below the tail boom section, giving the tail a boomerang or shark's tail look.

Ka-25 Hormone (KAMOV)

GENERAL DATA

Country of Origin—Russia.

Similar aircraft----- Ka-27 Helix.

Crew----- Two.

Role----- Multipurpose military.

Armament----- ASW torpedos.

Dimensions----- Length: 32 ft (9.75 m).
Rotor diameter: (each) 51 ft, 7in (15.74 m).

WEFT DESCRIPTION

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

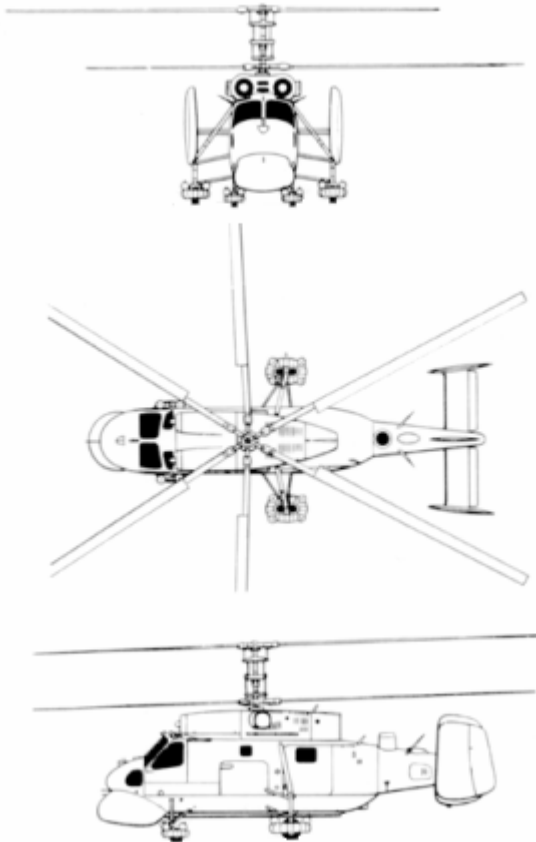
Engine(s)-----Two turboshaft engines located above cabin. Circular air intakes forward of rotor shafts. Single exhaust.

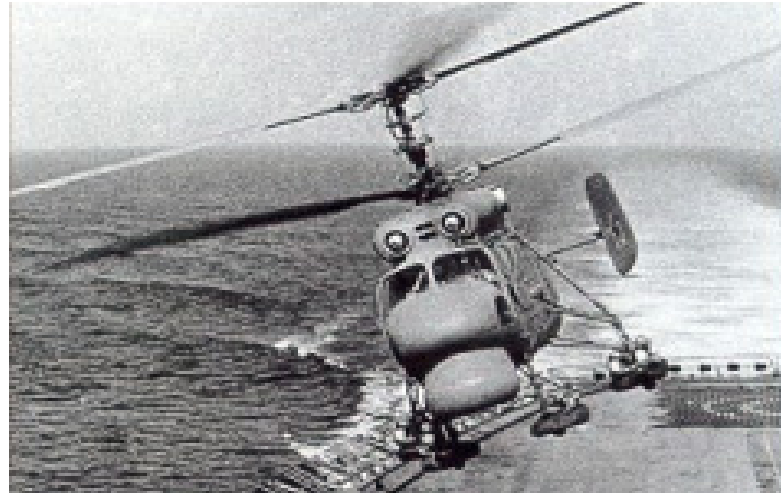
Fuselage-----Rectangular shaped body with side-by-side dual control nose cockpit Short tail boom.

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

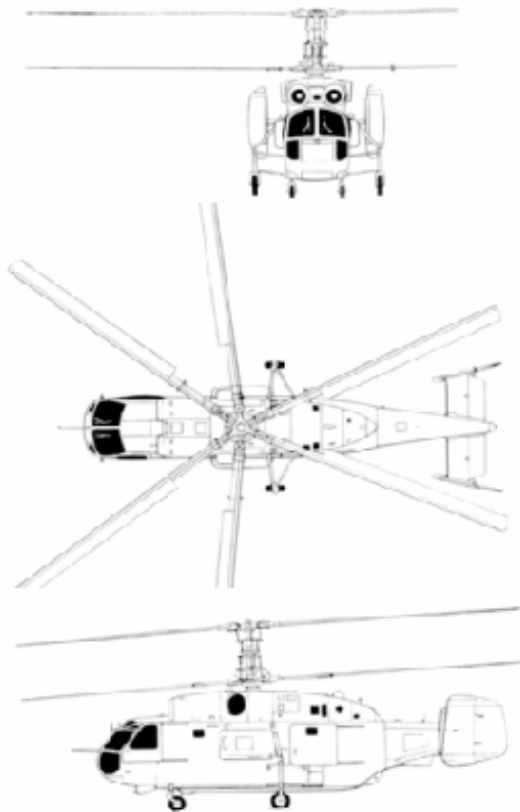
USER COUNTRY

CIS, India, Syria, Vietnam, Yugoslavia.





The Ka-25 Hormone first flew in 1961, with 460 built before production ended in 1975.



Ka-27 HELIX (KAMOV)

GENERAL DATA

Country of Origin—Russia.

Similar aircraft---- Ka-25 Hormone.

Crew----- Three.

Role----- Multi-purpose military.

Armament-----Torpedos, Depth charges.

Dimensions----- Length: 37 ft (11.30 m).
Rotor diameter: (each) 52 ft, 2in (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.

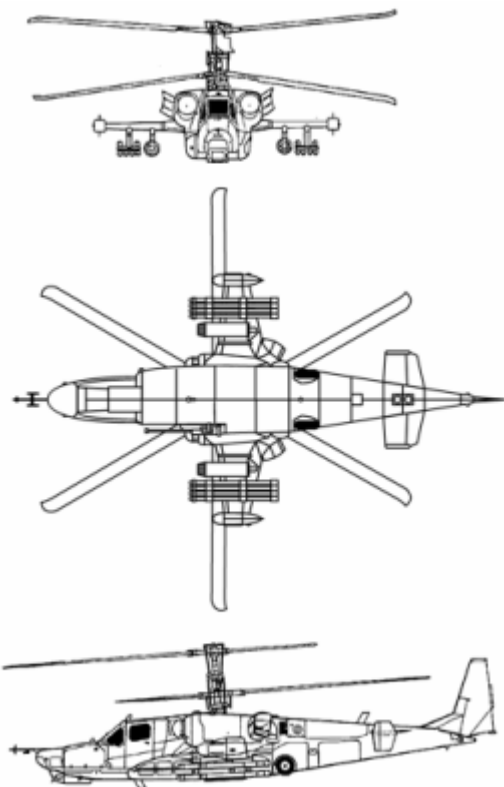
Tail----- Tail flat mid-mounted on tail boom has two toed in tip fins and a central fin.

USER COUNTRY

CIS, India, Syria, Vietnam, Yugoslavia.



The Ka-27 Helix is a cousin to the Hormone but is heavier, more powerful, and has expanded capabilities. First flew in 1973. Versions include the Ka-28, Ka-29 and Ka-32 and over 220 were built.



Ka-50 HOKUM (KAMOV)

GENERAL DATA

Country of Origin-----CIS (Formerly USSR).

Similar Aircraft-----Hirundo A109, Mangusta A129, AH-64 Apache, AH-1F Cobra.

Crew-----Hokum-A = One, Hokum-B = Two.

Role-----Anti-helicopter and gunship.

Armament-----Rocket packs, gun, AAMs.

Dimensions-----Length: 52 ft, 6 in (16.0 m).
Rotor diameter (each): 47 ft, 7 in (14.5 m).

WEFT DESCRIPTION

Wings----- Coaxial, contrarotating, 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.

USER COUNTRY

CIS.



The Hokum (Werewolf), which first flew in 1982, comes with a pilots ejection seat that can be used after the main rotors have been blown away.

LYNX (WESTLAND)

GENERAL DATA

Country of Origin--- UK.

Similar Aircraft-----OH-58 Kiowa, Hirundo A109, UH-1 Iroquois, Dauphin 2.

Crew-----Two.

Role-----Utility, attack, antitank.

Armament-----Cannon, minigun, 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.

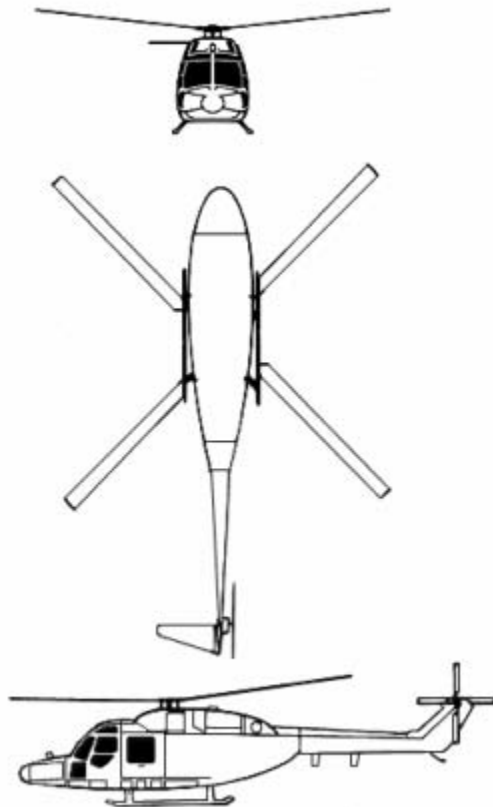
Engine(s)---Two turboshaft engines on top of rear of cabin.

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.

USER COUNTRIES

Brazil, Denmark, France, Germany, Netherlands, Nigeria, Norway, UK.





There are two main versions of the Lynx: a wheeled version, primarily for naval use; and an army version with skids or skis. The Lynx first flew in March 1971 and was developed under an English-French helicopter agreement.

MANGUSTA A129 (AGUSTA)

GENERAL DATA

Country of Origin----- Italy.

Similar Aircraft----- AH-64 Apache, Mi-28 Havoc, Ka-50 Hokum.

Crew-----Two.

Role----- Light-attack, antiarmor, 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.

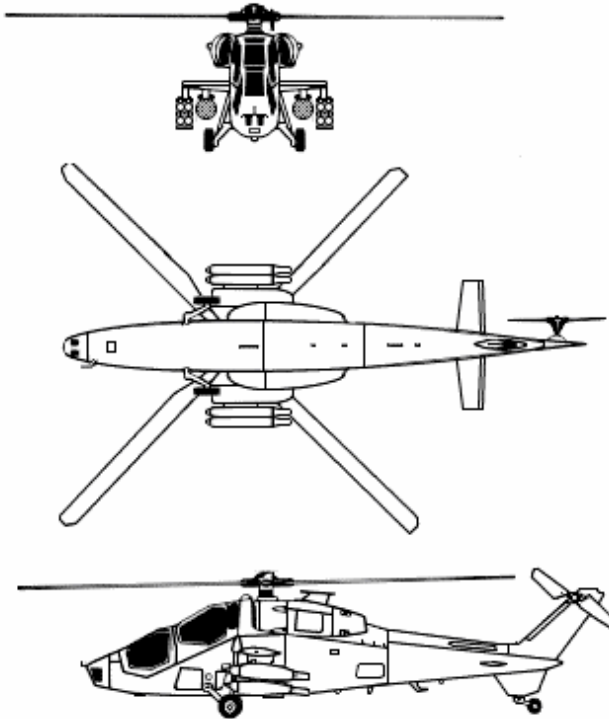
Engine(s)---Two turboshaft engines mounted alongside the top of the fuselage. Semicircular air intakes.

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.

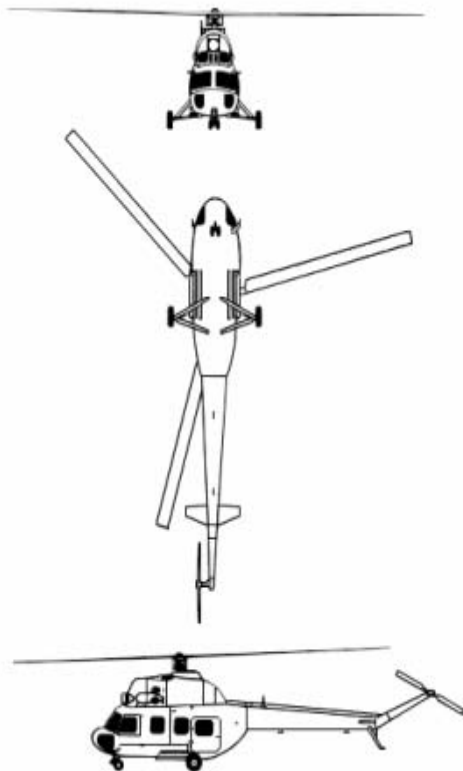
USER COUNTRY

Italy.





The Mangusta A129, armed with antitank and area-suppression weapons systems, is intended primarily as an attack helicopter to be used against armored targets. The aircraft can operate during day, night, and all-weather conditions.



Mi-2 HOPLITE (MIL)

GENERAL DATA

Country of Origin--- CIS (formerly USSR).

Similar Aircraft-----Hirundo A109, Mi-8 Hip.

Crew----- One.

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.

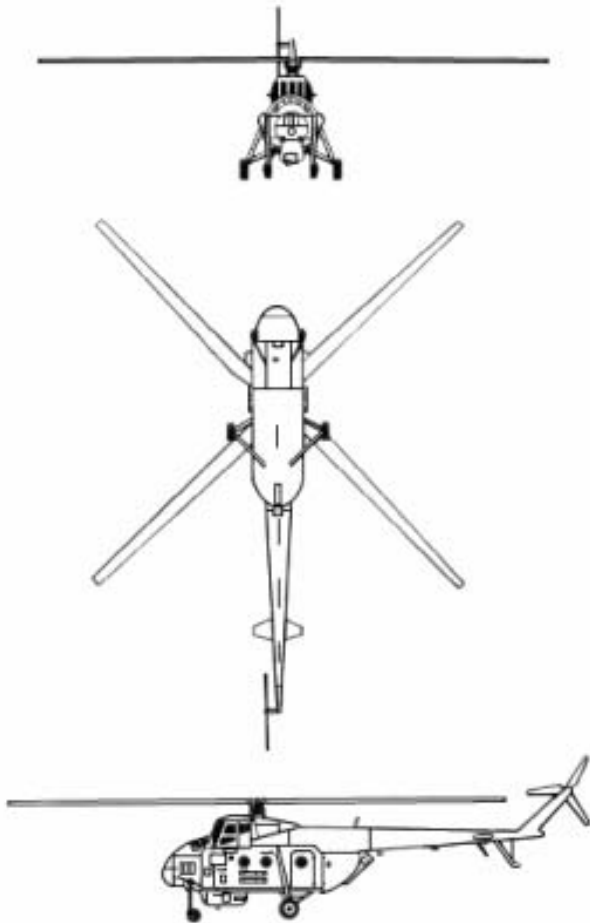
Tail-----Tapered tail boom. Small, unequally tapered flats. Thin, swept-back fin. Rotor is on the right.

USER COUNTRIES

Azerbaijan, Burma, Bulgaria, CIS, Cuba, Czech Republic, Georgia, Germany, Ghana, Hungary, Libya, Nicaragua, Poland, Slovakia, Syria, Ukraine.



Although the Mi-2 Hoplite was developed by the Mil bureau in the former Soviet Union, the aircraft was produced exclusively in Poland by the PZL Swidnik aircraft factory. Several thousand of these aircraft were built and remained in production until 1985.



Mi-4 HOUND (MIL)

GENERAL DATA

Country of Origin---CIS (formerly USSR).

Similar Aircraft-----BO 105, Defender 500.

Crew-----Three.

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

Armament-----Machine gun pod, rockets.

Dimensions----- Length: 55 ft (16.8 m).
Rotor diameter: 69 ft (21 m).

WEFT DESCRIPTION

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

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

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

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

USER COUNTRIES

Afghanistan, Albania (Z-5), Algeria, Bulgaria, Cuba, Czech Republic, Egypt, Germany, Mali, Mongolia, North Korea, North Yemen, People's Republic of China (Z-5), Poland, Romania, Somalia , South Yemen, Sudan, Syria, Vietnam.



Aproximately 3,000 Mi-4 Hounds were built before production ended in 1969. These piston-engined aircraft have been largely replaced by turbo-powered helicopters and used in the transport and antisubmarine roles.



Mi-6 HOOK (Mil)

GENERAL DATA

Country of Origin--- CIS (formerly USSR).

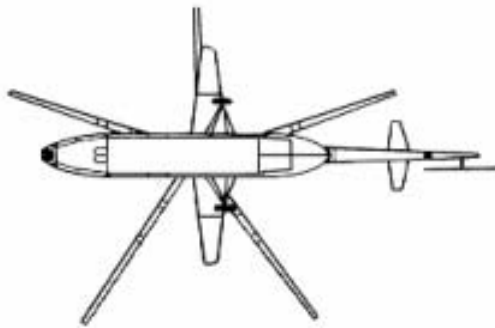
Similar Aircraft----- Mi-26 Halo.

Crew----- Five.

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

Armament----- Machine gun.

Dimensions-----Length: 109 ft (33.3 m).
Rotor diameter: 115 ft (35 m).



WEFT DESCRIPTION

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

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

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

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

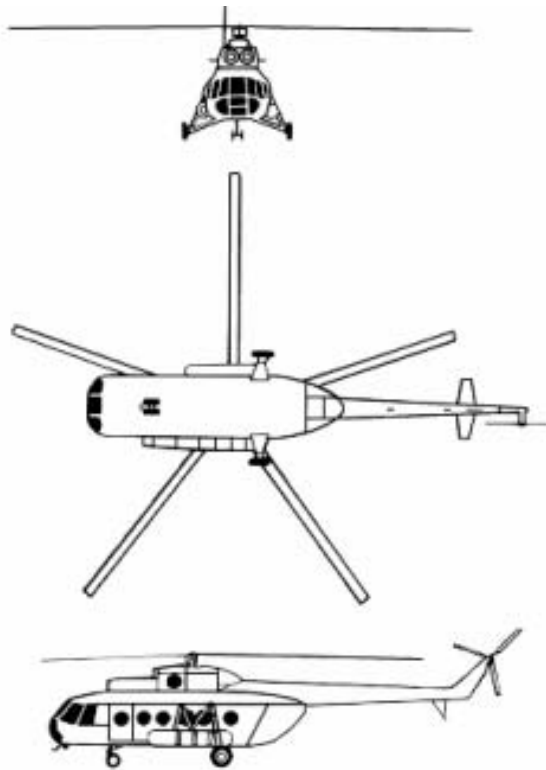
USER COUNTRIES

Algeria, CIS, Egypt, Laos, Peru, Syria, Vietnam.





When first flown in 1957, the Mi-6 Hook was the world's largest rotary-wing aircraft. More than 800 of this heavy-lift helicopter were built before production ended in 1981.



Mi-8 HIP (Mil)

GENERAL DATA

Country of Origin----- CIS (formerly USSR).

Similar Aircraft-----Mi-17 Hip H, Puma, Mi-2 Hoplite, Super Frelon.

Crew-----Two (three with flight engineer).

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

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

Dimensions-----Length: 61 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.

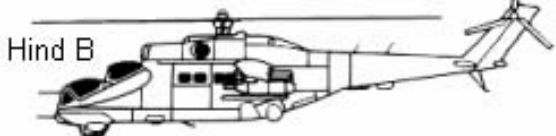
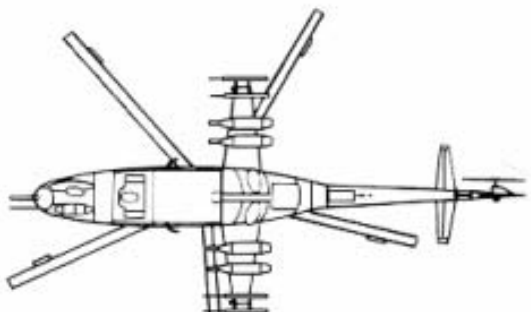
Tail----- Tail boom tapers to the small, swept-back, and tapered fin with rotor on top right or left. Small flats of the fin.

USER COUNTRIES

Armenia, Afghanistan, Algeria, Angola, Belarus, Bulgaria, Cambodia, CIS, Cuba, Czech Republic, Ethiopia, Georgia, Germany, Hungary, Iran, Libya, Mongolia, Mozambique, Nicaragua, North Korea, Peru, Poland, Slovakia, South Yemen, Syria, Ukraine, Vietnam.



There are many variants of the Mi-8. Included in these are the Mi-9 Hip-G, the Mi-17 Hip-H, and the Mi-171. More than 10,000 Hips have been manufactured since being introduced in 1962.



Mi-24 HIND (Mil)

GENERAL DATA

Country of Origin---- CIS (formerly USSR).

Similar Aircraft-----AH-1 Cobra,UH-60 Black Hawk, AH-64 Apache, Mangusta A129.

Crew-----Two.

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.

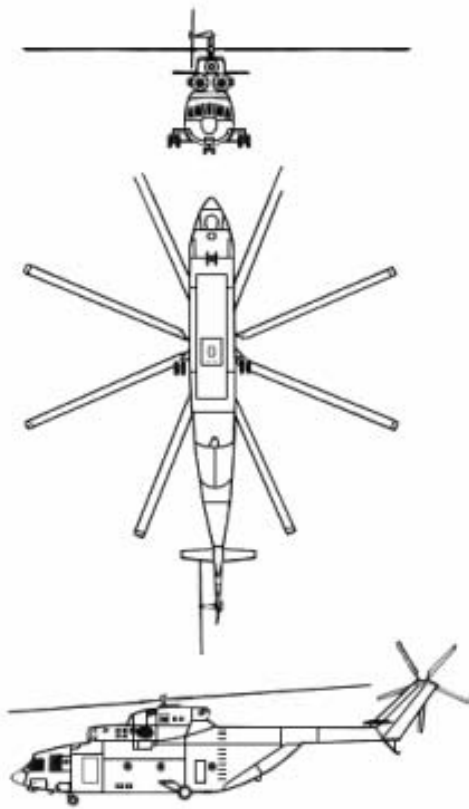
Tail. Swept-back, tapered fin with rotor on right on some models. Tapered flats on boom just forward of the fin.

USER COUNTRIES

Armenia, Afghanistan, Algeria, Angola, Belarus, Bulgaria, Cambodia, CIS, Cuba, Czech Republic, Ethiopia, Georgia, Germany, Hungary, Iran, Libya, Mongolia, Mozambique, Nicaragua, North Korea, Peru, Poland, Slovakia, South Yemen, Syria, Ukraine, Vietnam.



The Mi-24 Hind is a heavily armored assault and gunship helicopter which has been built in very large numbers. There are several versions of the Hind including the export version known as the Mi-25 and Mi-35.



Mi-26 HALO (Mil)

GENERAL DATA

Country of Origin-----CIS (formerly USSR).

Similar Aircraft-----Mi-6 Hook.

Crew-----Four.

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.

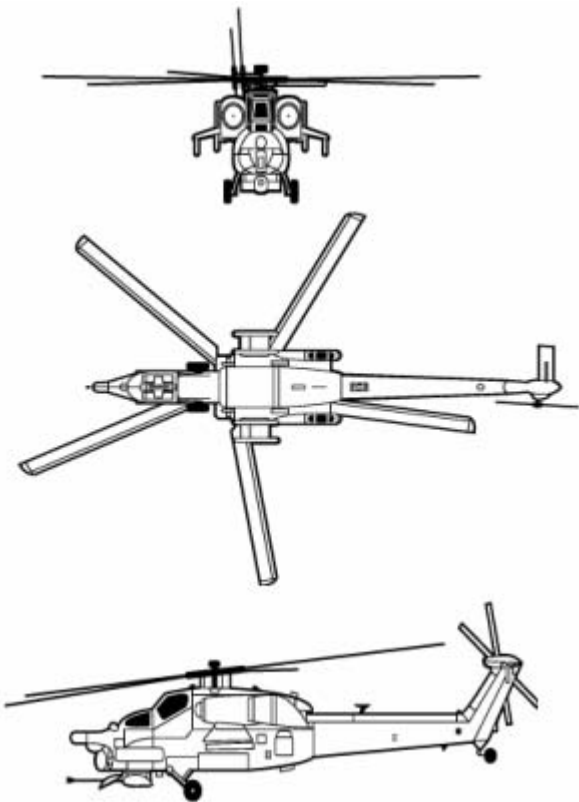
Tail-----Swept-back, slightly tapered fin with large rotor on right side. Flats are forward-tapered and low-mounted on leading edge of the fin.

USER COUNTRIES

India, CIS.



The Mi-26 Halo is the world's heaviest helicopter. It is also the first helicopter with an eight-blade rotor. First flown in 1977, the Halo became fully operational in 1983.



Mi-28 HAVOC (Mil)

GENERAL DATA

Country of Origin-----CIS (formerly USSR).

Similar Aircraft-----Mangusta A129, AH-64 Apache, AH-1F Cobra.

Crew-----Two.

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, apered, 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.

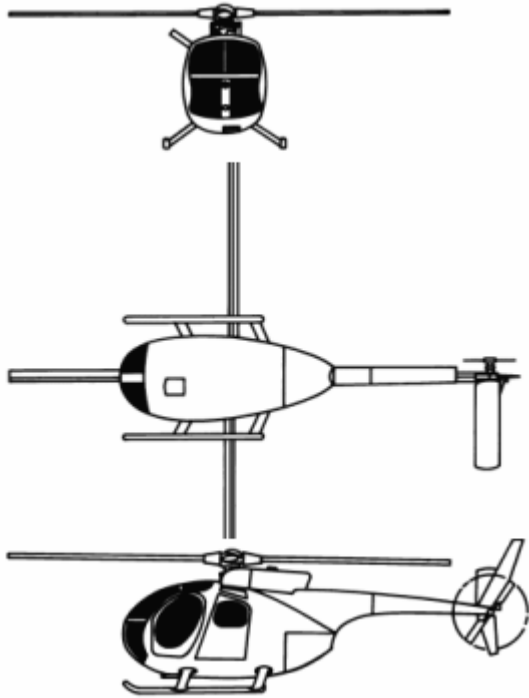
Tail-----Tapering tail boom to swept-back fin. Flat high-mounted on the fin. Rotor mounted on right.

USER COUNTRY

CIS.



The Mi-28 Havoc is a new-generation attack helicopter that will be an air-to-air and air-to-ground partner for the Mi-24 Hind and Ka-50 Hokum.



OH-6A CAYUSE (HUGHES)

GENERAL DATA

Country of Origin---- USA.

Similar Aircraft-----Defender 500MD, BO 105.

Crew-----One.

Role-----Observation, liaison.

Armament-----Usually none. Hardware available for minigun 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.

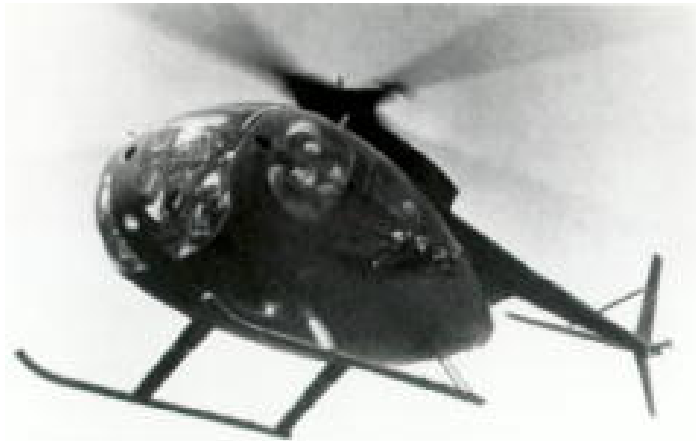
Engine(s)---One turboshaft located on the top rear of the fuselage.

Fuselage---Teardrop-shaped with round, glassed-in cockpit. Upswept rear section. Skid-type landing gear.

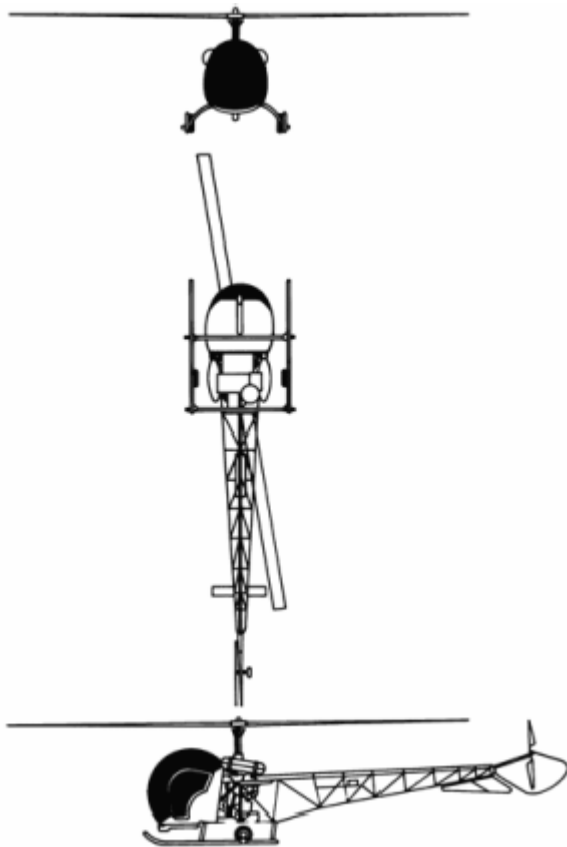
Tail-----Y tail. Thin, tapering tail boom. Rotor on the left attached to the tail boom.

USER COUNTRIES

Brazil, Japan, Nicaragua, USA.



There are several different identification features between the Cayuse and Hughes Model 500 series. Among the differences are: The OH-6 has a Y tail and the 500 has a T tail; the OH-6 has a four-blade main rotor, and the 500 has a five-blade main motor.



OH-13 SIOUX (BELL)

GENERAL DATA

Country of Origin---USA.

Similar Aircraft.---- Alouette II, Alouette III, Gazelle, Scout/Wasp.

Crew.-----One.

Role.----- Utility, observation.

Armament.-----Minigun, rocket pods.

Dimensions.----- Length: 31 ft, 7 in (9.64 m).
Rotor diameter: 37 ft (11.32 m).

WEFT DESCRIPTION

Wings----- Dual-blade main rotor located above body midsection behind the cockpit.

Engine(s)--One piston engine located inside latticework midsection behind the cockpit.

Fuselage----Round (goldfish bowl), glassed-in cockpit. Open-grid midsection and tail boom tapers to the rear. Belly fin. Skids with movable wheels attached for handling.

Tail-----Small, rectangular flats. Small rotor centered at end of boom with rotor guard.

USER COUNTRIES

Brazil, Colombia, Spain, Thailand, Turkey, Uganda, USA.



The Bell Model 47 first flew in 1945. First production models were ordered for service with the US Army and US Navy. Several versions have been built for military service in many countries. All have goldfish-bowl cabins and open tail booms.

OH-58D KIOWA (BELL)

GENERAL DATA

Country of Origin---USA.

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

Crew-----Two.

Role-----Utility, scout, observation.

Armament-----7.62-mm minigun.

Dimensions-----Length: 31 ft (9.45 m). Rotor diameter: 33 ft, 4 in (10.16 m).

WEFT DESCRIPTION

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

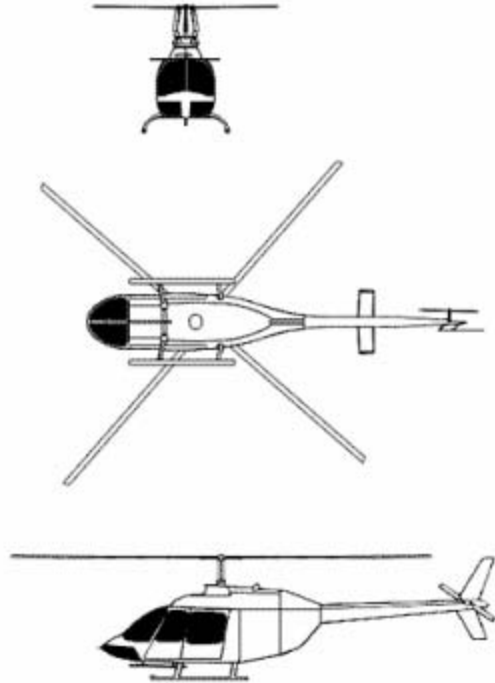
Engine(s)-One engine on top rear of midsection in a hump-like fairing.

Fuselage--Oval body, pointed nose, 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.

USER COUNTRIES

Australia, Austria, Bangladesh, Brunei, Canada, Chile, Colombia, Guatemala, Guyana, Jamaica, Japan, Kenya, Libya, Morocco, Nepal, Oman, North Yemen, Saudi Arabia, South Korea, Sri Lanka, Tanzania, Thailand, United Arab Emirates, USA, Venezuela.





The OH-58 Kiowa first flew in 1966. More than 2,200 Kiowas were built between 1969 and 1974. Many of these Kiowas have been upgraded to improved standards. The latest of these upgrades is the OH-58D standard, which features a four-blade main rotor instead of the previous two-blade main rotor.

PAH-2 TIGER (EUROCOPTER)

GENERAL DATA

Country of Origin---Germany, France.

Similar Aircraft-----AH-1 Cobra, AH-64 Apache.

Crew-----Two.

Role-----Scout, anti-tank, fire support, escort.

Armament----- 12.7-mm guns, rockets, missiles.

Dimensions-----Length: 49.21 ft (15.00 m).
Rotor diameter: 51.84 ft, 4 in (15.80m).

WEFT DESCRIPTION

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

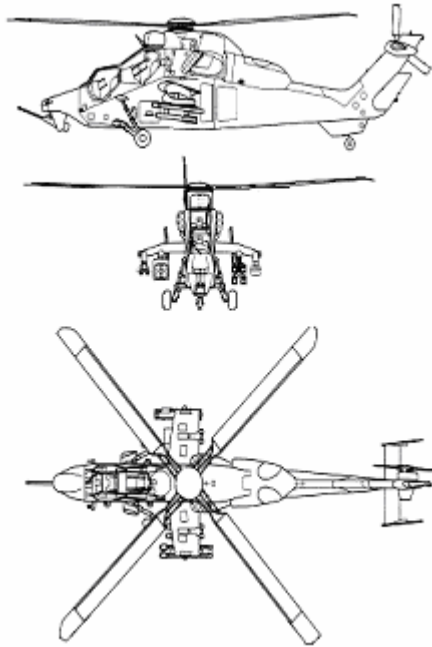
Engine(s)-One turboshaft engine on top rear of midsection in a hump-like fairing.

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.

USER COUNTRIES

Germany, France.





The PAH-2 Tiger will become the pivot stone of the German and French air arms when the first of 427 of these anti-tank, escort Scout and fire support aircraft are delivered. This system will be developed in three variants and will be able to operate in all weather and NBC conditions.

PUMA (AEROSPATIALE, WESTLAND)

GENERAL DATA

Countries of Origin--- France, UK.

Similar Aircraft----- Super Frelon, SH-3 Sea King, CH- 53 Sea, Stallion, Mi-8 Hip, UH-60 Black Hawk.

Crew-----Two.

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.

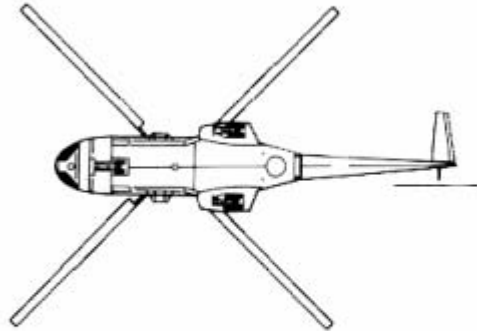
Engine(s). Two turboshaft engines mounted on top of fuselage midsection giving the helicopter a humpbacked appearance.

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.

USER COUNTRIES

Algeria, Argentina, Belgium, Brazil, Chad, Chile, Djibouti, Ecuador, France, Gabon, Germany, Iceland, Indonesia, Ivory Coast, Jordan, Kenya, Kuwait, Lebanon, Libya, Malawi, Mexico, Morocco, Nepal, Nigeria, Oman, Pakistan, Panama, Philippines, Portugal, Senegal, Singapore, South Africa, Spain, Sudan, Switzerland, Togo, United Arab Emirates, UK, Zaire.





Designed as a medium transport helicopter, the Puma entered service in 1969. A total of 692 Pumas were built before production ended in 1984.

SCOUT, WASP (WESTLAND)

GENERAL DATA

Country of Origin---UK.

Similar Aircraft----- Alouette II, Alouette III, Gazelle, OH-13 Sioux.

Crew----- One.

Role----- Utility.

Armament----- Accommodations for antitank missiles, cannon, rockets.

Dimensions----- Length: 30 ft, 4 in (9.26 m).
Rotor diameter: 32 ft, 3 in (9.84 m).

WEFT DESCRIPTION

Wings----- Four-blade main rotor mounted on a shaft behind the cabin and between the cabin and engine.

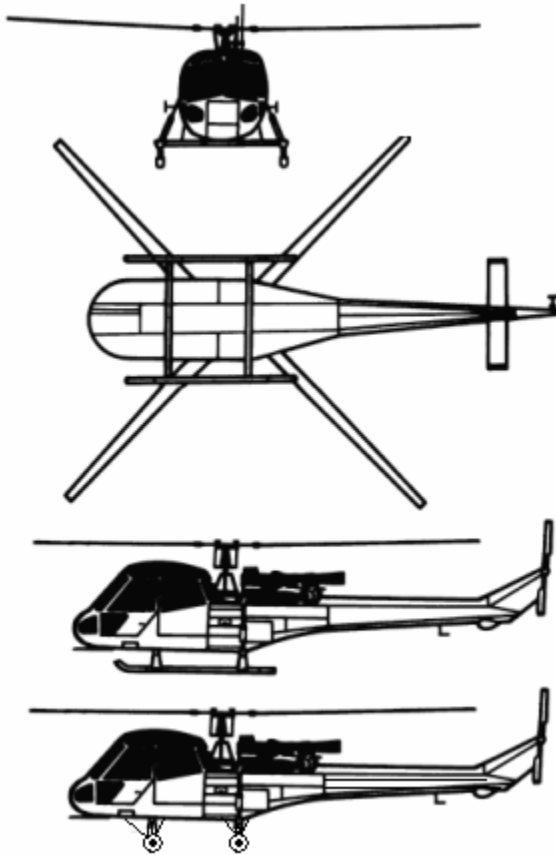
Engine(s)---One turboshaft mounted behind rear of cabin (exposed).

Fuselage---Rounded nose, stepped-up, glassed-in cockpit, including top; slightly tapered rear section. Fixed landing gear.

Tail-----Swept-back, tapered fin with small rotor on the left. Rectangular flats (Army version) mounted to the underside of boom below the fin.

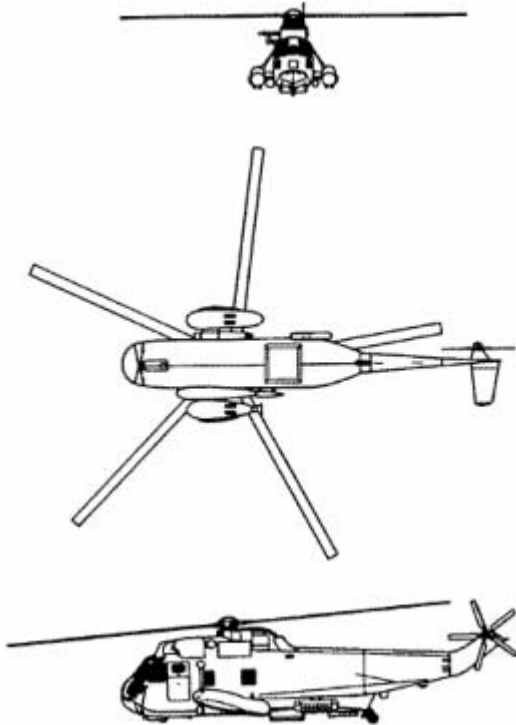
USER COUNTRIES

Brazil, Indonesia, Malaysia, New Zealand, UK.





The Scout was first flown in 1958. The UK army took delivery of about 150 Scouts, which were fitted with a skid undercarriage. The Royal Navy received its first deliveries of Wasps in 1963. This version has a wheeled undercarriage and a single tail flat on the right side of the tail boom.



SH-3 SEA KING (SIKORSKY)

GENERAL DATA

Country of Origin--- USA.

Similar Aircraft----- CH-53 Sea Stallion, Super Frelon, Puma.

Crew-----Two on flight deck; two in main cabin.

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.

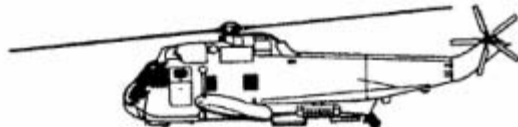
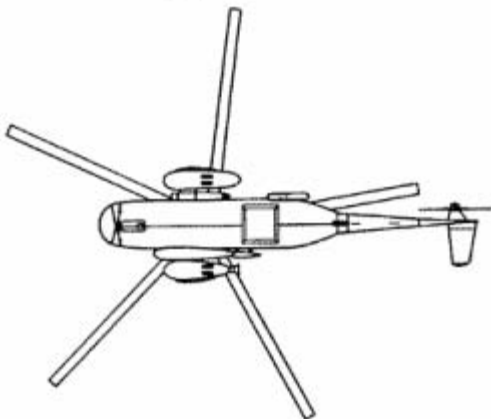
Tail-----Swept-back fin is tapered. Rotor on left side. Single flat is tapered with square tip mounted at the top right side of fin.

USER COUNTRIES

Argentina, Australia, Belgium, Brazil, Canada, Egypt, Germany, India, Iran, Italy, Norway, Pakistan, Peru, Spain, UK, USA.



The SH-3D King is a standard antisubmarine helicopter of the US Navy. 105 SH-3As were converted to utility duties by removing antisubmarine warfare equipment and adding a minigun for protection in combat search and rescue missions.



SUPER FRELON (AEROSPATIALE)

GENERAL DATA

Country of Origin---- France.

Similar Aircraft----- Puma, SH-3 Sea King, CH-53 Sea Stallion, Mi-8 Hip.

Crew----- Two on flight deck; three in main cabin.

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.

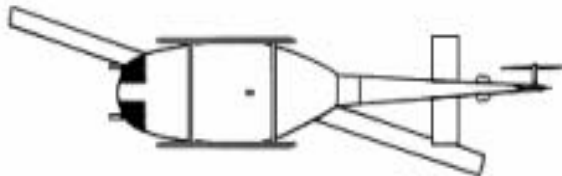
Tail----- Boom tapers from main body to swept-back, tapered fin. Rotor on left. Single, tapered, and flat-mounted on the right side of fin.

USER COUNTRIES

France, Israel, Libya, People's Republic of China, Zaire.



The Super Frelon first flew in 1962. The Super Frelon was produced in a civilian transport version and military transport, anti-submarine, and anti-ship versions.



UH-1 IROQUOIS (BELL)

GENERAL DATA

Country of Origin--- USA.

Similar Aircraft----- OH-58 Kiowa, Lynx, Hirundo A109.

Crew.-----Two.

Role----- Utility transport (seven equipped troops).

Armament----- Missiles, rockets, machine guns.

Dimensions----- Length: 42 ft (12.79 m).
Rotor diameter: 48 ft (14.64 m).

WEFT DESCRIPTION

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

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

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

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

USER COUNTRIES

Argentina, Australia, Austria, Bolivia, Brazil, Burma, Canada, Chile, Colombia, Ecuador, El Salvador, Ethiopia, Finland, Germany, Greece, Guatemala, Honduras, Indonesia, Iran, Italy, Israel, Japan, Malta, Mexico, Morocco, New Zealand, North Yemen, Norway, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Saudi Arabia, Singapore, Somalia, South Korea, Spain, Suriname, Taiwan, Tanzania, Thailand, Tunisia, Turkey, Uganda, United Arab Emirates, Uruguay, USA, Venezuela, North Yemen, Zambia.



Flying for the first time in 1956, the UH-1 Iroquois became the first turbine-powered aircraft ordered by the US Army. Over 3,000 were built and is in use by 52 countries. The UH-1 is more commonly known by its nickname "Huey".



UH-60A BLACK HAWK (SIKORSKY)

GENERAL DATA

Country of Origin---USA.

Similar Aircraft----- Hirundo A109, Mi-24 Hind, Mi-8 Hip, Puma.

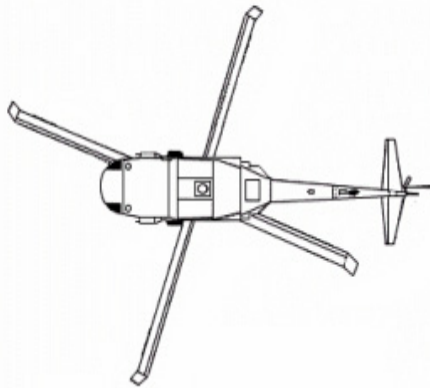
Crew-----Two.

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.

USER COUNTRIES

Colombia, Israel, Spain (SH-60), USA.





Originally designed as a US Army combat assault helicopter, the first production UH-60 Black Hawk made its maiden flight in 1978. Since that time numerous versions of the Black Hawk have been deployed. Some versions of the Black Hawk can be equipped with an External Stores Support System. This system appears as stub wings and is capable of carrying external fuel tanks or a variety of weapons.

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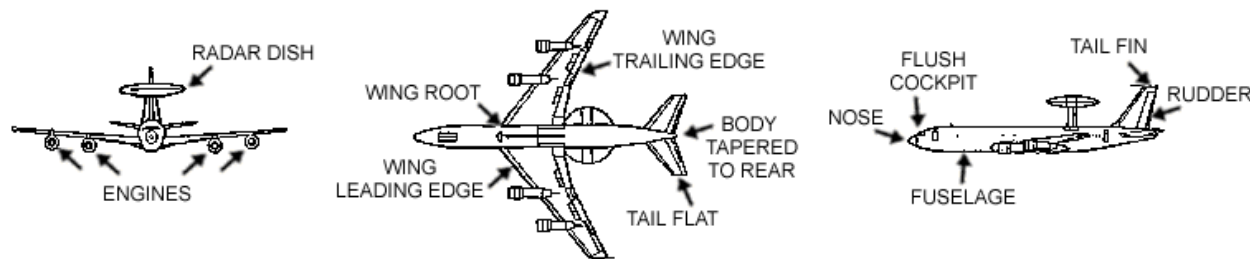


Chapter 11

Early Warning, Observation, and Reconnaissance Aircraft

This chapter features early warning, observation, and reconnaissance aircraft that are built and used for special purposes. There are aircraft shown in other chapters that can and are used in these roles, but not as the aircraft's primary mission. Some aircraft covered in this chapter are high-flying and will not be seen within range of FAAD guns and missiles. Other types shown will be within range and operating low enough to be recognized for an engagement decision. For each aircraft, there are line drawings, general data, WEFT descriptions, user countries, photographs, and aircraft manufacturer information. The following illustration shows early warning, observation, and reconnaissance aircraft WEFT description features. Line drawings are not to scale.

WEFT DESCRIPTION FEATURES



A-50 MAINSTAY (ILYUSHIN)

GENERAL DATA

Country of Origin----CIS (formerly USSR).

Similar Aircraft-----E-3 Sentry.

Crew-----Seven.

Role----- AEW, control.

Armament-----Tail turret.

Dimensions-----Length: 152 ft, 8 in (46.5 m).
Span: 165 ft, 6 in (50.5 m).

WEFT DESCRIPTION

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

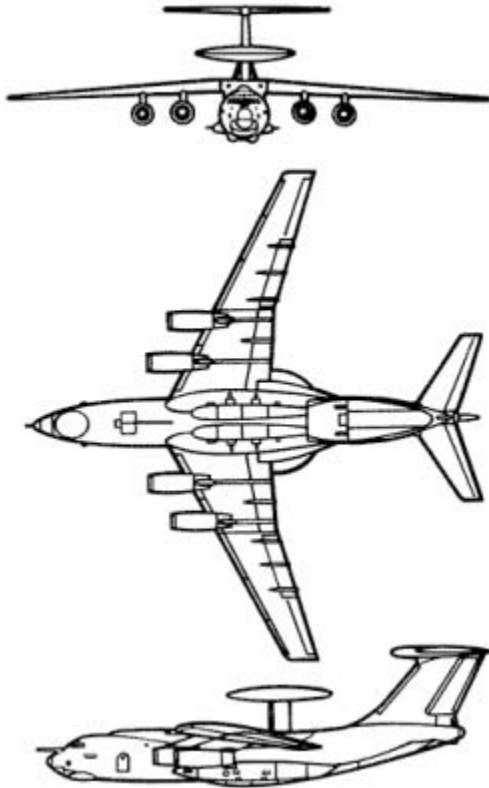
Engine(s)--- Four turbofans mounted on pylons under and extending beyond the wings' leading edges.

Fuselage----Long, round tapering to the rear with a radome on the chin. Saucer type radome on top of the aircraft. Stepped-up cockpit.

Tail----- Flats swept-back and tapered with blunt tips high-mounted on the swept-back, tapered fin, forming a T.

USER COUNTRY

CIS.





Developed from the IL-76 Candid, the Mainstay retains all the same features except the addition of the radome on top of the fuselage.

E-2C HAWKEYE (GRUMMAN)

GENERAL DATA

Country of Origin-----USA.

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

Crew----- Five.

Role-----AEW.

Armament-----None.

Dimensions-----Length: 57 ft, 6 in (17.53 m).
Span: 80 ft, 6 in (24.6 m).

WEFT DESCRIPTION

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

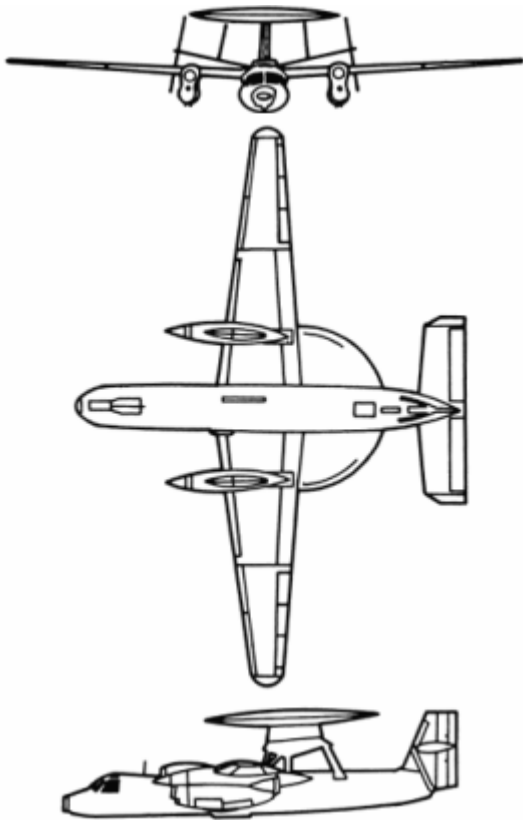
Engine(s)---Two turboprops mounted under the wings. Engines extend well beyond the wings' leading edges.

Fuselage-----Oval that tapers to the rear. Rounded nose. Stepped-up cockpit. Large radome.

Tail-----Four fins (two fins are mounted on the tips of the flats and extend below the flats; the two inside fins are mounted on top of the flats). Flats are high-mounted on the fuselage and have a positive slant.

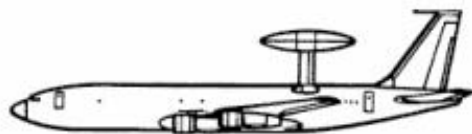
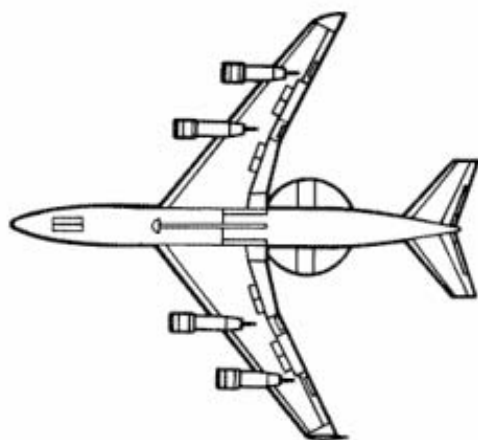
USER COUNTRIES

Egypt, Israel, Japan, Singapore, USA.





The Hawkeye is a carrier-borne aircraft. The aircraft has a huge radome mounted on top of the fuselage. The transport version is the C-2A Greyhound which can carry about 40 passengers.



E-3A SENTRY (BOEING)

GENERAL DATA

Country of Origin-----USA.

Similar Aircraft-----A-50 Mainstay.

Crew-----Seventeen.

Role-----AWACS.

Armament-----None.

Dimensions----- Length: 152 ft, 9 in (46.6 m).
Span: 154 ft, 7 in (44.4 m).

WEFT DESCRIPTION

Wings-----Low-mounted, swept-back, and tapered with a positive slant. An electronics pod is mounted on the right wing-tip.

Engine(s)---Four turbojets mounted on pylons under the wings. Engines extend well forward of the wings' leading edges.

Fuselage-----Round, cigar-shaped, tapers to the rear. Rounded nose, stepped-up cockpit. Large radome on top of the body between the wings and tail section.

Tail-----Swept-back, tapered fin with a square tip. Flats are swept-back, tapered, and mid-mounted on the fuselage.

USER COUNTRIES

Israel, Luxembourg (NATO), Saudi Arabia, USA.



The Airborne Warning and Control System (AWACS) is an air defense operations center in the sky. The sentry's crew tracks multiple hostile targets and directs fighters to them.



EA-6B PROWLER (GRUMMAN)

GENERAL DATA

Country of Origin-----USA.

Similar Aircraft-----Hunter.

Crew-----Four.

Role-----ECM.

Armament-----HARM.

Dimensions-----Length: 59 ft 10 in (18.24 m).
Span: 53 ft (16.15 m).

WEFT DESCRIPTION

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

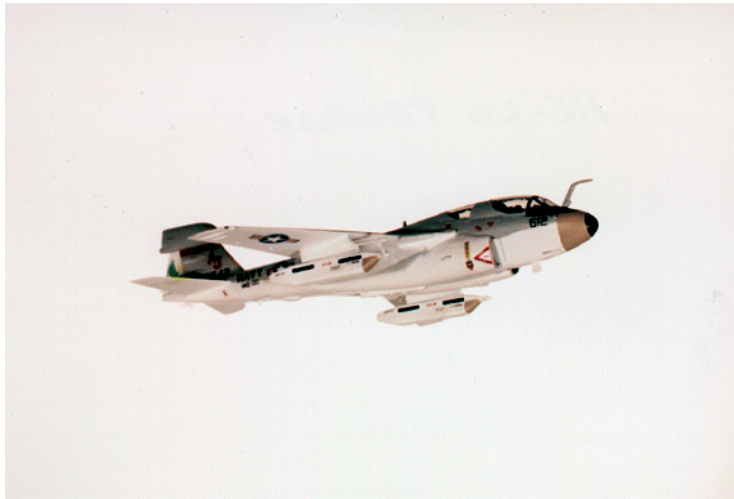
Engine(s)---Two turbojets mounted on body midsection. Semicircular air intakes below and forward of the wing roots. Exhausts are in the trailing edges of the wing roots.

Fuselage-----Teardrop-shaped with a rounded nose. Body tapers to the rear section. Long, stepped canopy with added enclosure for ECM operators.

Tail-----Unequally tapered tail fin with ECM pod at the top. There is a small fairing in the leading edge. Swept-back, tapered tail flats high-mounted on the fuselage with blunt tips.

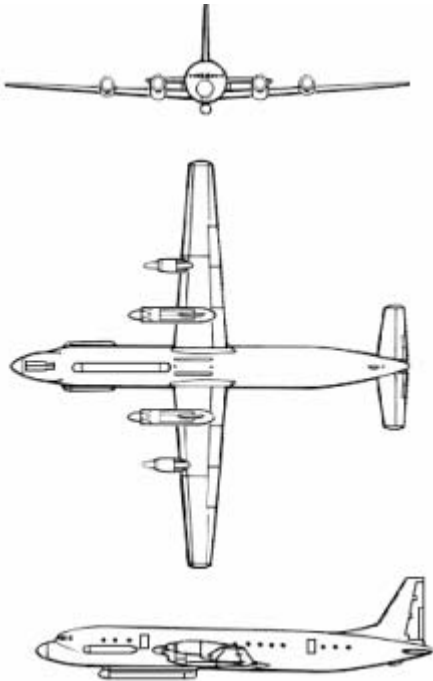
USER COUNTRY

USA.



The Prowler is an advanced ECM aircraft that was used extensively in the Persian Gulf War. Another version of this aircraft was the A-6 Intruder which was used in the Viet-nam war and then retired.

IL-20 COOT (ILYUSHIN)



GENERAL DATA

Country of Origin----- CIS (formerly USSR).

Similar Aircraft-----P-3C Orion, An-24 Coke, An-12 Cub.

Crew----- Five.

Role----- Electronics surveillance.

Armament----- None.

Dimensions----- Length: 117 ft, 9 in (35.9 m).
Span: 122 ft, 7 in (37.4 m).

WEFT DESCRIPTION

Wings-----Low-mounted and unequally tapered with blunt tips and positive slant.

Engine(s)----- Four turboprops mounted in the wings and extending forward of the wings.

Fuselage----- Round, cigar-shaped tapered at the rear and a rounded nose. Stepped-up cockpit. Bulges on sides of fuselage aft of the cockpit. Pod carried on the fuselage bottom is a SLAR.

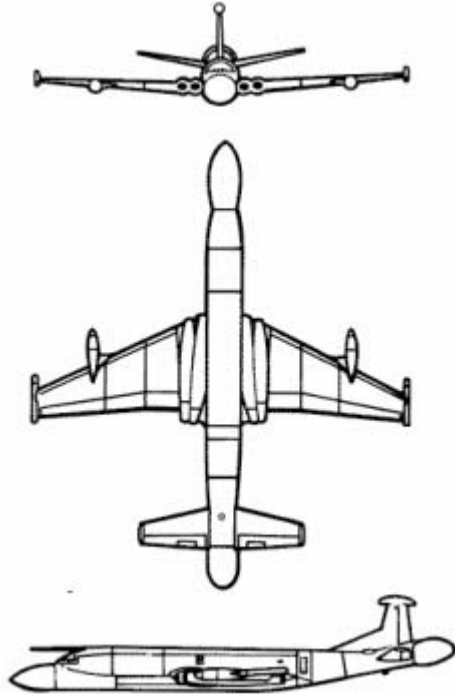
Tail-----Back-tapered fin with square tip. Equally tapered flats, mid-mounted on the fuselage.

USER COUNTRIES

Afghanistan (Il-18), CIS.



The IL-20 Coot first appeared in 1978. The Coot is in widespread use with the Russian naval air arm.



NIMROD AEW3 (BAe)

GENERAL DATA

Country of Origin----UK.

Similar Aircraft-----Nimrod, P-3C Orion.

Crew-----Twelve.

Role-----Surveillance, ASW.

Armament-----None.

Dimensions-----Length: 126 ft, 7 in (38.6 m).
Span: 114 ft, 8 in (35 m).

WEFT DESCRIPTION

Wings-----Low-mounted, swept-back, and tapered with blunt tips. Wide wing roots. External fuel tanks in wings extend beyond the wings' leading edges.

Engine(s)----Four turbojets mounted in the wing roots. Oval air intakes. Exhausts are to the rear of the trailing edges of the wings.

Fuselage----Cigar-shaped with rounded nose and tapered rear section. Rounded tail boom. Stepped cockpit.

Tail-----Fin is equally tapered with an ECM pod mounted at the top. Large angular fairing. Flats are high-mounted on the fuselage and back-tapered with a positive slant.

USER COUNTRY

UK.



This Airborne Early Warning aircraft was developed from the Nimrod MR2 which was developed from the Comet airliner. All three of which can be similarly recognized, although the AEW has the bulbous nose and tail boom that houses radar equipment.

P-3C ORION (LOCKHEED)

GENERAL DATA

Country of Origin-----USA.

Similar Aircraft-----Il-20 Coot, An-24 Coke, C-130 Hercules.

Crew-----Ten.

Role-----Reconnaissance, ASW.

Armament-----Torpedoes, depth charges.

Dimensions-----Length: 116 ft, 8 in (35.6 m).
Span: 99 ft, 7 in (30.4 m).

WEFT DESCRIPTION

Wings-----Low-mounted and forward tapered with blunt tips. Positive slant.

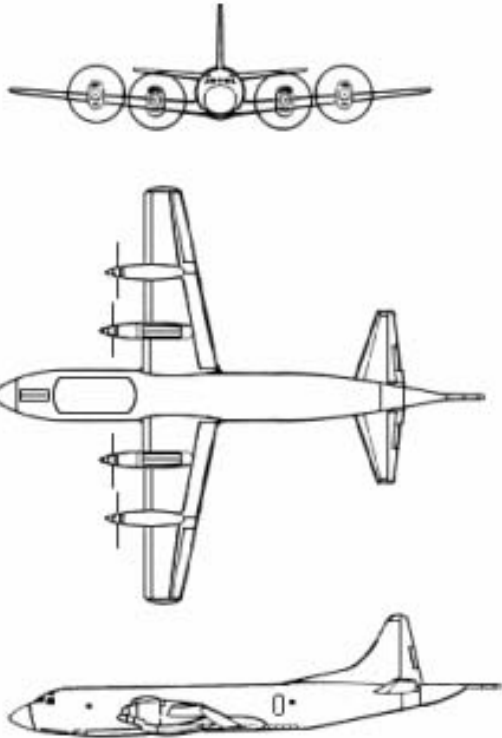
Engine(s)---Four turboprops mounted in the wings. Engine nacelles extend beyond the leading edges of the wings.

Fuselage---Cigar-shaped with rounded nose and stepped-up cockpit. Radar boom mounted on the rear of the tail.

Tail-----Fin is rounded and tapered with a curved fairing. Flats are high-mounted on the fuselage, equally tapered, and a positive slant.

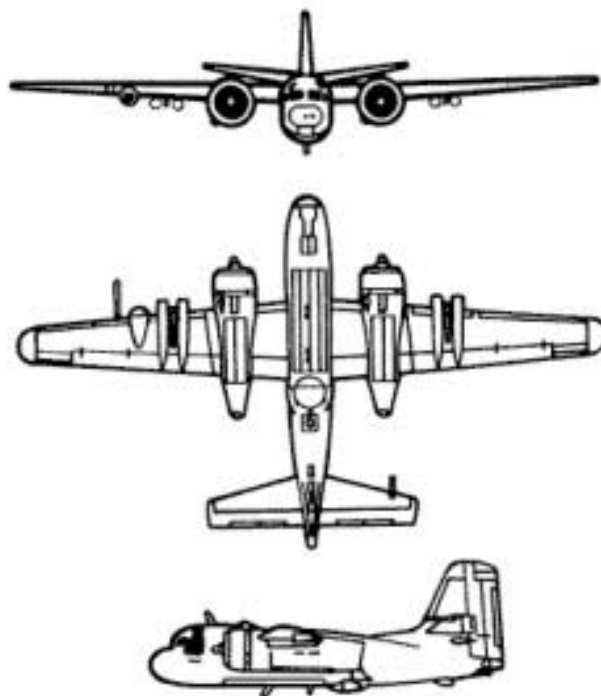
USER COUNTRIES

Australia, Canada, Iceland, Iran, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, USA.





The P-3 Orion is an anti-submarine and maritime patrol aircraft which first entered service in 1962. Several versions of the P-3 have been produced and purchased by other countries making it the most widely used aircraft in the ASW field.



S-2 TRACKER (GRUMMAN)

GENERAL DATA

Country of Origin-----USA.

Similar Aircraft-----S-3 Viking.

Crew-----Four.

Role-----Antisubmarine, reconnaissance.

Armament-----Torpedoes, depth charges, rockets.

Dimensions-----Length: 43 ft, 5 in (13.3 m).
Span: 72 ft, 5 in (22.1 m).

WEFT DESCRIPTION

Wings-----High-mounted and equally tapered with rounded tips.

Engine(s)---Two turboprops or piston engines mounted in the wings. Engine nacelles extend beyond the leading and trailing edges of the wings.

Fuselage-----Oval and club-shaped that tapers to the rear. Rounded nose, stepped-up cockpit, and radome on the belly.

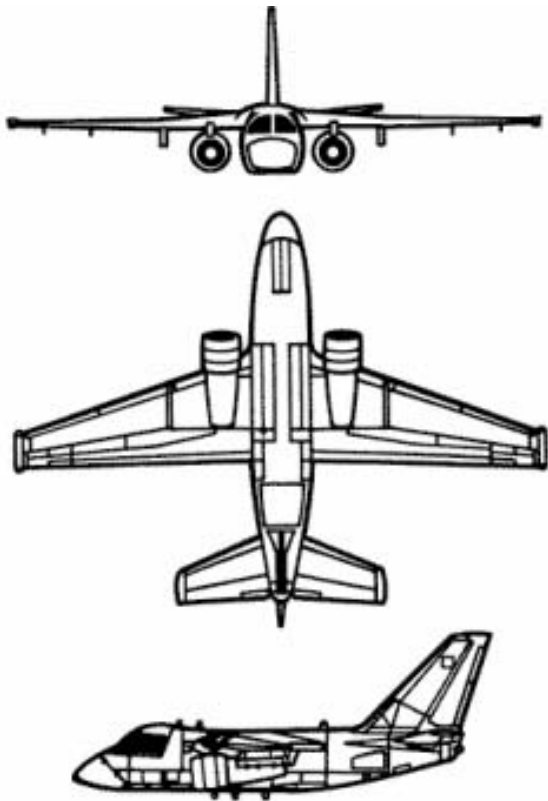
Tail-----Fin back-tapered with round tip and a curved fairing. Flats low-mounted on the fin and are back-tapered.

USER COUNTRIES

Argentina, Brazil, Canada, Lebanon, South Korea, Taiwan, Thailand, Turkey, Uruguay, USA, Venezuela.



The Tracker is used on land and on aircraft carriers. This antisubmarine aircraft was first flown in 1953 and more than 1,000 were produced. The passenger version is the C-1 Trader that can seat about 10 passengers.



S-3 VIKING (LOCKHEED)

GENERAL DATA

Country of Origin-----USA.

Similar Aircraft-----S-2 Tracker.

Crew-----Four.

Role-----ASW, transport.

Armament-----Torpedoes, depth charges, mines.

Dimensions-----Length: 53 ft, 3 in (16.2 m).
Span: 68 ft, 6 in (20.9 m).

WEFT DESCRIPTION

Wings-----High-mounted and back-tapered with electronic pods at the tips.

Engine(s)---Two turbofans mounted on pylons under the wings just outboard of the wing roots. Engines extend beyond the leading edges of the wings.

Fuselage-----Oval, club-shaped, and tapers to the rear. Rounded nose and a stepped-up cockpit.

Tail-----Fin swept-back and tapered with a square tip. Flats are back-tapered with blunt tips, high-mounted on the fuselage, and a positive slant.

USER COUNTRY

USA.



About 160 were produced since its sea trials in 1978. The KS-3A is the tanker version, and the US-3A is the cargo version.

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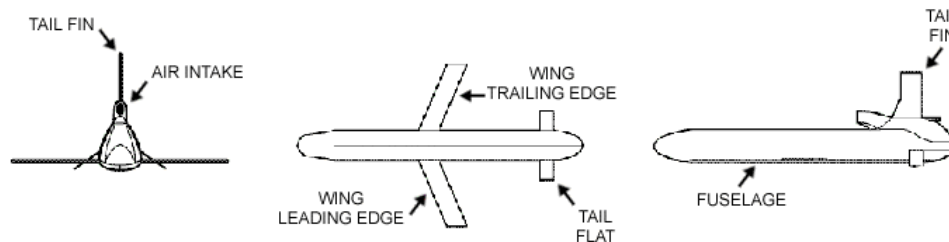


Chapter 12

Unmanned Aerial Vehicles and Cruise Missiles

This chapter shows examples of unmanned aerial vehicles (UAVs) and cruise missiles. UAVs will perform a variety of missions: reconnaissance, surveillance, intelligence, targeting, and acquisition. Cruise missiles are like artillery, which detonate at proximity, on command, or on impact. There are many more UAVs than can be listed here. For this manual, UAVs were grouped together based on similarities and roles. One, and in some cases, two, UAVs were selected from each group to be represented in this manual. For each, there are line drawings, general data, WEFT descriptions, user countries, photographs, and manufacturer information. The following illustration shows WEFT description features. Line drawings are not to scale.

WEFT DESCRIPTION FEATURES



APACHE CWS (MATRA)

GENERAL DATA

Country of Origin-----France.

Similar Aerial Platform---Tomahawk, AGM-86.

Role-----Cruise, air-to-ground attack.

Armament-----Submunitions and HE warhead.

Dimensions-----Length: 16 ft, 4 in (5.01 m).
Span: 8 ft, 3 in (2.53 m).

WEFT DESCRIPTION

Wings----- High-mounted on body, straight with square tips, and a slight negative slant.

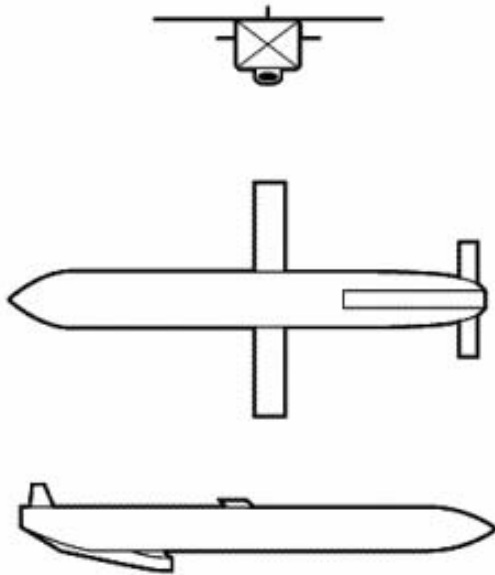
Engine(s)---Single turbojet mounted in rear of fuselage. Air intake in scoop beneath the rear section. Round exhaust in rear.

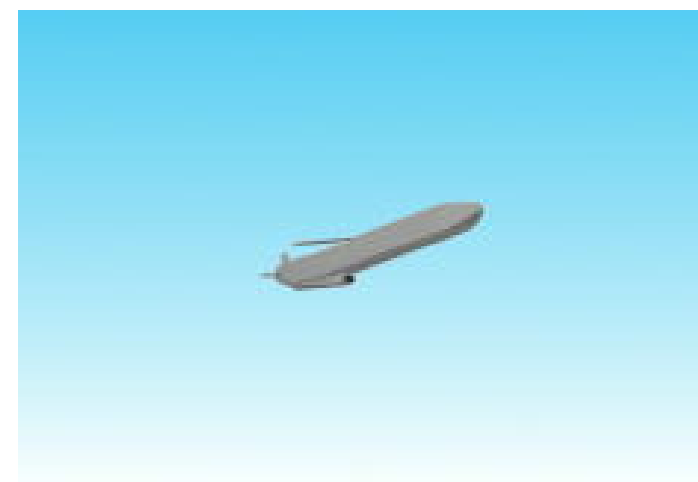
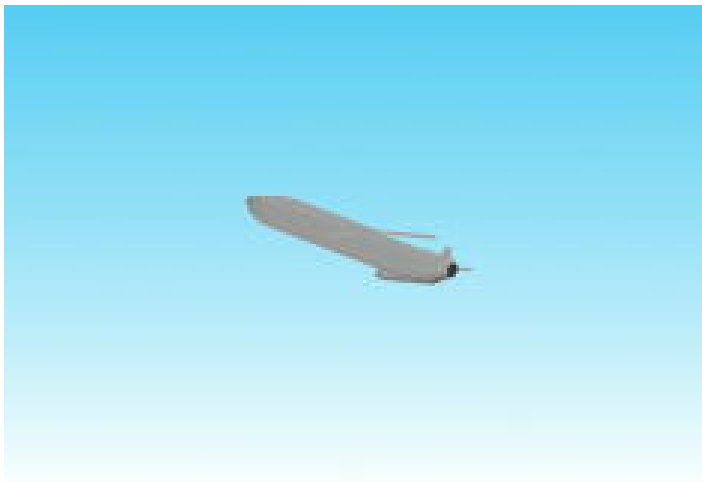
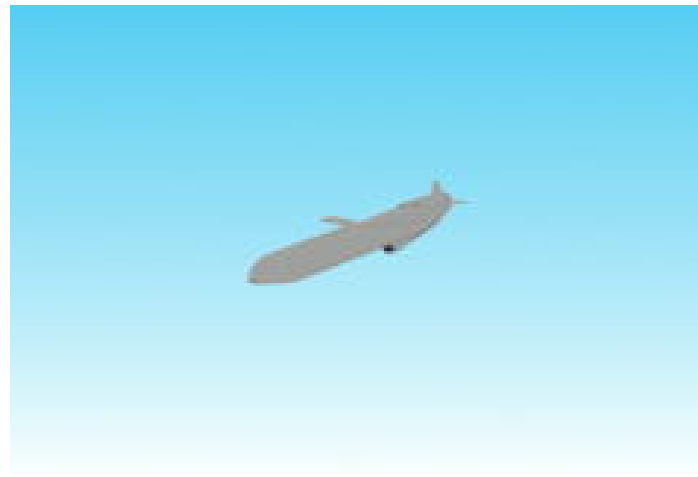
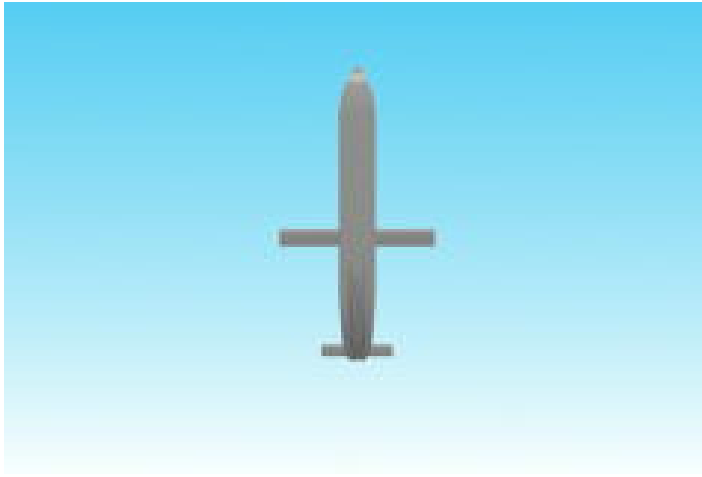
Fuselage---- Round, tapers to a pointed nose and a blunt rear. Radar in nose is not visible.

Tail-----Fin unequally tapered with square tip. Flats mid- to high-mounted on the fuselage, straight with square tips.

USER COUNTRY

France.





The Apache is both a short-range cruise missile and a weapons dispenser. It is similar in function to a guided missile and represents a new generation of air-to surface missile systems.

AS-4 KITCHEN (CIS)

GENERAL DATA

Country of Origin-----CIS.

Similar Aerial Platform---DR-3.

Role-----Long-range, radar-guided, air-to surface missile.

Armament-----350-kt nuclear or 1000-kg HE.

Dimensions----- Length: 37 ft (11.3 m).
Span: 9 ft, 8 in (3 m).

WEFT DESCRIPTION

Wings----- Mid-mounted, delta-shaped wings with square tips.

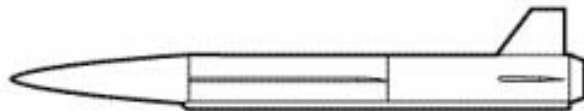
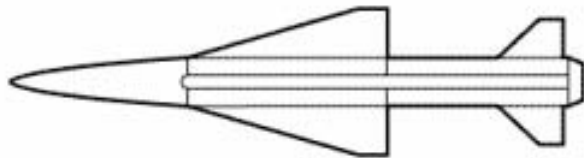
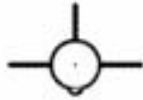
Engine(s)----- Liquid propellant with exhaust in the rear.

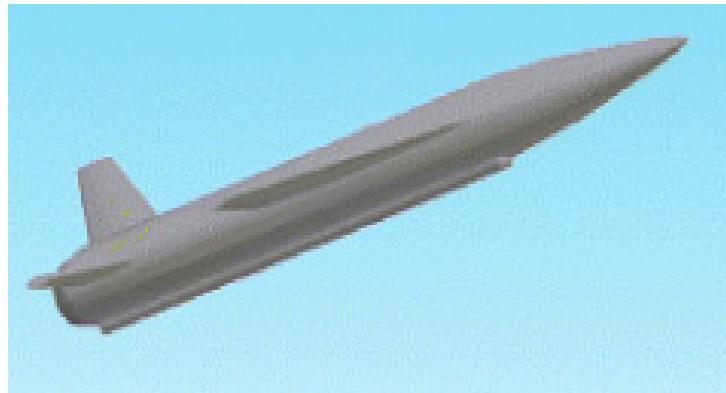
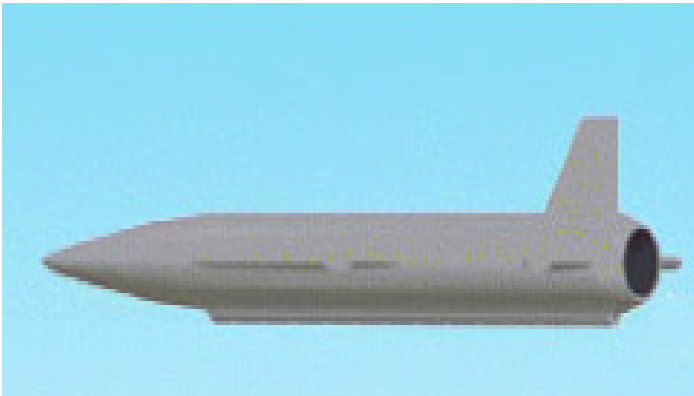
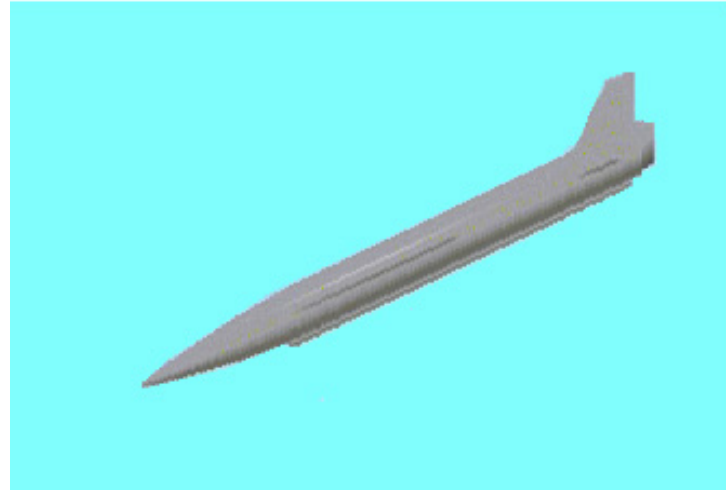
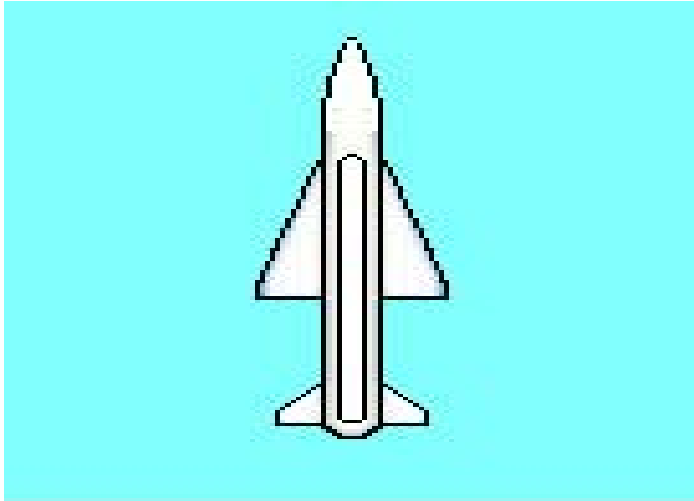
Fuselage----- Long, round, slender body that tapers to a pointed nose.
Fairing on the belly. Blunt rear.

Tail-----Flats mid-mounted on body, delta-shaped with square tips.
Fin back-tapered with a square tip.

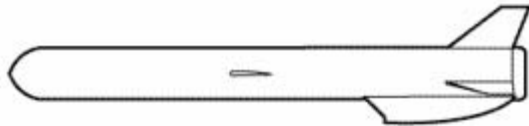
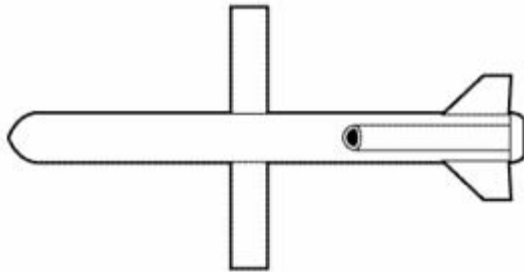
USER COUNTRY

CIS.





There have been at least three versions of this cruise air-to-ground missile produced since its initial development in the late 1950s and early 1960s. It is carried by the Tu-26 Backfire and Tu-95 Bear.



AS-15 KENT (CIS)

GENERAL DATA

Country of Origin-----CIS.

Similar Aerial Platform-----AS-4 Kitchen.

Role----- Air launched cruise missile (ALCM).

Armament-----200-kt nuclear.

Dimensions----- Length: 19 ft, 6 in (6 m).
Span: 10 ft, 1 in (3.1 m).

WEFT DESCRIPTION

Wings----- Mid-mounted on body, straight with square tips.

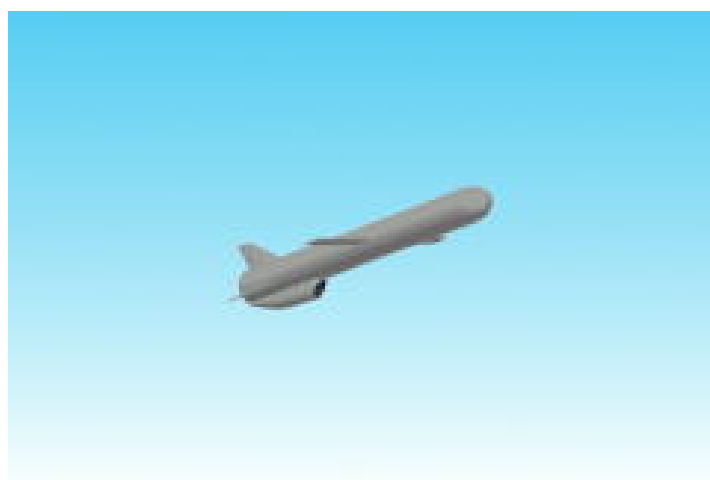
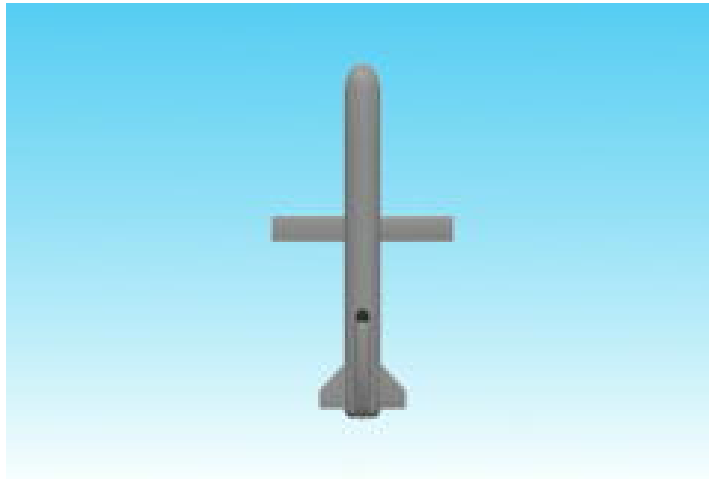
Engine(s)---- Single turbofan in rear body. Round air intake. Round exhaust.

Fuselage-----Long, round, rounded nose and blunt rear section.

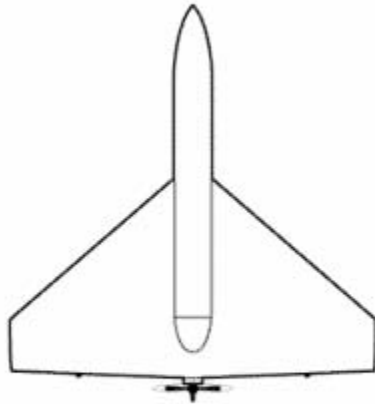
Tail-----Flats mid-mounted and back-tapered. Fin is swept-back and tapered.

USER COUNTRY

CIS.



The AS-15 Kent is an intermediate-range nuclear cruise missile. The Tu-95 Bear carries 16 missiles and the Tu-160 Blackjack carries 12 missiles.



BANSHEE BTT-3 (MEGGITT AEROSPACE)

GENERAL DATA

Country of Origin-----UK.

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

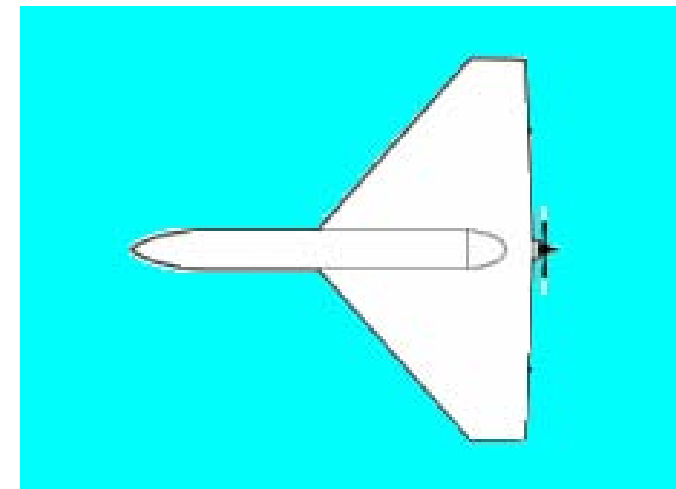
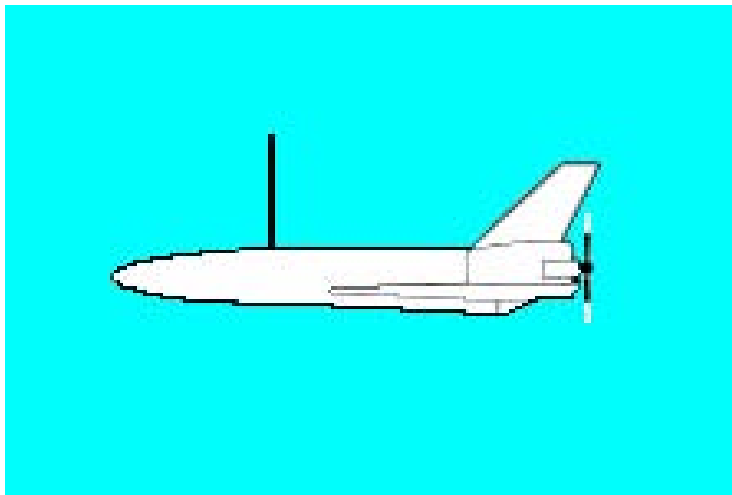
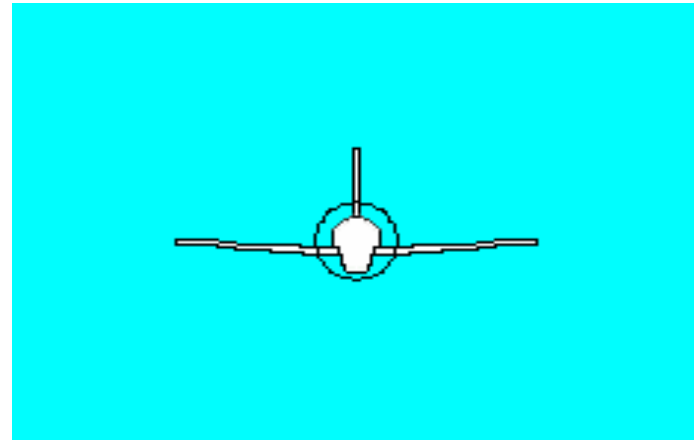
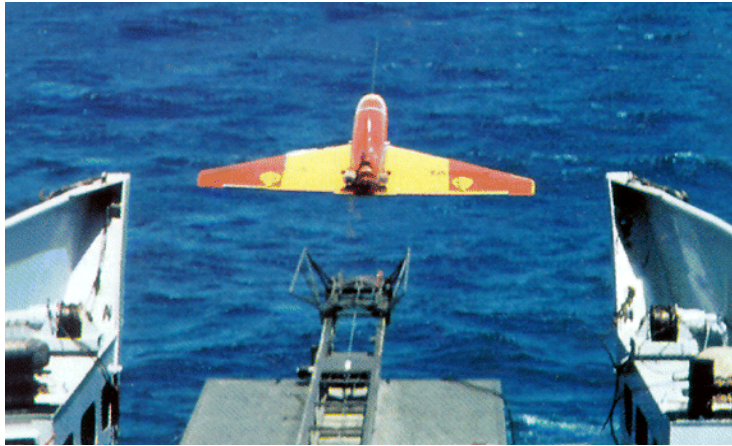
Engine(s)-----Single jet in rear. Single exhaust. May have prop-driven engine with prop at the rear in the opposing position.

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.

USER COUNTRIES

UK and over 20 other countries.



Banshee aerial target systems have achieved world acclaim and are used over land and sea by many countries to include eight NATO countries. Other similar aircraft include the Sarab 3 (Iran) and the CT 20 (France).

BREVEL (MATRA, MBB)

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.

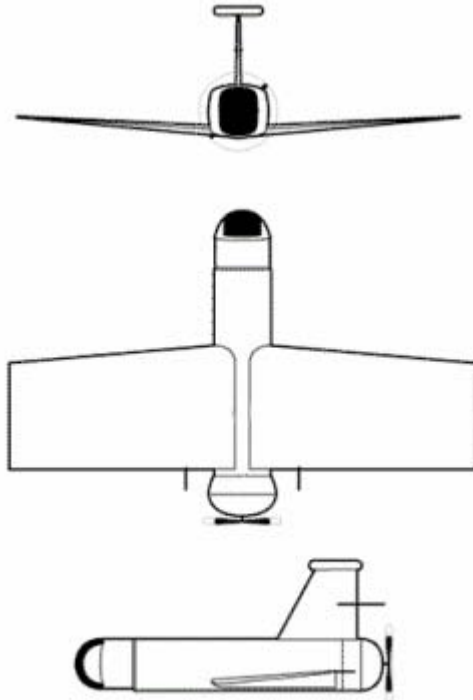
Engine(s)---One piston engine mounted on rear of fuselage in the opposing position.

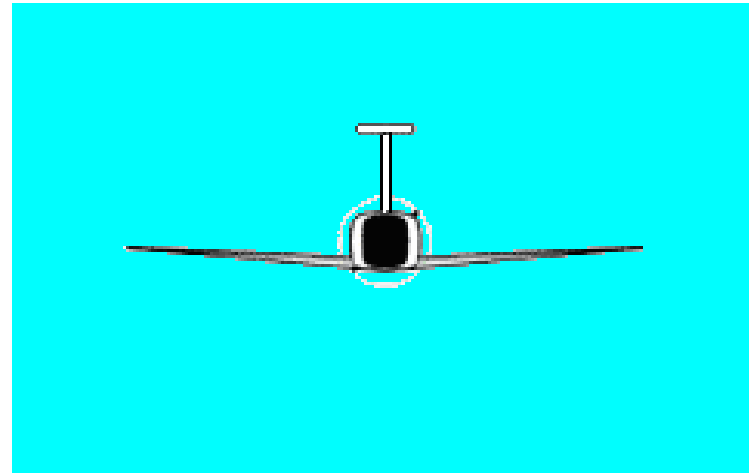
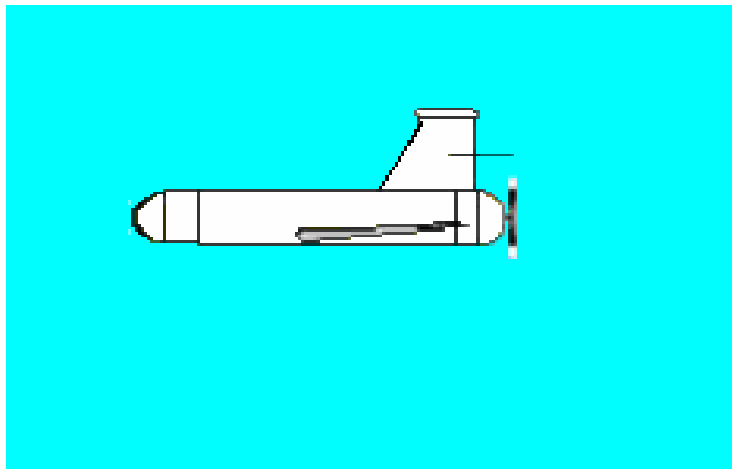
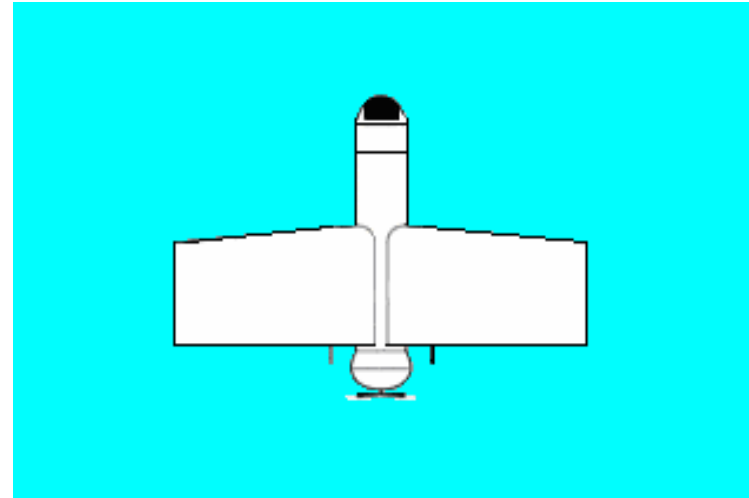
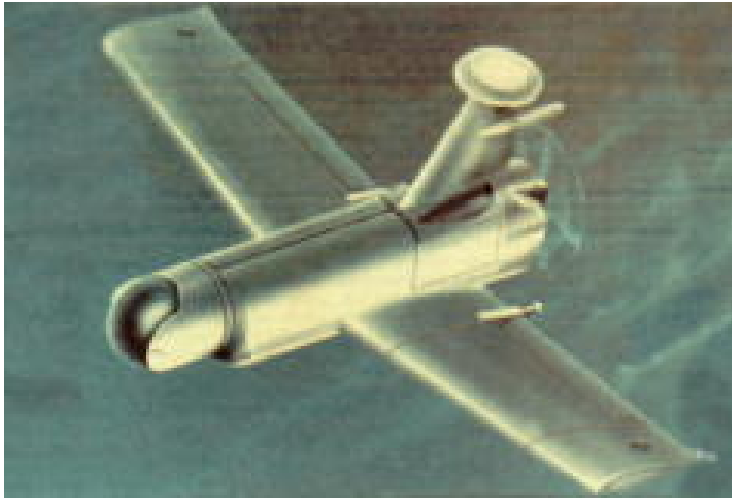
Fuselage----Round body. Rounded, glassed-in nose section.

Tail-----Back-tapered fin. Small, round radar dish on top. No flats.

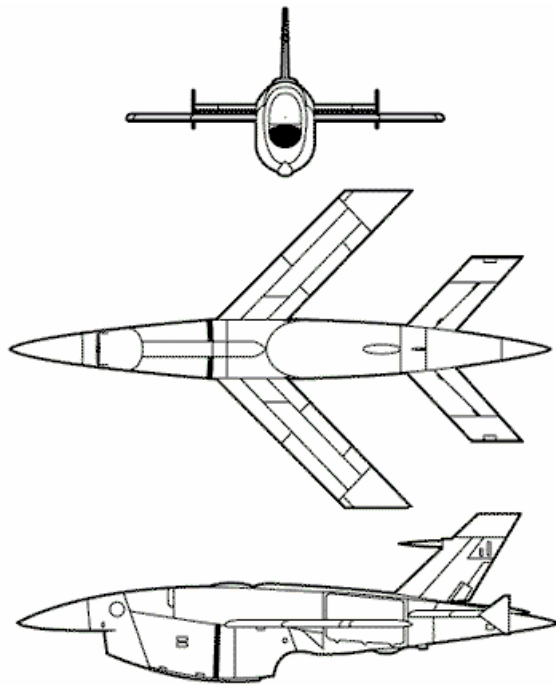
USER COUNTRIES

France, Germany.





The Brevet is designed to provide real-time observation, day or night, at distances of up to 100 Kilometers. This craft is also very resistant to jamming.



BQM-34 FIREBEE II (TELEDYNERYAN)

GENERAL DATA

Country of Origin-----USA.

Similar Aerial Platform----- D-3, I 24 I.

Role-----Reconnaissance, target.

Armament-----Usually none.

Dimensions-----Length: 22 ft, 10 in (6.98 m).
Span: 12 ft, 10 in (3.93 m).

WEFT DESCRIPTION

Wings-----Mid-mounted, swept-back, and untapered with angular tips.

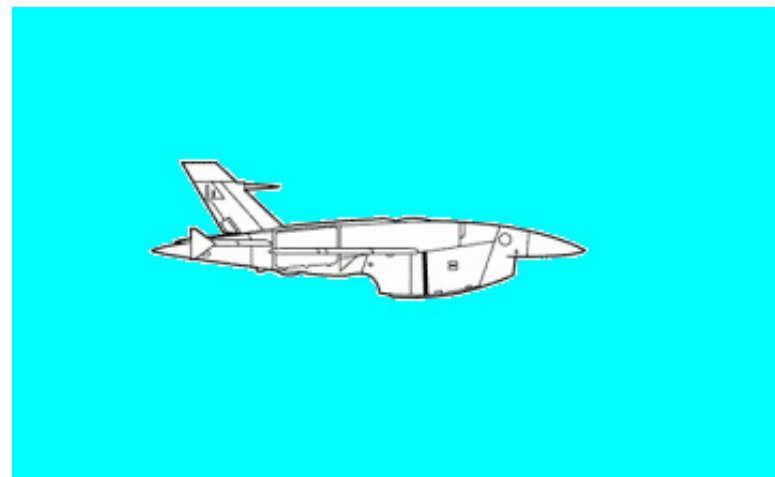
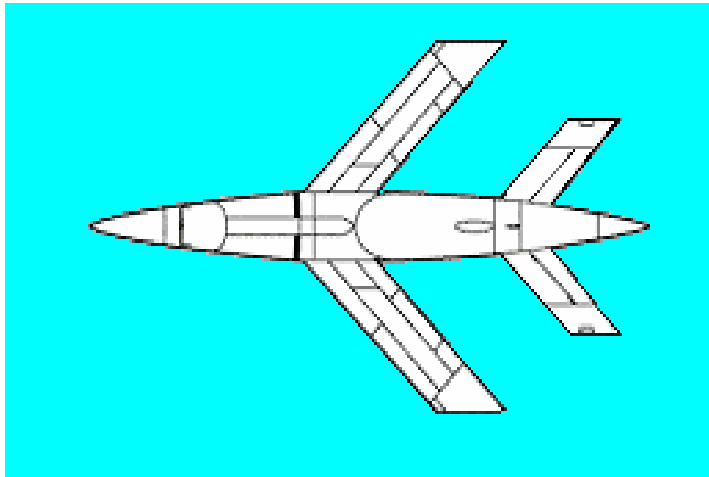
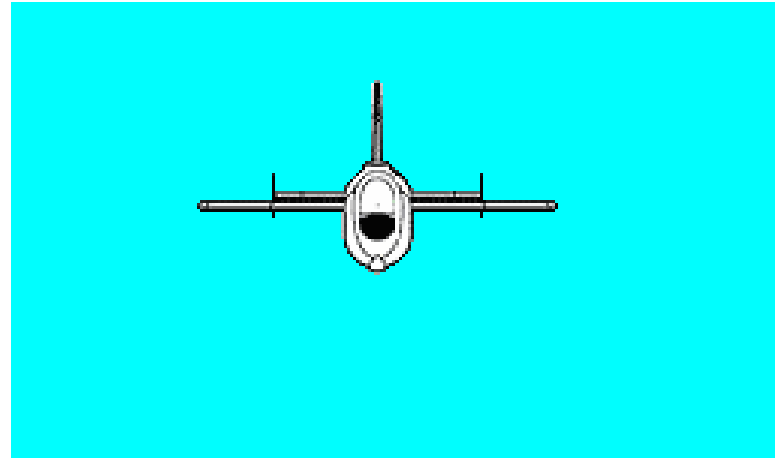
Engine(s)---Bulging jet on belly. Oval intake and round exhaust.

Fuselage-----Round, tapered front and rear. Pointed nose and tail cone. Belly fin.

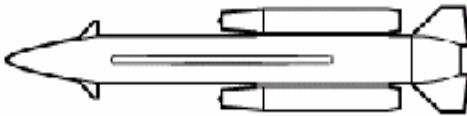
Tail-----Flats high-mounted, swept-back, and untapered. Fin swept-back and tapered.

USER COUNTRIES

China, Iran, Israel, USA.



The Firebee has several designations, for example, BQM-34S is Air Force, MQM-34D is Army, and there are several versions under the model 147 designation. Both China and Iran have this UAV in their inventory.



C-101 (CPMIEC)

GENERAL DATA

Country of Origin-----China.

Similar Aerial Platform---AS-15 Kent.

Role----- Medium-range, air-to-surface cruise missile.

Armament-----400-kg warhead.

Dimensions-----Length: 19 ft (5.8 m).
Span: 3 ft, 9 in (1.2 m).

WEFT DESCRIPTION

Wings-----Similar to canards, they are mid-mounted on the body near the nose section.

Engine(s)---Side-mounted ramjet mid-mounted on the body. Small round intakes and large Round exhausts.

Fuselage---Long, round, and tapers to nose cone. Blunt rear. Launch rail on bottom.

Tail-----V-mounted, back-tapered tail flats. Square tail fin forward of tail flats.

USER COUNTRY

China.



The C-101 is a further development of the CIS-produced and exported SS-N-Styx missile. It is both ground and air-launched.

CRECERELLE (TARGET TECHNOLOGY)

GENERAL DATA

Country of Origin-----UK, France.

Similar Aerial Platform---Banshee, ASR-4 Spectre.

Crew-----None.

Role-----RISTA UAV. Armament. Usually 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.

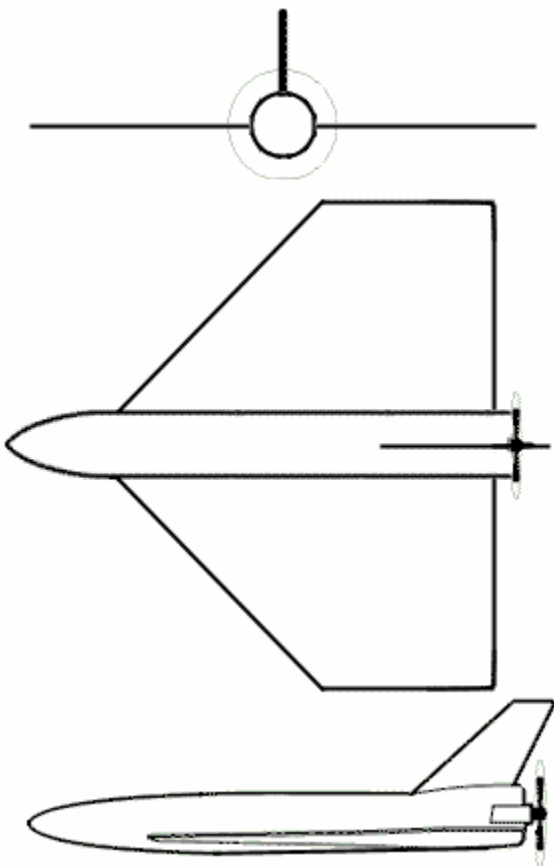
Engine(s)---Twin-cylinder, two-cycle. Two-bladed propeller in the opposing position.

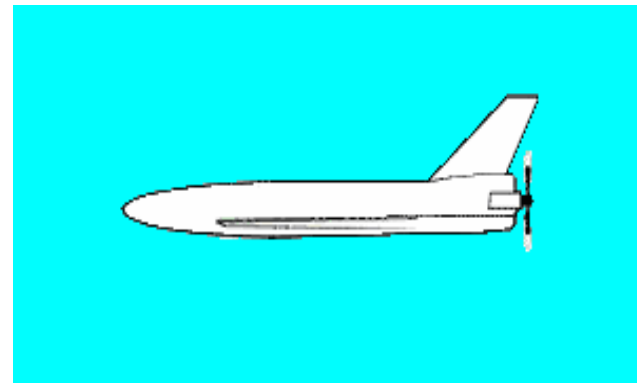
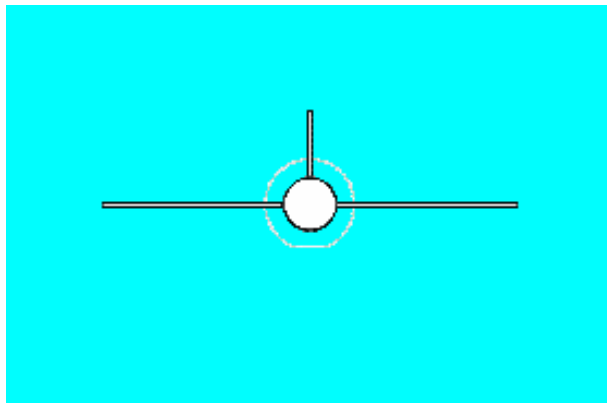
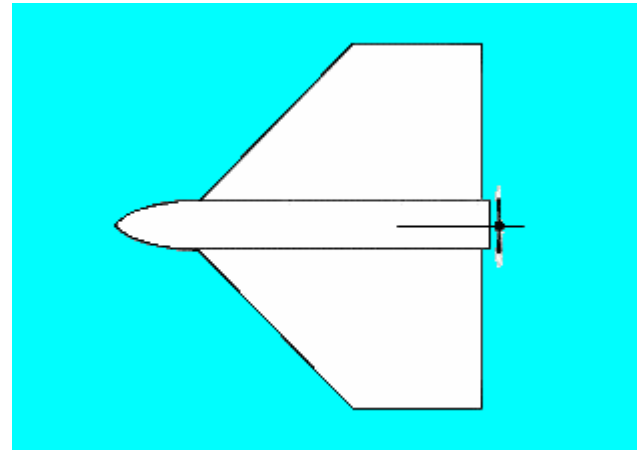
Fuselage----Round, tapers to a round nose. Blunt rear.

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

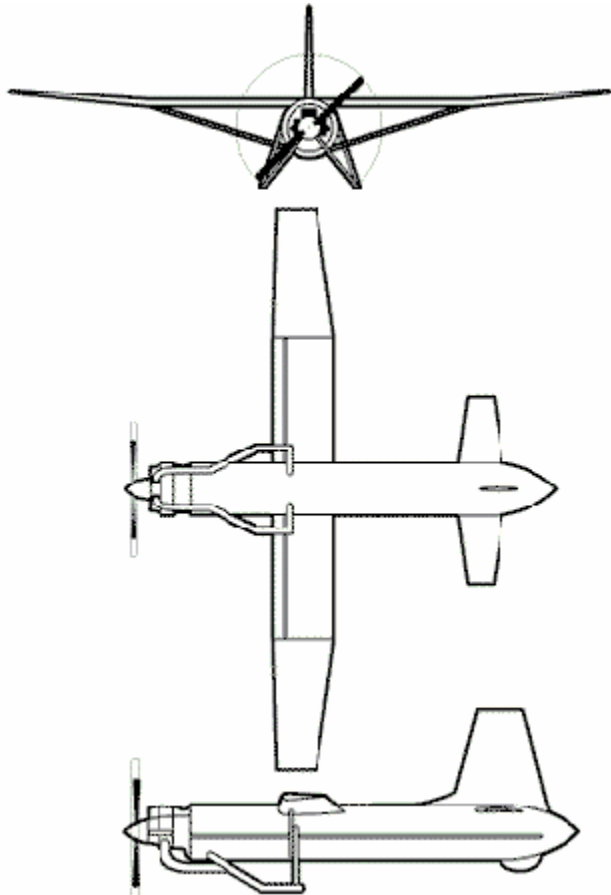
USER COUNTRIES

France, Netherlands, United Kingdom.





The Crecerelle is built in the UK with payloads from companies in France. This RISTA UAV will cost less than \$100,000 to build.



D-4 NPU (XIAN 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 midwing to tips.

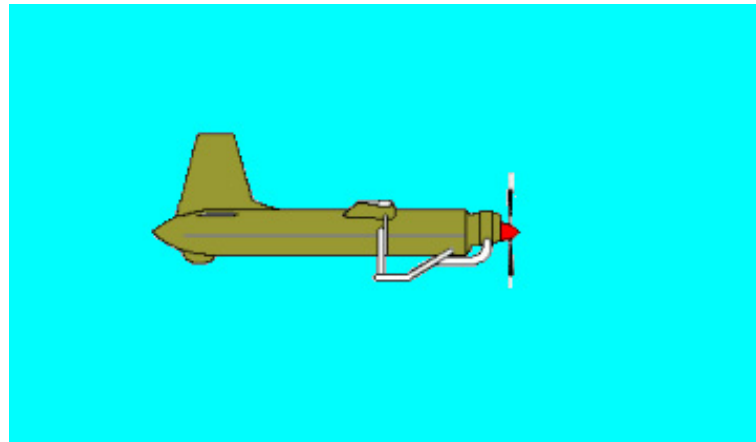
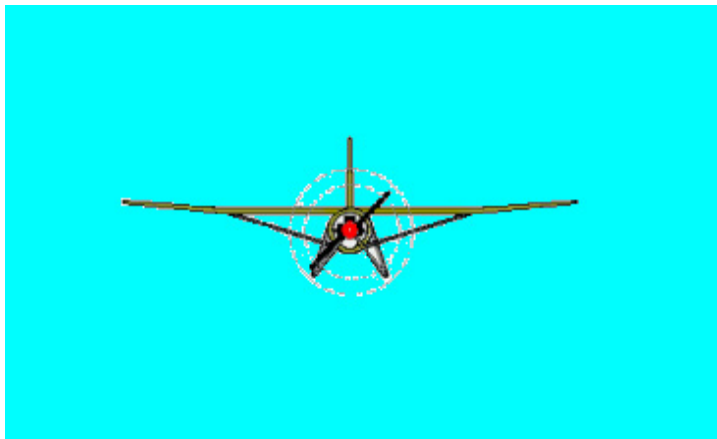
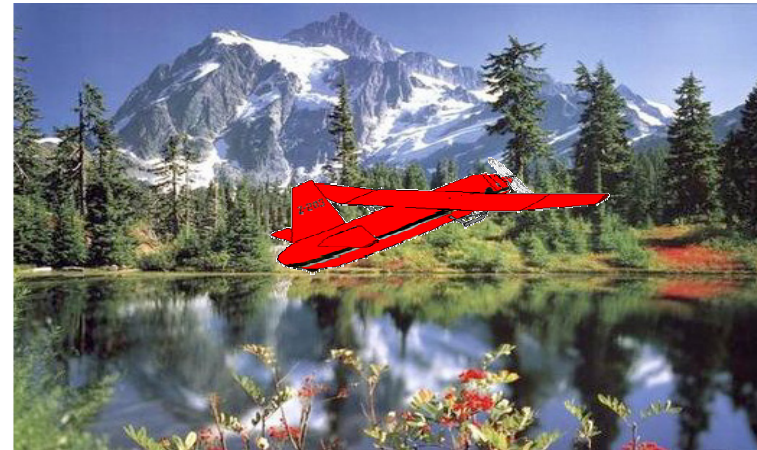
Engine(s)---Single, prop-driven engine in the nose section.

Fuselage----Round and tapers to front and rear. Fixed landing pads.

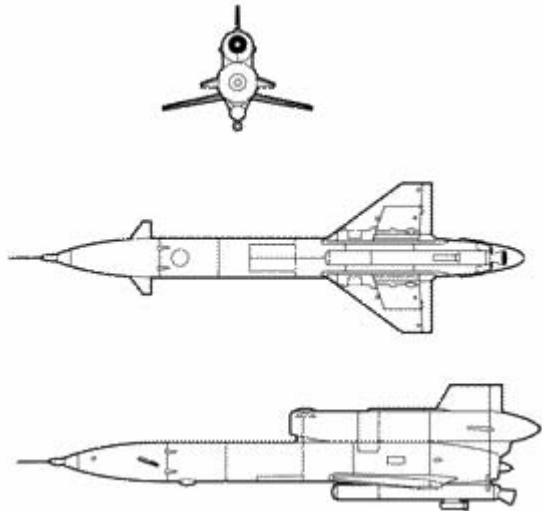
Tail-----Flats high-mounted on body and equally tapered. Fin is equally tapered.

USER COUNTRIES

China and exported.



The D-4 is a small UAV operated by remote control. The contractor is Xian Pilotless Research and Development Center, located at the Northwestern Polytechnical University in China. Other similar craft are IBAZ (Iran) and LG 17 (CIS).



DR-3 REYS (TUPOLEV)

GENERAL DATA

Country of Origin-----CIS.

Similar Aerial Platform---DR-5, Banshee, Crecerelle.

Role-----Tactical reconnaissance UAV.

Armament-----None.

Dimensions-----Length: 23 ft (7.3 m).
Span: 9 ft 10 in (3 m).

WEFT DESCRIPTION

Wings-----Low-mounted and delta-shaped with square tips. Small, swept-back canards.

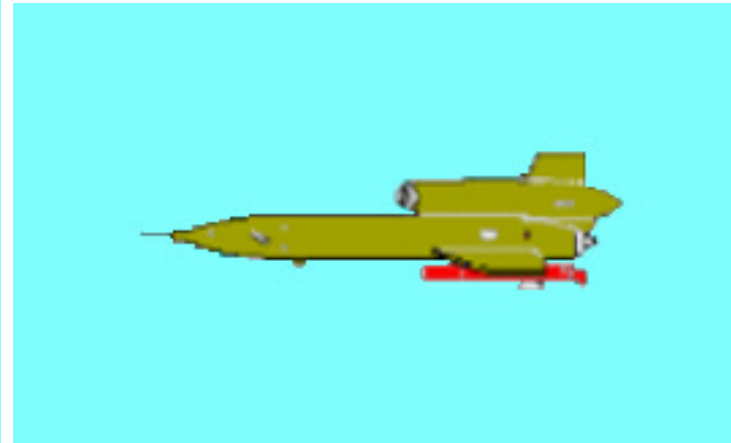
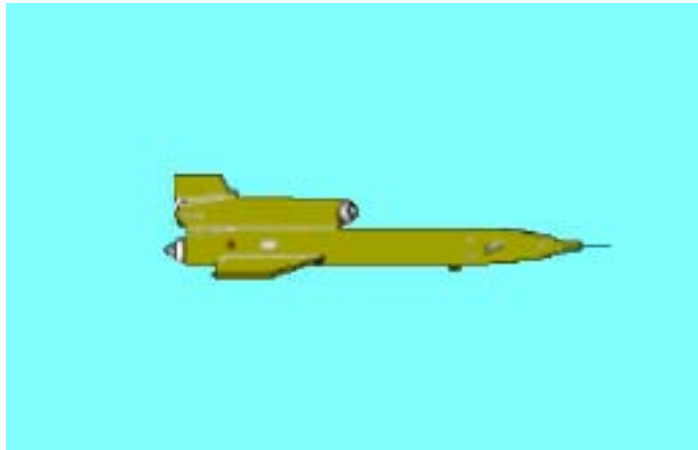
Engine(s)--Large, jet on top rear of fuselage. Large air intake.

Fuselage---Long, slender, tapers to the front, blunt rear. Pitot tube.

Tail-----Short, swept-back fin on top of engine. Tail cone.

USER COUNTRY

CIS.



The Reys (voyage) was developed by the Tupolev design bureau in the 1970s. The DR-3 is very similar to the DR-5.

MODEL 324 (TELEDYNERYAN)

GENERAL DATA

Country of Origin-----USA.

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.

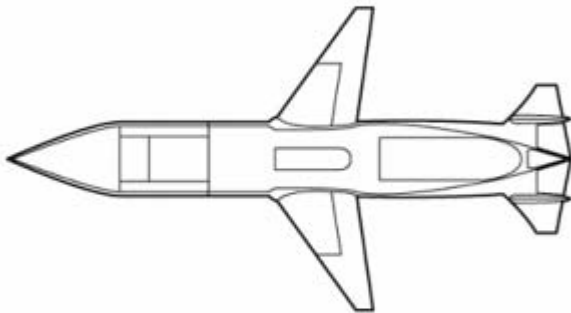
Engine(s)-----Turbojet hidden in aft belly compartment until launch.

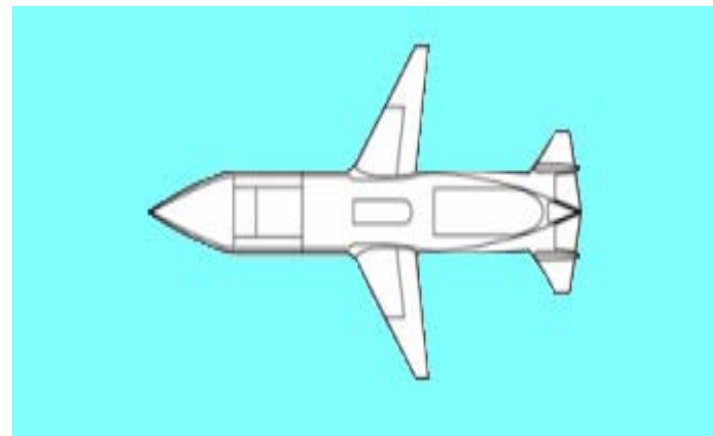
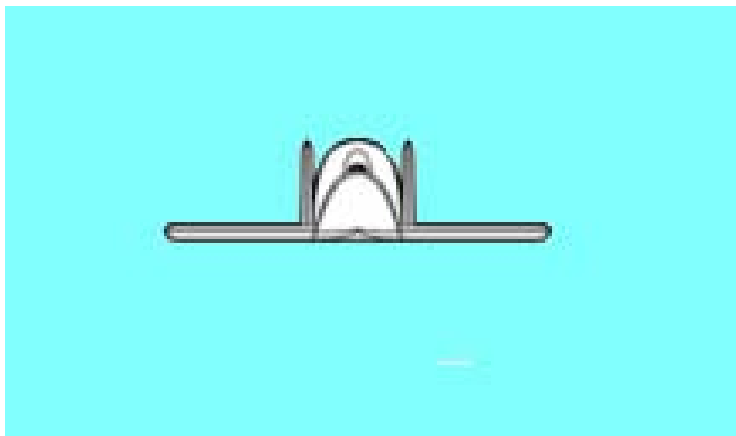
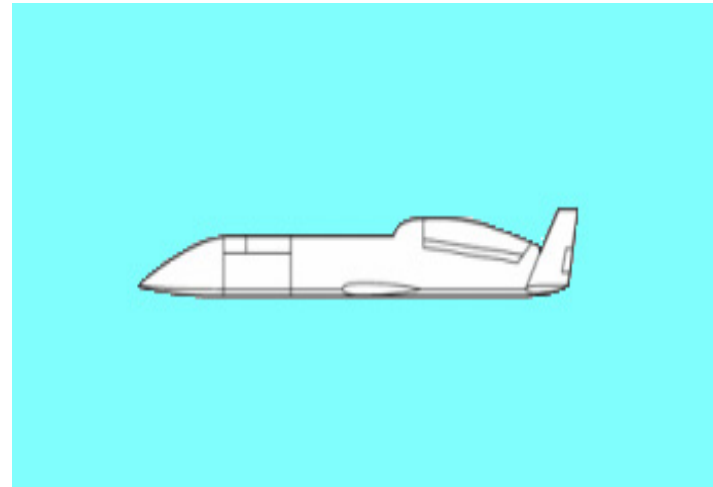
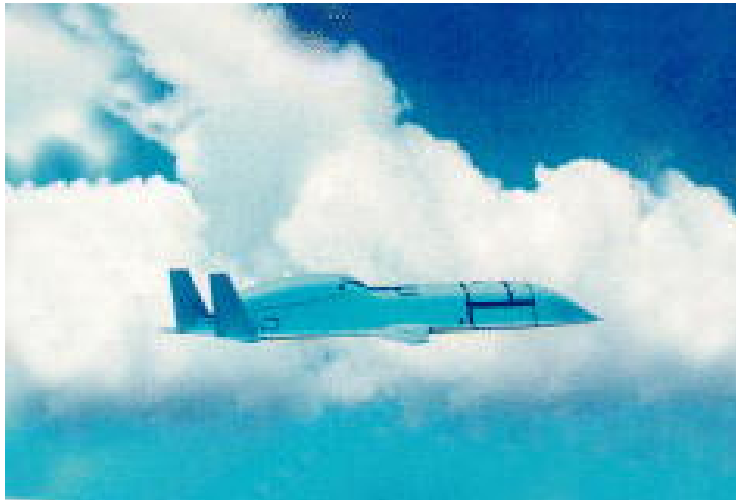
Fuselage-----Flat-bottomed. Pointed nose and hump on aft top of craft.

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

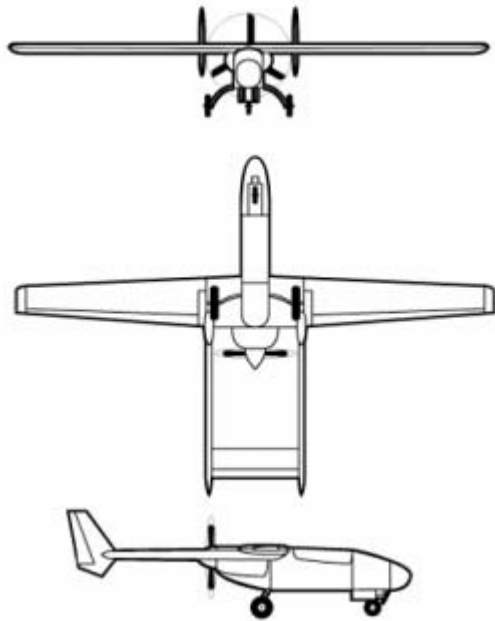
USER COUNTRY

USA.





The Model 324 is a versatile, easy to operate reconnaissance UAV that has a cruise range of 1,400 miles and with a speed of Mach 0.8.



Model 410 (TELEDYNE RYAN)

GENERAL DATA

Country of Origin-----USA.

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

Role. Reconnaissance-----EW.

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.

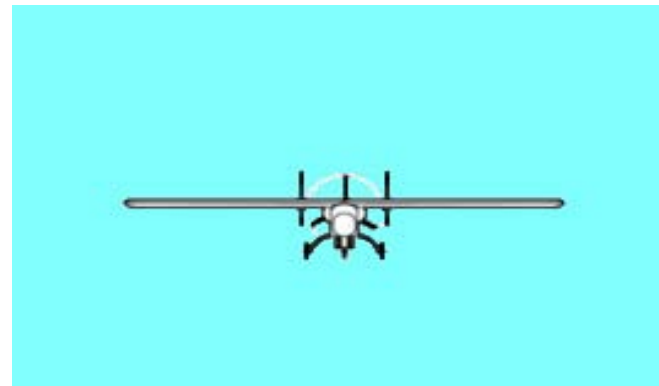
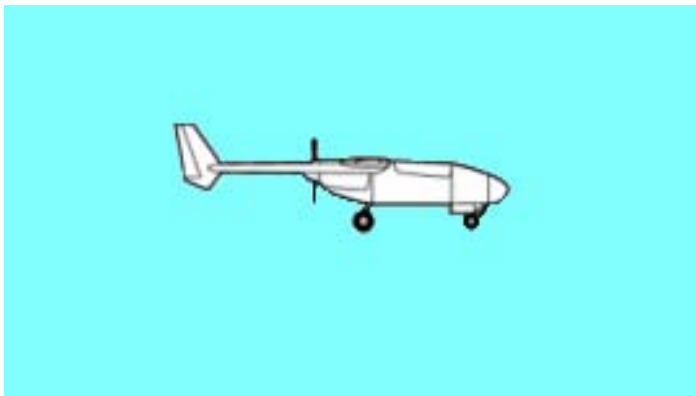
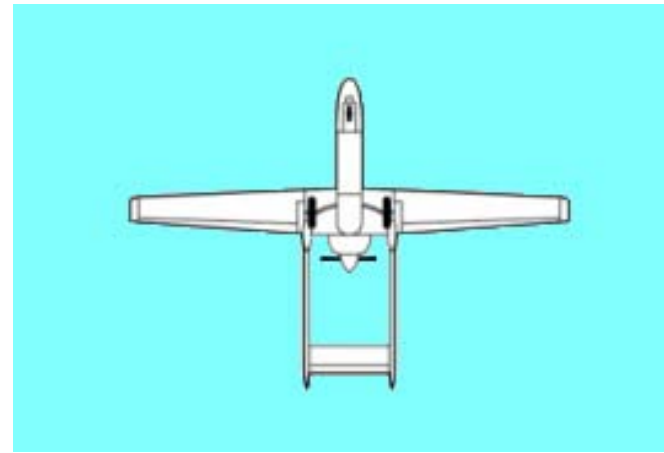
Engine(s)---Four-cylinder turbo on rear of fuselage in the opposing position.

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

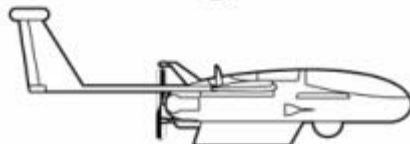
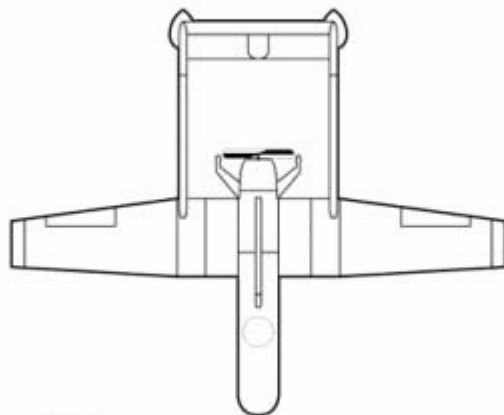
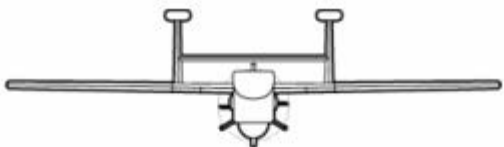
Tail-----Tapered back fins mounted on booms. Rectangular flat between fins.

USER COUNTRY

USA.



The 410 can fly about 1,200 miles and stay aloft for about 14 hours. It can fly autonomously or from the ground control station. It can use data from the GPS.



MIRACH 26 (ALENIA)

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 midwing, and tapered to square tips.

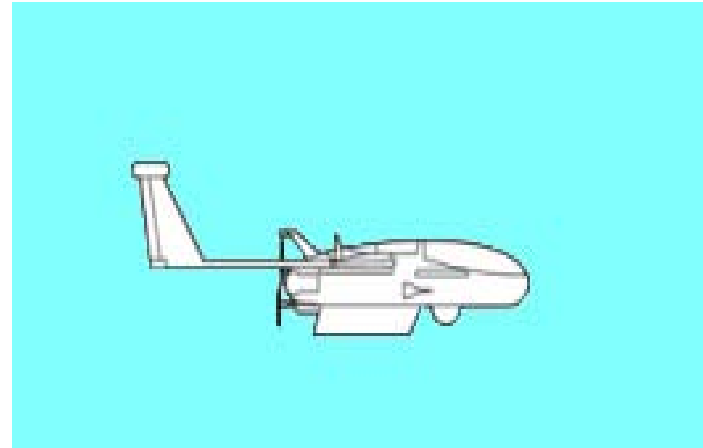
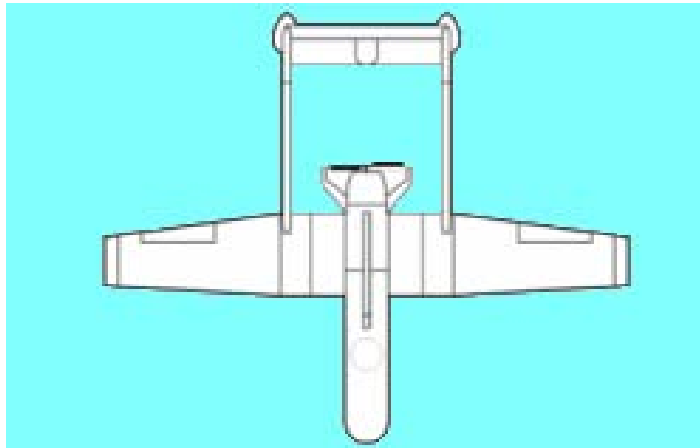
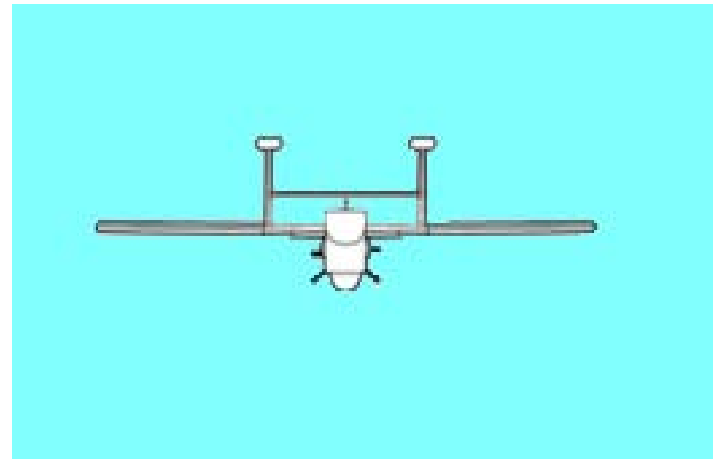
Engine(s)---Small piston engine mounted on the rear of the body in the opposing position.

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

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

USER COUNTRY

Italy.



The Mirach 26 can be operated from a ground control station (GCS) or autonomously. It is built entirely with composite materials giving it a very low radar signature.

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 semidelta with square tips.

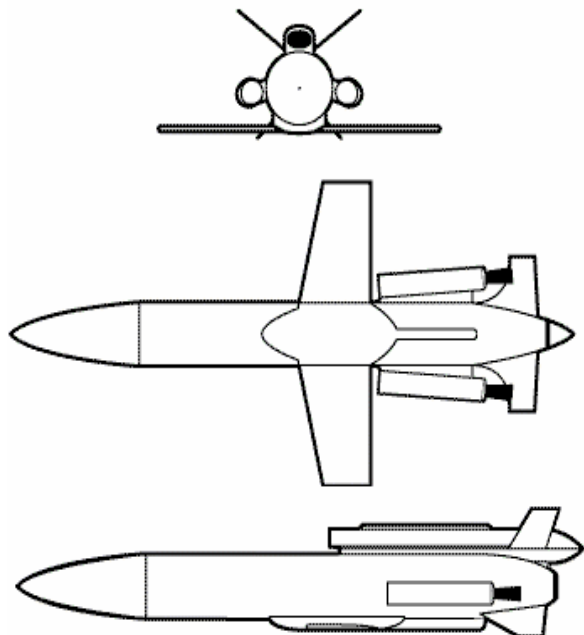
Engine(s)--Single jet on top rear. Oval intake and round exhaust.

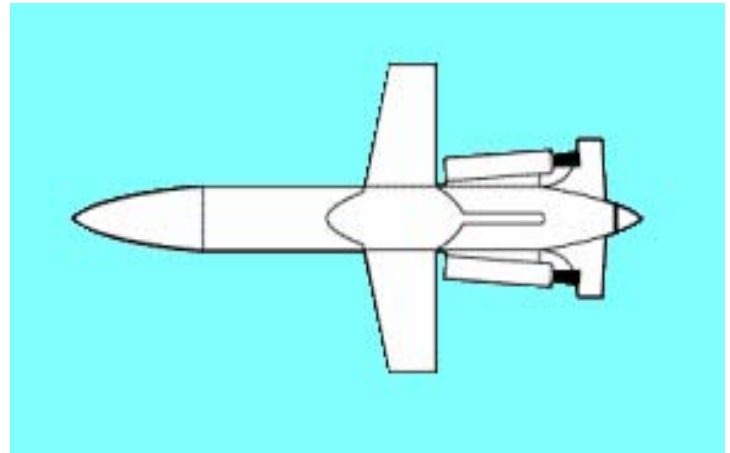
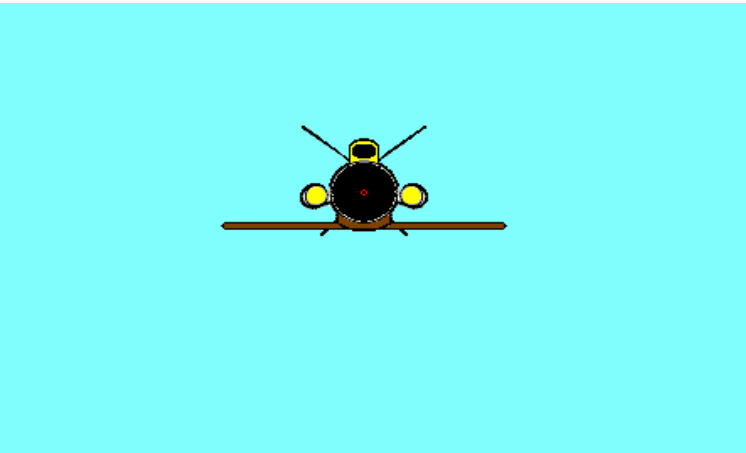
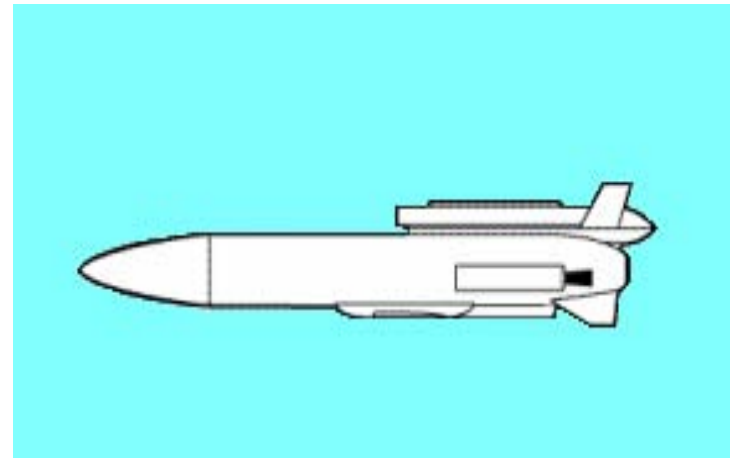
Fuselage---Round, tapered to the front and rear. Two belly fins.

Tail-----Back-tapered, V-type flats on sides of engine. Tail cone.

USER COUNTRIES

Argentina (MQ-2 Bigua), Greece, Italy, Libya.





The Mirach 100 is controlled by ground control or by automatic navigation. It is an aerial target, but can also be used as a tactical cruise missile launched from aircraft.

MK-105 FLASH (IAT)

GENERAL DATA

Country of Origin-----France, Germany, USA, UK.

Similar Aerial Platform-----Mirach 26, Shaheen, MK III, Mastiff, Ranger ADS 90.

Role----- Short-range multirole UAV.

Armament-----Usually none.

Dimensions-----Length: 10 ft, 9 in (3.34 m).
Span: 14 ft, 4 in (4.40 m).

WEFT DESCRIPTION

Wings-----High-mounted and forward tapered from midwing to the square tips.

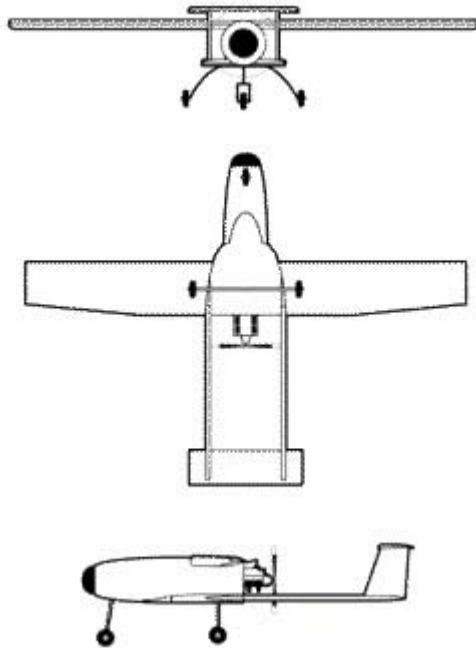
Engine(s)---Four-cylinder, prop driven on rear of fuselage in the opposing position.

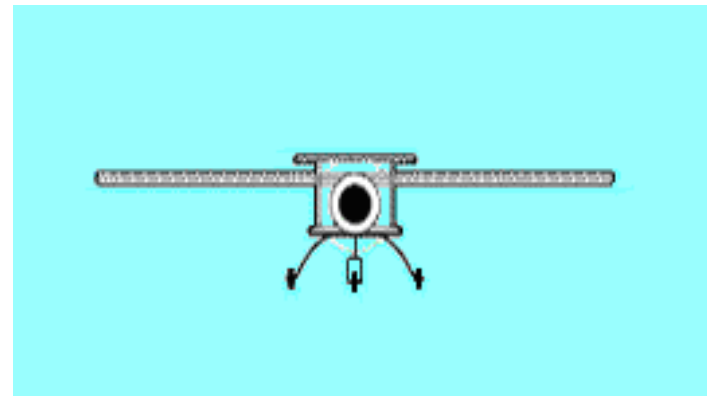
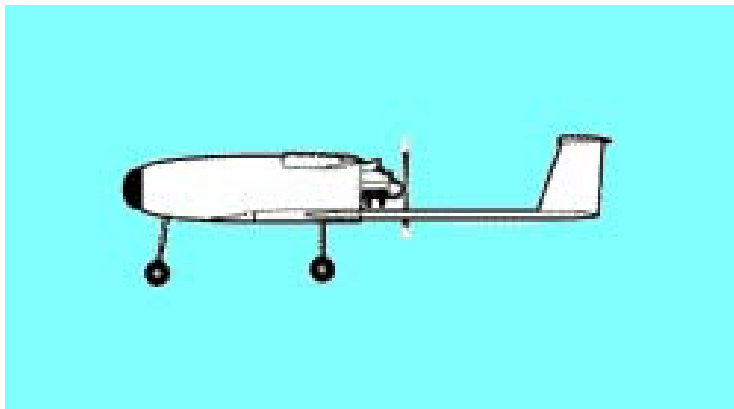
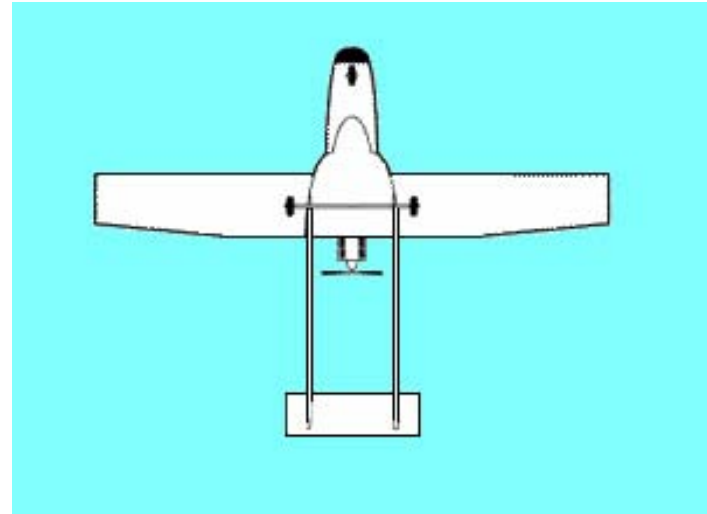
Fuselage----Round with round, glass nose. IR bubble sensor on belly. Thin booms.

Tail-----Back-tapered fins on booms. Square flat on top of fins.

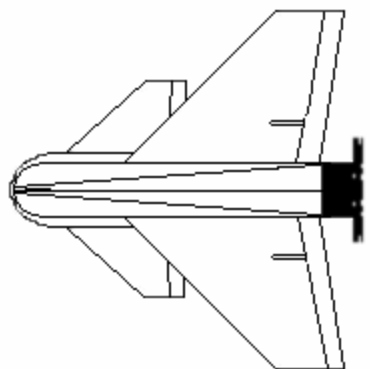
USER COUNTRIES

France, Germany.





The MK-105 Flash is a reusable, low-cost UAV. It can be controlled by ground remote or can be preprogrammed. Made of composite materials, it has a low-radar cross section.



MK-106 HIT (IAT)

GENERAL DATA

Country of Origin-----France, Germany, USA, UK.

Similar Aerial Platform---Harry, Donier DAR, Raki, AW-10.

Role-----Multirole, reconnaissance/targeting.

Armament-----None.

Dimensions----- Length: 6 ft, 5 in (2 m).
Span: 6 ft, 8 in (2.1 m).

WEFT DESCRIPTION

Wings-----Mid-mounted and semidelta with square tips. Winglets at tips. Large semidelta canards mounted high at the nose section.

Engine(s)----Four-cylinder, prop-driven and mounted in the rear in opposing position.

Fuselage-----Round, tapering to the round nose. Launch fairing on belly.

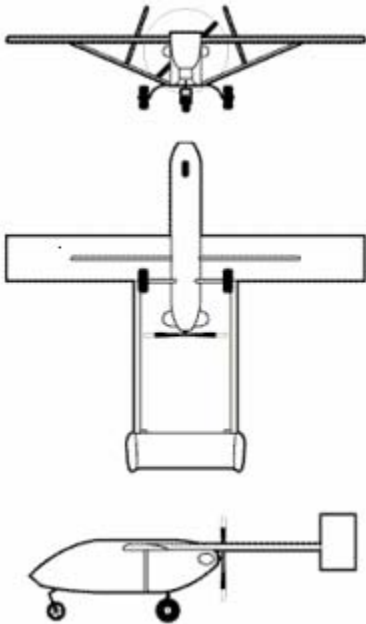
Tail-----No fins or flats.

USER COUNTRIES

France, Germany, USA, UK.



The International Aerospace Technology MK-106 Hit has excellent maneuverability at high speeds with its unusual design, compact size, and 24-HP engine. Low-radar signature.



PIONEER (AAI, IAI)

GENERAL DATA

Country of Origin—Israel, USA.

Similar aircraft-----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.

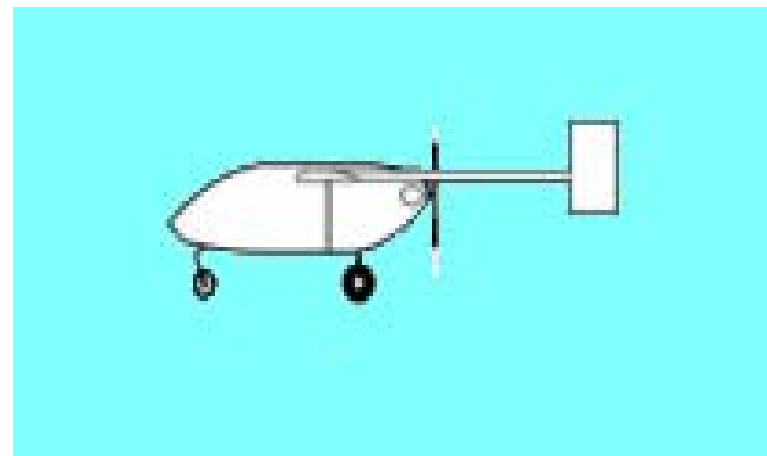
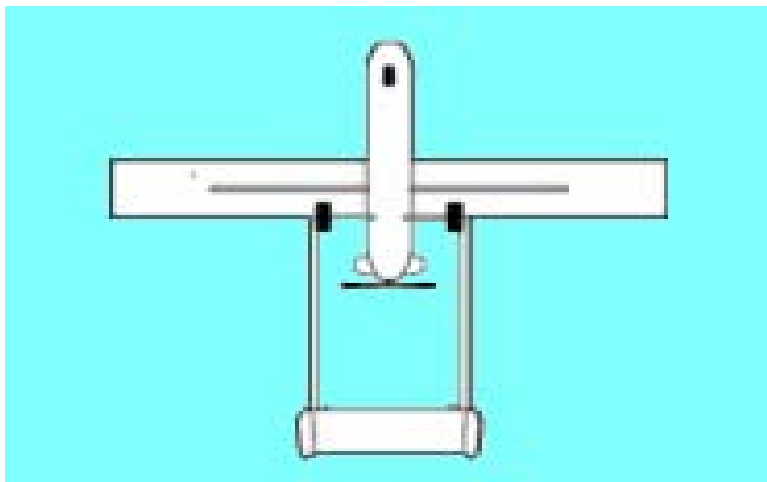
Engine(s)---Single, prop-driven and mounted in fuselage rear in the opposing position.

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.

USER COUNTRY

Israel, USA.



The Pioneer is used by the Marine Corps as well as the Israeli forces. It is controlled by the mission planning and control station (MPCS). Other similar craft are ADE RPV, Shahin, Al Yamamah, Seeker, and Hunter.



PREDATOR (GAAS)

GENERAL DATA

Country of Origin—USA.

Similar aircraft----- D-4 NPU.

Role----- Reconnaissance, targeting.

Armament----- None.

Dimensions----- Length: 26 ft, 6 in (8.12 m).
Span: 41 ft, 7 in (12.71 m).

WEFT DESCRIPTION

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

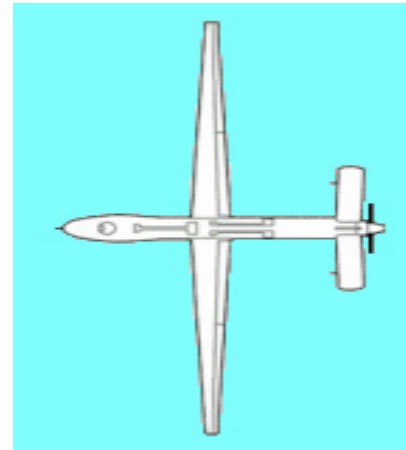
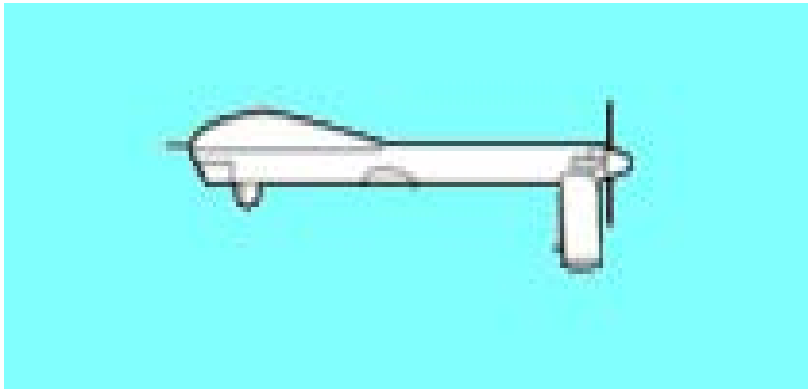
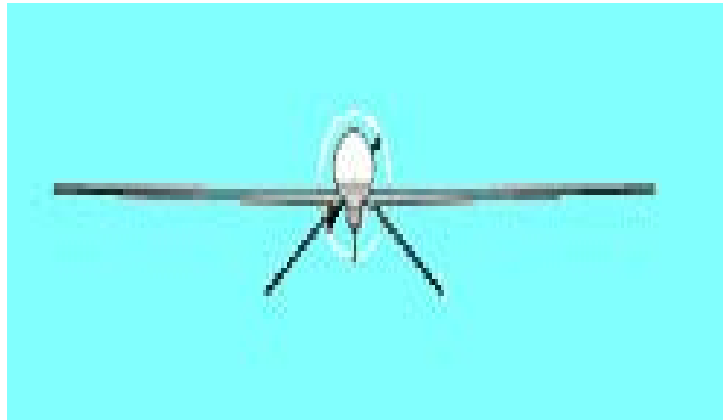
Engine(s)---Single, prop-driven and mounted on rear in the opposing position.

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

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

USER COUNTRY

USA.



The Predator is used by US forces to gather intelligence. Tricycle landing gear is retractable.

RAVEN (FLIGHT REFUELING)

GENERAL DATA

Country of Origin----- UK.

Similar Aerial Platform----- Stableye, Fox Aspic, and FW-100.

Role-----Close-range, day and night surveillance.

Armament-----None.

Dimensions----- Length: 10 ft (3.2m).
Span: 11 ft, (3,6 m).

WEFT DESCRIPTION

Wings-----High-mounted and rectangular with blunt tips.

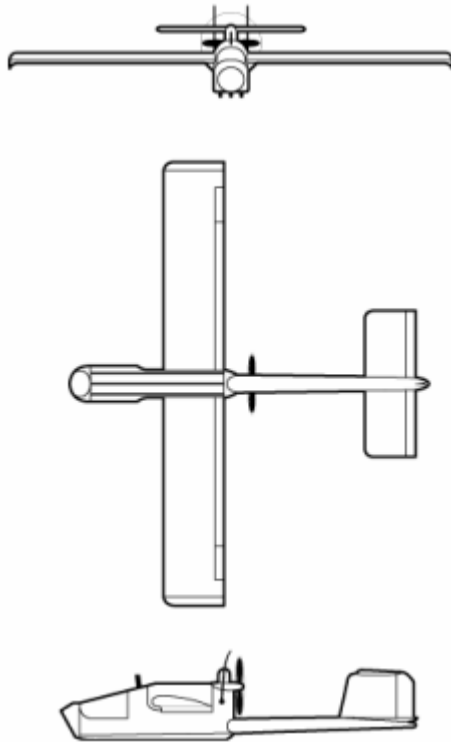
Engine(s)----Two-cylinder engine with propeller mounted at rear of the fuselage in the opposing position.

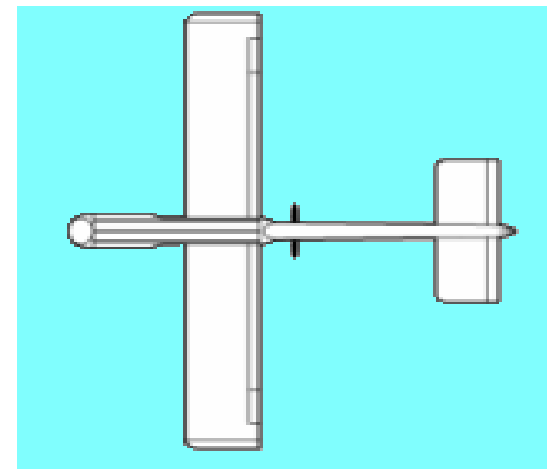
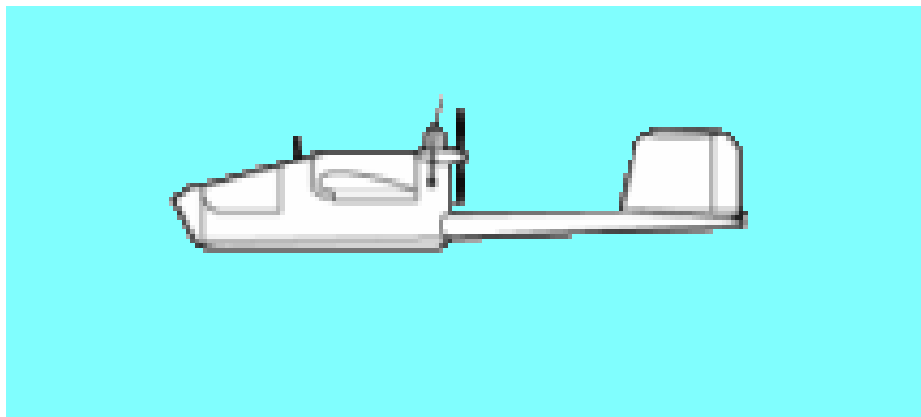
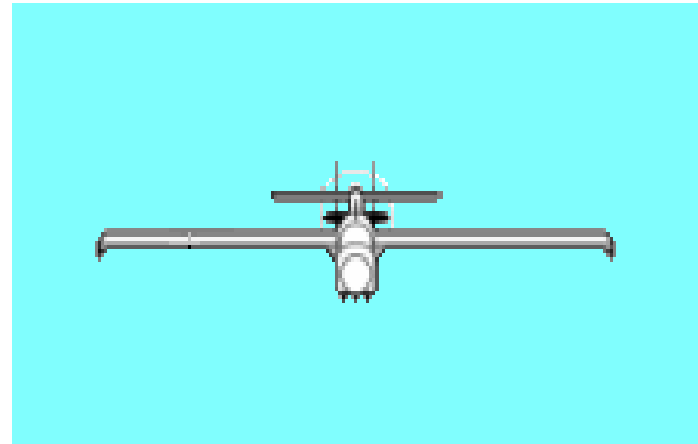
Fuselage-----Oval with round nose. Single thin boom. Modular package.

Tail-----Back-tapered fin on boom. Flat rectangular and mounted on fin forming a T.

USER COUNTRY

UK, USA.





The Raven is a lightweight UAV providing day and night surveillance for forward area commanders. Its IR and radar signatures are very low. System is modular and easily assembled.

SCOUT (IAI)

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: 20 ft, 7 in (6.32 m).
Span: 11 ft, 8 in (3.65 m).

WEFT DESCRIPTION

Wings-----Low-mounted, swept-back, and untapered with small, square tips.

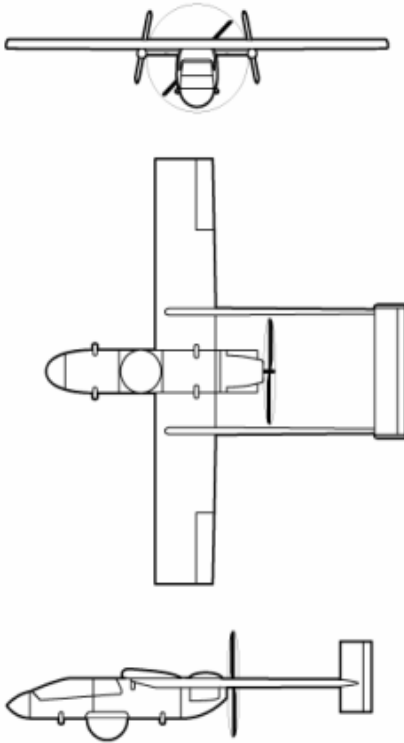
Engine(s)-----Turbofan in aft section. Oval intake and a round exhaust. May have propfan.

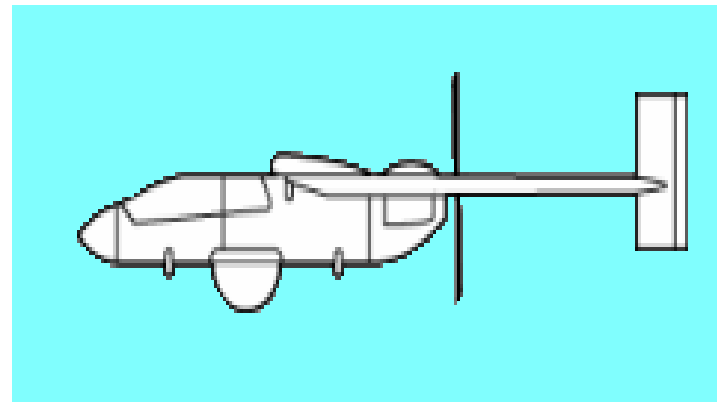
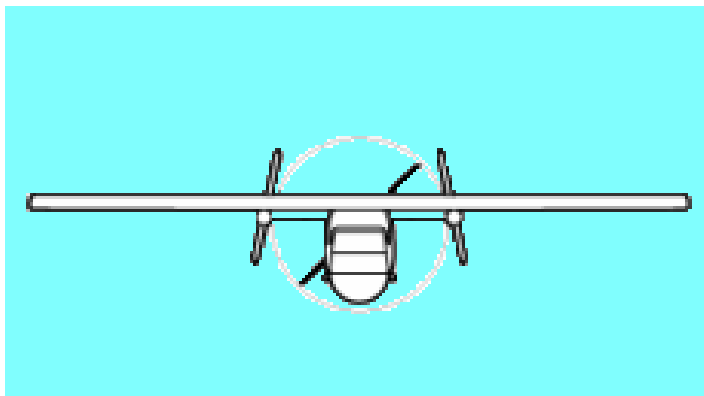
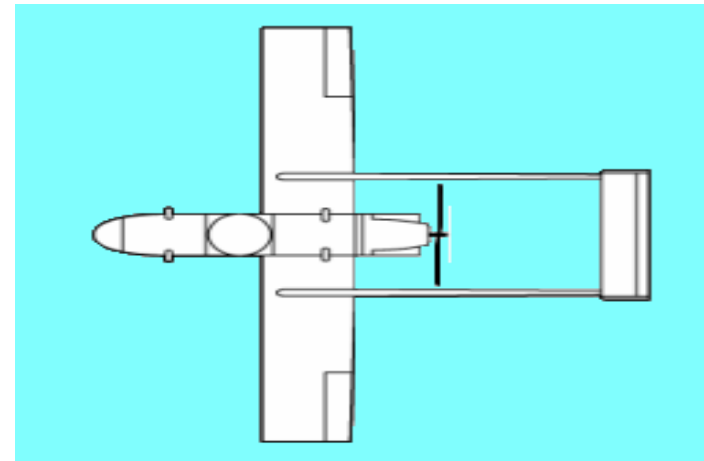
Fuselage-----Slabsided with flat bottom. Tapers to a round nose and at rear section.

Tail-----Fin backtapered with square tip. Flats low-mounted and straight. Some versions have a V-tail

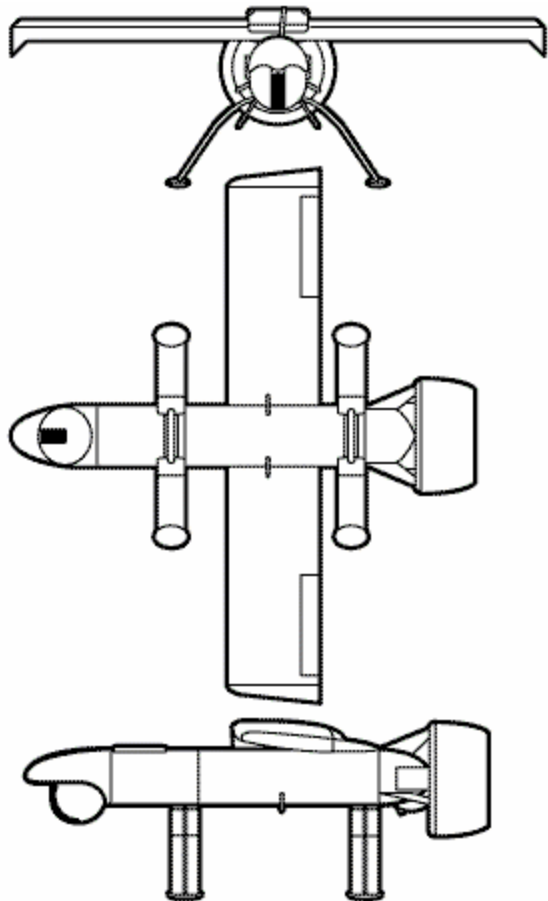
USER COUNTRY

USA.





The Scout is a versatile short-range battlefield reconnaissance UAV that is similar to the Pioneer and Hunter.



SHMEL-1, YAK-061 (YAKOVLEV)

GENERAL DATA

Country of Origin-----CIS

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.

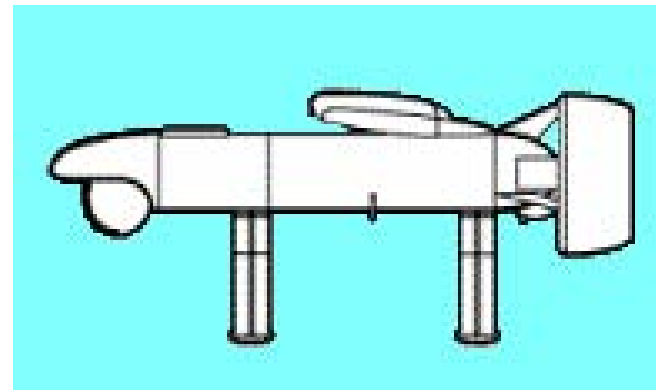
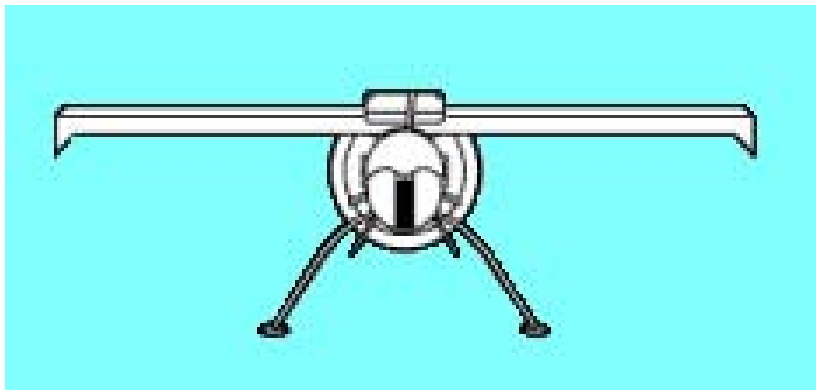
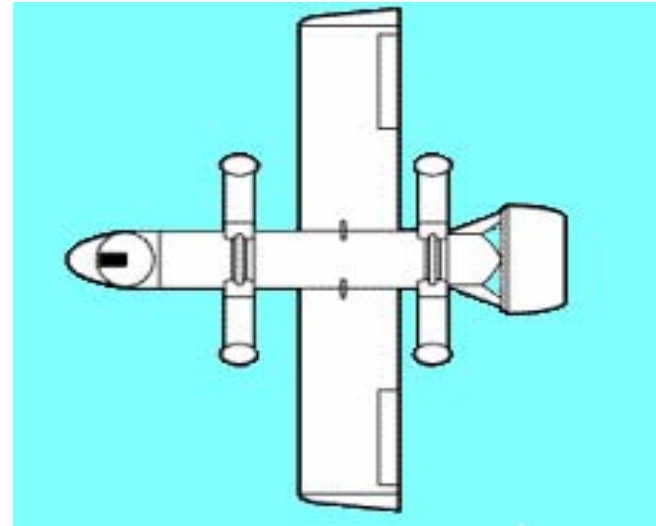
Engine(s)----Prop-engine and has a round enclosure at the rear in the opposing position.

Fuselage----Rounded, bullet nose. Pads on feet of four curved legs for landing.

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

USER COUNTRY

CIS, Syria.



Shmel-1 was designed for day and night surveillance and monitoring operations. This system has been exported to other countries under the name of Malakhit.

TAIFUN (SYSTEM TECHNIK NORD)

GENERAL DATA

Country of Origin-----Germany.

Similar Aerial Platform---Brevel.

Crew-----None.

Role-----Anti-armor drone.

Armament-----Shaped charge.

Dimensions-----Length: 5 ft 9 in (1.8 m).
Span: 7 ft 5 in (2.3 m).

WEFT DESCRIPTION

Wings-----X-section. Mid-mounted, back-tapered with square tips.

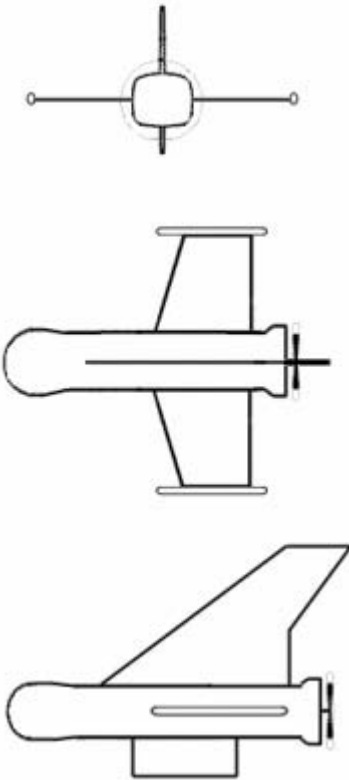
Engine(s)---Two cylinder, piston engine with prop mounted in the opposing position.

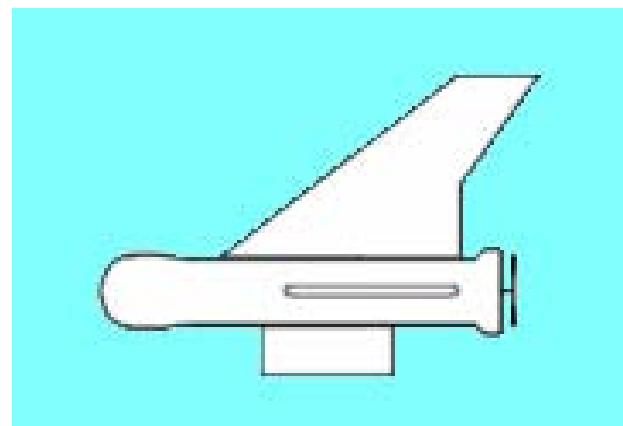
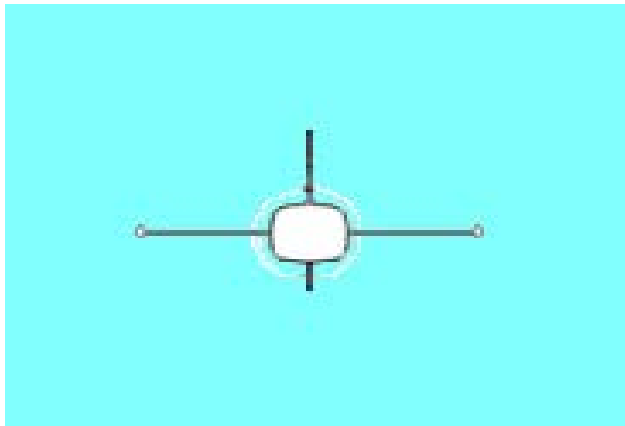
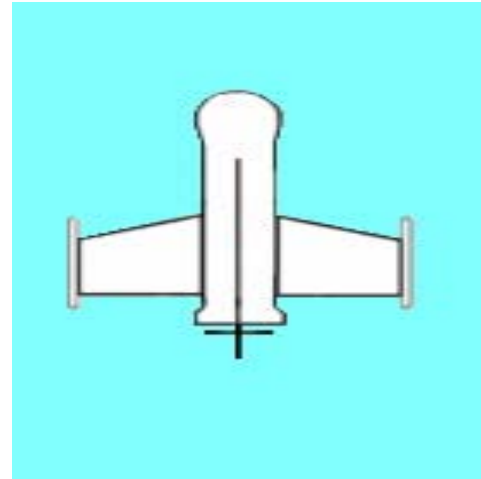
Fuselage----Round, cylinder-shape with bulbous nose and blunt rear.

Tail-----Back-tapered top and belly fin with square tips and sensor pods.

USER COUNTRY

Germany.





The Taifun is a ground launched anti-armor drone. It is preprogrammed with flight profile embedded. The drone makes a top kill with a shaped charge.

TOMAHAWK (BOEING AEROSPACE)

GENERAL DATA

Country of Origin-----USA.

Similar Aerial Platforms-----Apache.

Role-----Air-launched cruise missile.

Armament-----Nuclear or HE warhead.

Dimensions-----Length: 20 ft, 7 in (6.32 m).
Span: 11 ft, 9 in (3.65 m).

WEFT DESCRIPTION

Wings-----Low-mounted, swept-back, and untapered with small, square tips.

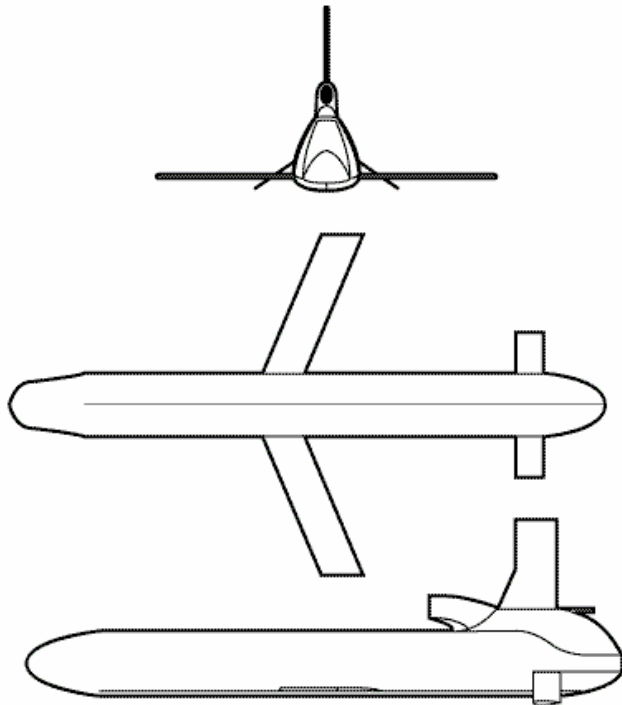
Engine(s)---Turbofan in aft section. Oval intake and a round exhaust. May have propfan.

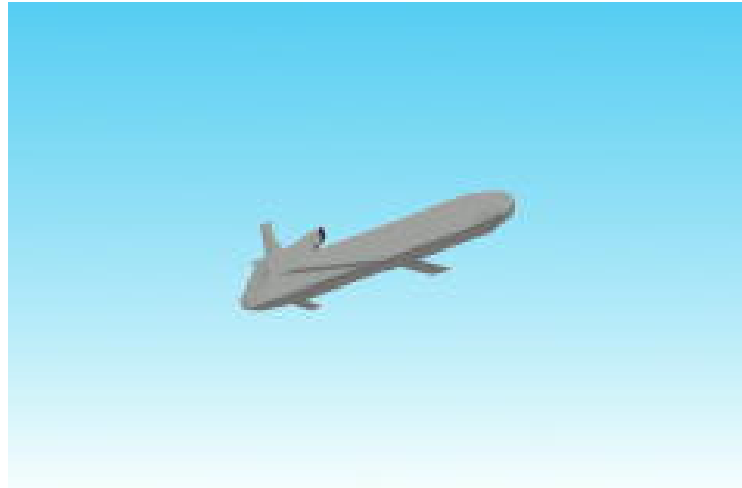
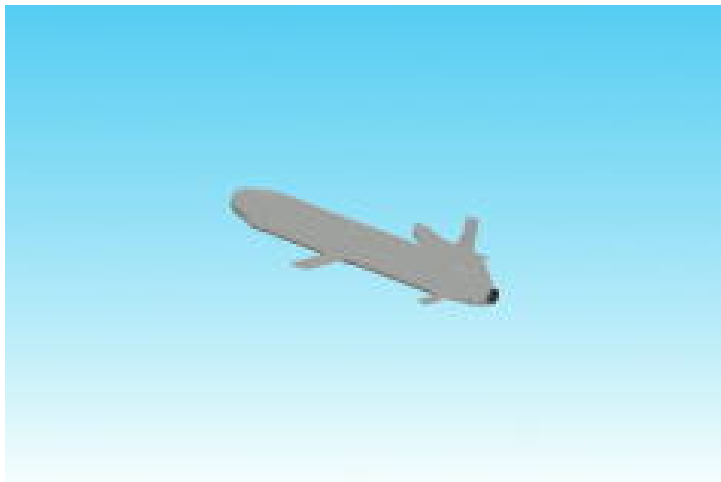
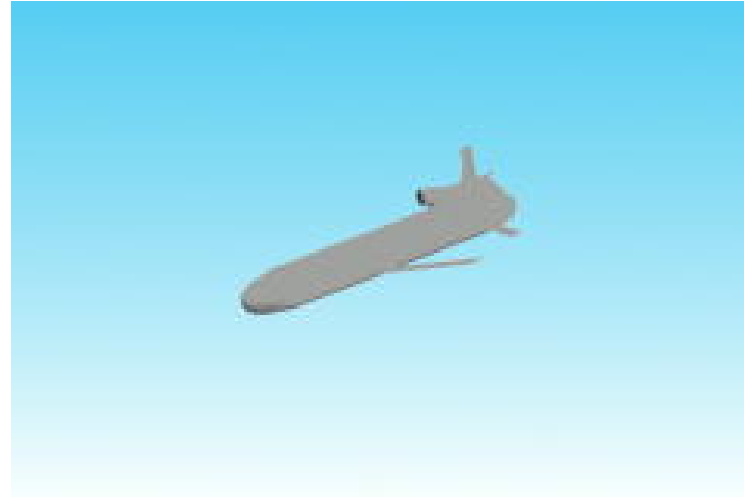
Fuselage----Slabsided with flat bottom. Tapers to a round nose and at rear section.

Tail-----Fin backtapered with square tip. Flats low-mounted and straight. Some versions have V-tail.

USER COUNTRY

USA.





The Tomahawk is used as an air or submarine-launched cruise missile. It was used extensively in the Gulf War and since. There are several versions with slightly different shapes.

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Appendix

Master Aircraft List

GROUND-ATTACK, CLOSE AIR SUPPORT, AND FIGHTER-BOMBER AIRCRAFT

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Glossary

AAM	air-to-air missile
AD	air defense
AEW	airborne early warning
AGM	air-to-ground missile
Aileron	aircraft roll control
ALCM	air-launched cruise missile
Altitude	height above sea level
ART-V	aircraft recognition training-visual 35-millimeter slide kit
Assault gunship	rotary- and fixed-wing aircraft, armed and equipped to carry combat troops into battle and operating from land or sea
ASM	air-to-surface missile
Aspect	aircraft appearance with respect to a ground observer
ASW	antisubmarine warfare
ATF	advanced tactical fighter
ATGM	antitank guided missile
ATOLL	AA-2-2 air-to-air missile, CIS (former USSR)
Attitude	inclination of aircraft in relation to the ground (heading, pitch, and roll)
Avenger	30-millimeter cannon on A-10A Thunderbolt II. FAAD weapon system
AWACS	airborne warning and control system
BAe	British aerospace (aircraft manufacturer)
Butterfly tail	rounded tail fin and flats of a particular aircraft type (O-1 Bird Dog)
Cabin	housing on an aircraft for troops or cargo
CAI	computer aided instruction

Canards	winglets, controllable or fixed, located forward of the center of gravity
Canopy	cover for cockpit
CAS	close air support
CBU	cluster bomb unit
CD	compact disc
Chord	straight line joining the leading and trailing edges of airfoil section
CIS	Commonwealth of Independent States (formerly USSR)
Clean	aircraft in flight with landing gear, flaps, slats retracted, and or without external stores
Cluttered	aircraft with external stores (bombs, missiles, and fuel tanks)
Cockpit	housing for crew and aircraft instrumentation
COIN	(co-in) counterinsurgency
Detection	(DOD) in tactical operations, the perception of an object of possible military interest but unconfirmed. By recognition (NATO) the discovery by any means the presence of a person or object of potential military significance.
DHC	DeHavilland Canada (aircraft manufacturer)
Dihedral	upward or positive slope of the wings or tail flats (anhedral is the downward or negative slope)
Dogtooth	horizontal step in the leading edge of the wing
DOD	Department of Defense
Dorsal spine	fairing along the back of an aircraft, usually housing avionics equipment
Drone	pilotless aircraft (remotely controlled)
ECM	electronic countermeasures
Elevator	a hinged, horizontal surface that controls the pitch of an aircraft
ELINT	electronic intelligence
EMB	Embraer (aircraft manufacturer)
Exocet	French-built air-to-surface missile (antiship)

FAAD	forward area air defense
Fairing	streamlined covering (also curvature in spine connected to the tail fin)
Fence	projection parallel to the wing chord that modifies the distribution of pressure
Ferry range	maximum range without payload
Fin	vertical stabilizer
Flat	horizontal stabilizer
Flap	movable surface that increases the resulting from lift or drag of an aircraft increase in chord (also sawtooth)
FLIR	forward looking infrared
Fuselage	body of an aircraft
GCS	ground control station
Glove	located at the pivots on variable-geometry aircraft. It is impossible to have one-piece pivotal aircraft because at zero sweep, the inner ends would overlap (the solution to this problem is a fixed inner wing called a glove).
GOAR	ground observation aircraft recognition (an obsolete 35- millimeter slide kit superseded by ART-V)
Grail	CIS-built SA-7, man-portable antiaircraft missile
Gunship	generally a helicopter that was designed for battlefield attack. Also some fixed-wing aircraft are designated gunships (AC-47, AC-119, and AC-130)
Hardpoint	reinforced stations to which external stores can be attached. Pylon is another term.
HARM	US-built AGM 88A high-speed antiradiation missile used against air defenses
Hellfire	helicopter-launched fire and forget. The missile is also fired from some attack fixed-wing aircraft (A-10A Thunderbolt II).
HOT	air-to-ground antitank missile, also called Euromissile Hot. Full name is "hautsubsonique optiquement teleguide tire d'un tube".
IAI	Israel Aircraft Industries (aircraft manufacturer)
IAT	International Aerospace Technology

Identification	(DOD/IADB) the process of determining the friendly or hostile character of an unknown detected contact. In ground combat operations, discrimination between recognizable objects as being friendly or enemy, or the name that belongs to the object as a member of a class. (NATO) In imagery interpretation, the discrimination between objects within a particular type or class.
IFF	identification, friend or foe (generally electronic)
Incidence	angle at which a wing is set in relation to the fuselage axis
IR	infrared
KMPH	kilometers per hour
Knot	one nautical mile (1.152 land miles per hour)
Loiter	flight endurance
LEX	leading edge extension
LERX	leading edge root extension
Mach	speed of sound. One Mach=1,116 feet per second at sea level.
Maritime	actions performed by forces over, under, or on the seas
Maverick	US-built AGM-65 air-to-air missile
MBB	Messerschmitt-Bolkow-Blohm (aircraft manufacturer)
Mission	primary task
MM	millimeter
MPH	miles per hour
Nacelle	enclosed engine housing (also an enclosed passenger cabin like the C-119)
NATO	North American Treaty Organization
NFOV	narrow field of view
NOE	nap-of-the-earth (flying low, using natural cover)
NOGS	night observation gunsight
Open lattice	uncovered tail boom with visible
Ordnance	aircraft weapons load

Phoenix	US-built AIM-54 air-to-air missile
PNVS	pilot's night vision sensor
Port	left side looking forward
Pylon	structure that links aircraft to loads, drop-tank, bombs, and engines
PZL	Panstwowe Zaklady Lotnicze (state aviation works) at the cities
QSTAG	Quadripartite Standardization Agreement
Radius	the distance an aircraft can fly and return including standoff and loiter
RAF	Royal Air Force
RAM	Ramenskoye Flight Test Center in the former USSR
Range	performance characteristic expressed as total distance
Recognition	object is similar within a category of something already known
RN	Royal Navy
ROE	rules of engagement
Role	function, such as a fighter-bomber
RPV	remotely piloted vehicle
Saw tooth	a step in the leading edge of an aircraft wing
Shrike	US-built AGM-45 air-to-surface anti radiation missile
Sidewinder	US-built AIM-9 series air-to-air missile
Signature	smoke infrared, or radar fingerprints
SL	sea level
SLAR	side-looking airborne radar
Sparrow	US-built AIM-7 air-to-air missile
Spectre	AC-130 Hercules gunship
Spooky	AC-47 Skytrain gunship
SRAM	short-range attack missile

Stabilizer	part of the tail assembly (horizontal flats and vertical fin(s))
Starboard	right side looking forward
Stealth	low-visibility aircraft with little or no radar signature
STOL	short takeoff and landing
Store	payload
Strake	small stabilizer on aircraft surface (Kfir nose section)
Strategic bomber	aircraft designed primarily for long-range bombing or missile attack
Strategic transport	aircraft designed primarily for the transport of cargo or personnel over long distances
Tactical air ops	USAF term for air operations involving the six combat functions of counterair, close air support, air interdiction, air reconnaissance
TADS	target acquisition and designation sight
Tail plane	horizontal stabilizer-tail flat
Taper	diminishing width from base to tip
TEC	training extension course
Threat aircraft	bearing the military markings and or having the configuration of an aircraft employed by a known hostile nation, or meeting the criteria as prescribed by policy
Turbofan	gas-turbine engine with a large diameter
Turbojet	simple gas turbine with compressor chamber cowled fan turbine, and propulsive nozzle
Turboshaft	gas turbine where energy is transferred from gas jet to drive a high-speed shaft and helicopter blade
SOP	standing operating procedure
Swep-back	backwards inclination of the wing or tail plane, measured relative to the fuselage by the wing or tail plane center line
Subsonic	a speed less than the speed of sound
Supersonic	a speed in excess of the speed of sound training
UAV	unmanned aerial vehicle

UK	United Kingdom
US	United States
USSR	former Union of Soviet Socialist Republics restructured to Commonwealth of Independent States
VACR	visual aircraft recognition
Variable geometry	movable wings
Ventral fin	stabilizing surface attached to the under surface of an aircraft, commonly called a belly fin
VSTOL	vertical short takeoff and landing
WCS	weapon control status
WEFT	wings, engine(s), fuselage, tail. Method used to learn aircraft's major parts for recognition
WFOV	wide field of view
Wild Weasel	an aircraft specifically modified to identify, locate, and physically destroy or suppress enemy ground-based air defense systems

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**REFERENCES
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DA Form 2028.	Recommended Changes to Publications and Blank Forms.	
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FM 3-01.94.	Army Air and Missile Defense Command Operations.	Apr 2005
QSTAG 699.	Aircraft Recognition Training.	Jul 1980

DOCUMENTS NEEDED

These documents must be available to the intended users of this publication.

GTA 44-2-017.	Combat Aircraft: CAS, Fighter-Bomber, and Air Superiority.	Jan 1996
GTA 44-2-018.	Combat Aircraft: Helicopter.	Jan 1996
GTA 44-2-019.	Combat Aircraft: UAV, Bomber, and Cargo/Utility.	Jan 1996

READINGS RECOMMENDED

These readings contain relevant supplemental information.

JP 3-01.1.	Aerospace Defense of North America.	Nov 1996
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FM 3-01.80
17 January 2006

By Order of the Secretary of the Army:

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