EF-18
para España

ROLLOUT

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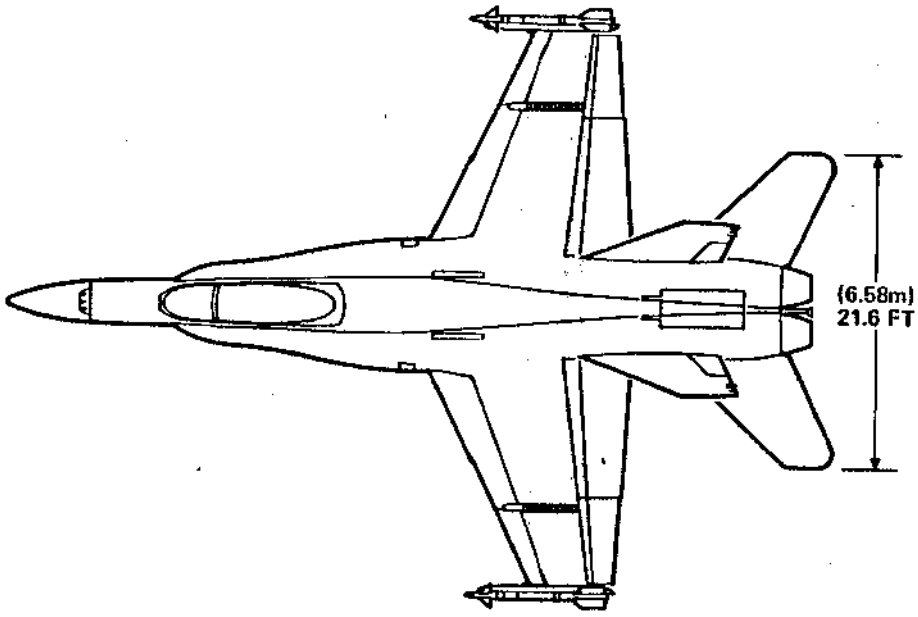
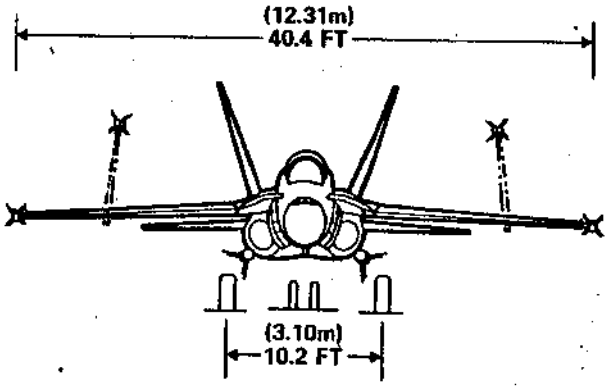
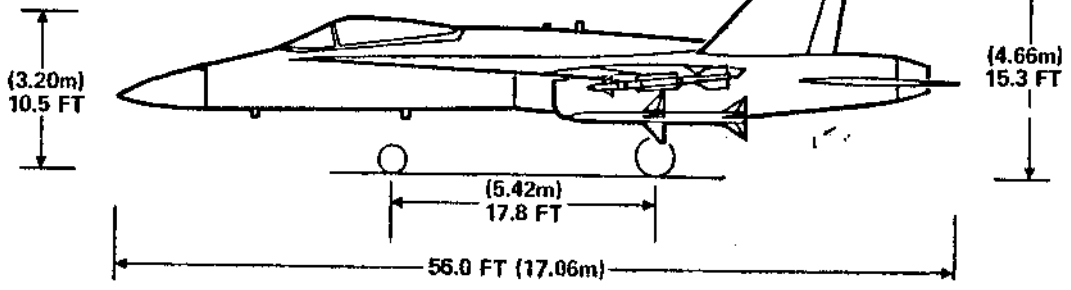
F/A-18 HORNET







MCDONNELL DOUGLAS CORPORATION

The F/A-18 Hornet Strike Fighter

Prime Contractor	McDonnell Aircraft Company division, McDonnell Douglas Corporation
Type	Single-seat, twin-turbofan aircraft for fighter and attack missions
Powerplant	Two General Electric F404-GE-400 low bypass turbofan engines; each in the 16,000-pound thrust class; thrust-to-weight 8-to-1
Length	56 feet
Height	15.3 feet
Wingspan	37.5 feet
Wing area	400 square feet
Speed	Mach 1.7-plus (Mach 1+ at Intermediate Power)
First Flight	November 1978
Crew	One (two in trainer version)
Combat Radius	500+ Nautical Miles; Ferry, 1,800+ NM
Combat Ceiling	50,000 feet (approx.)
Fuel	11,000 pounds internal (approx.) 16,000 pounds with external tanks (approx.)
Maximum takeoff weight	56,000 pounds (approx.), fighter escort missions
Armament	Up to 17,000 pounds maximum on nine stations -- two wing-tip for Sidewinder heat-seeking missiles; two outboard wing for air-to-ground ordnance; two inboard wing for Sparrow radar-guided missiles, air-to-ground, or fuel tanks; two nacelle fuselage for Sparrow missiles, or sensor pods; one centerline for weapons, sensor pods, or tank. Internal 20mm cannon mounted in nose.

NEWS

From MCDONNELL DOUGLAS

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FOR IMMEDIATE RELEASE

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ST. LOUIS, Mo., Nov. 22, 1985 -- Spain's newest strike fighter, the McDonnell Douglas EF-18, made its first public appearance today at McDonnell Douglas Corporation facilities here.

More than 2,000 Spanish and American guests were on hand as the first of 72 EF-18s to be purchased by Spain was formally unveiled in a one-hour ceremony.

The newest addition to the Spanish Air Force will be flown first in the United States and will be ferried to Spain with three other EF-18s early next summer. The strike fighter flies both air-to-air and air-to-ground missions.

The Spanish Air Force will base the first of these aircraft at Zaragoza, in northeast Spain. Spanish pilots will start their EF-18 training in the United States next spring.

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Spain, the third country other than the United States to purchase the McDonnell Douglas strike fighter, ordered the EF-18s in 1983. Canada and Australia have ordered 138 and 75 strike fighters, respectively.

The U.S. Navy and Marine Corps have been operating the aircraft, designated the F/A-18 Hornet in the United States, for nearly three years and plan to buy 1,377 strike fighters.

More than 300 Hornets have been delivered to the U.S. Navy and Marine Corps, Canada, and Australia.

Since its first flight in 1978, the Hornet has accumulated more than 171,000 flight hours and has demonstrated that it is two to three times more reliable than current Navy fighter aircraft. The time required to maintain the F/A-18 is about half that required for current fleet aircraft.

The Hornet production team includes Northrop Corporation, principal airframe subcontractor; General Electric, which builds the plane's twin F404 engines, and Hughes Aircraft Company, maker of the APG-65 radar.

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F/A-18 HORNET STRIKE FIGHTER
BACKGROUND INFORMATION

The F/A-18 Hornet, new strike fighter for the U.S. Navy, Marine Corps, Canada, Spain and Australia is a single-seat, twin-engined multimission aircraft. The Hornet will replace two aircraft in front-line service with the Navy and Marine Corps -- the A-7 light attack jet and the F-4 Phantom fighter.

Canada's 138 CF-18s will replace its CF-101 fighters in fulfillment of North American Defense (NORAD) commitments and replace CF-104 aircraft in Canada's NATO obligations in Europe. Australia has contracted for 75 Hornets and Spain has signed a contract for 72 Hornets with an option for 12 more.

McDonnell Aircraft Company, a division of McDonnell Douglas Corporation, is the prime contractor for the F/A-18. General Electric produces the Hornet's smokeless F404 low-bypass, turbofan engines; Hughes Aircraft Company provides the APG-65 radar; and Northrop Corporation is the principal airframe subcontractor.

The Navy has been operating a Hornet training squadron at Naval Air Station Lemoore, Calif, since November, 1980, and it recently established a second training squadron at Naval Air Station Cecil Field, Fla., in April, 1984. The Marine Corps started its first operational squadron, VMFA-314, at Marine Corps Air Station El Toro, Calif., in January, 1983. The Navy soon followed with its first operational squadron, VFA-113, in October, 1983. Squadrons VFA-113 and VFA-25 recently finished the first operational carrier deployment aboard the USS Constellation in August, 1985. Four squadrons of F/A-18s began an operational assignment aboard the USS Coral Sea in early fall, 1985.

Canada received its first CF-18s in October, 1982, for Squadron 410, based at Cold Lake, Alberta. The Canadians currently have 65 CF-18s operating out of CFB Cold Lake and CFB Baggotville in Canada and Baden-Soellingen in West Germany.

The first Australian F/A-18 made its maiden flight in late 1984 and five Hornets have been delivered to the Royal Australian Air Force. Operational Conversion Unit Williamtown in Australia received the first of those Hornets in May, 1985.

Meanwhile, the Hornet has accumulated more than 171,000 flight hours. A reconnaissance version of the Hornet was flight tested last year.

Standard air-to-air combat armament for the Hornet is two AIM-9 heat-seeking Sidewinder missiles on the wingtips, two AIM-7 radar-guided Advanced Sparrow missiles on fuselage stations, and an internally mounted M61 20 mm gun carrying 570 rounds of ammunition. The Sparrow and

Sidewinder missiles have scored direct hits during weapons testing, and integration of the 20 mm gun is proving to be the most successful program of its kind.

Air-to-ground weapons can be carried on centerline, inboard, or outboard stations. Up to 17,000 pounds of payload can be loaded on the Hornet's nine stores stations. An F/A-18, without refueling, has flown more than 600 n.m., dropped 4,000 pounds of bombs on a target and returned to base with fuel to spare. In another exercise, a Marine Corps squadron of 12 Hornets flew 80 missions in a nine and one-half hour period. Four of the aircraft flew eight sorties apiece.

Each General Electric F404 engine develops 16,000 pounds of thrust, giving the Hornet an impressive thrust-to-weight ratio of more than 1:1, a maximum speed of Mach 1.7-plus, and a combat ceiling greater than 50,000 feet. Ferry range exceeds 1,800 nautical miles. The Hornet can fly at the speed of sound with intermediate power -- afterburner power is not required.

Because of the F/A-18's advanced avionics system, including the Hughes APG-65 radar, the Hornet pilot can convert his plane from a fighter to an attack aircraft with the flip of a single switch. The APG-65 radar has long-range detection capability in both head-on and tail-on aspect for both look-up and look-down modes against air-to-air targets.

The Hornet was designed to be both reliable and easily maintainable, ready for duty ashore or at sea. In Navy and Marine Corps operations, the F/A-18 is demonstrating two to three times better reliability at half the maintenance of other fleet aircraft.

Fully armed, the Hornet has a fighter escort range greater than that of the F-4J. It can also accelerate from Mach .8 to Mach 1.6 much quicker, turn in a much tighter circle, and detect enemy aircraft significantly better.

In its role as a light attack aircraft, the Hornet offers unprecedented precision in weapons delivery. In comparison with the light attack aircraft it will replace in the U.S. Navy and Marine Corps, the Hornet's agility and power provide greater speed and maneuverability over target and a considerable thrust-to-weight ratio improvement. Because the attack Hornet is armed with a gun and Sidewinder missiles, it can provide its own fighter escort capability on attack missions.

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Armament	Up to 17,000 pounds maximum on nine stations -- two wing-tip for Sidewinder heat-seeking missiles; two outboard wing for air-to-ground ordnance; two inboard wing for Sparrow radar-guided missiles, air-to-ground, or fuel tanks; two nacelle fuselage for Sparrow missiles, or sensor pods; one centerline for weapons, sensor pods, or tank. Internal 20mm cannon mounted in nose.

THE HORNET STRIKE FIGHTER

Design and build one aircraft. To be a superior fighter and a superior attack plane. To be highly reliable and easily maintained. To serve the U.S. Navy, Marine Corps and America's allies into the 21st century.

Those were the requirements specified by the U.S. Navy and Marine Corps in 1974 for a new aircraft -- a strike fighter.

Today, it is called the F/A-18 Hornet.

The Hornet is a single-seat, twin-jet, twin-mission strike fighter for use aboard aircraft carriers or ashore. The F/A-18 can be configured, depending upon specific mission requirements, as a fighter (air-to-air) or attack (air-to-ground) aircraft. With the flip of a single cockpit switch, the Hornet can switch from one target to another -- in the air or on the ground.

It takes a lot of teamwork to build such a flexible airplane at a moderate cost. The Hornet team includes Naval Air Systems Command in Washington; Northrop Corporation, principal airframe subcontractor in Los Angeles; General Electric, which is building the Hornet's F404 engines in Massachusetts; and Hughes Aircraft Company of California, maker of the F/A-18's long-range radar. Supporting that group are hundreds of subcontractors across the United States and abroad.

What emerged from that team effort is a highly maneuverable strike fighter able to move at nearly twice the speed of sound, capable of defeating hostile aircraft with missiles and 20-millimeter cannon. What emerged is an aircraft capable of

pilot directs the Hornet to do -- including accelerating while climbing straight up.

Top speed is in excess of 1.7 times the speed of sound and the Hornet can also maneuver superbly at lower speeds than most jet fighters. Its combat ceiling exceeds 50,000 feet.

The pilot's ability to see the enemy is essential in a combat aircraft. In some planes, cockpit structure restricts visibility and it is often hard for the pilot to see what's behind him. Hornet pilots, however, have a full 360 degrees of visibility.

Then there is the matter of "legs". Few think of an airplane as having legs, but those who design, build and fly them often do. "Legs" is a nickname for range and an aircraft with good range is said to have long legs. Hornet's ferry range is about 1,800 nautical miles; its fighter escort range exceeds 400 nautical miles plus time for air combat maneuvering; and its air-to-surface mission radius is better than 550 nautical miles.

Fuel tanks in the Hornet's fuselage and wings will hold 10,860 pounds or about 1,700 gallons. For added range, over 990 gallons can be carried in three external fuel tanks.

System Design

From the beginning, the USN and McDonnell Douglas team insisted that the Hornet be an available aircraft -- one ready

carrying up to 17,000 pounds of ordnance on nine weapons stations while performing at more than seven and one-half times the normal force of gravity.

Production

Assembly and flight tests for U.S., Canadian and Spanish Hornets take place at the McDonnell Aircraft Company in St. Louis, Mo. Assembly and flight tests for most Royal Australian Air Force F/A-18s will occur in Australia.

Several allied governments are considering the Hornet for their air arms and have requested and are receiving details and proposals from McDonnell Douglas and the U.S. Navy with the approval of the U.S. government.

Performance

Many factors contribute to an aircraft's performance. In a superior aircraft like the F/A-18, physical design, engines, fuel capacity and range, speed, climbing ability, ceiling and visibility all play major roles.

The Hornet's twin General Electric F404 engines are in the 16,000-pound thrust class each. Those 32,000 pounds of thrust mean that, when the F/A-18 enters combat, its thrust will exceed its weight, thus ensuring peak performance no matter what the

and able to do its job when needed. No matter how potent an aircraft is, it is useless if it cannot fly when needed. Every step in the design process, therefore, stressed three attributes which came to be nicknamed the "ilities." Reliability, maintainability and survivability.

These were given equal status with more traditional prime considerations such as performance and cost.

To ensure maximum reliability, the USN required every subcontractor to test, analyze and fix each piece of Hornet equipment in a realistic environment before that equipment entered formal demonstration tests or production. Because of this special emphasis in the Hornet design, the plane is currently demonstrating reliability two to three times greater than that measured for the A-7 and F-4 and other U.S. Navy fighter and attack aircraft. The Hornet's maintainability is being measured at 40 to 50 percent fewer direct maintenance hours per flight hour compared to the A-7 and F-4.

The Hornet is structured to allow easy routine maintenance and repair. Service points are dispersed so maintenance personnel will not get in each other's way. An engine can be removed and replaced in less than one hour and the radar rolls out on tracks for easy access. Electronic equipment is behind quick-release doors at chest height and the windshield is hinged for access behind the instrument panel.

In the nosewheel well of every Hornet is a status panel to

tell the maintenance man if a problem exists and where to find it. When he opens the indicated maintenance door, he finds the problem part and replaces it. In the air, the pilot can use the same system with results displayed on a monitor similar to a television screen.

Simplicity in design also means there are fewer things that can go wrong. The multimission radar has 8,000 fewer parts than the F-4 air-to-air radar, yet has 20 percent greater detection range and will track targets at all altitudes, above or well below the Hornet.

To speed Hornet back to fully operational status after a malfunction, most electronic "black boxes" plug in and out. Then, if one has a problem, the maintenance man simply pulls it out, puts in a spare, and repairs the faulty box.

Ground crews also use a panel that gives a "go" or "no go" measurement of various liquid levels, including engine oil, hydraulic fluid, oxygen, radar coolant, oil in the auxiliary power unit, and others. This permits a quick preflight check, eliminating the need to open numerous doors and inspect gauges.

Pilots new to the Hornet find many features added, and some missing. Gone are most of the traditional cockpit instruments. Three cathode ray tubes and an "up front" control panel directly in front of the pilot replace those gauges. At eye level is the head-up display -- a clear glass through which necessary flight information is projected for the pilot's view as he looks

through the cockpit. Thus the Hornet pilot is told everything he needs to know about his aircraft and about his target without ever taking his eyes off that target.

He is also not distracted by having to move his hands from knob to toggle switch to lever. Every critical switch for air-to-air and air-to-surface engagements is either on the throttle under his left hand, or on the control stick he holds in his right hand.

The cockpit, coupled with the Hornet's inherent performance characteristics, makes this a most survivable plane. The Hornet's relatively small size -- 56-foot length, 40-foot wingspan and 15-foot height -- and its smokeless engines make it hard to be observed by enemy pilots or ground gunners. If seen, the Hornet will probably be in a position to strike the enemy before he can fire. And if hit, the Hornet stands a better chance than most airplanes of getting home, thanks to damage control features built in.

Those "get home" features include that second engine, self-sealing tanks, built-in fire extinguishers, self-sealing fuel lines, foam in the wing tanks to suppress explosion, filler foam in the fuselage for fire suppression, and such devices as a hydraulic reservoir level sensing system. That last system automatically detects any hydraulic leak, isolates the portion

of the hydraulic system that is leaking, and allows normal operation through the rest of the system.

Finally, there is what engineers call "redundancy," back-up systems to take over in case something happens to the primary system. There are many examples of redundancy in the Hornet and perhaps the main one is a second independent flight control system. Should anything happen to the Hornet's electronic flight controls, the pilot has a mechanical back-up system with which he can fly the plane.

Engines

The Hornet's F404 engines by General Electric are modifications of the YJ 101 engines used in Northrop Corporation's YF-17 aircraft, the aerodynamic basis for a design that would eventually become the F/A-18. Each F404 engine has about 1,000 pounds more thrust that its YJ 101 ancestor.

These engines are efficient, lightweight and simple, reflecting the Hornet emphasis on increased performance and simpler design. Simplicity in aircraft and engine design means higher reliability, easier maintenance, and more trouble-free performance.

General Electric designed the F404 to achieve thrust eight times its own weight with fewer stages, fewer frames, fewer

bearings and fewer parts than other high performance engines. It has about the same thrust as the J79 engine which powers the F-4 Phantom -- but the F404 is 25 percent shorter, half as heavy and has 7,700 fewer parts.

Important also to military commanders who must keep their Hornets maintained in the tight spaces aboard aircraft carriers or spartan forward bases ashore is the fact that a Hornet engine can be changed within the shadow of the airplane -- in less than one hour.

Other engine-related features aboard each Hornet are the airframe-mounted accessory drive system and auxiliary power unit. These devices allow the pilot to start his engines without any external power. And they permit full ground checkout of all aircraft systems requiring electricity, hydraulic power, fuel pressure or cooling, all without having to start the engines and without external power.

Finally, there's the important fact that each Hornet has <u>two</u> F404 engines. Twin-engine jet fighters are safer than single-engine fighters. U.S. Navy and Air Force experience has shown that a single-engine fighter force can expect to lose about twice as many airplanes as a twin-engine force doing the same amount of work.

Air-to-Air Combat

Attacking aircraft always have several important advantages. It is the attacker, for instance, who chooses when, where and how the attack will take place, and what type weapons will be used. It is obvious, too, that the attacker will analyze defending forces and shape his attack to take advantage of the defenders' weaknesses.

Defenders therefore must be able to overcome a variety of threats in a variety of circumstances. Adding to the defenders' problem is the fact that potential enemies are modernizing their air forces with sophisticated, all-weather aircraft.

Simply-armed aircraft with short-range radars cannot fight at night or in bad weather and they are not able to face today's strong threats. The USN and F/A-18 designers, therefore, insisted on an airplane able to win beyond visual range engagements using the Hughes APG-65 radar and Sparrow radar-guided missile; an airplane equally capable of close-range dogfights with Sidewinder missiles and cannon; an airplane able to win at very high or very low speeds; and an airplane able to fight anytime, anywhere.

Additionally, the F/A-18 will be the first Navy aircraft

flying in fleet operations with the Advanced Medium Range Air-to-Air Missiles (AMRAAM).

The F/A-18, furthermore, has a much greater fighter escort radius (over 400 nautical miles) than the F-4 Phantom. It also has a superior turn rate, more excess power, and it accelerates faster. As one example of acceleration, the F/A-18 at 35,000 feet altitude will move from 530 miles per hour to 1,060 miles per hour in under two minutes.

When a Hornet takes off on a fighter mission, its gross weight is about 35,000 pounds.

Air-to-Surface

Attack pilots and their commanders need faster, more maneuverable, and more accurate aircraft than were used in Vietnam. Speed gets them in and out of the target zone faster, maneuverability helps them avoid ground fire and defending aircraft, and accuracy increases chances of hitting the target the first time around.

Pilots will find all that in the Hornet. Because this aircraft is armed with Sidewinder missiles and its cannon in addition to the bomb load, it can perform well as a fighter should enemy aircraft appear.

The Hornet is faster than the A-7 Corsair II it will replace, its thrust-to-weight ratio is better at intermediate

power and much better at maximum power. It has a turn rate three times greater and it can drop its weapons more accurately. It can also carry and accurately deliver a full range of conventional, guided and anti-missile weapons.

Armament

The Hornet has nine stores stations, the points on an airplane where a variety of weapons or external fuel tanks can be carried. Its air-to-air combat weaponry includes two radar-guided Sparrow (AIM-7) missiles mounted at the lower edge of the fuselage, two heat-seeking Sidewinder (AIM-9) missiles on the wingtips, and a 20-millimeter cannon with 570 rounds of ammunition mounted in the nose. Another pair of Sparrow or Sidewinder missiles may be carrier under the wings.

For air-to-ground missions, Hornet retains Sidewinder missiles and cannon for self-defense, and can exchange fuselage-mounted Sparrows for infrared and laser targeting sensors.

Materials

Built to withstand the punishment of carrier landings, the Hornet balances conventional material, such as steel and

aluminum, with light, strong material such as carbon-epoxy composites. This composites material, proven in flight on other McDonnell Douglas aircraft, is used to make the Hornet's wing skins, flaps, ailerons, horizontal and vertical tails, many maintenance access doors and other parts.

Growth

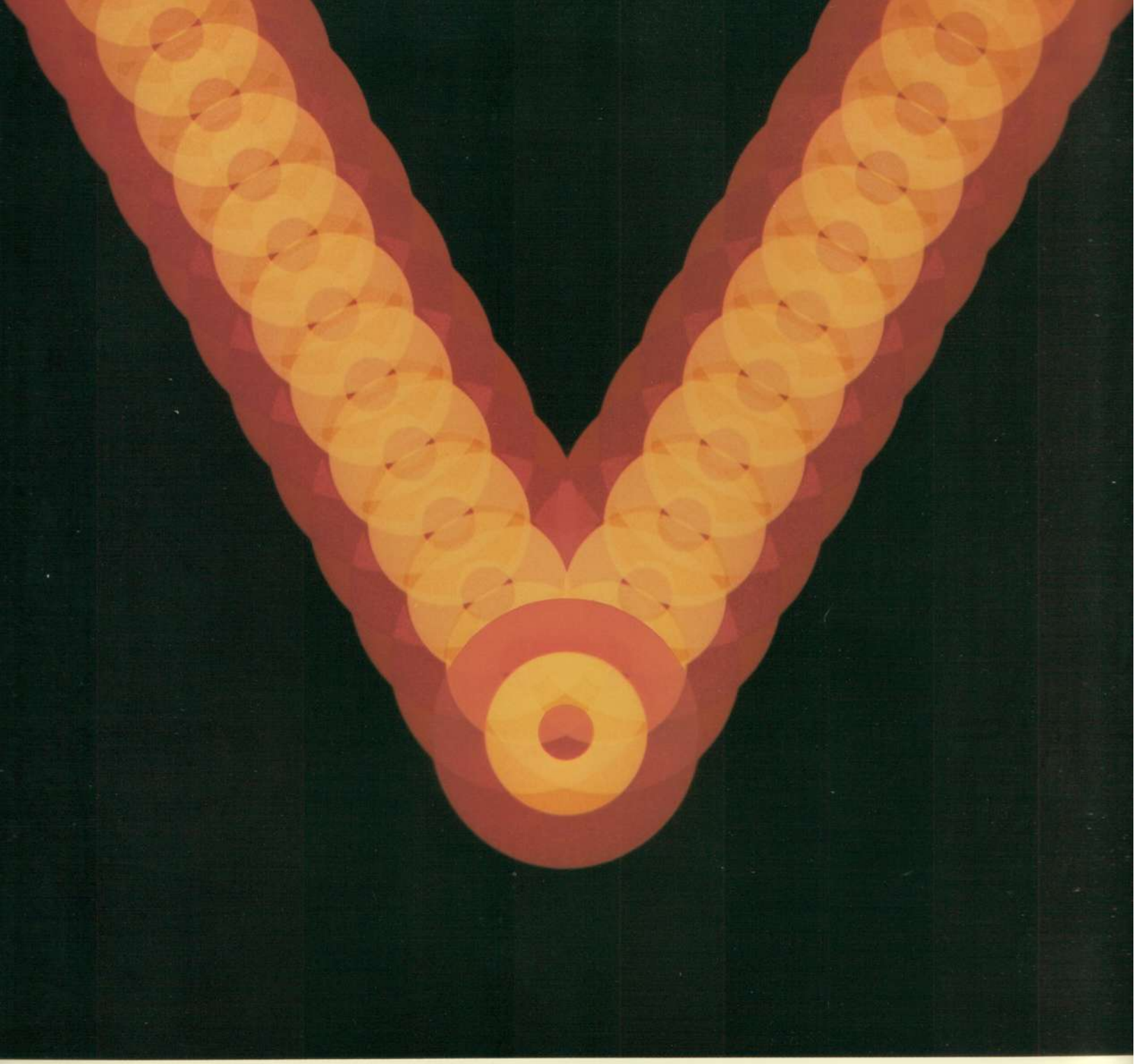
Realizing that an airplane capable of doing two jobs equally well probably could do even others if needed, Hornet designers allowed for growing room. Electronic equipment can be upgraded and new equipment added without any increase in volume. With minimum modifications, about 20 cubic feet are available for more electronics. If the 20-millimeter cannon is removed, another 27 cubic feet open up for use in future missions, like reconnaissance.

Engine growth has been planned in advance, increasing F404 thrust and reducing fuel consumption.

Such future changes would make Hornet an extraordinarily effective reconnaissance or all-weather attack aircraft at minimum cost.

That's the Hornet -- tomorrow's aircraft for tomorrow's mission.

Today.



EF-18

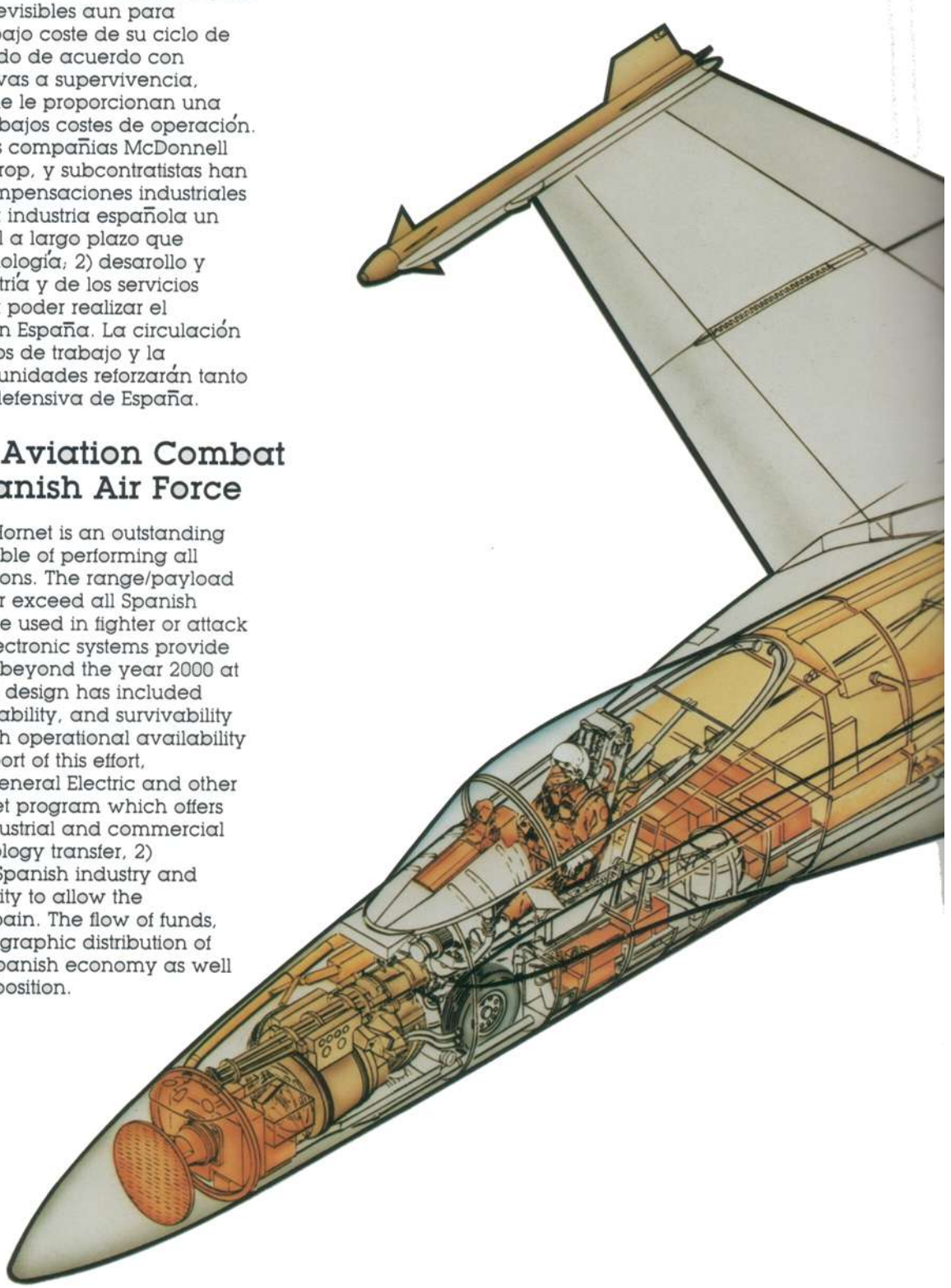
para España

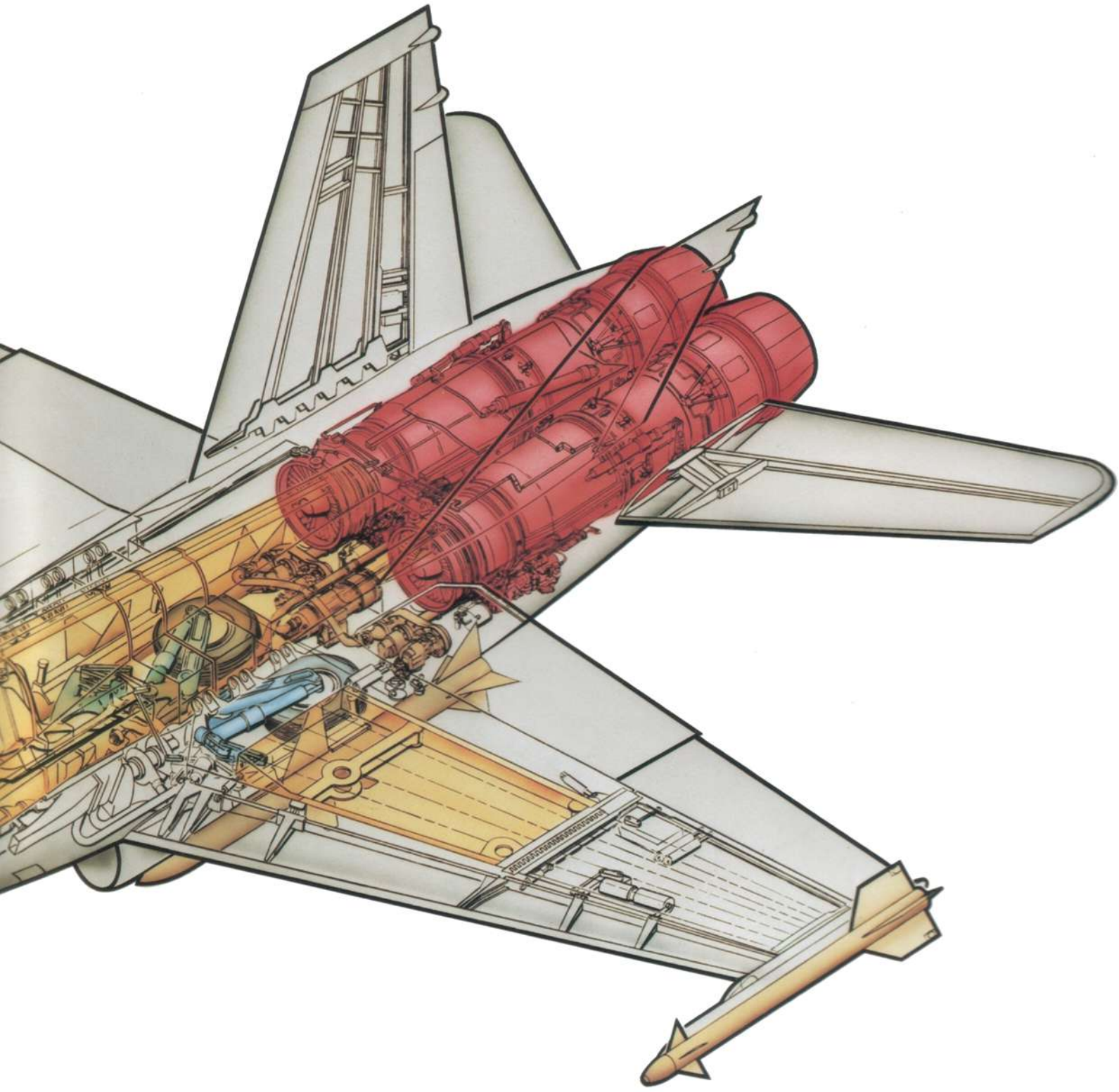
EF-18 Hornet Nuevo Avión De Combate Para Las Fuerzas Aéreas Españolas

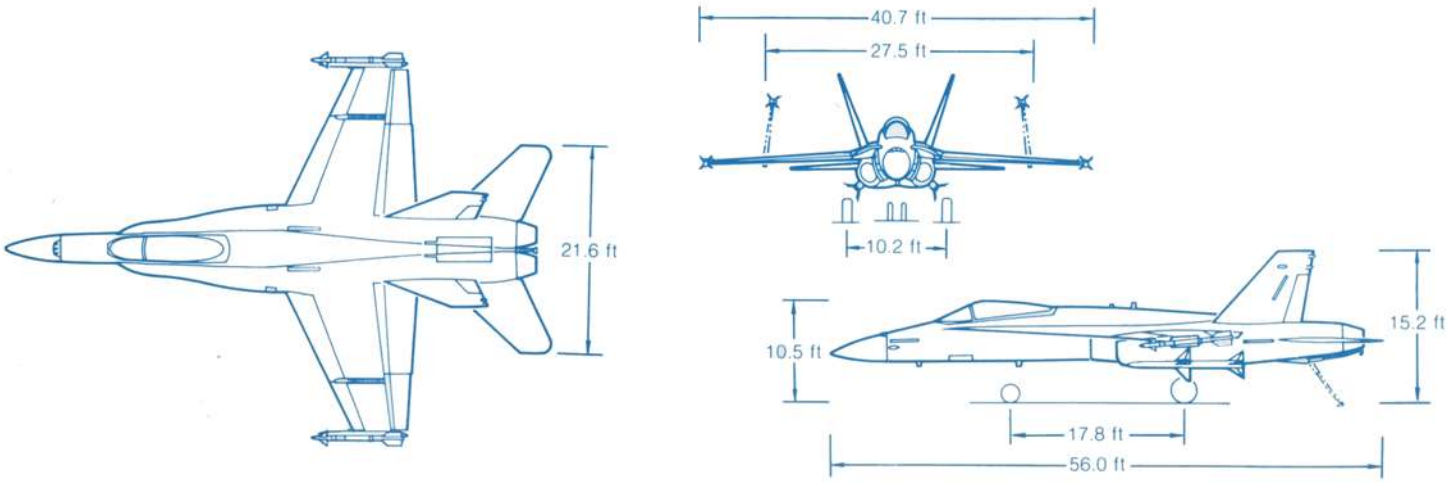
El avión EF-18 Hornet de la compañía McDonnell Douglas es un excelente avión multimisión, capaz de realizar todas las misiones especificadas por el Ejército del Aire Español para el Futuro Avión de Combate y Ataque (FACA). La capacidad de carga en relación con el radio de acción del avión EF-18 satisface ó supera todos los requisitos exigidos por parte española. El avión Hornet puede ser usado en misiones de caza ó de ataque. Los sistemas electrónicos digitales para misiones múltiples ofrecen posibilidades de desarollo para hacer frente a las amenazas previsibles aun para después del año 2000, con un bajo coste de su ciclo de vida. El avión ha sido proyectado de acuerdo con rigurosas especificaciones relativas a supervivencia, mantenimiento, y fiabilidad, que le proporcionan una alta disponibilidad operativa y bajos costes de operación. En apoyo de este programa, las compañías McDonnell Douglas, General Electric, Northrop, y subcontratistas han preparado un programa de compensaciones industriales y económicas que ofrecerá a la industria española un programa industrial y comercial a largo plazo que incluye: 1) transferencia de tecnología; 2) desarollo y asistencia a sectores de la industria y de los servicios españoles; y 3) capacidad para poder realizar el mantenimiento de los aviones en España. La circulación de fondos, la creación de puestos de trabajo y la distribución geográfica de oportunidades reforzarán tanto la economia como la posición defensiva de España.

EF-18 Hornet . . . New Aviation Combat Aircraft for the Spanish Air Force

The McDonnell Douglas F/A-18 Hornet is an outstanding multimission aircraft that is capable of performing all specified Spanish Air Force missions. The range/payload capabilities of the F/A-18 meet or exceed all Spanish requirements. The Hornet may be used in fighter or attack roles. The multimission digital electronic systems provide growth potential to meet threats beyond the year 2000 at a low life-cycle cost. The aircraft design has included demanding reliability, maintainability, and survivability specifications which provide high operational availability and low operating costs. In support of this effort, McDonnell Douglas, Northrop, General Electric and other suppliers have prepared an offset program which offers Spanish industry a long-term industrial and commercial program that includes, 1) technology transfer, 2) development and assistance to Spanish industry and service sectors, and 3) a capability to allow the maintenance of the aircraft in Spain. The flow of funds, the creation of jobs, and the geographic distribution of opportunities will enhance the Spanish economy as well as strengthen Spain's defensive position.



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10.5 ft
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17.8 ft
56.0 ft


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MCDONNELL DOUGLAS