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INTELLIGENCE

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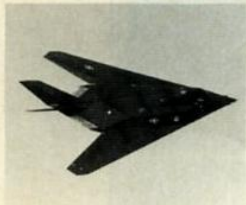
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Cooperation Seen as Path To Industrial Profitability

Paris exposition shows diversity in aerospace, electronic commercial and military systems.



French President François Mitterrand (second from left), accompanied by Serge Dassault (left), chief executive officer of Dassault Aviation and air show president, and Henry Martre (right), president of GEFAS and chairman and chief executive officer of Aerospatiale, tour a major exhibit hall.

By Gerald F. Merna

France's Thomson-CSF and Aerospatiale have agreed to cooperate in the production of military space systems. Company officials say this joint venture will produce military reconnaissance and surveillance radar imaging satellites operating in either the X or millimeter bands.

This joining of forces by these two French industrial giants was one of the most significant actions emerging from this year's 39th Paris Air Show.

The quest by Thomson-CSF, a member of the Thomson Group, one of the world's largest electronics corporations, and Aerospatiale for a larger slice of the military space market immediately captured the attention and concern of aerospace firms in the United States and elsewhere around the world, according to industry leaders. This marriage would make Thomson-

CSF and Aerospatiale the largest such joint venture in Europe.

Thomson-CSF officials at Le Bourget added that other space sensors, electronic intelligence systems and signals intelligence devices could be produced by the two French corporations. It is believed that products could be ready within the next two years. Thomson-CSF withdrew from the military satellite market about five years ago. In a related development, Thomson-CSF, Aerospatiale and Italy's Alenia agreed to team for civil space applications, especially in meteorological areas. One likely project is to develop an air traffic control radar satellite system for use over the Atlantic Ocean.

Thomson-CSF also is designing and producing equipment to protect transmissions from electronic warfare threats and is involved in secure command/telemetry links for the Telecom 1, Telecom 2, Spot and Helios satellites. The company also is producing signal processing modules for beacon

systems and communications security devices for systems using super high frequency modems.

The Soviet Union, meanwhile, is looking for partners in space and civil aviation enterprises. For the Salon de l'Aéronautique et de l'Espace 1991, the Soviets put together a large exhibit of the Mir space station. The full-scale engineering model came with Kvant 1, Kvant 2 and Kristall modules joined to the mock-up station.

In an attempt to attract corporate dollars, the Soviets also unveiled the latest configuration of the proposed Gulfstream/Sukhoi business jet, the S21G SSBJ. This new design shifts from a tri-engine configuration to twin jets. Rolls-Royce and Lyulka will develop the final powerplants. Soviet representatives currently are conferring with the U.S. Federal Aviation Administration (FAA) for certification. A Soviet official at the show said a market of 100 aircraft is anticipated initially. The Soviet government will use 20.

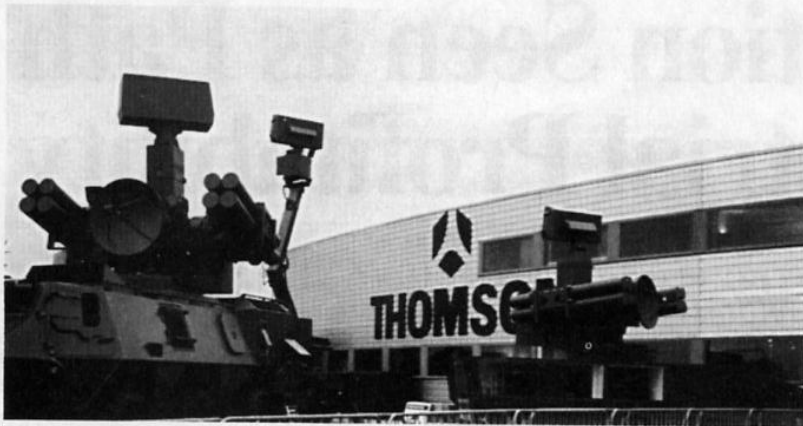
Talks With Greece

Thomson-CSF announced it is in final stages of talks with the Greek government on an air traffic control system that will cover the entire country. Remote stations are a key to this system. Also, Thomson-CSF's RBE2 multimode radar, which is under development for the Dassault Rafale combat aircraft, is a joint venture with Dassault Electronique by the Groupeement d'Interet Economique Radar French air force/navy combine. Delivery is set for later this year.

The system features a two-dimensional electronically scanned antenna, which improves beam agility up to 100 percent, according to Thomson-CSF officials. Random scanning is possible in the air-to-air regime, which makes electronic countermeasures more difficult. Other modes are automatic terrain following/terrain avoidance and air-to-surface. The radar can track while scanning against multiple air threats and can launch protective missiles while terrain following.

British Connection

Thomson-CSF and Short Brothers of the United Kingdom agreed to develop a new generation of very short range air defense missile systems. Officials said the market poten-



Thomson-CSF's mobile battlefield air defense systems are among many weapons, detection and communications products on display by the partially French government owned corporation at the Paris Air Show.

tial is about \$15 billion during the next 10 years.

Deutsche Aerospace AG (DASA) of Munich, Germany, a recently merged collection of Germany's largest aerospace corporations, and Raytheon of Lexington, Massachusetts, formed a joint venture to produce missile systems. Alenia and DASA created a joint venture called EuroColumbus to construct a European space shuttle. Rolls Royce and Germany's BMW teamed up to produce turbofans for regional airliners and business jets.

The Soviet Union and Bendix/King agreed to work on integrated avionics systems for the Ilyushin Il-114, Yakovlev Yak-42 and Tupolev Tu-334 aircraft. Flight test equipment will be delivered next year. Alenia and the Soviet Union formed a company called Buran, the Russian word for snowstorm, to produce air traffic control systems in the Soviet Union.

These actions were representative of several other teaming arrangements, consortia and joint ventures that were announced at the air show. The move to joint action and cooperation cut across all sectors of the aerospace-defense industry and national boundaries.

The biennial air extravaganza, which was staged against a backdrop of slipping profits, global aviation industry lay-offs, diminishing defense budgets and the most profound recession in the airline industry in more than 10 years, was regarded by sponsors as a huge success. Show officials claimed a record number of exhibitors, although participation by U.S. firms was less than it had been at previous shows.

Participants offered optimistic predictions of increased sales for civilian and military aircraft, related avionics, weaponry and air traffic control systems. Serge Dassault, chief executive of Dassault Aviation and the air show



Italy's Alenia displays its newest tactical radar systems, including the RAT-31 S, three-dimensional range surveillance radar (right).

president, predicted a sizable market upturn particularly for fighter sales, his own included. Iraq's misuse of Avions Marcel Dassault-Breguet Aviation-built Mirage fighter aircraft has not hurt sales in the Middle East, he said.

Capturing the Market

Company representatives in interviews with *SIGNAL* Magazine generally suggested that the European industry is convinced it has developed an independent defense capability. Europeans, then, consider Europe to be the first market, with the United States, the Far East and other countries as potential growth areas. They believe that the United States will continue to dominate in space exploration with the Soviet Union having a greatly diminished role. They also predict that European firms have excellent prospects for dominating world commercial aviation markets.

The recent U.S.-led coalition forces victory in Southwest Asia had endless reverberations at Le Bourget. The U.S. static exhibit, arguably the most popular at the trade show, featured an array of Desert Storm veterans, including the star of the show, the Lockheed F-117A

stealth fighter. French President François Mitterrand, who opened the Paris Air Show, detoured from his official itinerary to view the F-117A. The aircraft was designed to deliver a 5,000-pound payload, but a Lockheed official said that even more ordnance could be carried depending on distance and other mission factors.

Paul W. Martin, Lockheed's F-117A program manager, confirmed that some of these aircraft remain in the Gulf. Martin said that an \$83 million avionics and other systems upgrade for the F-117A that was recommended by the House Armed Services Committee and countenanced by the full House had been coordinated with the Air Force. These improvements are scheduled for Fiscal Year 1992.

Total upgrade costs for the fleet

were set at half a billion dollars, he said. Enhancements include upgrading the mission planning system's user interface, improving maintainability of the aft end of the engines, adding a global positioning system capability and giving the F-117A an all-weather capability. Seven of the 56 F-117As already have received improvements under the offense capability improvement program, Martin said.

Gulf War Stars

Other U.S. Desert Storm stars included the McDonnell Douglas F-15C Eagle and Fairchild Republic's A-10A Thunderbolt II, which decimated Iraqi armored columns. The A-10A, also called the Warthog, was armed with a General Electric Avenger 30-millimeter Gatling type cannon and Hughes AGM-65 Maverick missiles. Other popular performers were the McDonnell Douglas-AH-64 Apache attack helicopter, the Vietnam-vintage Grumman A-6 Intruder and the Lockheed P-3C Orion that guaranteed the Iraqi maritime blockade.

Desert Storm pilots and crews, who provided autographs to the public and enjoyed the adulation of the crowd,

described the capabilities of these combat aircraft.

Ironically, the Soviet Union's display was adjacent to the U.S. aircraft exhibits. The Soviets used the air show to unveil a new version of the Mikoyan MiG-31 long-range interceptor. Known as the Foxhound, this big jet is powered by two 34,170-pound-thrust Soloviev D-30F6 turbofan engines. Its Flashdance radar operates in the X band in the 9 to 9.5 gigahertz range. The MiG-31 can fly at Mach 2.35 at 57,000 feet.

The Soviets also displayed a model of their new supersonic vertical/short takeoff and landing Yakovlev Yak-141 fighter aircraft.

Desert Camouflage

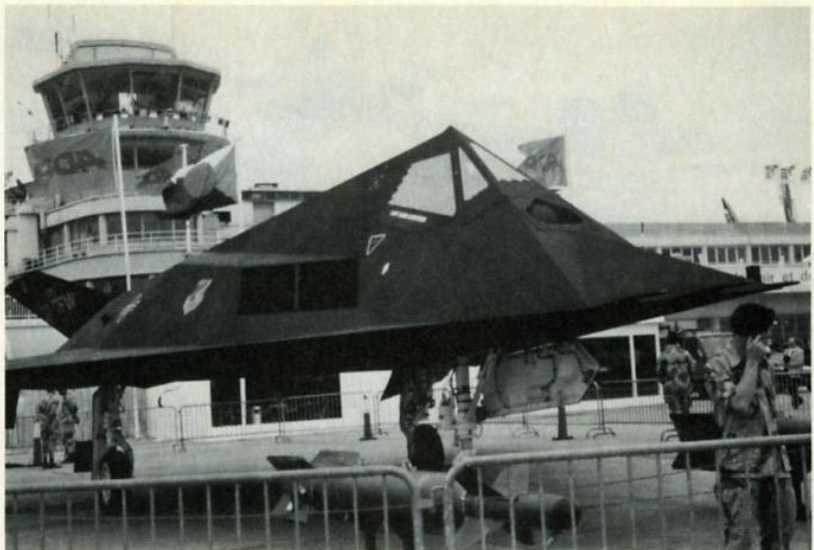
The Sepecat Jaguar, Mirage F1 and Panavia MRCA Tornado, all in desert camouflage, also were on display at the show. The Tornado is gaining a series midlife upgrade following its experience in Desert Storm. The upgrade includes stand-off weapon systems, main computers and management systems storage. The aircraft is being used by Germany, Britain, Italy and Saudi Arabia. Contractors include Alenia, Germany's Messerschmitt-Bölkow-Blohm and British Aerospace. Saudi Arabia is using 72 of the aircraft. The Saudis, so far, have made the only export purchases of the Tornado.

Moshe Keret, president of Israel Aircraft Industries, said firms that remain in the international defense market will face considerable competition in the years ahead. Keret said his own company would seek to diversify into non-defense related market areas. With an eye on Desert Storm, Keret predicted which of the weapons systems will face the highest priority for improvement and refinement in the near term.

On his list are unmanned aerial vehicles, smart weapons for all weather and day-night operations, and systems for defense against tactical ballistic missiles. He also sees expanded use of helicopters in warfare. Keret noted the crucial role that command, control, communications and intelligence systems and bomb damage assessment played in the Gulf War, noting that these systems probably would increase in importance in future conflicts.

Regional Expansion

With large airliner sales apparently stymied, aviation companies at Le Bourget paid considerable attention to smaller passenger liners or regional jets. A consortium led by Deutsche Aerospace believes a requirement for 2,000 transports in the 80- to 130-passenger category will be necessary during the next two decades.



Lockheed's F-117A stealth fighter was on static display at the 11-day French aerospace exposition.

British Aerospace is moving on its own 70-passenger aircraft. Germany's Fokker said it would offer 80- and 130-passenger variants of the F100. McDonnell Douglas announced a memorandum of understanding with China National Aero-Technology Import/Export Corporation, Pratt & Whitney and Northwest Airlines that

could lead to the development of a 105-seat aircraft that may be ready for commercial service by 1995.

Canadair, meanwhile, is considering enlarging its new (RJ) 50- to 56-seat regional jet. Fokker is competing in this market. Boeing also is heavily involved in this emerging market.

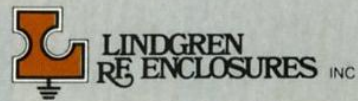
In other commercial developments,

Choosing the Proper Shielding System Isn't Always a Matter of Red and Black

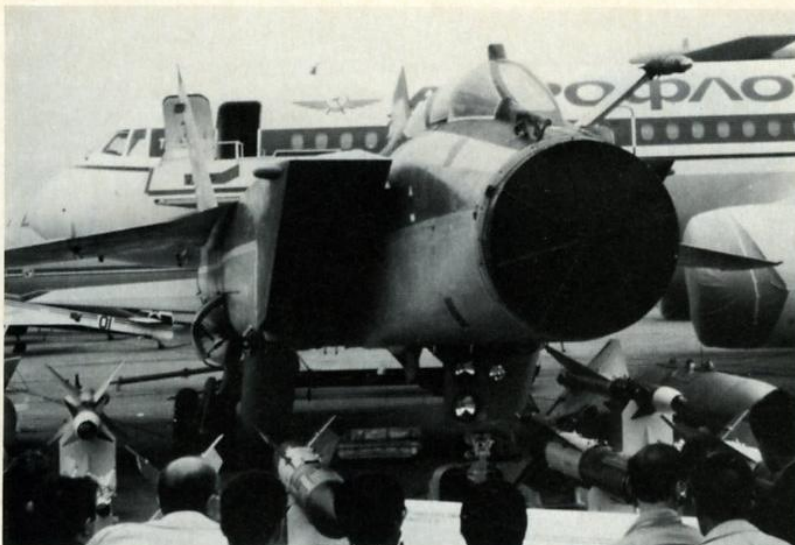
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The Mikoyan MiG-31 advanced long-range interceptor, the Soviet's newest high performance fighter, is parked four aircraft away from the U.S. F-117A stealth fighter. A year ago, such juxtaposition would have been impossible.

Canadair and the French government neared the end of negotiations on procurement of 12 Canadair CL-215T amphibious water bombers. Two CL-215Ts that were delivered to Spain just before the air show had been put to use fighting forest fires. If France makes the purchase, it will gain improved air-

craft, rather than conversions of the earlier piston-engined CL-215s.

Germany's Siemens has joined with a U.K.-based plant to draw together expertise involving air traffic control activities, including those acquired by the takeover of Plessey. The company is looking at Europe and other regions

for sales of its air traffic control systems. Siemens Air Traffic Management will be located at the Chessington, Surrey, plant that came into the group with its acquisition of Plessey Radar in 1989. Company officials unveiled what they say is the first full-color 2,000-line display for controllers on the world market. Another featured system is the Siemens Navigator system for producing computer-generated aeronautical charts.

Air Traffic Vision

The FAA outlined at the show its vision of air traffic control (*SIGNAL*, July, page 50) in the 21st century. Called the future air traffic management system, it boasts evolutionary air traffic control, automation, computer systems to manage information flow and cockpit displays of air traffic control information. This future system, in part, will rely on satellite systems.

The United Kingdom's Ferranti International showed off its new civil flight simulators. The Vector 2000 simulators are based on modular design concepts in both hardware and software. They were developed according to FAA guidelines for less sophisticated flight training devices. These systems use Harris Night Hawk computers, Fokker MiCol digital control systems for motion and control loading and visual displays based on the McDonnell Douglas Vital series.

Casa, a Spanish manufacturer, which is planning to produce a CASA 3000 turboprop, said it is looking for at least two high risk partners. One possible contender is the Soviet Union. Casa officials envisioned a 64-passenger Ilyushin fuselage married to a CASA wing with Allison GMA 2100 high speed turboprop powerplants.

China, a major exporter of missiles, displayed its PL-9 air-to-air missile, which was copied from the U.S. Raytheon/Ford Aerospace AIM-9L Sidewinder. The new model differs in important details from the U.S. original. The Chinese also displayed a model of a new surface-to-surface missile, the KS-1. No explanatory literature or briefings were offered.

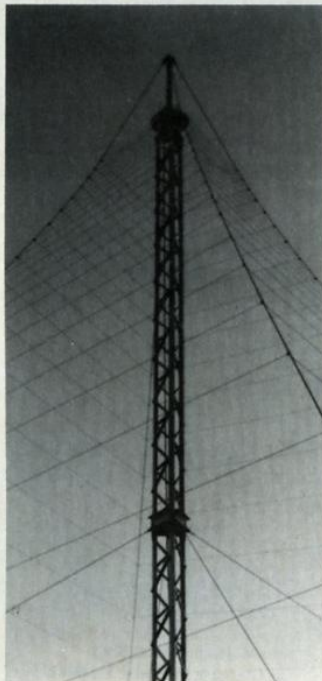
The 11-day show, which was held near Paris, attracted approximately 500,000 visitors. There were 1,700 exhibits, six covered exhibition halls, national pavilions and 500 chalet reception units. Nearly half of the exhibit space, aircraft and chalets were dominated by French aerospace industries.

Observers at the show said that security was tight but unobtrusive, particularly at the U.S., Soviet and Israeli chalets, pavilions and exhibit areas.

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Photography by Gerald F. Merna

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