

Flight Line

The Official Publication of the CAF
Southern California Wing
455 Aviation Drive, Camarillo, CA 93010
(805) 482-0064

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© Photo by Gene O'Neal

Unveiling of Photo of So Cal Wing's Spitfire displayed
in the Crown & Anchor, a Ventura County British pub.

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© Photo by Dan Newcomb

Our CAF-So Cal Wing fighters, accompanied by Jason Somes's Aero L-29 Delfin
jet trainer flying in formation to the air show at March Air Force Base
earlier this year.

**Wing Staff Meeting, Saturday, May 21, 2016 at 9:30 a.m. at the
CAF Museum Hangar, 455 Aviation Drive, Camarillo Airport**

THE CAF IS A PATRIOTIC ORGANIZATION DEDICATED TO THE PRESERVATION OF THE WORLD'S GREATEST COMBAT AIRCRAFT.

May 2016

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2 Museum Closed	3 Work Day	4	5 Work Day	6 April Fool's Day	7 Work Day
8 Mother's Day	9 Museum Closed	10 Work Day	11	12 Work Day	13	14 Work Day
15	16 Museum Closed	17 Work Day	18	19 Work Day	20	21 Wing Staff Meeting 9:30 Work Day
22	23 Museum Closed Docent Meeting 12:00	24 Work Day	25	26 Work Day	27	28 Work Day
29	30 Museum Closed Memorial Day	31 Work Day	Museum Open 10am to 4pm Every Day Except Monday and major holidays			

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* Denotes Staff Position

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Generation Gap: Jet Fighters, continued...

The third-generation of jet fighters heralded a proliferation of new designs and capabilities: supersonic speeds, sophisticated missiles, and high-output turbojet or early turbo-fan engines.

This third generation also included the remarkable Century series, which began with the first operational American supersonic fighter, the North American F-100. Within six years (from 1951 through 1956), fighter and engine design took a giant leap the world over. In that time, at least eleven world-class fighters debuted: the F-100, Convair F-102 and F-106, Lockheed F-104, McDonnell F-101, MiG-17 and -19, Dassault Etendard and Mirage III, Saab Draken, and the English Electric Lightning.



This sudden flowering of jet design incorporated many advances: delta wings, more highly swept wings, more powerful yet more fuel-efficient engines, sophisticated fire control and navigation systems, and in-flight refueling. Later aircraft of this generation were far more sophisticated and possessed much greater capability.

The Republic F-105, MiG-21 and -25, McDonnell F-4, and the Saab Viggen belong in this generation.

Even as speed, altitude, and firepower increased, jet fighters still faced hard combat lessons in Vietnam and in the Middle East. Vietnam War politics restrained US forces and enabled a relatively few older MiG-17s and -19s along with the newer MiG-21s to dictate terms of combat. The result was a discouraging victory ratio for US forces that ranged from a low of one victory to two losses to a high of four victories to one loss.

These wartime lessons meshed with the emerging computer age as digital electronics were incorporated into the design and production process as well as into the new aircraft designs. What resulted was a tidal wave of technological advances in fourth-generation jet fighters: the General Dynamics (now Lockheed Martin) F-16, Grumman F-14, McDonnell Douglas F-15 and F/A-18, Dassault Rafale, Eurofighter Typhoon, MiG-23 and -29, Saab Gripen, and Sukhoi Su-27.

These vastly superior aircraft generally possessed high-output turbo-fan engines, infinitely more capable and reliable electronics, fly-by-wire control systems, zero-altitude ejection capability, improved ordnance, and an ever-increasing number of onboard computers.



Another development was that companies and even countries teamed to reduce research and development risk and enhance fighter capabilities. The Lockheed F-104 pioneered these efforts during the 1950s; the F-16 cemented international cooperation in the 1970s.

The increased cost of these latest fighters strained military budgets everywhere and dictated the aircraft be adapted to both air-to-air and ground attack roles.

Among these fourth-generation aircraft, the F-15 and F-16 emerged earlier than their foreign equivalents and established a reputation for air dominance unchallenged for years. As foreign-built fourth-generation contenders emerged, their US counterparts maintained their lead with significant advances in radar and engine performance as well as improved air-to-ground capabilities, including night, all-weather, and precision attack.

Even with these improvements, fourth-generation fighters fielded by the United States and its allies face serious competition by such aircraft as the Su-27, MiG-29, and MiG-35. For example, the advantages of US F-15 fighters were put in question by highly motivated, well-trained Su-30K pilots of the Indian Air Force during Cope India exercises in 2004. Fourth-generation fighters also face more advanced ground threats in the form of "double-digit" (e.g., SA-14) surface-to-air missiles.

On the Eastern front, China is rapidly moving toward an indigenous air-and-space capability suitable for a superpower. It is plausible that China will build aircraft and missiles in numbers compatible with its population and growing wealth and will create training programs to produce pilots with skills to match their Western—and Indian—counterparts.

The Fifth Generation

The overriding characteristic of fifth-generation fighters is integrated very low observable, or VLO, stealth. Stealth relies on shape, materials, and internal weapon carriage. The result is a very low radar cross section even when fully configured for combat.

The fifth-generation fighter takes advantage of the previous generations of stealth technology developed and matured for the B-2 bomber and AGM-129 Advanced

Cruise Missile to become more than just a fighter generational evolution. This combination of near-invisibility to an enemy along with fighter maneuverability establishes fifth-generation platforms as more a part of a revolution than an evolution.

A particularly important advance of fifth-generation stealth is its ease of maintenance. Stealth maintenance on the early F-117As required fifty man-hours per flight hour; at maturity, stealth maintenance on the fifth-generation aircraft will require minutes of maintenance per flying hour. Fifth-generation fighters combine stealth with huge improvements in integrated avionics and supportability. Stealth, agility, performance, fused-information, improved situational awareness, and network-enabled operations all combine to create advantages never seen before in previous fighter evolutions.

Other critical factors include an emphasis on reliability, maintainability, and sustainability — the capability to fight day after day without extensive maintenance. Fifth-generation maintenance requirements will be one-third the maintenance requirements of the legacy aircraft they replace. They also have the ability to deploy more rapidly.

The fifth generation, therefore, is really defined by two fighters, the F-22 Raptor and the F-35 Lightning II. By fielding a fifth generation of jet fighters, the United States establishes a true generation gap unapproachable by a single power or a combination of powers. The F-22 and F-35 offer obvious complementary advantages.



Both have all the features that define fifth-generation fighters, but the F-22 adds the unique features of high-altitude supercruise and extraordinary agility. These attributes allow it to more efficiently secure immediate air dominance in any environment.

Among all fighters—current as well as future, including the F-35—the F-22's ability to supercruise (fly at greater than Mach 1.5 without the use of afterburner) adds to the kinetic energy imparted to its missiles at launch while simultaneously denying the enemy time in which to respond. Supercruise also allows for increased supersonic persistence and decreased adversary reaction times.

In combat, the integrated avionics system gives a God's eye view of the combat scene to every pilot in a data-

linked flight of F-22s, raising the concept of situational awareness to a universal level. This universal situational awareness enables Raptor pilots to concentrate on tactics. They don't have to spend time integrating separate data inputs from multiple sensors. The F-22 enables pilots to see and destroy enemy fighters and missile sites before either is aware of the Raptor's presence. If a threat gets within dogfighting range, the incredible agility of the thrust-vectoring Raptor ensures close-in success.

A less-obvious relationship between the F-22 and the F-35 is their unprecedented exchange of technology. Lessons learned on the F-22 are built into the F-35, while advances from the F-35 can be retrofitted into the Raptor fleet.

The extraordinary performance of the two aircraft is dependent upon their power plants, and these are inextricably linked. The F-22 is powered by two Pratt & Whitney F119 engines with about 35,000 pounds of thrust each. The core section of the F119 was used to develop the P&W F135 for the F-35.

The F-35 adds its own unique features that focus on basing flexibility, as its three versions are individually designed to operate from carriers, conventional runways, or extremely short austere strips. With both good-range and high-payload capacity in nonstealth mode, the F-35 will be able to secure immediate strike dominance.

The F-35A is optimized for the US Air Force; the F-35B offers short takeoff and vertical landing for the US Marine Corps and Allied countries; and the F-35C operates off large aircraft carriers. The F-35B is the world's first stealthy, supersonic, STOVL strike fighter.

The design of the F-35 incorporates advances in electronics not immediately available to the F-22. These advances — fourth-generation active electronically scanned array radar with half the weight, half the cost, and twice the reliability of the third-generation F-22 AESA — will be retrofitted to later-block F-22s. The active and passive capabilities of the F-35's radar exceed any previous radar and can generate long-range, high-resolution synthetic aperture radar maps of unprecedented size.

Other advances featured in the F-35 include a distributed aperture system, which acts as an infrared sensor and provides a protective sphere around the aircraft to alert the pilot to any threat; an internally mounted electro-optical targeting system that provides long-range, high-resolution target recognition; an integrated communications, navigation, and identification avionics suite, which provides lethal beyond-visual-range recognition and intraflight data exchange; an advanced electronic warfare and countermeasures system; and a helmet-mounted display with the most advanced head-tracking system available.

These systems combine to optimize fighter tactics through the OODA loop — observe, orient, detect, and act — as defined by fighter tactics guru John Boyd. These systems depend on the aircraft's integrated core processor, which presents all incoming information to the pilot in an optimized form.

There is also an X factor. Ingenious future aviators will use the capability of these aircraft beyond the standard air-to-air and air-to-ground regimes. Examples could include intelligence, surveillance and reconnaissance, and advanced electronic attack, both of which show promise to radically change the use of tactical aircraft.

The F-22 and the F-35 will stand alone for decades to come. No other fifth-generation fighters exist and none appear on the horizon. The fifth generation will be with us for decades, and one can only speculate about the advances to be found in the sixth generation and beyond.

Weapons will change over time, with directed energy coming to the fore, along with satellite-linked missiles.

And, as much as pilots may hate the idea, a generation of stealthy, agile, and lethal unmanned fighters may someday be flying under the control of pilots in sixty-year-old F-22s and forty-year-old F-35s.



Wing Air Show Schedule: 2016

Date	Location	Aircraft
Apr 29, May 1	Chino	Zero, Hellcat, Spitfire
May 28, 29	Cannon AFB	TBD
June 4, 5	Kirkland AFB	P-51, Spitfire
July 8, 9	Tahoe/Truckee	P-51, F6F, F8F, PBJ(?)
July 28, 29	Skyfair – Seattle	TBD
Aug 5-7	Oregon Intl. AS	Zero, Hellcat
Aug 20, 21	Wings Over CMA	All available aircraft
Sept 14-18	Reno Air Races	TBD
Sept 23-25	Sacramento AS	TBD
Nov 10, 11	Nellis AFB	TBD

Note: If you plan to attend any air show, please call us at 805-482-0064 to confirm date, as changes may occur.



© Photo by Frank Mormillo

This outstanding photo appears in the June, 2016 issue of *Flight Journal*. The Republic/Curtiss P-47G in the foreground is the Planes of Fame's Thunderbolt in 56th Fighter Group's markings, with Mike DeMarino at the controls. The other P-47G is "Snafu," from the Comanche Warbirds LLC collection, in 78th Fighter Group markings, with Steve Hinton in the cockpit. Beautiful aerial aviation photography by our wing member Frank Mormillo.

We can't see P-47s and not think about Joe Peppito.

Flying Magazine Features CAF and SoCal Wing

by Pat Brown

I hope you saw the photos and articles in the current *Flying Magazine*. There are a number of pages about us. They came to the museum on a Saturday recently and we gave them the full "cooks tour" of the operation. It happened to be a very busy day and so they got to see all of us in action! They also have some information on how the CAF got started and some quotes from Steve Brown. It turned out great so I hope you saw the magazine.

A Man Of Many Parts: Gene O'Neal

Four years ago when I turned 80, I decided it was time to stop walking on wings, hanging on hot engines and standing on ladders all day. I needed a desk job. An opening occurred when our Procurement Officer Chuck Willams suddenly passed away and joined the "Gone West" group.

I knew very little about the job, but volunteered and was accepted. The paper work was a learn-as-you-go process. There were the standard parts and hardware catalogs available. But where do you find old WW II parts, pieces, and equipment?

Chuck had made many contacts and some of our older members had additional contacts. Some of our pilots had contacts. WW II junkies at air shows had contacts, some of them very false. But never the less even a bad contact can lead to a good contact. Each of our planes has its own source of required parts.

And where do you get these unique parts overhauled? That is also another industry. Some sources dry up after the old time owners pass on, and some sources just go out of business. Someone is always finding a new source of parts for each type aircraft. So there can always be a new challenge.

Most of this is done by telephone, so I talk with the same people, and they become telephone friends. I get to work with the crew chiefs deciding what they really need. Sometimes going out to the airplanes for a hands- on look at what it may take to correct a problem. After ordering the parts, I get to be the Receiving Department when the parts arrive. I check the inventory and make sure we have the correct parts and the quantity.

The parts are turned over to the Crew Chiefs or put in the stock bins. And the paper work has to be completed and the invoice turned over to the Finance Officer for payment. I am the holder of the CAF credit card and must account for all charges made.

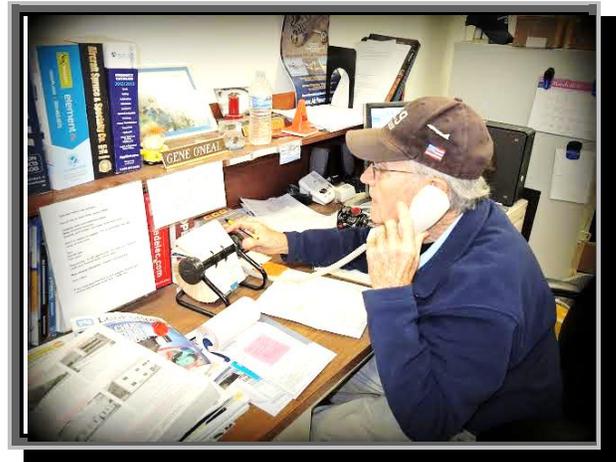
I also get to be the Shipping Department when things need to be sent out for repair or returned. That includes packaging and getting it ready for UPS pick up.

Everyone here helps in some way to make all this happen. Many times our members who drive back into L.A. will hand- carry a part to our vendor and then pick it up when it is ready for return.

There are many jobs in our SOCAL WING and all members have an opportunity to participate as they want. Never a dull moment for the Procurement Officer, that is for sure.

Gene O'Neal
Procurement Officer

CAF – So Cal Wing



© Photo by John Cutright
Gene, hot on the trail of a hard-to find part.



© Photos by John Cutright
Gene and Maintenance Officer Mike Perrenoud discussing what a subcontractor can do to repair a 70-year old part.

SAFETY CORNER by Col. Gene O'Neal Safety Officer

This is a good time to review some of the SAFETY items we have talked about.

1. ALL ACCIDENTS CAN BE PREVENTED.
2. A CLEAN worked area is a safer work area.
3. Everyone help each other. If you see something unsafe report it and fix it.
4. Do not lay tools on top of ladders and walk away. "He who moves the ladder gets tools on the head." (Confusion)
5. Do not block access to the wall-mounted fire extinguishers. Be careful in the new hangar not to push airplanes that block access to the fire extinguishers.
6. Little things can make a big difference in SAFETY.
7. Consider removing your finger rings when working around the hangar.
8. Respect the propeller arc, don't walk through it.
9. Always think **SAFETY FIRST**.

May 2016 Photo Page I

© Photos and Text by Dan Newcomb



This last Thursday, April 21, our intrepid “Knight Of The Air” – Col. Al Kepler – launched forth in the Wing’s faithful old SNJ-5 Texan “No. 290”. The new engine performed flawlessly. Thanks to a great crew this valuable asset is back in the air. Back to training our pilots and giving rides to our enthusiastic public in the Warbird Ride Program.



© Photos by Gene O’Neal

Col. David Baker was among those attending the unveiling of a large photograph of the CAF So Cal Wing’s Spitfire Mark IV at the Crown & Anchor, a British pub in Thousand Oaks, California. Col. Baker spoke briefly about the Spitfire and what it signified to the British people during the dark days of WWII.



The moment of unveiling.....



The photo as it will be prominently displayed at the Crown & Anchor. The Wing’s P-51 is depicted flying in formation with the Spitfire

May 2016 Photo Page I: March AFB Air Show



© Photo by Dan Newcomb



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May 2016 Photo Page III: Riverside Air Show

© Photos by Frank Mormillo



Hellcat Day



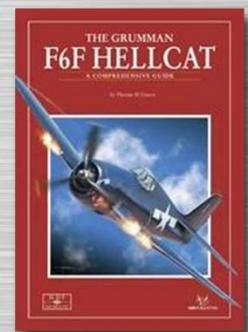
Sunday, June 19, 2016

Fathers' Day - 11:00 a.m. to 2:00 p.m.

Commemorative Air Force Aviation Museum

455 Aviation Drive, Camarillo Airport

- Presentations on The History of Our Hellcat***
- Thomas Cleaver, author of "The Grumman F6F Hellcat: A Comprehensive Guide" (SAM Publications)***
- Pilot Questions and Answers***
- Fly-bys of our Grumman F6F Hellcat "Minsi III"***



Bring your father/ grandfather/ husband/ boyfriend to our Aviation Museum for a Fathers' Day treat. His/ their mind(s) and heart(s) will soar with the Hellcat. It will be a day he/ they will remember forever!