



AMA Chapter #3798

# Chino Valley Model Aviators Official News



January 30, 2021

Volume 24 Issue 1

www.chinovalleymodelaviators.org

*"To create an interest in, further the image of, and promote the hobby/sport of radio controlled aircraft"*

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### Quote of the Month:

**"Luck is what happens when preparation meets opportunity"**

Seneca

### Support our Local Hobby Shop



**Valley Hobby**  
Prescott Gateway Mall

## DAVE DOMZALSKI'S WWII EDF POWERED V-1 BUZZ BOMB



## Control Line Club Members at Watson Lake



Photo by Carol Meathrell

Standing L to R: *Greg Daebelliehn, Bob Shanks, Rick Nichols Randy Meathrell, Dave Domzalski, and Harold Ellis.* Kneeling is *Gene LaFaille* a new Prescott resident and quite a C/L aficionado. These are mostly Gene's planes with the exception of Rick, Randy and Harold, they are holding their planes.



# Bill Gilbert: CVMA President's Message



Well, after a "non-soon" season it appears that old man winter may be making up for our lack of moisture this past summer. We need the water, so that's the silver lining. But with the recent weather conditions, we have been unable to hold an outdoor club meeting. Knowing that many of you wisely prefer to not attend an indoor meeting at the Sr. Center, we will forego those as well for the obvious reasons, unless conditions change.

Fortunately, we have no critical or urgent business that can't wait for nice weather. We can discuss club upgrades and improvements when the weather gods cooperate. In the meantime, it's a perfect occasion to build, re-build or maintain our flying creations. Get ready for the better weather

that is to come!

We have added Indoor Flying at the PHS Gym, available for all members to participate in. There is an associated cost, but it permits flying when the weather is just too adverse to do so outdoors. We have a nice interest group going in that activity. Just right for this time of year. If you are interested just reach out.

As soon as the weather gets nice again, the Control Line flying interest group is ready to get their circle laid out in the front forty. This is another activity to lend variety to the clubs' flying that is open to all members.

Our club membership renewals are going well. We have three new student members this year; it's always good to have new young folks join the club - welcome! If you haven't renewed

yet, please do so at your earliest convenience.

Enjoy this newsletter brought to you by the fine efforts of Dr. Bob. We will continue to keep you informed via e-mails, newsletter and Face Book, until we can meet again. If you have any questions or concerns, do not hesitate to contact me or any of the other club board members.

Stay warm and dry, until we can fly again at the field!

*Bill*



## CVMA Flight Instructors

- Steve Shephard  
*Chief Flight Instructor*
- Al Marelllo-basic
- Lloyd Oliver-basic
- Riley Harley-basic
- Jack Potter-gliders

## CVMA NEWSLETTER

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Published Monthly

President — *Bill Gilbert*



Vice President — *Doug McBride*



Treasurer — *Harold Ellis*



Secretary — *Bob Steffensen*



Safety Officer — *Rick Nichols*



At Large Member — *Dan Avilla*



At Large Member — *Dennis O'Connor*



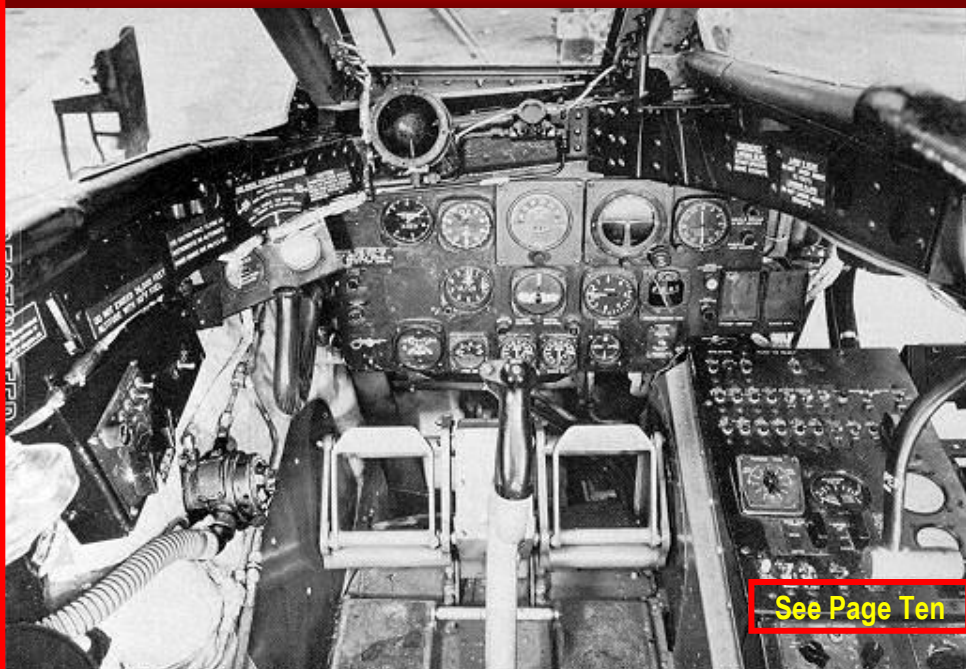
At Large Member *Mark Lipp*



Newsletter Editor — *Bob Shanks*

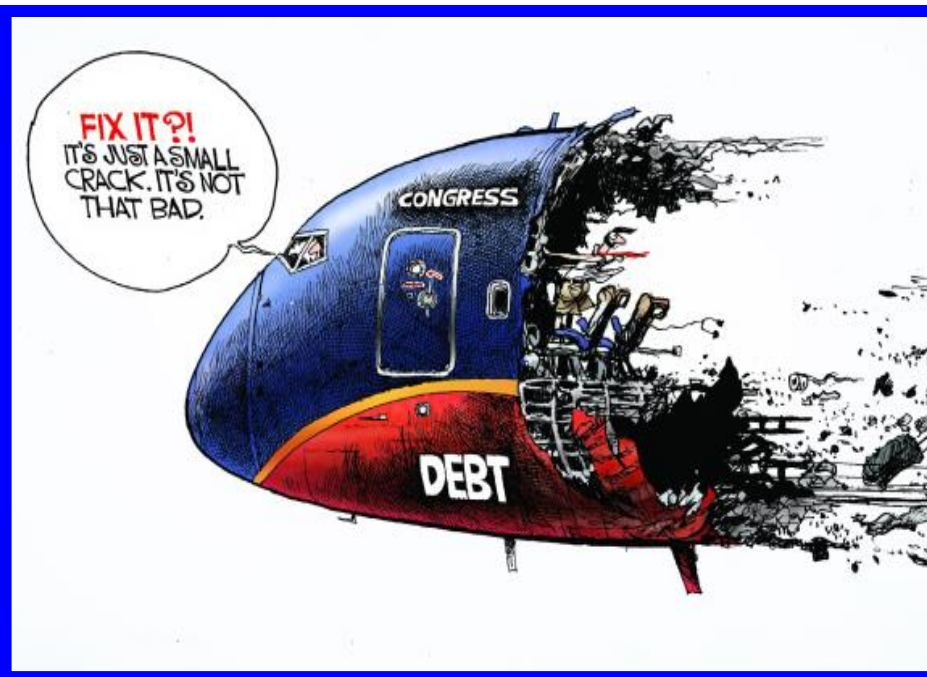


### An Old Aircraft Design: So Members, What cockpit is This ?



See Page Ten



**2021 — MARK YOUR CALENDARS****May 22 - Spring Fling Fun Fly & Swap Meet****June 12 - E-warbird Races****June 19- Delta Wing Combat Event****July 4 - Pot Luck Fun Fly & Chino Valley  
Fireworks (watch from our field)****Aug 20-21 IMAC Southwest Region Shootout  
Held at our field.****Sept. 25 Annual Steve Crowe Memorial Fun  
Fly****Oct 23 Fourth Annual Build & Fly Challenge****Dec 3 Annual Christmas Banquet****BORN IN A BARN ?**IF YOU ARE THE LAST ONE TO LEAVE THE FIELD **CLOSE & LOCK THE GATE.****SAFETY IS ALWAYS A CRITICAL ISSUE***By Rick Nichols, Club Safety Officer*

I am happy to say that the months of November, December and now into January have been really accident and incident free. I think that our members are really trying to do their best at the field, and I am glad that this is the trend.

A couple of notes that we might be aware of. Accidents do not always happen at the field. Shop safety is also so very important to keep in mind. The practice of removing your propellers while testing the electronics of your airplane is so important to those that fly electric airplanes.

We have several members that in the past have not taken heed to this basic safety precaution and have had to make the trip to the hospital or the emergency room. A trip to the emergency room is not a thing that any of us want to do at this time. . . Also, if you happen to drop your exacto knife from your work bench, do not try to catch it! A new blade is cheaper than a few stitches.

A reminder to all pilots, Chino Valley currently has no Urgent Care facilities, A trip to the hospital in Prescott or Prescott Valley can result in a very long wait due to the

Corona 19 virus.

Each of us have airplanes that may function slightly differently. It is important to develop in your own mind a procedure to use a checklist, just as you would in a full-sized airplane, to ensure that your controls, radio, and airplane will perform in the manner that it is has been designed for, before calling out the shout, taking off, to your fellow pilots on the flight line. Remember to call out your landing intentions also.

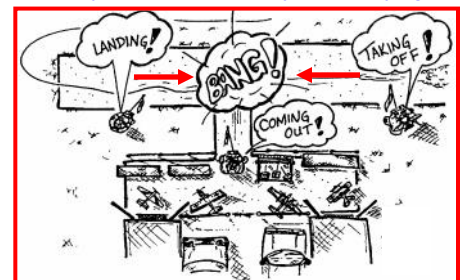
Many of us have had to duck to avoid a model that has not been set up properly while taking off or landing. Sometimes due to a poor setup or maybe gross pilot error.

Preplanning by the active pilot can solve many of the issues that I have mentioned. Please make a point of pre-flighting each of your airplanes before each and every flight. Be sure the controls are functioning in the proper direction and manner. Just making sure that your ailerons are moving does not mean that they are moving in the proper direction.

In these Covid times that all of us are experiencing please try to at least do your

best to observe social distancing at the field and during our meetings. Personally, I have had 3 very good friends that did not make it. Another 7 that have been very sick. Be safe and observe as many health and safety precautions as possible both inside and outside.

I do not want to lose any more friends than I have already lost. You are all important to me, and all the members of our Chino Vallely Model Aviators Club. Be courteous to each other and practice safety for enjoyment of our sport. Stay safe and Healthy.

**Always Check the Runway Before Flying**

# Members' Cool Planes

Don Ferguson's Twin



Harold Ellis' Tower Hobbies high wing design flies like a glider.



Rick Nichols' stick just about to flare for landing.

Randy Meathrell's little EP Edge 540



Steve Zingali's UFO "Z"



Dave Domzalski and his foam design of the WWII V-1 Buzz Bomb. (Also on page one)

Rick Nichols Launches his Radian as Dave flies one of his planes at the far end of the runway.



Steve Zingali's Russian SU-27.



Steve Zingali's Star Ship Enterprise entering orbit above our flying field!

At left, Rick Nichols flying Randy Meathrell's small foam electric control line Nobler on 25' lines.

Matt Butler's A-6 has his little foam Mig resting on its wing.



Dave Domzalski's bi-wing.





## Our Crowded Satellite Orbits Around Earth \*

Space, that final frontier, could become very crowded very soon and already is crowded. There are an estimated 2,200 satellites orbiting the Earth at present, but telecommunications companies are launching dozens of new satellites regularly in hopes of providing high-speed broadband internet access to the entire planet.

Just how many satellites are we talking about? London-based One Web planned to launch nearly 400 this year and ultimately have 650 in place. Elon Musk's SpaceX has put 240 into orbit since last spring and could have 1,000 more launched by the end of the year. The company hopes to deploy as many as 42,000 satellites for its Starlink internet system.

Not to be left out of the game, Amazon plans to create its own space-based internet system, Project Kuiper, with the launch of more than 3,000 satellites. That's a *lot* of satellites that could fill the skies over the next decade. Now would be the time for the formation of an international organization — composed of satellite companies, scientists and government representatives — that would provide some control over how many satellites orbit the Earth.

While providing global internet access would open the doors to nearly 3 billion people who are currently offline, the launch of these “megaconstellations” of satellites has scientists and space officials worried about the impact of so many orbiting devices.

Some scientists fear that the sheer number of satellites could blot out the stars to the point where observations of the universe through Earth telescopes would be nearly impossible. They could also affect astronomy research by disrupting radio frequencies used for deep-space observation.

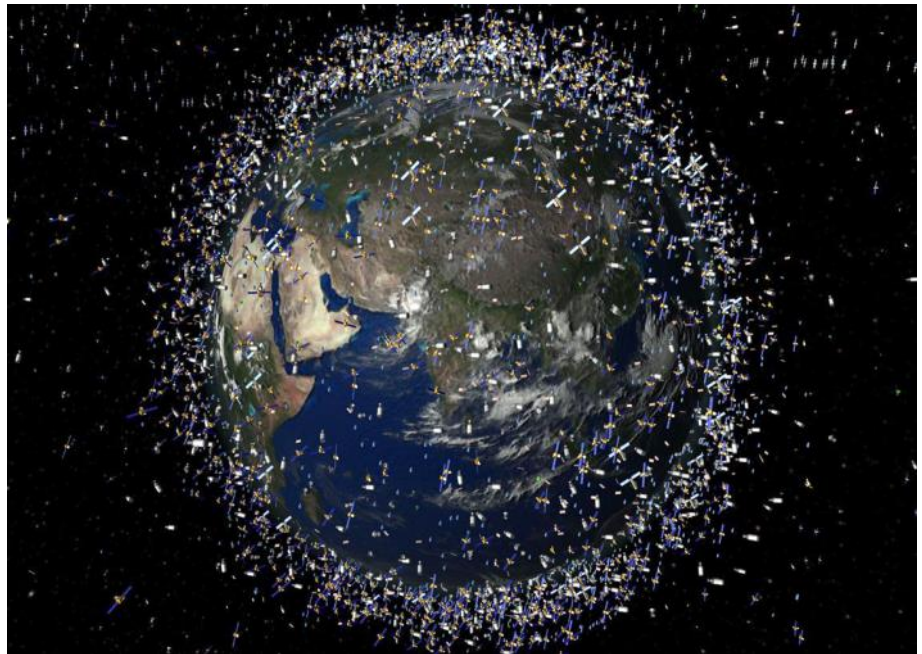
And there's also the concern about the amount of space junk that could be floating around. There are already millions of pieces of junk — from abandoned satellites or pieces of spacecraft — in space. Crowding the skies with tens of thousands of new satellites increases the risk of more pieces falling off, as well as the possibility the debris would strike other satellites. In the late '70s, NASA scientist Donald Kessler put forth a theory — the Kessler effect — that the floating debris could create a catastrophic chain of collisions that would produce a field of space junk and hinder space travel.

Most astronomers doubt there is a real danger from the Kessler effect, but controlling the path of satellites and avoiding collisions will take considerably more vigilance. Earlier this year, the possibility of two satellites colliding over Pittsburgh drew wide attention. A NASA official said that if thousands more satellites are placed in orbit, collision avoidance maneuvers would increase from “three a day to eight an hour.”

The good news is that before companies launch satellites, they have to present plans to their respective country's regulators — the Federal Communications Commission in the U.S. They have to provide an analysis of collision risks and proposals for taking satellites safely out of orbit. Most would burn up in the Earth's atmosphere once taken out of orbit. Still, the possibility that **50,000 more satellites could be in orbit within a decade** demands some international attention and cooperation. Taking steps now to limit the impact could keep the skies a bit clearer for future exploration.

### Editor's Note:

One of my assignments when on active duty with the USAF was to the U.S. Space Command, Peterson AFB, Colorado Springs, CO. I worked in the area where all space orbits and space junk was tracked. A fascinating assignment to see just how much junk is in orbit and that was years ago!



All satellites in orbit are too small to show up in photos of the earth: this is an artists depiction.



# Electronic Control Line Systems Overview

By *Fred Cronenwett*

Lafayette Esquadriille C/L club in St. Louis, MO

Electronic Controls operate one or more functions on a CL model with two flying lines. The handle can be adjusted for neutral elevator without affecting the throttle setting. The model with electronic controls results in smoother operation of the throttle and other features. The servo can make very small changes that would be difficult to accomplish with a mechanical system that has multiple points of friction which reduce the sensitivity of the 3-line setup.

The Electronic Control system uses equipment that was designed for a Radio Control RC models. The equipment is used in such a way that no frequency is ever transmitted. The signal and ground are transmitted through the two flying lines (no power is transmitted). This signal and ground is generated by the transmitter or Servo Driver hanging from the pilots belt or handle and then communicated to the receiver or servo in the model through two insulated flying lines, since Electronic Controls are not based upon line tension like the older 3-line system. If you lose line tension with electronic controls you still have control of the throttle and other features.

The use of electronic controls has been growing steadily since 1991. Single Channel was used at the 1992 Scale World Championships with great success. Electronic controls have been very popular with the United States FAI C/L scale team over the last decade. The top three finishers at the 2000 Scale CL World Championships used electronic controls. As the electronic controls improved over the years we have adapted a system called "Direct Servo Connection" or DSC. The radio control systems that use the DSC functionality (JR for example) have given us a huge leap forward in capability.

In 1999 Bill Young designed a specially built CL electronics handle that eliminates the transmitter or Servo Driver that hangs off of the pilot's belt. All of these systems permit the application of Electric motors with proportional throttle control. Other electronic items designed for Radio Control airplanes can also be used. *Fred Cronenwett*



## Many of Our CVMA Members Started Out in Control Line Modeling

Now that we are in the midst of winter and the weather has turned cold with sharp northern winds, perhaps it's time for some of our more enterprising club members to break out your creative design cap and come up with a cool C/L design using electronic control systems.

Over the years, this member, has often been approached by various other members about getting a C/L circle installed. Some of us, years ago, looked at various spots but the only one that looked feasible is where we have our helicopter pad. We have plenty of room there and just before it turned cold some of the members looked at where the circle could be placed. Looks like it will be closer to Santa Fe Springs road and part of our helicopter area. We looked at several other areas but they were up the hill and there were no large flat spaces to fly control line.

Since we have a few helicopter pilots and now possibly a few who want to fly control line again, that space can be shared without any difficulty.



(See next page for more general information and developmental C/L history)



## Using RC Electronic Systems for Flying Control Line Scale Models

By Fred Cronenwett

Lafayette Esquadrilla C/L club - St. Louis, MO

### Editor's Note:

*I have the very extensive and complete pdf file that Mr. Cronenwett put together on how to build electronics into C/L models. Contact me if interested. At our field we have space where we fly helicopters and can now fly control line models there too, for those interested.*

In 1988 I started looking for information about the use of electronic controls for Control Line Scale Model Airplanes. At that time I was building a Sterling Corsair with a 36" wing span. I first built the model without any throttle system. I would start the engine at full bore and let her go. I am amazed I did not pile the little plane into the concrete. After surviving those flights I wanted to add throttle control so I got hold a 3-line handle and bell crank. In the back of my mind I always knew there was some slick way to using some of the technology that Radio Control used on a daily basis to improve the throttle control system. I never was able to find anyone who could tell me what equipment to buy and how to set it up. Letter after letter came back with the standard answer "I don't know".

I knew that it was possible to use Electronic Controls so I decided to figure it out for myself. I pulled out my Ace 3 Channel radio that I used once in a RC glider. I called up ACE and asked a few questions and told them what I wanted to do. After a few weeks I was modifying the ACE radio for CL electronics use. Then I met two other CL pilots who also wanted to use the electronics and had also been looking for information without much luck. Grant Hiestand, Merle Mohring and myself teamed up to come up with the information that is being presented here. This is everything that we have learned to date with the numerous models we have built and flown over the years. By 1991 we had finished the development and testing of two major systems, Single and Multi-Channel controls. DSC with the use of JR radios came later in 1997.

This is intended to provide the newcomer to Control Line Scale, Carrier and general sport flying an alternative to the normal fixed throttle, fly until you are out of gas model airplane. All of the techniques shown here have been tested many times by others and myself. We continue to develop new ideas and test them. Just because we do something one way does not mean that it can't be done slightly differently. For those who maintain that the 3-line handle and bell crank should not be replaced with all these wires, batteries and servos consider this actual case.

When I first met Virgil Wilbur he like myself started with the 3-line bell crank and handle. For several years we flew together, I had my electronics and Virgil had his 3-line set up.



Then one summer he decided to try electronic controls. He wasn't real sure if he was going to like the system, but he was going to give it a try. After his first test flight with electronic controls he came back to the pits real excited. By the next weekend all of his models had been converted to electronics and he never looked back. He never built a model with a 3-line bell crank again. Until you have actually flown and setup a model with electronics you have no idea what you are missing.

Good luck and keep your wings level!

*Fred Cronenwett*

## Retired Lockheed-Martin F-117 Nighthawk has a Secret Third Life

<https://www.aerotime.aero/26246-the-secretive-third-life-of-f-117-nighthawk>

Few military planes are as iconic and recognizable as the F-117. Even fewer have such an aura of mystery and secrecy. Despite being over 40 years old and officially retired, the Nighthawk continues to be involved in one secretive exploit after another.

It is the most famous black project ever, therefore it is only fitting that it starts and ends with rumors. Through the 80s and 90s they shrouded the F-117 like nothing else: from the capabilities of the “stealth fighter” (it was not a fighter after all) to its purported “invisibility” (still attributed to stealth jets even today), to UFOs that supposedly accompanied it. Unconfirmed snippets of half-truths stirred imaginations, as the aircraft became a part of the green-lit image of high-tech combat the U.S. was boasting during the Gulf War, and this unmistakable piece of jagged and rough aesthetic of the war of the future.

No surprise then, that many took news of the Nighthawk’s retirement in 2008 with a degree of sadness. The iconic aircraft served for just three decades – two, if we exclude the period before the public reveal – in a world where militaries still wield fleets of bombers dating from the 50s. It was supposed to be this incredible machine of the future, yet almost immediately got replaced by newer, less futuristic aircraft like the F-22.

But then came the twist: as 2010s rolled by, F-117s were popping up here and there, noticed by aviation enthusiasts around various military bases, including but not limited to Area 51. There were reports of them flying training sorties with F-16s, painted in strange camouflages, even deployed to the Middle East. It all fueled a new wave of rumors, no less wild than the one from which the Nighthawk emerged in the 80s.

### Shady Experiments

While officially retired, much of the 51-strong F-117 fleet was never scrapped. Demilitarizing the aircraft is costly and requires dousing them in chemicals to wash off radar-absorbent materials, as well as gutting the airframe and replacing avionics, engines, and other classified elements with elaborate mockups. While it was done on several occasions for airplanes destined to be transferred to museums, others remained in long-term storage, ready to be either destroyed or repaired and flown again. In 2017 a Congressional mandate to start scrapping them came, saying that four units per year are to be eliminated. But the intention never turned into action. While at the same time it was stated that a small number of Nighthawks – four, perhaps – will remain airworthy for experimental purposes, later developments show that a lot more of them were flying. Why? Experimentation, of course. It was confirmed in 2019, at the height of speculation, when an Air Force spokesperson has admitted that yes, the supposed destruction of the fleet is not happening, and that an undisclosed number of F-117s are undertaking undisclosed research activities. Nighthawk is a perfect platform to do that, mostly because its capabilities are well known.

The military will not have to close the entire fleet if one crashes in a random test, and its presence at one or other airbases does not have to be kept in secret. Meanwhile, radar-absorbing coatings, newer and stealthier engine exhausts and other gadgets can be swapped on and off, without the fuss that some yet-unseen X-plane would create. This might explain the extraordinary appearance of some Nighthawks, such as the one with white wings, photographed by the Combat Aircraft Journal magazine recently.

### Dark Knights and Other Secrets

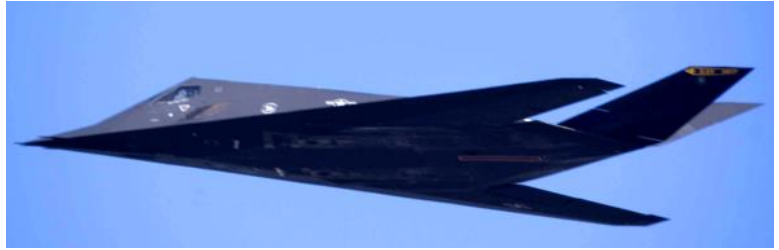
Another explanation – some of the features – availability and familiarity among others – make F-117s the perfect stand-ins for enemy stealth aircraft in exercises. The role of aggressor, or “Red air”, is one of the most exotic roles a military unit can take on. Its primary aim is to imitate enemy behavior in a simulated encounter (in-called war games), often making the F-117 used like foreign-made aircraft and employing unconventional tactics. Both in the past and the present. Dedicated units within the U.S. Air Force took on that job, although lately it was mostly relegated to special private companies using their aircraft or similar type enemy look-like aircraft.

### World’s Most Powerful Private Air Forces

Many the world’s air forces are maintained and commanded by sovereign states, being part of their military structures and having the aim of protecting the country’s interests. However, there is another kind of air force: a private air force, these air forces belonging to commercial companies offering their services for profit.

China and Russia, both potential enemies of the U.S., have access to stealth technology. The former is already wielding a fleet of operational stealth fighters, and the latter will likely start deploying theirs soon too. In addition to that, both have developed their own stealth attack drones, a task that Iran has been trying to accomplish for a decade. These kinds of stealth aircraft that U.S. pilots and radar operators are likely to encounter are then potential enemies of the U.S. Although, reportedly, F-117’s radar-evading capabilities leave a lot to be desired in comparison with newer stealth aircraft like the F-22 and F-35, it can be flown as an interim measure before something better takes its job. An ability to repaint the relatively cheap aircraft and otherwise modify it turning its radar signature into an approximate copy of the likely enemy is a big plus for air combat exercises.

And while the F-117 lacks many features of the Su-57 or J-20 would display – such as supersonic speed or super maneuverability – it can still imitate stealthy cruise missiles of the sort Russia is supposedly developing.



Nighthawks in storage. (Image: Courtesy of USAF)



## THE IMPORTANCE OF LUNEBERG LENSES ON MILITARY AIRCRAFT \*

### What are these strange items bolted on these aircraft?



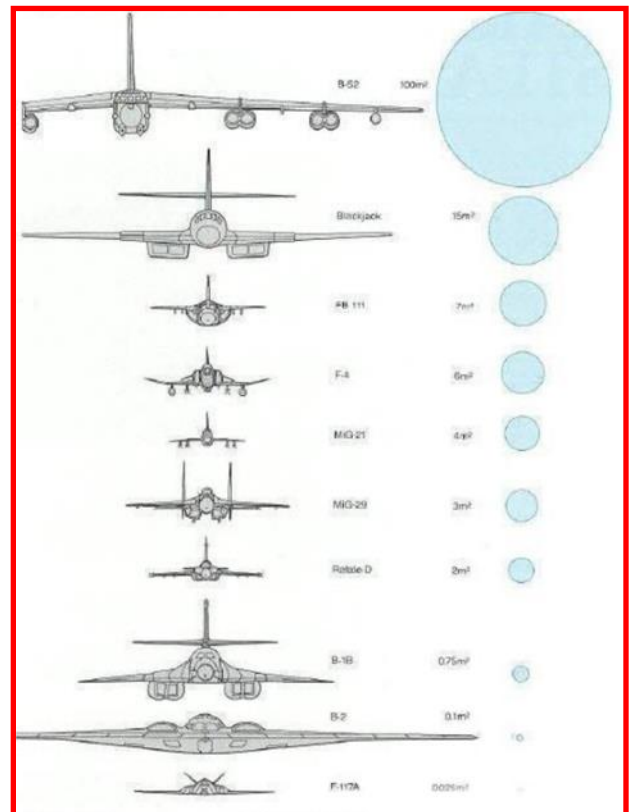
Here is another good photo of them on the F-35.



Especially used on the F-117, as it is very stealthy.



Here's some on the F-22.



Note the aircraft size and aircraft radar return.

What are they? They are Luneberg lenses. They are bolt on radar reflectors. The planes are so stealthy that civilian air traffic control would not be able to see them on radar (obviously, that's the point of a stealth plane).

Unlike what you may see in Hollywood, stealth mode is not a switch that you flip in the cockpit. The shape is stealthy all the time. You also have things like encoded altimeters that broadcast your altitude to ATC, but it still helps if they can see you with radar. So sometimes, they add little radar reflectors to the planes when they don't need to be "stealthy."

Their entire purpose is to reflect radar energy back at the transmitter, so the plane can be "seen."

It would therefore be very easy to take a small cruise missile, like the ADM-160 MALD and put Luneberg lenses inside it, to give it the same radar signature of a fighter or a bomber.

By adding radar reflectors. For example, the F-105 was so thin (relatively) that it was difficult to see on airfield radar of the time, while on final for landing. A radar reflector was added to the nose landing gear to enhance the radar image during the landing phase. There were no electronics involved, just a metal pyramid shape that was hidden while the gear was up.

It's used on almost all small boats such as sail boats and trawlers. The same concept is used on stealth aircraft when flying non-operational missions or when flying in controlled airspace and makes them highly radar-reflective.

\* Sources: [www.quora.com/Is-it-possible-to-make-small-target-objects-look-like-much-bigger-aircraft-on-fighter-radar-screens-How?](http://www.quora.com/Is-it-possible-to-make-small-target-objects-look-like-much-bigger-aircraft-on-fighter-radar-screens-How?)  
 Also available at : [Is-it-possible-to-make-small-target-objects-look-like-much-bigger-aircraft-on-fighter-radar-screens-How?](http://Is-it-possible-to-make-small-target-objects-look-like-much-bigger-aircraft-on-fighter-radar-screens-How?)

## NAME THE PLANE: YB-49 FLYING WING

<http://www.century-of-flight.freeola.com/Aviation%20history/flying%20wings/Northrop%20bombers.htm>

The final chapter in the odyssey of Jack Northrop's quest for the true flying wing is a microcosm of all of the disappointments and glorious moments one could expect in the development of an aircraft as unconventional as the flying wing bomber. The piston-engined XB-35, and its jet-powered successor, the YB-49, were immensely pleasing to the eye, but to conservatives within the aeronautical community, they probably did not "look right", and therefore their ultimate success was in doubt.

The flying wing bombers enjoyed all the usual financial support and governmental interest normally associated with a wartime program. They also suffered through the chaotic period that came with the war's end. The program endured, however, because of the enormous potential demonstrated by the unique aircraft. The enthusiasm for the program that was demonstrated by the Northrop "family" was shared to a great extent by many of the technical and management people of the Army Air Forces. Their foresight, assistance, and encouragement kept the development program going through the rough times.

Project MX-140, as the bomber program was called, was officially initiated by contract action on November 22, 1941, following previous discussions between Northrop and Air Force officials regarding performance requirements for a high altitude, long range, heavy bombardment airplane. The numbers that spelled out the airplane's vital statistics in formal Airplane Specifications NS-9A gave no hint of the sheer expansiveness of the airplane, and its spectacular performance. They also gave no hint of the problems that would attend its design, construction, and flight evaluation.

In size, the XB-35 would dwarf the B-17 Flying Fortress, with wing area and gross weight almost three times those of the legendary heavy bomber. The unconventional control system reflected years of study, wind tunnel tests, and flight test data gleaned from the N-1M and N-9M programs. The elevons and rudders were power operated. Thus, it was necessary to provide an artificial "feel" to the controls for these surfaces. This was accomplished by springs attached to the control wheels and rudder pedal mechanisms which returned the controls to neutral and provided the "feel" necessary to prevent over-control of the rudder and aileron movement of the elevons. "Feel" to the operation of the control columns for elevator control was provided by ram air pressure in a bellows attached to the control columns.

Trim flaps, elevons, and landing flaps were arrayed in order from each wing tip inboard along the trailing edge of the wing. The electrically actuated trim flaps at the wing tips were used by the pilot in much the same manner as elevator or aileron tabs. Their primary purpose was to balance the large diving moments produced by the split trailing edge landing flaps, minimizing the upward deflection of the elevons, and thus permitting them to be deflected over a greater range as elevators. The trim flaps could also be operated differentially to counteract unbalanced rolling moments.

Rudders consisted of split flaps that were incorporated as an integral part of the trim flaps at the trailing edges of the wing tips. Operated one at a time by the pilot's movement of the corresponding rudder pedal, the surfaces deflected above and below the trim flap. Simultaneous movement of the rudder pedals, which were not interconnected, opened both rudders for speed control. Despite the unconventional arrangement and function of the control surface, the conventional control column with wheel and rudder pedals made the pilot feel right at home. Contributing to increased longitudinal stability at high angles of attack were wing tip slots with automatically controlled cover doors. These doors were set to open at high lift coefficients, preventing wing tip stall and increasing stability. A switch actuated by the landing gear also opened the doors when the gear was down.

One of the primary concerns in the layout of the aircraft was the cockpit design. Despite unorthodox configuration, space was not a problem. The aircraft's cockpit featured convenient control and instrument arrangements and excellent visibility.



The pilot seated in the plexiglass bubble to the left of the aircraft centerline. The co-pilot was to the right of and below the pilot, behind a large window in the leading edge of the wing. An engineer's station was also in the forward part of the crew nacelle, as were stations for the radio operator, navigator, bombardier, and gunners. The mid-section of the crew nacelle had sleeping facilities for a relief crew of six people, a requirement for operational missions of 10,000 miles where crew fatigue would be a primary consideration. The after section contained the gunner's station. The seven-foot headroom in the crew's quarters was certainly adequate, and the accommodations were the first of such extent and complexity to have been incorporated into such a radical design.

**Editors Note:** *The YB-49 design and work were important in the ultimate development of the B-2 Bomber we have today.*

