



October

Minneapolis, Minnesota U.S.A.

2016

2016 TCRC Scale Saturday Was Lots Of Fun!

by Scott Anderson

We had over 25 pilots and 50 airplanes at this non-competitive fly in at the TCRC Model Air Park. The goal was to have anyone who had a scale airplane to come fly it and let us learn from each other. We had many giant-scale warbirds and classics as well as quite a number of electric ARF's flying with us.

Saturday [September 17th](#) started with dark skies and scattered rain in the western suburbs causing concern that it might be a washout.

When I got to the field I found we had guests waiting outside the gate who had travelled from Waseca, Owatonna and Faribault to get here.

Larry Sorenson of Owatonna stepped in to help Steve Meyer sweep the water off the center of the runways to make it easier for the electrics to fly.



Cal Bratan's D-VII gets a once over before a flight at TCRC.
(Photo by Scott Anderson)

Calvin Bratan (president of the Scale Flyers of Minnesota) was first in the air with his Balsa USA 1/3rd Scale Fokker D-VII. Cal had just purchased it from a friend in Muncie, Indiana and found that the DA-85 had failed. He stayed up most of the night [Friday](#) to acquire another DA-85 and install it into the Fokker. He was later hindered by an out of balance prop that sheared several of the prop bolts.

Pete Stapleton brought his Balsa USA 1/3rd scale PT-17 Stearman powered by a seven cylinder Evolution 260 cc radial engine. Pete started building it last Fall and has been flying it most of the summer. It is impressive to see and hear!

Larry Sorenson of Owatonna brought his giant scale Spitfire (painted in captured German colors), a Cirrus as well as his converted EDF ducted fan jet.

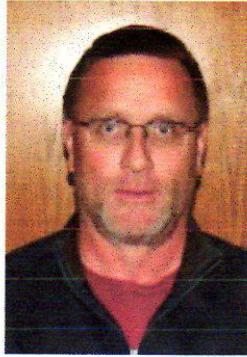
Bob Gustafson brought his Zirolgi giant-scale Cessna T-50 Bobcat again and it was expertly flown by Rusty Freeman. Bob also brought his scale Mooney.

Jay Schimke brought a carload of electric models including a large Grumman F-14 Tomcat with functioning swing wings. Unfortunately it caught the fence on landing and was damaged.

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A Note from The Head Wing Nut

By Bob Briesemeister



Hello TCRC Members!

I hope that my September article would be the last time this year I would be writing about the field being flooded . . . I was wrong! We are now flooded for the 5th or 6th time this year! I have lost count. We are currently at 25.5 feet which means 6 or 7 feet by the shelter. “Wow”. I would like to thank Corey Kaderlik and Jeff Tolzmann for helping me bring the equipment to higher ground.

Scott Anderson was able to sneak in the “Scale Fly” between the floods but we had to postpone the Season Finale to a later date and maybe combine it with a field clean up, so stay tuned. Meanwhile you can fly at the Scott County Fairgrounds.

We also had the Fall Float Fly. The high water didn’t affect that but it was a little breezy. However people were able to get some flights in anyway. Thanks to Steve Meyer for chairing this event.

Starting on October 11th the membership meetings will be moving back to CrossPoint Church at 7 pm. We will try to have a program but there will always be Show & Tell. Please note that the November meeting date has changed. It will be held on November 1st so that it does not conflict with the National Election on the 8th.

The club elections will be held at the November meeting along with the Ugly Airplane Contest. All four executive board positions and one at-large position are up this year. As for the Ugly Airplane Contest, it is very simple: Bring a plane that is flyable but its appearance might not be the greatest. It could be from crashes, repairs or just a bad build. Don’t be ashamed to bring this type of plane, you might win a prize.

The TCRC Banquet or end of the season dinner will be held on Saturday November 12th. It will again be held at Fong’s in Prior Lake. Cost is \$25.00 per person for the buffet dinner. Appetizers will be out by 5:00 p.m. and the bar will be open. Dinner will start around 6:00 with games to follow with the opportunity to win some nice prizes for both pilots and their spouse/guest. So come and join us at the banquet and enjoy an evening of delicious food, prizes and TCRC fellowship.

The plane for this month’s raffle is yet to be purchased but there will be one there for all to take a chance to win for only \$5.00.

See you at the meeting

2017 AMA Dues Statements

All TCRC members should have received their 2017 dues statements in the mail in September from the Academy of Model Aeronautics.

AMA 2017 dues are the same as the previous year. They are:

- Adult (19-65) \$75
- Senior (65 and up) \$65
- Under 19 Free
or \$15 with *MA*
- Additional family \$38

Your AMA membership gives you \$2.5 million in personal liability coverage, \$25,000 in medical coverage and also a subscription to *Model Aviation* for the year.

To belong to TCRC, you must have a valid membership for the year in AMA.

Please note that AMA also has a Park Pilot membership that has a cost of \$38 per year, but that membership is not valid for membership in TCRC.

To renew your membership in AMA, the Academy gives you four methods: at the AMA website, www.modelaircraft.org; by fax at (765) 741-0057; by phone at (800) 435-9262; or by returning the renewal form you received in the mail in the supplied envelope.

Deadline for paying your 2017 AMA dues is December 15 to avoid a lapse in membership services. J

J

Scale Saturday Giant-Scale Planes Could Be Seen Everywhere In The Pits

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Dan Schmidt brought his deHavilland DH-59a Rapide twin electric biplane and it is piece of engineering marvels. It flew very well but Dan had some radio trouble and lost it over the swamp to the north east of the field.

Bob Glass brought out his 40% Super Cub, Mr. Big Stuff, and flew it constantly. He helped in the recovery of Dan Schmidt's DH-59 by mounting a GoPro on it and flying a grid over the swamp. The DH-59 was recovered [Monday](#) by Steve Meyer and his kayak. (See article on page 11)

We had one NEW pilot join us at the event! Young Mr. Steve Liu of Bloomington heard about the event and brought his Timber electric trainer with his mother. He's had some time on the Real Flight simulator so we paired his transmitter to my DX6 and Rusty Freeman acted as the flight instructor. Due to Rusty's great teaching skills Steve SOLO'd during his second flight! I think Steve will be joining TCRC shortly!

We had a great time and look forward to next year. We hope we can have concessions in the future as it was a hassle for people to drive to McDonalds for lunch. Thanks to all who came out to enjoy a day of flying some great scale aircraft. J



Bob Glass gives a final tweak to his engine on his giant Super Cub before another flight on Scale Saturday. (Photo by Scott Anderson)

The Aircraft At Scale Saturday Were Works Of Art In The Air



Dan Schmidt's deHavilland flies over the field on Scale Saturday. (Photo by Pedro Restrepo)

Pictures From TCRC's Scale Saturday



Pete Stapleton's beautiful PT-17 Stearman from a 1/3rd-scale Balsa USA in the pits.



Pete's PT-17 makes a landing approach after another great flight at Scale Saturday.



Jay Schimke gets an assist from Corey Kaderlik with his Grumman F-14 Tomcat.



Jay's Grumman F-14 Tomcat had a great flight through the air but encountered the safety fence at the TCRC field on its landing approach and sustained some minor damage.



Corey Kaderlik and a great looking aircraft.



John and Kathy Dietz enjoy Scale Saturday.

Fall Float Fly 2016

by Steve Meyer

Weather has not been nice to the upper Midwest this year with 5+ inches of rain soaking the northern suburbs two days before the TCRC Fall Float Fly. The Jordan field is underwater at this time, but the float fly was already scheduled at Bush Lake for September 24th. I arrived at the field at 9:30 under gloomy skies and an 8-10 mph wind . . . wishing the forecast looked better for the float fly. I was happy to see a couple of pilots already there when I arrived. They were anxious to fly and happy to see me arrive with my wife's kayak for retrieval.



A nice looking Spacewalker taxis out onto Bush Lake. (Photo by Steve Meyer)

I lost count on the number of flights Dave Erickson made with his Sea Hawk. Chris O'Connor and I had two successful flights each with our Flyzone Beavers. Larry Sorenson flew his Spacewalker so many times that he needed to open a new bottle of fuel. Duane Murphy flew an old design called X-Mod. Mike Burke's electric powered Twin Star and Slow Stick were so light that when he was going into the wind they just hovered. Julian Bristow successfully flew his Neptune but he needed retrieval after his engine quit on a bumpy landing. Bob Svare brought his Smud Duck and Cub. The biggest plane at the event was Corey Kaderlik's 1/4-scale J-3 Cub. This was the Cub's maiden flight off water and he had several additional successful flights.



The pilots at TCRC's Fall Float Fly. (Photo by Steve Meyer)

Glen Hagfors was the first in the air with his souped-up Apprentice 15e showing how easy it was to fly in the breeze. He also flew a Seawind and Easy Fly 40. Others followed suit and had successful flights until Dave Langer tried to fly his Slow Stick which flipped over before it could even start its engine. I had to retrieve it with the kayak because the wind had taken it to the middle of the lake. It was flown successfully later in the day along with his Polaris Ultra.

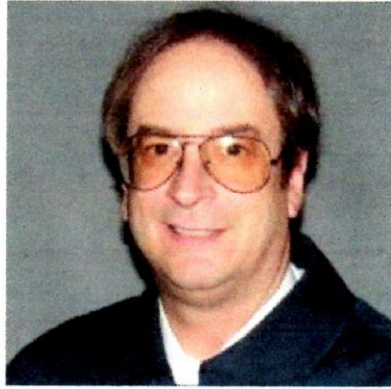
I was happy to see Larry Sorenson arrive with his canoe at 11:00 so I had help retrieving planes. Although during the entire day we only needed 4 retrievals, which is amazing. I think people fly better in a challenging breeze . . . maybe because they need to be more focused.



Although the day started gray and blustery the sun came out in the afternoon and the winds died down a little for a short time and the flying was great. Then the winds increased around 1:30 pm and we decided to call it a day. In all, eleven of us enjoyed a fun day of float flying. Hope to see you all next year at the Spring Float Fly. **J**

The Right Seat

by Mark Wolf



Stability, Maneuverability and Control

The airplane designers have reached a compromise in that final form of a particular airplane. What is this airplane's mission profile going to be? Is it a small compact aerobatic type with quick response to flight control inputs? Is it a slow, easy-flying, forgiving training type? Or is it a high-performance fighter, transport or multi-use type? Among the many design features considered for an individual airplane, stability, maneuverability or controllability are common to all.

The airplane has three axes of rotation around which it changes its flight attitude or position in flight. All three axes intersect each other (each is at 90 degrees to the other two). They intersect at the airplane's center of gravity (CG) or the point where the airplane weight is considered to be evenly distributed or balanced. The airplane can rotate around these axes simultaneously or it can rotate about just one.

The longitudinal axis, running from nose to tail, is associated with banking the wings left or right. Roll-controlled by the ailerons and referred to as lateral control or stability. The lateral axis running from wingtip to wingtip, is associated with the nose of the airplane tilting up or down. Pitch-controlled by the elevator and referred to as longitudinal control or stability. And from the top of the airplane down to the bottom, the vertical axis is associated with the nose of the airplane moving left or right. Yaw-controlled by the rudder and referred to as directional control or stability.

During flight the airplane that is stable requires little pilot attention once it's trimmed for a certain airspeed and power setting. The unstable airplane would require the pilot to continually vary pressure on the flight controls and would be difficult to control. The airplane has certain design features to counteract momentary unbalanced conditions and assist with our power management and flight control inputs to return the airplane to the desired stable attitude or direction of flight.

Directional stability. There is usually more fuselage side area aft of the CG than forward of the CG, along with a vertical fin on the tail. Any

sideways yaw or skid into the relative wind and the airplane tends to weathervane back to its original direction of flight similar to the effect of feathers on an arrow. Good examples of this are the WWII Boeing B-17 and B-29 bombers which have large vertical fins to help in case of an engine(s) failure. The WWII Consolidated B-24 with its twin vertical stabs and rudders is another way it's been accomplished. And even more interesting is the U.S. Navy version of that same B-24. The PB4Y Privateer was a B-24 with a single massive vertical tail used for the same effect instead of the original twin rudders. Contrast that to some WWI single-seat fighters such as the French Nieuport 17 and the Fokker DR-1 triplane. No vertical fin or stabilizer at all, just a moveable rudder.. Highly maneuverable fighter requirements vs. steady/stable bombing and maritime patrol platforms.

Lateral stability. Dihedral is the angle at which the wings are slanted up from the root to the tip. When the airplane sideslips slightly as one wing is forced down in turbulent air, the stabilizing effect of dihedral comes into action that lowered wing in effect has a higher angle of attack and produces more lift tending to return the airplane wings to level flight. Think about the old-time free flight and early 3-channel R/C models.

Longitudinal stability. The wing itself is unstable. Out at the field if you've demonstrated or been witness to the 'wing-away' maneuver you'll recall the fuselage descending rather quickly and that wing just rolling over and over as it flutters to the ground. The point of the wing in

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The Right Seat

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in which lift is concentrated is called the center of pressure or center of lift. It's not found on the wing plans but its relationship to the CG can have a significant effect on stability. It's usually located aft of the CG and results in an inherent nose-down tendency of the airplane to pitch away from a stalling condition. The horizontal stab exerts a downward force to partially offset this nose heaviness and at normal cruise speed helps to maintain the airplane in level flight.

This is a very basic introduction to some concepts associated with primary flight training. The following texts were used as reference sources: FAA-Flight Training Handbook ACGI-21A c1980, FAA-Pilots' Handbook of Aeronautical Information ACGI-23B c1980, Iowa State University Press – The Advanced Pilot's Flight Manual 4th Edition c 199976.

Luckily for us those designers have considered many important factors and designed them into practical flying aircraft. They've figured out all of the intricate details and have done all of the hard work. All we have to do is draw up plans, cut out the parts, engineer a sound structure, assemble or build the model, install the engine/motor and radio equipment, paint, finish and go out and fly it. All of the easy work!

Until next time . . .

J

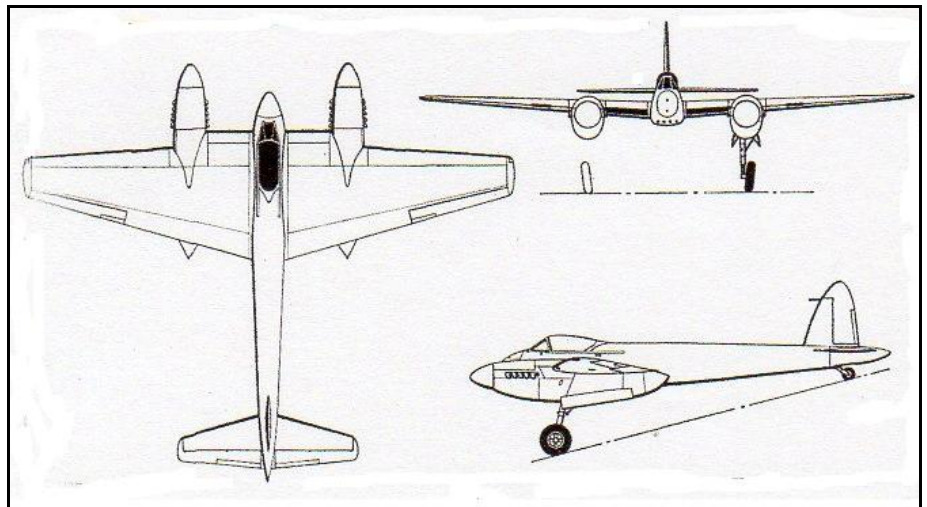
September Raffle Winner



Jim Lundquist won the September raffle at the TCRC 'Meeting At the Field' on September 13th. This was Jim's third win at the raffle. The plane was a Hanger 9 Meridian 10 cc ARF. President Bob Breisemeister had forgotten to bring the box of numbered ping pong balls for the drawing so he asked Conrad Naegele and Morgan Larson to just think of numbers from 1 to 75. Jim's number was Morgan's first selected number.

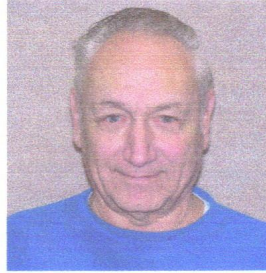
At the October 11th meeting the raffle prize will be a mystery plane, but of course well worth the cost of a chance. Chances are only \$5/each and you may enter as many times as you wish. Come to the monthly club meeting on Tuesday, October 11th at CrossPoint Church and be the next winner of the TCRC raffle. J

October Mystery Plane



Safety At The Field

By Larry Couture



That's it for now. Remember every landing that you can fly again after is great but not always graceful, so just keep the rubber side down and have fun. J

Safety Always Comes First!

Well here it is the end of September and the field is under water to the tune of 6 to 8 feet and rising. This year is getting to be one of the worst years for flying at the field and that is the truth! So there.

One of the safety items on my mind is what if the engine starts backwards!!!! The plane pulls to the rear and you are in a position where your upper arm can get cut by the prop when you try to hold or stop the plane. With that being said and cold weather upon us and the possibility of backward starting being more prevalent, just be extra careful this winter.

When the snow is here we tend to fly on areas other than the blacktop, so be very careful that the other fliers and you are aware of what's happening at all times. This is best accomplished by verbal communication with each other, as to take offs and landings.

One thing that seems to happen more often than anyone suspects is that fuel tanks leak. I have found that over time the rubber hardens and shrinks and the tank leaks at the stopper. The fix is to tighten the screw and the leak stops. The next leak found is the tank splits in the molding seam. This is only fixed by tank replacement. When a tank leaks the fuel can get on the battery or the receiver and they are not compatible with this fluid and the plane is in crash mode. So checking for this problem before take off is very easy and should be part of the preflight check.

Another problem that can occur is the battery or receiver has not been restrained enough and it or they can move around and disconnect and this results in a crash. So checking this is also very simple.

Everything is so simple and yet so easy to overlook it just makes good judgment to check and check.

Now for you electric guys it has been pointed out again that your messing around in the shop with the prop on and the motor starts. Now the fun begins! Everything in the shop is going past and your hand is getting the chop job as you grab whatever. **THE BEST WAY TO AVOID THIS IS TAKE THE DARN PROP OFF BEFORE YOU MESS AROUND!!!!**

Calendar

- Oct. 1 TCRC's Season Finale
Model Air Park
POSTPONED
Date TBD
- Oct. ??? Jordan Field
Clean-Up and Season Finale
Date TBD
- Oct. 11 TCRC Membership Meeting, 7:00 PM
CrossPoint Church
Bloomington
- Nov. 1 **TCRC Membership Meeting, 7:00 PM**
CrossPoint Church
Bloomington
(Note: Moved Because Of National Elections)
- Nov. 1 Ugly Airplane Contest
7:00 PM
CrossPoint Church
- Nov. 1 TCRC Elections
7:00 PM
CrossPoint Church
- Nov. 12 TCRC Banquet
David Fong's
Restaurant, 5:00 PM
Prior Lake



September TCRC Meeting At The Field

by Jim Cook

September 13th TCRC was able to hold the last scheduled 'meeting at the field'. The weather looked questionable but it was decided to have the meeting at Jordan.



The officers run the 'meeting at the field' on Tuesday, September 13th. (Photo by Jim Cook)

After the meeting, Tim Wirtz had all of the club's apparel and was fire-selling all of it for \$3/item.



Tim Wirtz fits Jim Ronhovde with a TCRC shirt at a bargain price. (Photo by Jim Cook)

Tim is planning on purchasing new TCRC apparel and will be taking orders at the next meeting.

By 7:30 PM it was getting too dark to fly, so most of the members packed in their planes at the end of the TCRC meeting. This concludes the 'meeting at the field' for the duration of 2016, but the board will be considering and planning the 2017 edition of this very popular event. J



The new windsock recorded the moderate winds at the 'meeting at the field'. (Photo by Jim Cook)

Around 5:00 PM the wind was 10 or so mph, and rain showers came and went during the meal from Jim Lundquist's grilling expertise, while using the club's new grill that was donated by a friend of Doug Elyea.



Jim Lundquist served up the burgers cooked on TCRC's new grill. (Photo by Jim Cook)

President Bob called the meeting to order at 7:00 PM to discuss the various events TCRC had scheduled for the month.

TCRCOnline.com

Everything You Need To Know About TCRC

October TCRC Meeting Program

by Mark Wolf

An Aluminum Finish Using Aluminum

Aluminum has been and still is a popular material used in aircraft construction. Combined with different metals into alloys with high strength-to-weight ratios, aluminum in many forms is used throughout the airframe.

Most external surfaces of the airplane are finished with some sort of protective coating to prevent corrosion, enhance durability and provide a decorative appearance, i.e. paint. Generally a base color and an accent or trim color(s). There are also many examples of airplanes which are 'finished' without such a complete overall paint job.

From general aviation aircraft with simple stripe/trim markings, thru the early airliners decked out with their distinguished liveries, to military fighters and bombers identified with national, squadron and individual aircraft markings, and unpainted or overall bare aluminum finish on an airplane can provide an alternative and attractive 'color' scheme.

Simulating that aluminum finish on a scale model or any model can be yet another challenge for us. It's ironic that to simulate a bare aluminum finish – paint is often used. There are many different shades of silver, aluminum and other various 'metallic' paints for providing a polished metal look. We've seen many models out at the field and in model magazines pictures with painted bare aluminum finishes. How about simulating that bare aluminum finish on a model with real aluminum?

How do we do it? Flite-metal is a trademark name for a product designed to do just that. The program at the October meeting will feature simulating a bare aluminum exterior surface finish using Flite-metal. Here are the program highlights:

- Flite-metal – what is it?
- Application Considerations
Substrate surfaces -- wood, fiberglass, plastic, open bay areas
- Scale Details
Landing gear struts, access hatches, cowl flaps, window/windshield frames, misc. cockpit details
- Surface Preparation
- Required Tools
- Material Preparation
- Application Technique(s)
- Finishing
Sanding, edges, field areas, applying painted details, clear coating
- Maintenance and repair

We'll have some examples of the material itself for some hands-on practice along with finished components. If your schedule permits, we'll see you at the TCRC meeting on Tuesday, October 11th. J

Don't



Forget!

The TCRC Membership meeting in November will be held on Tuesday, November 1, 2016 instead of its normal 2nd Tuesday of the month.

This is being done so that TCRC's meeting day does not coincide with the national election day of November 8th.

Mark your calendars so you do not miss the November meeting at CrossPoint Church. J

Lost PlaneFound

by Steve Meyer

At TCRC Scale Fly-in on Sept. 17th Dan Schmidt lost control of his deHavilland biplane and it went down on the east side of field. After an exhausting search we did not find the crash site. Bob Glass then offered to fly his 1/3rd-scale Cub over the area with a GoPro camera.



The missing plane can be seen just under the wheel.

After watching the video they spotted the plane in the TCRC swamp. Now that we knew where the plane was we needed to go get it. Tuesday I went to the field with my wife's kayak to rescue the plane. I found it sitting upright in the swamp with just its lower wing and landing gear in the water and except for a lost nose cone the biplane was not too badly damaged at all. Dan said "it reminds me of discovering a downed WWII bomber in the jungles of New Guinea".



Steve Meyer with Dan's rescued deHavilland.

The video of the fly over can be found on YouTube at **Search for lost biplane at TCRC**. A second plane (a foam trainer) was spotted and recovered at the same time.

Dan gives a great big thank you to Bob Glass for the great work on the video flyover and to Steve Meyer for the successful retrieval of his beautiful aircraft. **J**

THE TCRC FLARE OUT Monthly Newsletter



TWIN CITY RADIO CONTROLLERS INC.

Purpose: To preserve, encourage, and further develop the hobby of building and flying radio controlled model airplanes.

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Vice President	Mark Wolf 612-207-3128
Secretary	Jim Ronhovde 952-854-9062
Treasurer	Tim Wirtz 952-941-5357

TCRC Flare Out

Editor	James R. Cook	952-445-5257
Publishers:	Pat Dziuk	952-445-3089
	& Mike Timmerman	952-496-1631

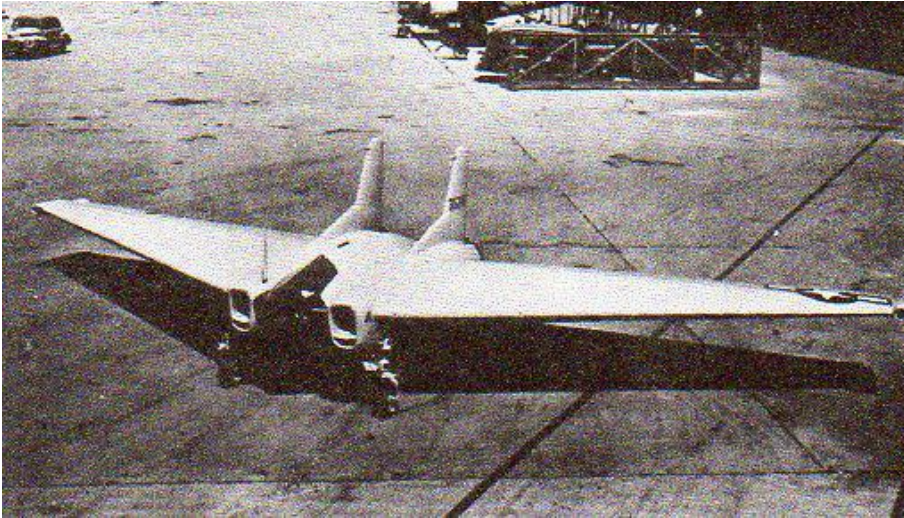
Website: <http://www.tcrconline.com>

TCRC meets every month on the 2nd Tuesday at 7:00 PM in Fellowship Hall of CrossPoint Church located on the southeastern corner of the intersection of 98th Street and France Avenue in Bloomington. Guests are welcome to attend these meetings.

Northrup XP79B

by Conrad Naegele

The September Mystery Plane was the Northrup XP79B.



The first reaction powered flight of a piloted aircraft took place on June 30, 1939, when a Heinkel HE 176 flew. Continued research led to the ME 163 'Komet', and the Japanese also tested and flew a rocket interceptor.

In the United States the first serious thought given to rocket powered flight did not happen until late 1942. Northrup devised liquid fuel, and in 1943 three fighters were ordered. This was shrouded in utmost secrecy, and since the prototype was to be mostly magnesium, a completely new technique for welding had to be devised.

Two months after contracts were let it was decided to power them with Westinghouse turbo jets, and these were designated XP79B. Rocket power was still in the works, and in 1944, the XP79 was flown. No details of that flight were released. The plane was extremely sturdy, and it was considered to be developed as an aerial ram, to slice off tail surfaces and wings.

The pilot was to fly in a prone position, able to withstand up to 21 G's. The XP79B was flown September 12, 1945 (after the war was over). It flew normally to 7,000 feet, then started to slow roll to the left, and was unrecoverable. The pilot ejected at 2,000 feet, the plane still rolling, hit the pilot, who was killed.

Incidentally, while there was a rudimentary rudder, the design employed rather novel wingtip bellows, to serve as 'rudders'. No further work was done on this plane.

The XP79B had a wingspan of 38-feet, a weight of 6,250 pounds and an estimated speed of 547 mph. It was powered with two Westinghouse J-30 turbojets, each of which developed 2,300 pounds of thrust. J

TCRC Annual Banquet November 12th

The TCRC Annual Banquet is almost here. It is scheduled to be held starting at 5:00 PM on Saturday, November 12th at Fong's Restaurant in Prior Lake at the intersection of Highway 13 and County Road 21.

The banquet is always a very enjoyable time with TCRC members and their families coming together to partake of a great meal, indulge in camaraderie with both old and new friends, to see a recap of the club's 2016 events, and to be a part of some fun games with nice prizes for the winners.

Cost is \$25/person and includes a buffet dinner of Fong's exquisite cuisine.

Start thinking now about attending the TCRC Annual Banquet. Bring your spouse, a good appetite, and come and enjoy this fun event. President Bob will be getting a nose count over the next month, so let him know you are planning on attending.

Be a part of the fun at the TCRC Banquet on Saturday, November 12th. J

Spitfire – History of the Spitfire's design and development

(Reprinted from military-history.org)

A masterpiece of aerodynamic engineering, the Spitfire was among the finest fighter aircraft of the Second World War.

Military archaeologist Keith Robinson celebrates the 75th anniversary of the Spitfire's iconic design.



Spitfire Solitaire - by Mark Bromley

Spitfires have hit the ground, touched the sea, bashed through trees, cut telegraph and high tension wires, collided in the air, been shot to pieces, had rudders and parts of wings fall off, and have yet made safe landings, with or without wheels.' So wrote Australian Spitfire pilot John Vader.

R J Mitchell, the Supermarine Spitfire's designer, learnt his trade during WWI. He was conscious of the fragility of the early planes, and always considered pilot safety in his designs. Even when designs were optimized for speed, such as those for the Schneider Trophy races, he never sacrificed his concern for the pilot. His masterpiece, the Spitfire, proved to be not only a beautiful plane much loved by its pilots, but also a robust and adaptable design.

It was, in fact, so adaptable that it was the only fighter in production before, through, and after the war. It eventually reached Mark 24, some

of those marks being specialist Photo Reconnaissance (PR) planes, others reserved for the Navy and christened 'Seafire'. Versions of the Spitfire were equipped with machine-guns, cannons, rockets, and bombs. It could be used at high altitude or adapted as a ground-attack plane. Two marks were even tried with floats. By the end of the war, it had got through 13 different designs of propeller. In all, 20,351 Spitfires were produced for the RAF.

Mitchell

Mitchell's search for an effective fighter-interceptor did not get off to a very good start. His Supermarine Type 224, with its steam-cooled Rolls-Royce Griffon engine, could only manage a top speed of 230mph, against the Air Ministry's rather modest specification, F7/30, for an all-metal, four-gun fighter, with a top speed of 250mph. This ugly duckling was nicknamed 'Spitfire' by the managing director of Vickers Supermarine. Mitchell, however, was already working on a much superior design, the Type 300, and went into collaboration with Rolls-Royce, who were, themselves, working on a new engine, which would eventually become known as the 'Merlin'. At first a private venture, it was taken up by the Air Ministry, whose fighter spec, F16/36, would be written around this design.

Work began on the 300 prototype, Air Ministry registration K5054, in

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Spitfire

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December 1934, and it underwent its maiden test flight at Eastleigh, Southampton, on 5 March 1936, in the hands of Vickers' chief test-pilot Joseph 'Mutt' Summers.

K5054 had a narrow fuselage with wings that tapered to slender tips and were elliptical, and its cockpit was enclosed. Its undercarriage was set close together to lower stress on the wings, and the wheels swung outward to retract flush into wing cavities. Suspension was provided by 'oleo' legs, which were telescopically sprung on oil and air. A tail skid completed the technical arrangements for take-off and landing. The plane was originally fitted with a two blade, fixed-pitch wooden propeller and a Merlin 'C' engine.

Unfortunately, Mitchell died of cancer in June 1937. He continued to work despite increasing pain, tweaking the design up to the moment of his death – earning himself the posthumous sobriquet 'the first of the few' from the makers of his 1942 film biography. Before he died, however, he had seen his prototype fly.

Production design and future adaptations were, thereafter, the work of Mitchell's long-time collaborator and successor Joseph Smith. It was Smith who oversaw

the production trials at Martlesham Heath, but the Air Ministry, impressed with the prototype, had already ordered 310 Spitfires, and, despite the problems with Type 224, the name had stuck.



Spitfire Dawn
by Mark Bromley

Spitfire Mark I

After consultations with RAF technical experts, the armament for the new Spitfire fighter was settled on 8 Browning .303 machine guns. These were basically Colt .30s manufactured under license but re-chambered to take the British rimmed cartridges.

They were placed four to a wing, a novel concept at the time, and designed to fire outside the circle of the propeller, doing away with the need for the interrupter gear of earlier aircraft. Smith also simplified the construction and design to make the Spitfire more amenable to mass production, and he finally brought Mitchell's idea to a practical conclusion when the first Mark I, K9789, officially entered service with No 19 Squadron at RAF Duxford on 4 August 1938 – though the first few planes had only four machine-

guns, as there was a desperate shortage of Brownings.

The early Mark Is had a service ceiling of 31,900 ft., and at 30,000 ft. could reach a speed of 315mph. Its maximum speed was 362 mph at 18,500ft. Its maximum cruising speed, though, was 210 mph at 20,000 ft., and at economical speed its range was 575 miles. Its combat range was 395 miles, allowing for take-off and 15 minutes of fighting.

By the time the Spitfire had brought down its first German plane, a Heinkel He 111 bomber over the Firth of Forth on 16 October 1939, several improvements had been made to the Mark I. To its elliptical wings and all-metal '*monocoque*' body, where the skin is part of the plane's structure rather than just a covering, had been added the bulged, or blister-shaped, cockpit, thereby completing the Spitfire's classic profile.

Windscreen plastic had been replaced by armoured glass, armour plate was fitted at the rear of the engine bulkhead, a power-operated pump was installed to operate the undercarriage, and the tail-skid had been replaced by a wheel. The Merlin Mark II engines were giving way to the Mark III with its improved airscrew shaft, and the two-blade wooden propeller had been replaced by the De Havilland

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Spitfire

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three-blade metal, two-pitch propeller, significantly enhancing performance, particularly in the climb.

Remodeling and rearming

Most of the Spitfires with which the RAF fought the Battle of Britain were Mark Is, but work had begun on a Mark II as soon as the first model had gone into production, and some were already in service as early as the summer of 1940.

There was little difference between the two marks, the main one being that the Mark II Spitfires were fitted with the Merlin XII engine, rated at 1150 hp. The Spitfire Mark II had slower maximum and cruising speeds, but a faster climb rate, being able to reach 20,000 ft. in 7 minutes, and had an improved ceiling of 32,800 ft. The Mark II had better protection for the pilot as well, with increased armour behind the pilot's seat to protect his head.

Another early development which led to increased Spitfire variety was the production of different wing types to accommodate a range of different armament set-ups. The A wing was the original one designed to hold four .303 machine guns. The

B wing was designed to accommodate the newly accepted Hispano-Suiza 20mm cannon, so each wing had one cannon and two .303 machine guns.

The C, or 'Universal', wing could accommodate either the A or B combinations, or an altogether new combination of two 20mm cannons. There was no D wing, but an E wing was created, which carried a 20mm cannon and a .50-inch machine gun.

Fifty Mark IBs were manufactured, but there were problems with feed to the cannon. By the time the Mark II was ready to enter service, this problem had been sorted. Of the 920 Mark IIs made, some 170 had the B-wing combination.

In the continual programme of updating and improving the Spitfire, the next most significant development was the Mark V, and with a production run of nearly 6,500, this was the most common type ever produced. They were manufactured mostly in the B and C versions. Some with the Universal wing were given four cannons and could carry one 500lb bomb or two 250lb bombs. They were also fitted with drop tanks of 115 or 175 gallons, significantly increasing endurance.

The Mark V Spitfires were powered by the Merlin 45 and 46 engines, producing 1470 hp at 16,000 ft. These new, more powerful Spitfires were the Air Ministry's response to the

introduction of the Messerschmitt Me 109 F and the Focke-Wulf FW 190 in the spring of 1941, both of which clearly outclassed the Spitfire Mark II. The Mark VAs could reach a speed of 376 mph at 19,500 ft., at which height the Mark VB's speed was 369mph, whilst the Mark VCs reached 374mph at 13,000ft. The climb performance of the Mark Vs was improved, being able to reach 10,000 ft. in 3 minutes 6 seconds, and 30,000 ft. in 12 minutes 12 seconds. The Spitfire's ceiling was also raised by some 2,000 ft.

As plane performance improved on both sides, and as the number of roles aircraft were asked to perform increased, so the Spitfire proved its versatility as a new range of designations was introduced. Those Spitfires designed for high-altitude work were given the preface HF, those for low-altitude LF, and those for normal duties F. The HF's and LF's were given variations of the Merlin engine specifically designed for their tasks. The HF's were distinguishable by their extra long wing-tips, whereas the LF's had clipped wings.

Developments and adaptations continued to the end of the war, with the Mark IX taking over from the Mk V as the most commonly manufactured plane of the later series, with some 5,500 produced, of which more than 1,000 went to Russia. Increasing numbers of

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Spitfire

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Spitfires were also being sent to the Middle Eastern and Far Eastern theatres.

Experiments had been ongoing with the new Rolls-Royce Griffon engines. The first of the production Spitfires with these engines was the Mark XII with the Griffon III or IV, followed by the Mark XIV with the 2050 hp Griffon 65, driving a five-blade Rotol propeller. The Mark XIV had a maximum speed of 443 mph at 30,000 ft., and could reach a height of 12,000 ft. in just 2 minutes 51 seconds. It was a Mark XIV which was the first Allied plane to bring down a Messerschmitt Me 262, the world's first operational jet fighter.

The appearance of the Me 262, however, showed the way to the future. After the war, designers everywhere turned to the production of jet-engined fighters. The Spitfire's postwar service life was brief. J



Spitfires At Rest
by Mark Bromley

Warbirds and Classics over the Midwest 2016 – Fond Du Lac, Wisconsin

by Scott Anderson

This is one of the biggest events in our area with over 150 pilots and over 400 aircraft on site. The runway is a 1,300-foot long manicured grass strip over 400 feet wide. Steve Meyer and I arrived Wednesday afternoon August 17th to get as much flying in as possible before the Friday and Saturday crowds arrived.

Steve flew his Balsa USA 1/4-scale Fokker Dr1 triplane over and over again! He was joined by over 14 other giant scale WWI warbirds for Dawn Patrol and WWI gaggles! There were so many great looking WWI aircraft flying I had to keep shooting pictures!

I flew my 100" span Ziroli P-47N with the other warbirds. It seemed we had the skies to ourselves on Wednesday and Thursday as many pilots sat in the shade to avoid the heat.

We had the pleasure of watching Ali (Ollie) Machinchy (of Horizon Hobbies) fly his turbine powered 14' span F86 through the most unusual maneuvers. The jet weighs only 38 pounds and can be flown in formation with the WWI fighters! He even flew it in formation with Bob & Tina Patton's 171" span Cessna 152! Ali also had a Spitfire powered by a turboprop engine that was amazing to watch.

Most of the Minnesota Embassy (Scale Flyers of Minnesota) was quartered in a 90' x 30' circus tent on the south end of the field. A dozen pilots were able to keep their aircraft in the tent overnight as well as during the day.

Chris and Nathan O'Conner drove up on Thursday evening just before the rains began. It was wet until 10 on Friday and then the flying was great for the rest of the day. The forecast for Saturday was 90% chance for thunderstorms and it poured. Most of us packed up Friday night and were loaded to drive home Saturday morning. J

Andersen Designs

Andersen La-7
Built by Jeff Quesenberry

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