THE SLOW ROLL

CHARTERED #921
Since DEC. 1974

APRIL 2024

The Slow Roll is published by the Sun Valley Fliers by and for its membership to all others interested in the building and flying of radio control aircraft.

Another great event that Brian and Bonnie brought to the valley and to the SVF field. In this Slow Roll many members took photos at the event and we will put them in this issue. Remember Model Airplane News magazine Will soon have coverage oof this event.

Inside this issue: **Cover Page by Bob Purdy**
SVF CLUB ending 49 years as a charter club

MEETING AT FIELD APRIL 6, 8AM

April 2024 Slow Roll Presidents Letter

Welcome to April 2024 Slow Roll. I hope everyone is having a great year so far.

The Classics, Scale Jets and Warbirds event took place March 14-17. The weather cooperated 3 out of the 4 days. All told it was a fantastic time for all involved. See pictures and comments in this edition of the Slow Roll. I want to thank all the SVF members that volunteered their time for all the various tasks that were required for this huge event. These events are so important to us. It's part of our revenue to survive and pay the bills. So, thanks again to those who always selflessly volunteer to assist.

Sun Valley Fliers Club Elections. Yes, it is that time of year again. Nominations for candidates to run for SVF Officer & Board of Director positions will be conducted during our Saturday April 6th meeting. 9am start time as usual at the field.

Any member can nominate another SVF member from the floor at the April meeting as long as the nominee is willing to run. The Board of Directors serves two-year terms and there will be 3 openings this year. All officers are up for re-election since their terms are for one year at a time. If you would like to be a part of how this club is run, you might want to come to the April 6th meeting and find out the latest. Our nomination committee consists of John Geyer, Todd Inskeep and Ben Gowell. Feel free to reach out to any of them with questions.

The actual election results will take place at our May 4th election meeting so please put this date down on your calendar so you can be there. We are also going to continue with our online method for submitting Ballots. We have been using this method for many years with great success. Prior to the voting week, you will receive an email with instructions on how to submit your vote. If you have any questions about voting or casting ballots, please contact John Geyer at jegeyer@centurylink.net

The weather is getting warmer which means more of our members will be at the field. As our membership grows and new faces appear, we all need to ensure that our field maintains its stature as the best-looking and most desirable club in the area. It is everybody's job to help. If you would like to voice your opinion regarding anything to do with our club, then please come to the monthly meetings. We look forward to hearing from each of you.

For those of you that have not attended a club meeting in a while, April is the time to start. Please join us for the April 6th club meeting. We will have many raffle prizes and the "50/50" could make you very happy $$$. You never know what might happen, and you do not want to miss it. We have coffee and donuts for your enjoyment. The meeting is at the SVF Field and starts at 9am.

Have fun out there!

Frank Moskowitz

President

Sun Valley Fliers Club Meeting Minutes
March 2, 2024

Officers Present: President Frank Moskowitz, Vice-President John Geyer, Treasurer Oliver Heinen, Secretary Mike Peck

Board Members Present: Charlie Beverson, Jim Sprecker, Brian Rhoads, Dan Bott, and Val Roqueni.

Meeting Open: President Moskowitz called the meeting to order at 9:00 AM at the SVF field.

Guests: Erv Singer and Phillip Meads

New Members: None

New Solo Pilots: None

Secretary's Report: The Feb. 3, 2024 club meeting minutes were approved as written and published.

Treasurer's Report: Oliver Heinen reported on the amount of funds in the club treasury, and they are sufficient to meet the club's recurring obligations and expenses for the next year. The report was approved as presented.

Membership Director's Report: Tony Quist reported that we have 231 members to date, and there are 19 people who were members last year that have not renewed their membership for 2024.

Safety Officer's Report: Kenny Rhoads had no specific issues to report, but he did note that the snakes were out and members should be very careful around our storage containers and when recovering aircraft in the brush. A 4 foot long rattlesnake was found near one of the storage containers and relocated to a safe part of the desert well away from the flying site.

IT Update: Bobby Santoro is working on the rollout of the new SVF website.

Old Business:

1. Ramada permitting is still in progress. The City of Phoenix has required the helicopter ramada to be removed to get the permit for the main ramada approved. The helicopter ramada was constructed without a permit. Ken Rhoads' 'demolition consortium' will remove the ramada. Pictures will then be provided showing no unpermitted structure on that site and a walk-through inspection will be conducted by Steve and Avi. The Board anticipates providing a popup shade canopy in the helicopter area, but we cannot add a new structure to the main ramada replacement project.

New Business:

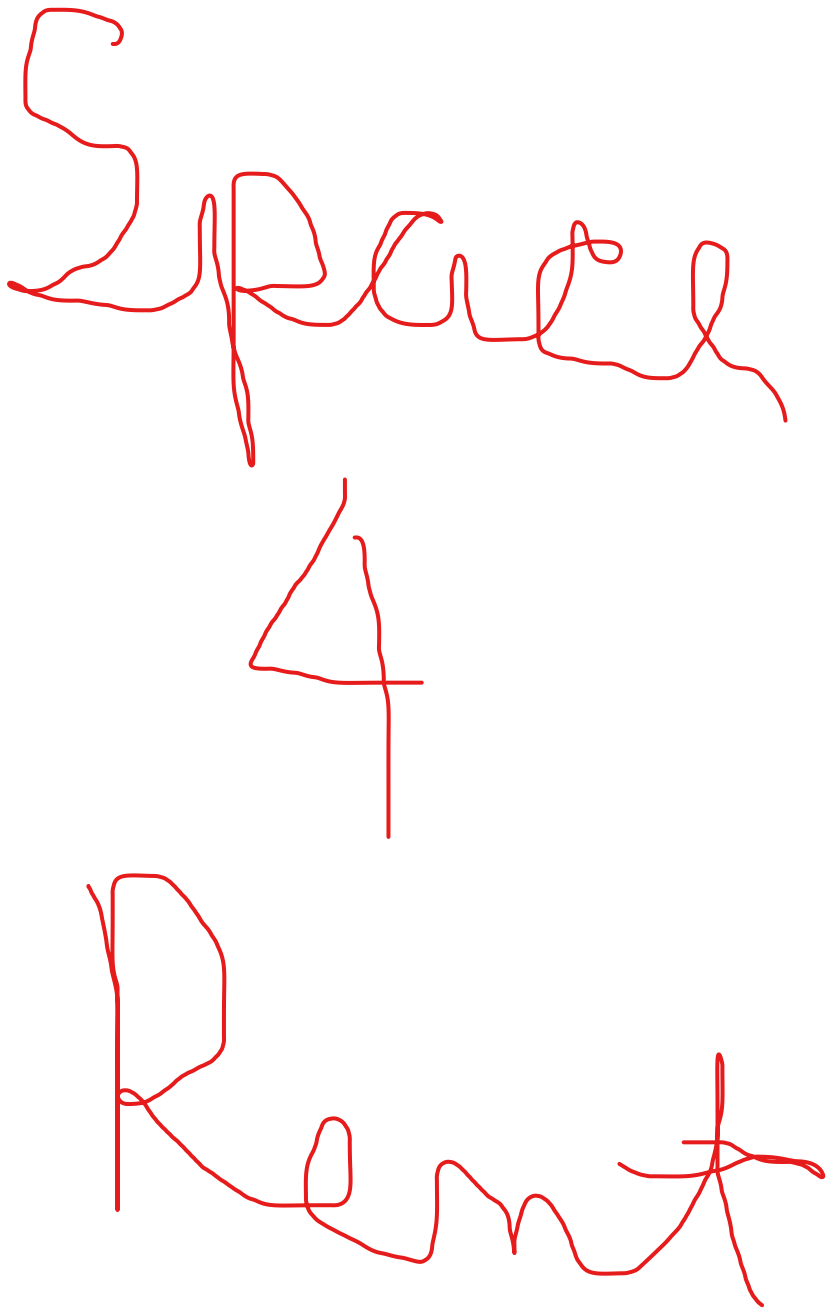
1. John Geyer has been appointed as the Board member to serve on the nominating committee for the election of Officers and Board members and he will be joined by non-Board members Todd Inskeep and Ben Gowell. President Frank will chair the committee. You have the month of March to think about running for a Board or Officer position. This year there are going to be three Board positions up for election as well as all the Officer positions. During the April 6th we will call for any nominations from the floor. That is when someone can nominate you to run for a position, if you agree. That will get your name on the ballot, and our annual election meeting will be the following month on May 4th during our normal Saturday meeting. President Frank will send an email to all members describing how we conduct voting via a web link as well; this has worked quite well for us in the last few years.
2. Brian O'Meara spoke about the March Warbirds and Classic event and requested help from the SVF membership. We need 2 gate workers per hour and Frank has sent a signup sheet out to the members. There are also many jobs that SVF members can help with in addition to the gate. Please contact Jim Sprecker and he will assist you with jobs suitable to your physical condition. Members are encouraged to signup as pilots to get access to the pits as a spectator. Signing up as a pilot will get you a free Buffalo Wild Wings lunch on Thursday as well as a free Friday night chicken dinner with all the trimmings in addition to pit privileges for all days of the event. Friday night is a 2 hour auction with many, many great items. Saturday night is a 10 oz filet dinner and the trophy awards ceremony. The SVF makes substantial money at this event, plus we get the added benefit of of being a major sponsor for the Morgan Adams Foundation that helps with the treatment of children's cancer.
3. An SVF member requested consideration for putting in an astroturf runway adjacent to the asphalt runway. Unfortunately, even that requires a permit in order to get the Flood Control District to approve it.

50/50 Raffle: The 50/50 raffle prize of $37 was won by Howard Kennedy, who donated the proceeds back to the Club. Thanks, Howard.

Show & Tell: None

Meeting close: Motioned, seconded, and approved to close the meeting at 9:36 AM.

Respectfully submitted,
Michael Peck
SVF Secretary



Sun Valley Fliers Board of Directors Meeting Minutes – March 4, 2024

Club Officers Present:

- President Frank Moskowitz, Vice-President John Geyer, Treasurer Oliver Heinen, Secretary Mike Peck

Board Members Present:

- Charlie Beverson, Tony Quist, Jamie Edwards, Bobby Santoro, Dan Bott, Brian Rhoads, Val Roqueni

Open: President Frank Moskowitz

1. The Zoom internet meeting was opened at 6:04 PM; there was a quorum present.

Secretary's Report: Mike Peck

1. The February 5, 2024 Board of Directors meeting minutes were not available for this meeting. The Secretary apologizes, but health issues have impacted his ability to transcribe the minutes, however, he expects to complete and publish those minutes as well as these shortly.

Treasurer's Report: Oliver Heinen

1. The club treasury balance was reported by the Treasurer, and it is adequate for the club's recurring needs throughout this year.
2. The analysis of how much dues should be increased is not yet finalized. Some of the accounting for the Winter Warbirds event is not yet categorized but will be shortly. This information will be needed to complete the analysis and Oliver asked for patience so that we can get the dues increase amount right the first time.
3. The Treasurer's report was approved by acclamation.

Membership Director's Report: Tony Quist

1. The club membership is at 231 members to date. We have 102 adult members, 11 of which are new members. There are 94 senior members, 3 of which are 1st year seniors. There are 14 junior members and 7 life members.

Safety Officer's Report: Ken Rhoads

1. The Board reviewed a recent incident where a member attempted a cross-runway takeoff and had a collision with another model on the runway. The Safety Officer had discussed this with the member and believed that the member understood he needed to cease taking off in that manner. Later the same day, the member was observed performing another cross-runway take off, and the Vice-President discussed the need for the member to cease this activity. In both instances the member was receptive to the request to cease and desist. President Frank noted this was a known common practice with this member and stated there would be only one more warning for him.
2. At the last Board meeting, we discussed an open letter to the membership that Ken Rhoads had drafted regarding member liability for actions made while flying models at the field. There was an issue with the possibility of Clubs getting a special one-time exemption to the AMA's 200 mph

max model speed. Mike Peck was asked to rewrite this portion of the letter, but it has not been done at this time.

Information Technology Report: Bobby Santoro

1. The website was upgraded about two weeks ago. A couple of plug-ins and front-page formatting issues still require some work. The links are all active and working well as far as can be determined at this point. President Frank noted the background pictures were not on the first page and thought that should help give the website more "pop".

Old Business:

1. Ramada permitting – It has been determined that the helicopter ramada was constructed without a permit, and the permit for the replacement of the main ramada cannot be issued until the helicopter ramada is torn down. Ken Rhoads and 'company' have torn down the helicopter ramada and removed it from its former location. Photos of the helicopter area with no ramada have been sent to our engineers to provide this proof to the City of Phoenix Commercial Planning Dept.
2. The 2024 Arizona Classics, Scale Jets, and Warbirds event is on track to be held March 14-17. Brian and Bonnie have donated a very large propane grill to the club so that steaks can be cooked appropriately in a reasonable amount of time.
3. The Rules Committee is getting two more members to serve on the review of club rules and widll report back in another month on their progress.

New Business:

1. The President requested that the Board authorize sponsoring a trophy for the Prado Warbirds and Classics event to be held in April in California. It was noted that many of their members attend Winter Warbirds regularly. A $150 donation for the trophy was approved.
2. John Geyer has recruited two non-Board members for the nominations committee for our upcoming officer and board member elections.
3. The helicopter area will need some pop-ups for shade, and President Frank said he will canvass the helicopter flying club members to see if there is willingness in the future among those members to help fund a replacement ramada down the road. This will, of course, require another permit in the future.
4. Brian Rhoads reported that he has found a person to pickup and recycle the old conduit and other metal around the flying site. Frank asked Brian to see if the person would also like to remove and dispose of the old tires. The individual will keep any proceeds from the metal recycling. The old tires have all been stacked on the side of the generator shed and still need to be removed. Brian said he expects to be at the field Monday and Tuesday next week in event mode. He will do some additional cleanup in the brush areas getting ready for the Arizona Warbirds event.
5. Brian Rhoads reported that since there would be several large temporary tents located East of the old ramada location. stretching about 100' to the East, the Arizona Warbirds event had decided the spectator bleachers and safety enclosure would be located forward of the parking lot fence as it was last year, instead of South of it to allow spectators a clear view of the flying activities. Several Board members voiced significant concerns regarding the safety of this location, the difficulty of keeping spectators in the bleacher area and out of the pits, and most of all the potential liability of the Club should a spectator be injured by an out-of-control model in this location. There was a

motion made, that was seconded, to require the spectator bleachers to be located South of the parking lot fence and further to the East past the area where the 100' of temporary tents would be. A spirited discussion on both sides of the issue ensued. It was noted that historically when an event has authorization to use the Club field, the contest director is responsible for all aspects of the safety regarding the conduct of the event including spectator safety and control. The event does plan to sell pit passes to spectators who wish to view the models in the pits with certain restrictions regarding where they can go and stand. It was also noted that the AMA has recommended distances from the flying deadline to the spectator area (which would include the bleacher location) and that should necessitate having the bleachers further south of the deadline than the proposed location. Our Club rules require adherence to AMA safety practices. The Board also discussed whether there was adequate plastic chain or orange fence material to extend the parking lot fencing to the entryway of the parking lot on the East. This would ensure an active barrier to discourage spectators from wandering into the pit areas or approaching the runway. A Board member requested a roll call vote on the issue, but President Frank said he could see everyone's hand that was voting on the Zoom call and the question was called for a vote. A majority of Board members voted in the affirmative to locate the spectator bleachers South of the parking lot fencing and East of the temporary rented tents.

Adjournment: The meeting adjourned at 7:07 PM.

Respectfully submitted,
Michael Peck, Secretary

"The doctor will now see the gentleman who glued his hands to his workbench".

SVF Meeting March 2, 2024

Sun Valley Fliers

COULD YOU DEFEND YOUR ACTIONS IN A COURT OF LAW?

For the privilege of flying our radio-controlled model aircraft at the property that the Sun Valley Fliers occupy and maintain, we must adhere to rules set forth by the Sun Valley Fliers and several other entities including the City of Phoenix Parks and Recreation Department, the Maricopa County Flood Control District, the Arizona State Land Trust, the AMA, and the FAA. When you joined the SVF, you agreed to follow these rules; all of the rules, all of the time.

You may be the best pilot at the field, but all the rules still apply. Many of our models were assembled by young people in a land far away, as was the radio equipment we use. Sometimes things fail; sometimes we fail. Sometimes things go to hell in a handbasket. Sometimes they happen in the blink of an eye.

The rules set forth by our club are there for our safety and the safety of others. This must be foremost in our minds at all times. Following the rules is not negotiable, nor is it dependent upon who is or is not with you when you are flying at the field.

The 400-foot altitude ceiling is not a suggestion, nor is the use of a caller. We get to fly because of the agreements we have in place with all these entities. The AMA has a rule regarding the maximum speed our model aircraft can be flown at. There is no provision for a club or an individual to request the AMA to waive this rule to allow models to fly faster than 200 mph, even under special circumstances.

So, if there is an incident/accident resulting from your actions while flying, were you following the rules and COULD YOU DEFEND YOUR ACTIONS IN A COURT OF LAW?

Ken Rhoads

What's Happening

Looks like Arthur and Mike got a new turbine????


Well done gentlemen!!

Do you see it???

VIDEO Brian o'Meara F-104 at the Arizona Warbirds & Classic

Horizon Hobby's own Ali Machinchy flying a giant Air World Germany F-104 Starfighter at the Arizona Warbirds event. The F-104 was built by Trond Hammerstadt and is owned an operated by Brian O'Mear. It is powered by a JetCat 300 Pro turbine and flown on a Powerbox Core radio, the Starfighter has been campaigned at Top Gun and flown at numerous events. Ali enjoys putting Brian's 104 through its paces.

VIDEO https://www.youtube.com/watch?v=SmVANS39kcU&t=20s

VIDEO Ali Machinchy flies the BELL X-1 https://www.youtube.com/watch?v=J9rjhGyFuUk&t=25s

BELL P-59 AIRACOMET AT AZ WB-C https://www.youtube.com/watch?v=rkFWvoWUUZg&t=114s

GIANT SCALE T-38 TALON AZ WB-C https://www.youtube.com/watch?v=35aUlHzkqlU

My 40% AMR Waco at AZ WB-C https://www.youtube.com/watch?v=mkmKmjeoEdE

ARIZONA WARBIRDS AND CLASSICS 2024 https://www.youtube.com/watch?v=g45B-9rEmMQ

Luke Days 2024 Airshow | USAF Thunderbirds | Static and Aerial Displays

https://www.youtube.com/watch?v=DO6oOnnGX2Q

The Editor was there

Photos by Bob Purdy

Photos by

Bob Purdy

Barry at the WB&C Event

Photos by Barry Hinrichs

Sun Valley Fliers

Barry at the WB&C Event

Photos by Barry Hinrichs

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Barry at the WB&C Event

Photos by

Barry Hinrichs

Marty at the WB&C Event

Photos by Martin Jones

WB & C Photos by Geoff

Photos by Geoffrey Gray

Posted in[STORIES]

AVIATION HISTORY: SCHNEIDER TROPHY RACE

Between 1913 and 1931, the Schneider Trophy race inspired some of aviation's greatest designers to devote their talents to building the world's fastest floatplane.

The son of a well-known French steel and arms manufacturer, Jacques Schneider was an aviation enthusiast who believed that floatplanes and flying boats were the most practical military and civilian design, since they could fly to any country with a coast, a river or a lake without requiring the construction of expensive airfields. On December 5, 1912, he declared a competition in which he appealed to manufacturers of marine aircraft to develop the world's fastest airplane. The trophy, which he called the 'Coupe d'Aviation Maritime Jacques Schneider, consisted of a silver sea wave 22 1/2 inches across, with the figures of Neptune and his three sons, over which was poised the winged, female personification of the spirit of flight, all set on a marble pedestal. In addition, the winner received 1,000 pounds sterling. The race — which soon came to be known simply as the Schneider Trophy — became one of the most prestigious annual competitions in history.

The distance flown had to be at least 150 miles over a triangular route, but prior to that Schneider expected all entries to cover a distance of 547 yards in contact with the sea. In later contests the aircraft were supposed to sit in the water for six hours to test the integrity of their floats or hulls — and to race weighed down with whatever liquid they had accumulated if they developed leaks during that time. The ultimate stake in the contest was permanent possession of the trophy, which would go to the country or pilot that could win three consecutive races within five years.

Despite his first attempt, Frenchman Maurice Prévost brought the first trophy to France in 1913 flying his Deperdussin to victory. (Historynet Archives)

Aviation was viewed at that time as one of the most exciting developments in the Western world, and seven countries — Belgium, France, Britain, Italy, Spain, Switzerland and the United States — applied for entry in the first Schneider Trophy race, which was held at Monaco on April 16, 1913. Although it was a gala affair, only four aircraft turned out for the actual race — all of them French, land-based airplanes with floats temporarily installed. The first to set out on the 6.4-mile course at 8 that morning was a Deperdussin, a midwing monoplane with a monocoque fuselage of three-ply tulipwood veneer, powered by a 160-hp, 14-cylinder Gnôme

rotary engine, and flown by Maurice Prévost. After flying 28 laps at an average speed of 61 mph, Prévost taxied the last 500 yards before crossing the finish line, only to learn that he had been disqualified for not flying over it. An hour after Prévost took off, American pilot Charles Weymann had begun his run in one of two Nieuports entered in the race. He closed rapidly on Prévost's overall time thanks to the Nieuport's superior maneuverability, which allowed it to make tighter turns at each lap than the Deperdussin. Prévost was offered second place if he flew one more lap, but he petulantly refused.

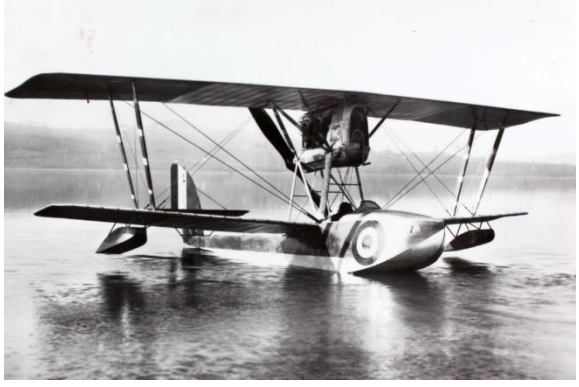
Meanwhile, the other contenders were having their own problems. Roland Garros' Morane-Saulnier bounced on the waves, throwing water over its fuselage until it finally slowed to a halt with a waterlogged engine. Louis Gaudart's Nieuport repeatedly went 10 feet into the air only to come down again, until the plane finally plunged nose-first into the water and sank. That left only Weymann — until his oil line burst and he was forced to land just four laps short of victory. At that point Prévost changed his mind and flew the remaining lap. The 58 minutes that had elapsed between his false finish and the official one were added to his time, lowering his average speed to 45.71 mph, but he had won by default, and the trophy was proudly displayed in the headquarters of the Aero Club of France…for the first and last time.

The 1914 competition was held at Monaco again, with considerably more exhilarating results. The winning plane this time was British, Thomas O.M. Sopwith's Tabloid floatplane, powered by a 100-hp Gnôme 9V rotary engine, flown by Sopwith test pilot C. Howard Pixton at an average speed of 86.83 mph. The trophy was moved to the Royal Aero Club.

The 1914 champion, Sopwith's Tabloid floatplane, was flown to victory by Sopwith test pilot Howard Pixton. (RAF Museum, Hendon)

Soon afterward, World War I broke out. For the first — but hardly the last — time, a Schneider-winning racer would evolve into something more bellicose. With its floats replaced by a wheeled undercarriage, the Tabloid's simple wood, wire and canvas structure and compact configuration served as the basis for a succession of fighters, including the famous Sopwith 1 1/2-Strutter, Pup, Triplane, Camel, Dolphin and Snipe.

The next Schneider Trophy race was not held until after World War I ended on November 11, 1918. The world was still war-weary, and only three British, three French and one Italian airplane competed at Bournemouth, England, on September 10, 1919. The race was by no means well organized. Speeds could not be measured efficiently because of dense fog that endangered the contestants and made the aircraft difficult for spectators to see. The only plane to actually complete the race was an Italian Savoia S.13bis flying boat, powered by a 250-hp, 6-cylinder Isotta-Fraschini engine and flown by Guido Gianello — and he was disqualified because he had rounded a reserve boat anchored in a cove southwest of the starting point, mistaking it for one of the three official marking boats. The outraged Italian delegation was only partially mollified when the Fédération Aéronautique Internationale, which controlled the race, invited the Royal Aero Club of Italy to manage the next year's race.



Giovanni de Briganti flew a modified Macchi M-7bis to win the 1921 Trophy. (Historynet Archives)

When Venice hosted the 1920 Schneider Trophy between September 19 and 21, the Italians found themselves unopposed, and Luigi Bologna completed the 230.68-mile course in a Savoia S.12bis powered by a 500-hp Ansaldo V-12 engine, flying at an average speed of 105.97 mph. Venice was also the setting for the

next race, on August 6 and 7, 1921 — and again it was dominated by the Italians. France entered only one plane, whose takeoff was canceled when its floats were damaged. The winner, Giovanni de Briganti, flew a Macchi M.7bis flying boat with a 280-hp Isotta-Fraschini V-6A engine through the 244.9-mile course at an average speed of 117.85 mph.

At that juncture, if Italy could win one more Schneider race, it would keep the silver trophy. The next event was held in Naples between August 10 and 12, 1922. France sent two flying boats. The Italians entered the Macchi M.17bis and a new biplane flying boat, the Savoia S.51. Britain fielded only one entry, the Supermarine Sea Lion II, also a biplane flying boat, powered by a 450-hp Napier Lion II engine. In the course of the race the S.51 crashed, killing its pilot. Adding to the Italians' setbacks was the narrow victory won by the Sea Lion, flown at an average speed of 145.72 mph by Henry C. Biard.

Britain had only a year in which to savor its victory, however, because when the next race was held at Cowes, on the Isle of Wight, on September 27 and 28, 1923, it saw another upset victory — this time by the U.S. Navy. The American entries were part of a public relations campaign being waged by both the U.S. Army and Navy at a time when funding for the military was being rapidly reduced. To counter that trend, both branches of service had financed the development of racing aircraft. Turning its attention to the prestigious Schneider Trophy, the Navy commissioned the Wright Aeronautical Corporation to produce a biplane for the race, the NW-2, but during preliminary testing its 650-hp Wright T-2 engine exploded and the plane crashed into the sea. Its pilot miraculously survived the catastrophe.

Hedging its bets, the Navy also converted its well-established Curtiss CR-2 landplane into a floatplane, raised the tailplane a few inches and enlarged the radiators to cover nearly the entire surface of the upper wing. The result, designated the CR-3, was powered by a 450-hp Curtiss CD-12 5PL engine, and Lieutenant David Rittenhouse flew the aircraft at an average speed of 177.279 mph to win the race. Second place was won by another CR-3, flown by Lieutenant Rutledge Irvine at 173.347 mph, while Biard, flying a Sea Lion III — essentially the same plane he had flown the previous year with a more powerful engine — came in third with a speed of nearly 160 mph. Although the English public warmly applauded the Americans' feat, the London Times commented critically on the unsporting manner in which the U.S. Navy had prepared for the event, remarking that British habits do not support the idea of entering a team organized by the State for a sporting event. Perhaps, but those habits were about to change.

The Schneider Trophy moved to the Western Hemisphere for the first time in 1925. It had been scheduled for Baltimore, Md., between September 19 and 21, 1924, but neither Britain nor Italy had any aircraft ready at that time, so the Americans sportingly postponed the race until October 23–26, 1925, to allow their European rivals to compete. Italy shipped two Macchi M.33 flying boats to Baltimore, while Britain pinned its hopes on the new Supermarine S.4 floatplane, a monoplane powered by a 700-hp Napier Lion engine. During a high-speed trial flight, however, the S.4 developed aileron flutter and pancaked into the Chesapeake Bay. Though its pilot, Henry Biard, bobbed to the surface, the British were left with only a Gloster III biplane. This time the U.S. Army Air Service fielded the principal American contender, a Curtiss R2C-2, powered by a 610-hp Curtiss V-1400 engine, and 1st Lt. James H. Doolittle piloted it to victory, averaging 232.573 mph over the 217-mile course. Second place went to Britain's Hubert Broad in the Gloster III, with an average of 199.16 mph.

Flying this Curtiss R2C-2, a young Army Lieutenant, James H. Doolittle, brought the trophy to the US. (U.S. Air Force)

At that point, the United States had not only surprised Europe with the performance of its Curtiss seaplanes, but it stood only one victory away from permanent possession of the trophy. The next race was scheduled for October 24, 1926. Yet at that same time, America was turning away from racing in favor of a more profitable venture, air transport, while the U.S. Congress was losing interest in allotting taxpayers' money to building military racing planes. In Europe, however, the holiday atmosphere traditionally surrounding the Schneider Trophy

race was acquiring an earnest undercurrent, as national governments became involved — especially that of Fascist Italy. While U.S. Army and Navy funding was being reduced and the British and French still depended primarily on the aircraft manufacturers and commercial or private sponsors for financial support, Italian aircraft firms had the enthusiastic backing of Benito Mussolini, who had decreed that the Schneider Trophy would be won by Italy in 1926, no matter what difficulties had to be overcome.

Accepting Il Duce's challenge was Mario Castoldi, chief designer for Aeronautica Macchi, who abandoned flying boats in favor of the twin-float configuration and adopted Tranquillo Zerbi's new 882-hp Fiat AS-2 V-12 engine. This was modeled after the D-12 wet sleeve monoblock engine that Charles B. Kirkham had designed and Curtiss had built, but with several added refinements, including the ingenious use of magnesium alloys. Castoldi shipped four of his racing red M.39s to Norfolk, Va., for the 1926 race, but the new planes proved tricky to fly, as the high torque and heavy floats gave them a tendency to lean dangerously during takeoff. Moreover, one of the new engines caught fire during a trial run, while another broke a connecting rod and then failed a second time after Italian mechanics had spent a sleepless night trying to repair it.

The 1926 race was delayed until November 11, but even by then Supermarine's chief engineer, Reginald Joseph Mitchell, had not yet completed Britain's entry, while the U.S. Navy had simply provided more power to the Curtiss R3C-2 airframe by installing a new 700-hp Packard 2A-1500 engine in the R3C-3 and a Curtiss V-1500 in the R3C-4. The Americans suffered a tragic setback when one of the Navy contestants, Lieutenant Frank Conant, died after crashing his Curtiss on the way to Norfolk. Then, on the day before the race, one of the R3C-3s crashed during landing, though its pilot, Lieutenant William G. Tomlinson, survived.

During the first six laps of the race, Navy Lieutenant George T. Cuddihy broke Doolittle's record with an average speed of 239.191 mph, but in the seventh he had to drop out with a broken fuel pump, just within sight of the finish line.

Lieutenant Charles F. Schildt of the U.S. Marine Corps flew his Curtiss to a maximum of 231 mph, but he ended up settling for second place when Regia Aeronautica Major Mario de Bernardi averaged 246.5 mph, in spite of having to climb his M.39 to 600 feet in order to cool his overheating engine. Soon after crossing the finish line, de Bernardi sent Mussolini a cable announcing, Your orders to win at all costs have been carried out, and then returned home to riotous celebrations. His victory left Jimmy Doolittle as the last American to win the Schneider Trophy, and the last man to do so in a biplane. The 1927 race was held in Venice between September 25 and 26. In addition to an upgraded version of the M.39, Italy entered four Macchi M.52s, the wings of which were of shorter span than the M.39's and had moderate sweepback. Power for the M.52s was provided by a high-compression 1,000-hp Fiat AS-3 V-24 engine. Again, the new engines proved to be dangerously unreliable — one Italian pilot was killed during test flights, leaving only three pilots available once the race began: Frederico Quazetti, Arturo Ferrarin and de Bernardi.

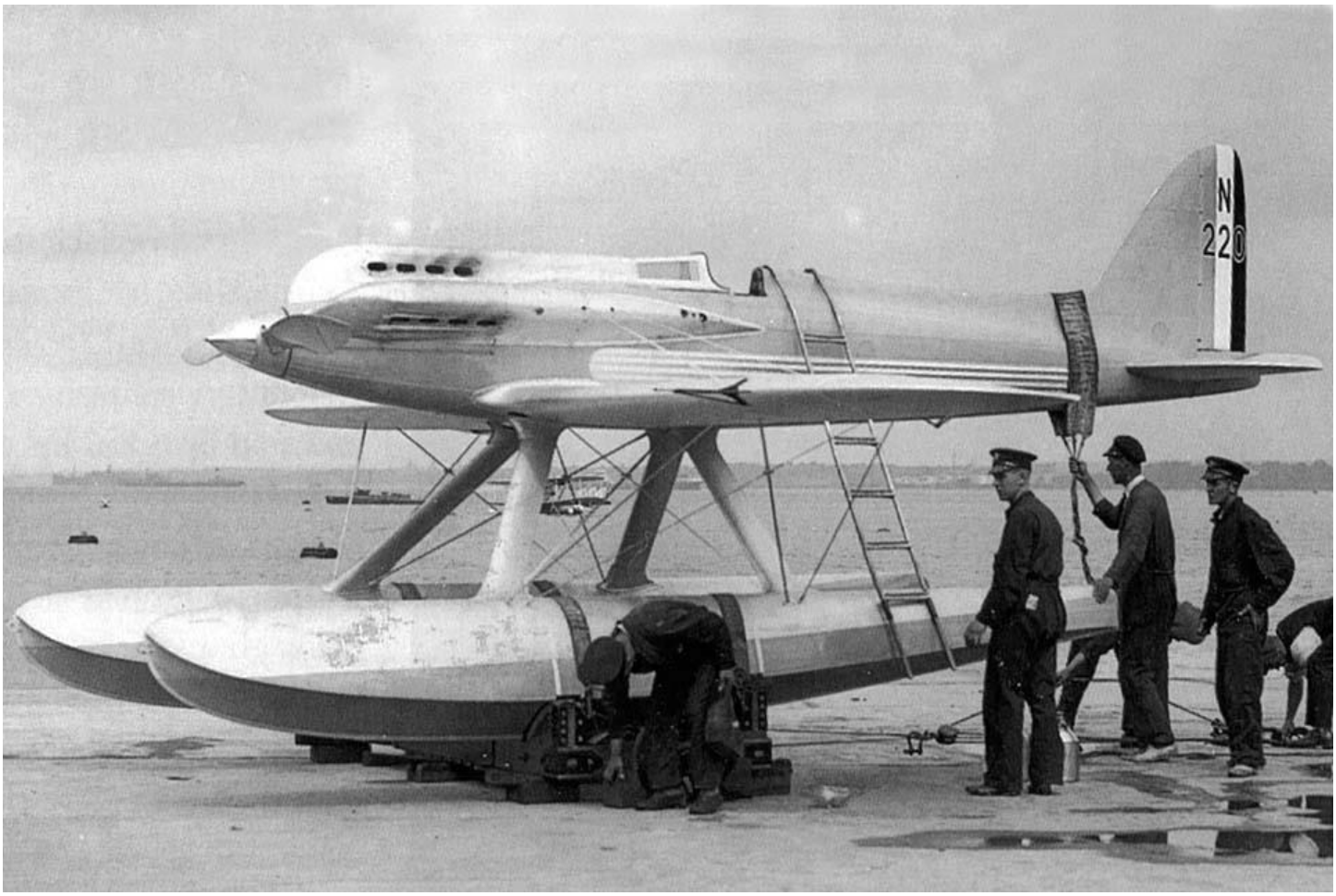
The home team brought four sleek Macchi M.52 racers to the 1927 competition in Venice, Italy, here showing off its 1,000 horsepower Fiat AS.3 DOHC V-12 engine. (San Diego Air and Space Museum Archive)

The American Kirkham Product Corporation had been secretly preparing a plane to take part in the race, to be powered by a 24-cylinder, 1,250-hp X-2775 engine that was expected to give it a maximum speed of 300 mph. But the engine was not ready as time for the competition drew nigh, and the United States withdrew, leaving the race essentially a contest between Italy and

Britain.

Britain's entries included the Short Crusader, a biplane powered by an 860-hp Bristol Jupiter 9-cylinder radial engine. Also present were two Supermarine S.5 monoplanes and three Gloster IV biplanes, all powered by 875-hp Napier Lion VIIB V-12 engines.

The 200,000 spectators who crowded Lido beach were in for a disappointment, as all of the Italian contenders dropped out of the race due to engine failure. The winner was Royal Air Force (RAF) Flight Lt. Sidney N. Webster in a Supermarine S.5, with an average speed of 281.65 mph, followed by Flight Lt. O.E. Worsley. Mario Castoldi had met his match in Supermarine's Reginald Mitchell, and from then on the Schneider Trophy races would be essentially a competition between those two designers.



R.J. Mitchell's Supermarine S5 took the trophy home from the race in Venice. (BAE Systems Archives)

The 1927 race also turned the Schneider Trophy into the most prestigious aerial competition in the world. Webster had outpaced most land aircraft, demonstrating that the long, streamlined floats of Schneider contenders created less drag than the wheeled landing gear of many conventional aircraft. The point was brought home further when de Bernardi test flew an M.52 at 297.83 mph — a little more than two miles per hour short of the 300 mph mark.

In 1928 Jacques Schneider died and the race was canceled for the year, to resume on September 7, 1929, in the waters off Portsmouth, England. France built three aircraft for the 1929 race, but they did not stand a chance and were not entered. Germany had begun to take an interest in the competition, but the one design it had in mind never got beyond the model stage.

The principal Italian entry, Castoldi's Macchi M.67, was similar in general layout to the M.39, but its structure had been beefed up to take a much larger engine, the 1,800-hp, 57.26-liter Isotta-Fraschini Asso 1000 V-18. The Italian public was highly vocal in its concern that the hot new engine had not undergone sufficient testing before being

committed to the 1929 race. But the government — especially Mussolini's ambitious Air Minister Italo Balbo — favored the M.67 as its best bet to win. Three M.67s were built for the race, and no fewer than 27 of the Asso engines were made available for the event, some of which exploded during testing. Another unusual aspect of the M.67's design was that one float carried more fuel than the other, so that its weight would counter the torque of the M.67's three-bladed propeller — an arrangement that proved dangerous when the plane was struggling to take off. During a trial run over Lake Garda in August 1929, Captain Guiseppe Motta reached a maximum speed of 362 mph but suddenly fell into a dive and crashed. Motta did not survive.

Fiat planned to enter one C.29 floatplane, powered by a 1,000-hp AS-5 engine, but that aircraft also crashed during testing. Savoia-Marchetti's S.65 mounted two 1,000-hp Isotta-Fraschini engines in tandem, with the tailplane supported by a pair of booms and extended rear floats. Finally, there was the Piaggio-Pegna Pc.7, a shoulder-wing monoplane whose most remarkable feature was that instead of floats it had a set of hydroplanes. The plane's 1,000-hp AS-5 engine was connected by a long metal shaft to a two-blade propeller with automatically adjustable pitch — and, by means of a second shaft, to a smaller propeller, similar to that of a motorboat, under the tail. Before takeoff, the Pc.7 floated up to its wings on its watertight fuselage. For takeoff, the pilot started the engine, then a clutch engaged the tail screw and the plane started to move. It was raised above the water's surface almost instantly by the high-incidence hydroplanes. At that point, the pilot opened the normal carburetor air intake and gave full power to the engine, at the same time engaging the flight propeller, which automatically went from feathered to flight pitch. Then the pilot, straining to see through the spray from the hydroplanes, would take off. Freed of the drag and weight of floats, the Pc.7 was supposed to reach a projected maximum speed of 434.7 mph. There were allegedly some takeoff attempts, but the drive train was plagued with problems, and many pilots were unwilling to fly the Pc.7.

Ultimately, both the Pc.7 and the twin-engine S.65 were excluded from the race. When the Royal Aero Club refused to postpone the contest to allow more time for Macchi to iron out the M.67's problems, General Balbo announced that the Italian team is going to England merely to perform a gesture of chivalrous sportsmanship. Privately, he no doubt hoped against hope that one of the two M.67s might function properly just long enough to recover the trophy for Italy. Almost as an afterthought, Italy also entered a slightly redesigned Macchi M.52, the M.52R.

Britain fielded two Gloster IVs, powered by 1,320-hp Napier Lion Mk.VIID engines, and two of Reginald Mitchell's newest design, the S.6, powered by a new 1,920-hp engine developed by Rolls-Royce. Sir Henry Royce, scorning Isotta-Fraschini's attempt to gain extra power by adding more cylinders, had sat on the beach near his home with three Rolls-Royce engineers and drawn his concept for a new V-12 engine in the sand with a stick. Essentially, it was a refined version of the Curtiss D-12, but instead of taking the risky step of raising cylinder compression, as the Italians had done, Royce proposed adding a supercharger — a mechanism that would force more air-fuel mixture into the cylinders than atmospheric pressure would normally admit. The first such engine, completed in May 1929, had produced 1,545 hp at 2,750 rpm before self-destructing in 15 minutes. After a dozen more disastrous failures, Rolls-Royce's 14th R engine managed to sustain 1,850 hp for 100 minutes. On August 5, Mitchell's first S.6, with Rolls-Royce's new engine, took to the water off Calshot Castle, near Portsmouth, to begin trials.

More than a million people crowded the beach, Calshot Castle, yachts and the decks of the battleship Iron Duke as the 1929 Schneider Trophy race opened on September 7. Italian aviation enthusiasts sat transfixed beside their radios, knowing that Lieutenants Remo Cadringher and Giovanni Monti were risking their lives, as well as Italy's honor, in the cockpits of their M.67s. Cadringher started the first 217.48-mile race with a thrilling burst of speed, but as he made the first turn, smoke and fumes suddenly poured into his cockpit, and the Macchi skidded wildly as its pilot, half-blind and choking, fought to regain control. Cadringher came out of a high-speed spin to find himself over land, but he courageously brought his plane back on course and completed one 33-mile lap at 284 mph before giving up and landing. At that point, his windscreen was so hazy from the smoke that he could not see the pylons marking the turns.

Monti averaged 301.5 mph on his first circuit, but as he began the second lap a pipe in his radiator burst, filling his cockpit with steam and boiling water. With his arms and legs scalded, Monti somehow managed to land and was taken to the hospital.

In contrast to the M.67s, both Supermarine S.6s behaved perfectly. Flight Lt. Henry R.D. Waghorn took the trophy with an average speed of 328.63 mph. Flying Officer R.L.R. Atcherley averaged 325.54 mph but was disqualified from second place when the judges ruled that he had cut inside a pylon in the first lap. Italy's M.52R took the second prize by default, but Warrant Officer T. Dal Molin's average speed was an embarrassing 44.458 mph less than the winner's. Britain now stood one race away from permanent possession of the Schneider Trophy.

We have finished playing our part as sportsmen, Balbo declared during a postrace banquet. Tomorrow our work as competitors will begin. Based on the experience of the 1929 race, the authorities agreed to allow two years for the contenders to develop new aircraft. Once again, the 1931 race would be a duel between Britain and Italy, Supermarine and Macchi, Mitchell and Castoldi. And again it would be held in England, near Portsmouth.

With the backing of the Mussolini government, Balbo established a flying school, designated the Reparto Alta Velocita (High Speed Section), on Lake Garda in 1930. Its sole purpose was to put seven specially selected pilots through 18 months of training for the 1931 race. Castoldi designed his next entry around Zerbi's new Fiat AS-6 V-12 engine — or rather, two of them coupled in tandem, generating a total of 2,800 hp — which could be raised to 3,100 hp for short spurts. The engines were connected by double reduction gears and concentric shafts to two contrarotating duralumin propellers. The arrangement eliminated the torque that had made takeoffs so hazardous in the past. Each of the engines was 11 feet long, weighed 2,083.7 pounds and had two Marelli magnetos per valve.

Cooling the engines required radiators on every available surface on the plane — wings, fuselage, the front of the floats and even the struts that supported the floats. The oil tank was in the lower front cowling, and two pumps circulated the oil in two stages. Four oil coolers with filters were placed on the rear of the floats. Fuel was housed within the floats and was independently drawn to each engine, which generated power for both of the fuel pumps. The cooling system was complex and expensive, but it worked.

The Macchi racer's structure was of steel tubing covered with sheet duralumin forward of the wings, and wood with plywood covering aft, including the tail surfaces. Plywood was used for the lower part of the floats and duralumin for the upper part.

Castoldi's new contender was designated the Macchi-Castoldi M.C.72 in his honor, and five were to be produced. Three were completed in 1931, but the development program suffered a tragic setback when the first one, after reaching a speed of 375 mph, crashed, killing Giovanni Monti. The Italians petitioned for the race to be postponed, but Britain refused, effectively eliminating Italy and France — whose entry was not ready, either — from participating in the 1931 race.

Meanwhile, Reginald Mitchell had refined his S.6 further to use a new version of the Rolls-Royce R, which could generate 2,350 hp without a significant gain in weight over the 1929 model. But at first it looked as if Supermarine would not have his S.6B ready either, for the firm was low on funds, and the Air Ministry refused to spend any more money on a racing event. At that point, however, Lady Lucy Houston intervened, contributing 100,000 pounds sterling to ensure that Britain did not win the race merely by default — and to give herself a forum to castigate Britain's Labor government. Even Mussolini himself could scarcely have surpassed Lady Houston's rhetoric. Every true Briton would rather sell his last shirt than admit that England could not afford to defend herself, she declared.

Originally scheduled for the second Saturday in September, the 1931 Schneider Trophy race was held up for one day due to bad weather, but the following day, September 13, turned out sunny and clear. The two contestants, both Supermarine S.6Bs, prepared to take off from Lee-on-Solent to begin the 217.48-mile course before an audience of nearly a million, crowding the coast of Portsmouth and the Isle of Wight. As his blue and silver S.6B, S1595, was pushed off its barge near Calshot Castle, Flight Lt. John N. Boothman speculated on whether he would complete the triangular 33-mile laps seven times as planned. Even with five long fluted radiators down each side of

its fuselage, he feared that his plane would be unlikely to last more than 90 minutes before the engine, which had hitherto never run longer than 27 minutes, started to melt on its mountings.

Taking off at 1:02 p.m., Boothman ran the first lap in 5 1/2 minutes, averaging 343.1 mph and reaching nearly 380 mph in the straightaways. From then on, however, his average speed gradually went down, until his seventh lap average was 337.7 mph. By that time, uneven fuel consumption had altered the trim, causing his plane to list to the left, but that was not enough to stop him from streaking over the finish line and then making a triumphant circling turn over Calshot Castle to the sound of a cheering crowd and ships' bells and whistles.

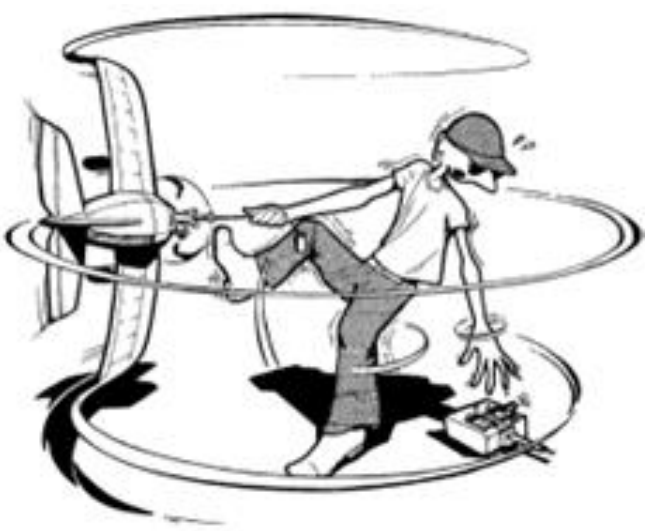
Further refinements led to an improved Supermarine S6b that kept the Schneider Trophy in England for good. (National Archives)

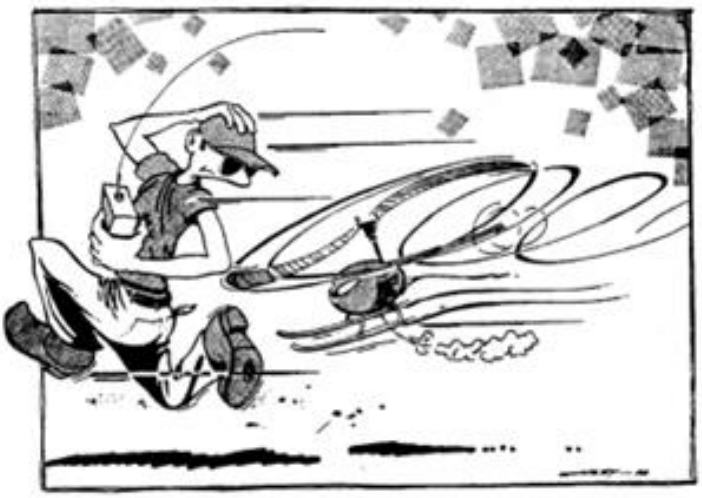
The Schneider Trophy race had ended with a bang rather than a whimper after all — in only 47 minutes, Boothman had averaged 340.08 mph, establishing the Supermarine as the fastest airplane in the world. Later that month, Royce installed an engine capable of producing 2,600 hp for short sprints in S1595, and on September 29 Flight Lt. George H. Stainforth flew it on five straight 1.9-mile runs over Southampton Water, averaging 407.5 mph and at one point hitting 415.2 mph. The S.6B was the first airplane to pass the 400 mph mark.

Although Italy's ambitions were dashed in regard to the Schneider Trophy, Castoldi continued to work on his M.C.72, in which Warrant Officer Francesco Agello finally completed a successful test flight over Lake Garda on April 10, 1933. A series of increasingly fast flights reached their climax on October 23, 1934, when Agello flew four laps in the M.C.72, at a maximum of 442.081 mph and an average of 434.7 mph, setting an absolute speed record that would not be broken until April 29, 1939, when a specially redesigned Messerschmitt Bf-109V-1 reached 469.22 mph, and an official seaplane record speed that would stand until October 1961, when a jet-powered Soviet Beriev Be-10 flying boat flew at 547 mph. Trophy or no trophy, the Italians had the last word on the subject of speed.

Over the 18 years of its existence, the Schneider Trophy race did much to influence progress in aviation, most dramatically in the increase in speed — from 45.71 mph in 1913 to 340.08 mph in 1931. A.F. Sidgreaves, managing director of Rolls-Royce, declared that it had compressed 10 years of engine development into two years. And yet the heated competition did not really fulfill the original hopes of Jacques Schneider, who had envisioned it as a means of accelerating the development of reliable flying boats for rapid air transport around the world. Instead, by becoming a quest for speed alone, the race had cost the lives of three British, two American and seven Italian pilots, and it ultimately led to the creation of more warlike aircraft than its founder had had in mind. Mario Castoldi applied the lessons he learned from the race to fighters, including the radial-engine M.C.200 Saetta, the sleek M.C.202 Folgore and the superlative M.C.205 Veltro. Rolls-Royce continued work on the engine it had built for the race, which evolved into the Merlin. Among the many great warplanes that would be powered by the Merlin was one that Reginald Mitchell, like Castoldi, evolved from his S.6B seaplane racer — a racy looking fighter that, against his personal preference, was christened the Spitfire.

This article was written by Radko Vasicek and originally published in the September 2002 issue of *Aviation History*.





Gas Engine

by Gerry Yarrish & Melissa Jones

When you make the transition from normal-size sport .40 models to giant-scale airplanes, the biggest difference you have to deal with is the gasoline engine. For many, these big-bore hunks of metal are a mystery because they look and operate so differently from the more familiar glow-powered (nitro) engines. In practice, however, starting, running and adjusting a gasoline engine is only slightly different and no more difficult than operating any other internal combustion engine. If you can operate a chain saw or a weed trimmer, then you'll be right at home powering your next giant-scale project with a gas burner.

Gas engines are much easier to adjust and have excellent fuel efficiency; a gas engine consumes roughly ⅓ as much fuel per minute as a glow engine of the same displacement burns. Gasoline engines tolerate heat much better than glow powerplants, and they require fewer fuel-mixture adjustments to keep them happy. You might need to adjust your gasoline carburetor only once during a flying season! Though the typical gas burner produces less rpm than its glow-powered cousin, it produces more low-end torque. Thrust is produced more efficiently with that bigger, slower turning prop. Because they are heavier than nitro engines, gas engines are often used in scale airplanes that have a shorter nose moment, and their weight helps eliminate some of the lead ballast needed to balance the airplane. In giant-scale, unlimited Tournament of Champions and International Miniature Aircraft Club (IMAC) events, big-bore gas engines are the norm, and you can't argue with success!

If you're leery about using a gas engine, this guide will clear everything up.

3W Modell Motoren

The German-made 3W engines have been used in several giant-scale competitions, including the Tournament of Champions and many giant-scale unlimited air races. 3W engines come with an electronic auto-advance ignition system and are designed to operate at lower rpm for more thrust and less prop noise.

3W 60I (shown)—$519.

Distributed by Aircraft Intl., 8 Country Meadow Dr., Colts Neck, NJ 07722; (732) 761-0997; www.aircraft-intl.com; and **Cactus Aviation**, 10380 E. Heritage, Tucson, AZ 85730; (520) 721-0087; www.cactusaviation.com.

BME

Designed specifically for light overall weight while retaining excellent crankcase stiffness and crankshaft support, BME engines are known for their smooth operation and user-friendliness. Most BME engines come with the CH syncro spark-ignition system and fiber-reed induction (except the BME 44 single, which is piston ported), plus a 2-year warranty.

BME 102 (shown left)—$1,149; BME 44 (shown right)—$499.

BME Engines, 10101B Cordoba Ct., Waco, TX 76708; (254) 836-0835; www.bmeengine.com.

Brison Aircraft

Designed with giant-scale modelers in mind, Brison engines' enhanced power and reliability make them ideally suited to Sunday fliers, scale modelers and IMAC competitors. Available in six sizes, ranging from a 2.4ci (39.33cc) single to a big 6.4ci (104.64cc) twin cylinder, all Brison engines come standard with nicasil-lined cylinders, metal bellcranks and anodized cases, and all the crankshafts are unconditionally guaranteed for one year. Every engine is test-run and tuned before being shipped.

Brison 3.2 (shown)—$549.

Brison Aircraft, 12075 Denton Dr., Ste. 11, Dallas, TX 75234; (972) 241-9152; www.brisonaircraft.com.

Guide

HIGH-OCTANE PERFORMANCE FOR GIANT SCALE

Desert Aircraft

Using some of the latest tools and techniques, including 3D CAD and stereo lithography, the DA-150 has been designed from the ground up with Tournament of Champions and World Masters-style competition aerobatics in mind. The DA-150 is ideally suited to aircraft for which existing 120cc and 140cc engines aren't quite enough. It can also power aircraft that are designed for heavier, 4-cylinder, 160cc engines.

DA 150 (shown)—$1,495.

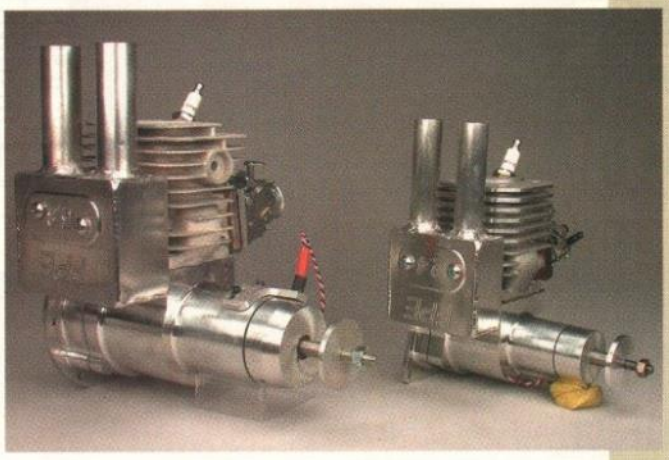
Desert Aircraft, 140 S. Camino Seco, Ste. # 418, Tucson, AZ 85710; (520) 722-0607; www.desertaircraft.com.

First Place Engines

Distributed by Sig Mfg., the First Place Engine (FPE) line consists of four, light, powerful gas engines designed specifically for large RC aircraft use. They offer a good power-to-weight ratio and come with a light, tig-welded, custom aluminum muffler that may be modified to accept a smoke system. All four engines come with an electronic ignition, complete instructions and a one-year warranty; a 50:1 oil/gas ratio is recommended.

FPE (5.8ci, shown left)—$699.95; FPE (2.4ci, shown right)—$499.

Sig Mfg. Co. Inc., P.O. Box 520, Montezuma, IA 50171-0520; (800) 247-5008; www.sigmfg.com.



FIRING UP A GAS ENGINE

Always ask a helper to assist you when you start a gas engine; make sure he knows how to operate the choke and how to shut off the engine.

Before you start a gasoline engine for the first time, it is best to review and become familiar with its operation manual. Even for bench-running, always have a helper. If the engine is already installed in a model, fully assemble the model and have your helper hold it securely. Tell him how to turn the ignition on and off and how to operate the choke, if the engine has one.

If your engine has an electronic ignition system, make sure that it is attached properly and that the ignition battery is fully charged. If you have a magneto-equipped engine, always install a kill switch to stop the engine. For the very first engine run, close both the high- and low-end needles fully, and then open the high-end needle 1½ turns and open the low-end (idle) needle 1¼ turns. These settings are a good starting point for a reliable idle and a rich high end. Check the manual for the recommended oil-to-gas mix ratio, and fill the tank with fresh, filtered fuel.

STARTING THE ENGINE

Be sure that the ignition, or the kill switch, is turned off. Set the throttle full open, and close the choke. If the carb does not have a choke, use your thumb to cover the venturi to choke it. Turn the prop counterclockwise several times until fuel starts to flow through the fuel line to the carb. Flip the prop a few more times until fuel is in the carb.

If your engine does not have a choke, turn the ignition on, set the throttle to ¼, and flip the prop until the engine begins to run. If you have a choke-equipped carb, leave the choke closed, turn the ignition on, open the throttle fully, and flip the prop until you hear the engine cough as it tries to start. Then open the choke, set the throttle to ¼, and flip the prop several times until the engine starts. If it does not fire, begin again from the start; let the engine warm up for a few minutes before you advance the throttle.

OIL-TO-GASOLINE RATIOS

The 2-stroke, air-cooled, giant-scale engines we use to power our models do not have separate oil tanks (unlike full-size aircraft engines), so we must add the oil to the gasoline. Your engine manufacturer provides a mixture ratio recommendation in the engine's operation manual. Here are some common ratios.

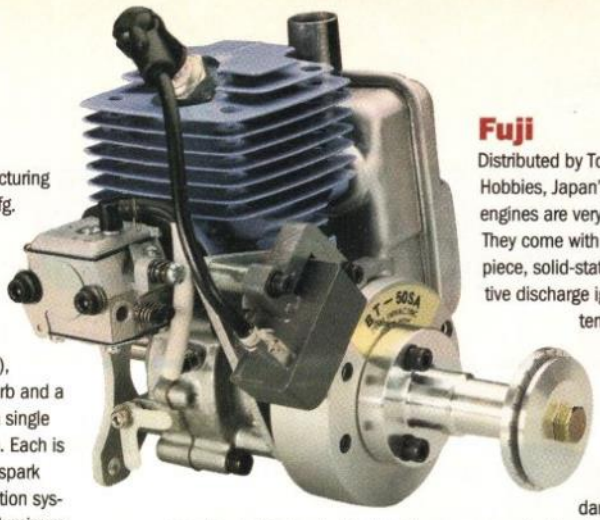
Ratio	Ounce of oil per gallon of gasoline
100:1	1.28
90:1	1.42
75:1	1.7
64:1	2
50:1	2.5
40:1	3.2
32:1	4
24:1	5.3
16:1	8

Use premium-quality 2-stroke engine oil (available at most automotive-and motorcycle-parts shops) when you mix your fuel.

Fox Mfg.

With its long history of manufacturing model airplane engines, Fox Mfg. offers custom-built RC aircraft engines. Each has a nicasil-lined cylinder/piston assembly (made by Makita/Dolmar USA), a Walbro pumper carb and a cantilevered crankshaft with a single bolt (⅜-24NF-thread) prop hub. Each is equipped with mechanical auto-spark advance with a CH electronic ignition system. The crankcase is machined aluminum with a polished finish; the cylinder is bead blasted.

Fox 3.2 (shown)—$575.
Fox Mfg., 5305 Towson Ave., Fort Smith, AR 72901; (479) 646-1656; www.foxmanufacturing.com.

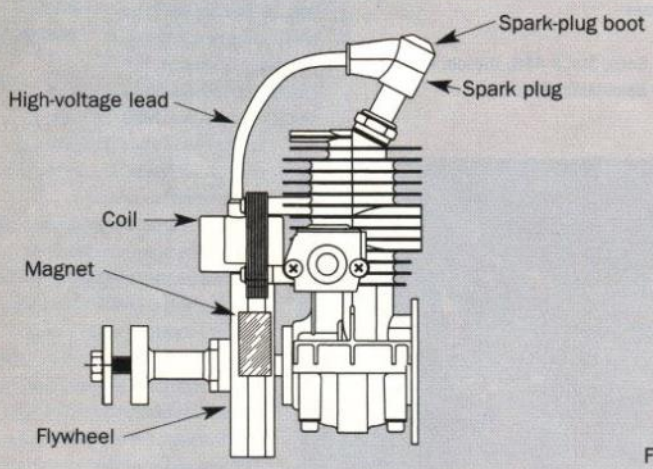


Fuji

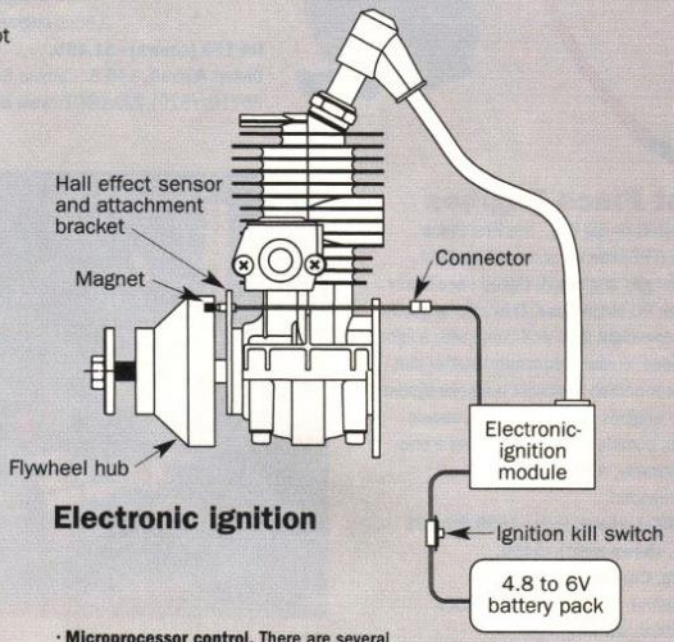
Distributed by Tower Hobbies, Japan's Fuji engines are very popular. They come with a one-piece, solid-state capacitive discharge ignition system (no breaker points). The Walbro carburetor is standard, and the propeller hub is knurled to hold the prop securely. Three hub lengths are available. The muffler is designed specifically for RC use.

Fuji BT-50SA (2.1ci, shown)—$399.99.
Distributed by Great Planes Model Distributors Co., P.O. Box 9021, Champaign, IL 61826-9021; (800) 637-7660; fax (217) 398-0008; www.fujiengines.com.

Engine-ignition system



Magneto ignition



Electronic ignition

IGNITION TIMING

Many manufacturers offer their engines with either a magneto or an electronic ignition system. Depending on your requirements, either type will provide reliable performance. In addition to supplying the spark plug with current, ignition systems also regulate engine timing. Magneto ignitions have fixed timing, while with electronic ignitions, you can advance or retard the timing. Electronic ignitions can be microprocessor controlled (with auto-spark advance) or equipped with a mechanical timing-advance ring that is coupled to the throttle.

· **Fixed timing.** With a fixed ignition timing, the engine must operate in a timing range that maintains a good power setting while still being fairly easy to start. Since a good starting timing is between 0 and 5 degrees before top dead center (BTDC), and maximum power is achieved at somewhere around 25 to 30 degrees BTDC, engines with fixed timing cannot offer optimum performance. Engines that are timed for optimum high-end output offer good overall performance but do not idle as low as those with adjustable timing.

This Brison 3.2ci engine has a mechanical timing-advance ring coupled to its throttle arm. The ring advances and retards the engine timing as the throttle settings are changed.

· **Microprocessor control.** There are several microprocessor-controlled timing units on the market. They have a fixed timing sensor placed at a specific timing setting and use a microprocessor to change the timing to suit the engine's rpm. They work very well, but they are usually limited to about 25 degrees of timing (advance or retard).

· **Mechanical advance.** Engines with a mechanical timing-advance ring tend to be very easy to start and can be adjusted to optimize an engine's full power range. Usually made of a non-metallic material, the ring holds the timing sensor; this ring is coupled to the throttle arm, and it moves the sensor to change the timing from 0 degrees BTDC for starting up to about 30 degrees BTDC for optimum top-end performance.

MAGNETO MAGIC

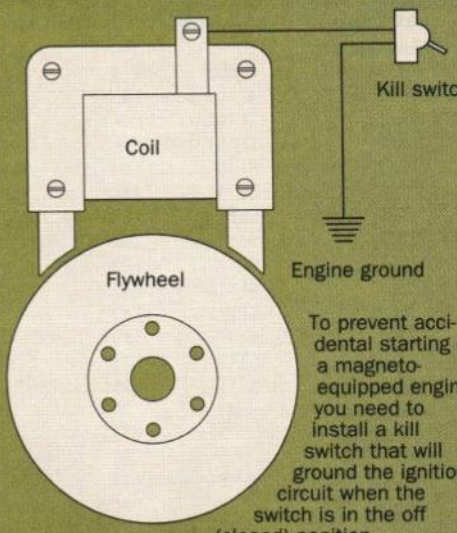
A magneto ignition is nothing more than an old-fashioned generator used to create a pulse of electrical current to fire the spark plug. The magneto ignition system consists of a permanent magnet mounted on a flywheel attached to the crankshaft and a field coil that induces the current when the magnet passes the ends of the coil shoes. The magneto is embedded in the flywheel's rim, and the coil sits right next to the flywheel. A battery isn't required for ignition.

With a magneto-equipped engine, use a kill switch to stop it safely. The switch simply grounds the magneto coil to the engine case and prevents current from firing the spark plug.

Many magnetos have an external secondary coil (or condenser); the current builds up in the primary coil and is then dumped into the condenser to produce a stronger spark while starting the engine. Magneto ignitions are completely self-contained, and if set up properly, they will supply current to the spark plug for as long as the engine is running. To stop the engine, the coil must be grounded to the engine case. A kill switch grounds the magneto coil to the engine case and prevents current from firing the spark plug.

To operate properly, the spark-plug gap and the coil gap (space between the flywheel magnets and the primary magneto coil) must be set up according to the engine's operating manual. For most engines, a spark-plug gap of between 0.018 and 0.025 inch and a coil gap of between 0.020 and 0.025 inch is recommended.

Kill switch installation



To prevent accidental starting of a magneto-equipped engine, you need to install a kill switch that will ground the ignition circuit when the switch is in the off (closed) position.

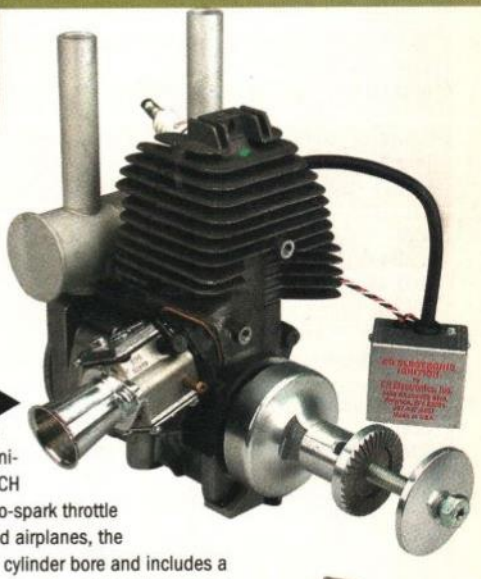
Quadra-Aerrow ▶

Manufactured since 1975, Quadra-Aerrow engines are among the most reliable and durable in the RC industry. Available in nine sizes and 17 variants, they produce from 3.9 to 45hp and can be equipped with battery-powered or magneto ignition systems. Ideal for aerobatics competition, all except one feature a reed-valve induction system for quick throttle response and high-torque midrange performance. Features include chrome or nicasil-plated cylinders with high-silicon/aluminum pistons, single and dual piston rings (pegged and chamfered), ball-bearing and needle-bearing support throughout, and on some models, semi-automatic compression release.

Q75B (shown)—$734.

Quadra-Aerrow Inc., P.O. Box 183, Perth, Ontario, Canada K7H 3E3; (613) 264-0010; www.quadraaerrow.com.

Cheetah ▶



Reid's Quality Model Products offers the Cheetah engine with magneto ignition, and the 42DX version with the CH electronic-ignition system with syncro-spark throttle linkage. Suitable for 15- to 25-pound airplanes, the Cheetah 42DX has a chrome-plated cylinder bore and includes a backplate engine mount and spacer, an adjustable velocity stack, a muffler and a 2-year limited warranty.

Cheetah 42DX (shown)—$399.95.

Distributed by Reid's Quality Model Products, 30 Clifton St., Phelps, NY 14532; (315) 548-3779; www.reidsmodels.com.

RCS ▶

RCS engines are available in displacements that range from 1.4 to 18ci. Designed to replace large glow engines, they deliver as much or more power as glow engines of the same displacement. The engines are equipped with electronic auto-advance computerized ignition. Available as side- and rear-exhaust versions, RCS engines are very easy to hand-start and have linear throttle response.

RCS 140 (shown)—$345.

RC Showcase, 3442 Gough Dr., Waldorf, MD 20602; (301) 374-2197; www.rcshowcase.com.

ZDZ ▶

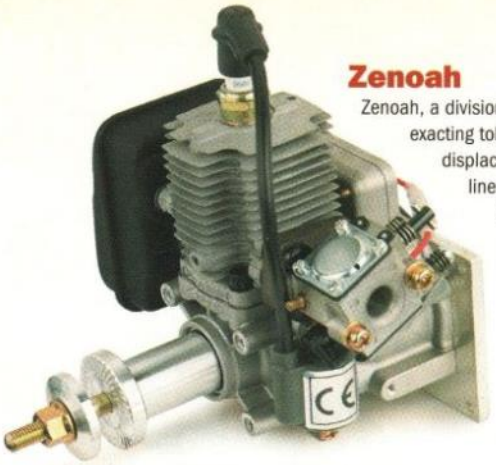
Manufactured in the Czech Republic and distributed in the U.S. by RC Showcase, ZDZ giant-scale gas engines have rotary disc valves and rear-induction carburetors (complete with control links for the choke) and throttle arms. All have a solid-state microprocessor-controlled electronic ignition with auto-advance and are completely shielded to minimize interference. Even the spark-plug lead is fully metal-shielded. ZDZ engines come with a 30-month warranty.

ZDZ 40 RV-L (2.4ci, shown)—$410.

Distributed by RC Showcase, 3442 Gough Dr., Waldorf, MD 20602; (301) 374-2197; www.rcshowcase.com.

ENGINE INFORMATION

Engine	Price	Bore (in.)	Stroke	Cylinders	Displacement (ci)	Weight (lb.)	Horsepower	Overall dimension (in.)
3W Modell Motoren								
3W-100iB2	$1,099	1.73	1.26	2	5.9	7	9.3	11.1x4.6x7.6
3W-105STR3	$2,475	1.58	1.1	2	4.3	10.1	11	14.4x4.4x9.4
3W-120iB2	$1,150	1.8	1.42	2	7.2	8.47	11.5	12.4x3.9x6.9
3W-120iB2F	$1,150	1.8	1.42	2	7.2	8.47	11.5	12.4x4.9x7.7
3W-140iB2	$1,199	1.88	1.49	2	8.3	8.58	13.5	13x3.9x6.9
3W-140iB2F	$1,199	1.88	1.49	2	8.3	8.58	13.5	13x4.9x7.7
3W-150iB2	$1,325	1.93	1.57	2	9.2	8.47	16.5	13x3.9x6.9
3W-150iB2F-TS	$1,625	1.93	1.57	2	9.2	8.47	17.5	13x4.9x7.7
3W-150iB2-TS	$1,625	1.93	1.57	2	9.2	8.47	17.5	13x4.9x7.7
3W-150iR2	$1,795	1.93	1.57	2	9.2	10.14	16.5	6.5x8x10.25
3W-150iR2-TS	$1,895	1.93	1.57	2	9.2	10.56	17.5	6.5x8x10.25
3W-156B4	$2,075	1.65	1.1	4	9.4	11.88	14.8	11x6.3x8.7
3W-170B4	$2,175	1.73	1.1	4	10.3	11.7	16.5	11x6.3x8.7
3W-240iB2	$2,150	2.26	1.8	2	14.4	14.74	22	14.17x5.5x8.7
3W-24i	$449	1.34	1.03	1	1.5	2.32-2.65	2.5	6.5x2.75x3.9
3W-38i (42.5cc)	$479	1.34	1.03	1	1.5	3.97	4	7.2x3.5x4.6
3W-48B2	$795	1.34	1.03	2	2.9	4.11-4.45	5	10.3x3.5x5.5
3W-50i	$499	1.73	1.26	1	3.0	4.36	6	3.5x5.8x5.8
3W-60i	$519	1.81	1.45	1	3.7	5.32	6	3.9x6.2x6
3W-70i	$575	1.88	1.49	1	4.1	5.32	6.5	3.9x6.4x6
3W-70iUS	$575	1.88	1.49	1	4.1	4.73	6.5	3.9x6.4x5.5
3W-75i	$619	1.93	1.57	1	4.6	5.32	7.5	3.9x6.4x6
3W-75iTS	$775	1.93	1.57	1	4.6	5.42	7.9	3.9x6.4x6
3W-75iUS	$619	1.93	1.57	1	4.6	4.73	7.5	3.9x6.4x5.5
3W-75iUS-TS	$775	1.93	1.57	1	4.6	4.83	7.9	3.9x6.4x5.5
3W-85iB2	$999	1.73	1.1	2	5.2	6.49	7.8	11x3.5x5.7
A.J. Machine								
Wolf Predator 1.8	$528.95	±	±	1	1.8	3.28	3.6	5.5x4.5x4.3
Wolf Predator 3.2	$649.95	±	±	1	3.2	3.75	5.2	6x6x4.5
BME								
BME-102	$1,149	1.77	1.26	2	6.2	4.7	9.1	10x6x8
BME-44	$499	1.69	1.18	1	2.7	2.7	4.2	6.75x4.3x6.25
BME-61	$995	1.42	1.18	2	3.7	4.2	6.4	8.62x6x8
BME-80	$1,079	1.57	1.25	2	4.9	4.7	7.5	10x6x8
BME-50	±	1.77	1.22	1	3	3	4.8	±
Brison Aircraft								
2.4ci	$449	1.57	1.22	1	2.4	2.75	4.5	5.375x5x4.625
3.2ci	$549	1.73	1.34	1	3.2	3.25	5	6x 5.375x5.25
4.2ci	$649	1.92	1.41	1	4.2	4.75	7.5	6.75x6x6.4.9
4.8ci	$999	1.57	1.22	2	4.8	5.63	8.5	5.5x5.875x8.75
5.8ci	$699	2.16	1.57	1	5.8	6	9	6.5x5.75x6
6.4ci	$1,199	1.73	1.34	2	6.4	6	9.4	5.5x6x9.75
D&B Engines								
3.7ci	$995	1.42	1.18	2	3.7	5	N/A	10.2x5.9x8.8
5.1ci	$1,195	1.65	1.18	2	5.1	6.4	N/A	10.9x5.5x8.9
Desert Aircraft								
DA-100	$1,150	1.68	1.38	2	6.1	5.8	9.8	11.5x3.5x6.3
DA-150	$1,495	1.93	1.57	2	9.2	8	16	13.4x4.5x7.7
First Place Engines								
FPE 2.4ci	$499	1.65	1.22	1	2.4	3.2	4	5x6.1x7.6
FPE 3.2ci	$579.95	1.73	1.34	1	3.2	3.6	5	6x7.25x7.58
FPE 4.2ci	$639.95	1.92	1.42	1	4.2	5.5	6.5	6.5x8.3x9.3
FPE 5.8ci	$699.95	2.17	1.57	1	5.8	5.9	9.5	7x8.1x9.5
Fuji								
Bt-32A	$299.99	1.14	1.49	1	1.5	3.74	2.2	7.5x5x4.4
Bt-86	$849.99	1.18	1.68	2	3.7	6.38	7.5	7.75x8.6x3
Bt-50SA	$399.99	1.26	1.69	1	2.1	5.28	5.2	8.5x5.5x4.8
Quadra-Aerrow								
A 150B	$1,795	1.97	1.5	2	9	9.5	13.5-17	7.8x10x8.8
A 200B	$2,095	2.25	1.5	2	11.9	11.3	17-21	7.8x10.3x8.8
A 200RSS	±	2.25	1.5	2	11.9	10.4	23.5-27+	7.8x10.3x8.8
Q 1000B	$1,199	1.65	1.5	2	6.4	6.5	9.4 min.	6.1x10.3x6.8
Q 100B	$839	2.25	1.5	2	6	6.9	9.5-11.9	9x6.8x6
Q 100M	$734	2.25	1.5	2	6	8.3	9.5-11.9	9x6.8x6
Q 100RSS	±	2.25	1.5	2	6	6.6	11.5-16+	9x6.8x6



Zenoah

Zenoah, a division of Komatsu Zenoah, manufactures 2-stroke engines to exacting tolerances at its factory in Japan. Available in 1.3 to 4.87ci displacements, Zenoah engines come with chrome-plated piston liners and are equipped with compact, maintenance-free CDI-type flywheel/magneto ignition systems. Each engine comes with a muffler, an engine mount, a spark plug and plug wrench and a Walbro pumper carb. The G-23 is available in airplane gasoline and glow-plug (nitro), helicopter and marine versions. The twin-cylinder GT-80 has a cast intake manifold and a spring starter.

G-23 (shown left)—$289; GT-80 (shown right)—$999.95.
Distributed by Horizon Hobby Inc., 4105 Fieldstone Rd., Champaign, IL 61822; (800) 338-4639; www.horizonhobby.com.

Engine	Price	Bore (in.)	Stroke	Cylinders	Displacement (ci)	Weight (lb.)	Horsepower	Overall dimension (in.)
Quadra-Aerrow (cont'd)								
Q 400B	$438	1.58	1.18	1	2.3	3.19	3.9	6x5x6.38
Q 400M	$358	1.58	1.18	1	2.3	4.16	3.9	6x5x6.38
Q 52B	$525	1.65	1.5	1	3.2	4.1	4.5	7.6x5x6
Q 52M	$424	1.65	1.5	1	3.2	5.1	4.5	7.6x5x6
Q 65M	$583	1.88	1.44	1	4	6.5	6.8	8.6x6.2x6.95
Q 75B	$734	1.97	1.44	1	4.4	5.2	8-10	8.6x6.2x6.95
Q 75M	$629	1.97	1.44	1	4.4	6.5	8-10	8.6x6.2x6.95
Q 75RSS	‡	1.97	1.44	1	4.4	5.1	10-12	8.6x6.2x6.95
RC Showcase								
RCS 140	$345	‡	‡	1	1.4	1.75	2.9	4.5x2.35x3.6
RCS 180	$369	‡	‡	1	1.8	3	4	7.3x4x4.92
RCS 215	$2,650	‡	‡	5	13.1	12	13.5	11.5x7.9
RCS 44 B2	$635	‡	‡	2	2.8	4.2	4.8	10.5x4.5x7.25
RCS 75	$505	‡	‡	1	4.6	5	7.5	7.88x4.3x5
RQ Model Products								
Cheetah 42	$279.95	‡	‡	1	2.5	4.5	3	5x6x6.5
Cheetah 42DX	$399.95	‡	‡	1	2.5	3.9	3	5x6x6.5
Taurus Engines								
TS 42	$529.95	‡	‡	1	2.6	3.13	3.9	5.9x5.6x5.44‡‡
TS 52	$559.95	‡	‡	1	3.2	3.31	5	5.8x2.58x4.61‡‡
TS 62	$589.95	‡	‡	1	3.7	4.5	5.8	7.29x3x5.13‡‡
TS 69	$640.95	‡	‡	1	4.2	4.75	6.4	7.29x3x5.13‡‡
TS 72	$699.95	‡	‡	1	4.4	4.94	8.1	6.68x3x4.8‡‡
TS 95	$758.95	‡	‡	1	5.8	5	7.2	7.29x3.22x5.55
TT 85	$1,115	‡	‡	2	5.2	4.5	‡	‡
TT 107	$1,225	‡	‡	2	6.6	‡	‡	‡
TT 122	$1,325	‡	‡	2	7.5	‡	‡	‡
TT 144	$1,450	‡	‡	2	8.8	‡	‡	‡
TT 185	$1,655	‡	‡	2	11.4	‡	‡	‡
TT 240	$2,190	‡	‡	2	14.6	‡	‡	‡
US Engines								
US 35cc	$229	1.57	1.28	1	2.5	4.5	2.4	6.5x6x6
US 41cc	$249	1.44	1.28	1	2.1	4.5	3	6.5x6x6
ZDZ								
120 B2 RV	$985	1.77	1.50	2	7.3	6.4	10.5	12.6x3.3x7.8
160 B2 RV	$1,100	2.05	1.50	2	9.8	6.6	16	12.75x3.3x7.7
210 B2 RV	$1,475	2.05	1.97	2	12.8	9.6	21	14.3x3.9 x10.8
40 RV-L	$410	1.50	1.38	1	2.4	2.9	4.8	6.2x3.35x5.2
60 RV	$490	1.77	1.50	1	3.7	4.2	5.4	7.75x3.33x5.9
80 B2 RV-L	$870	1.50	1.38	2	4.9	4.2	8.1	11.5x3.33x7.95
80 RV	$590	2.05	1.50	1	4.9	4.3	8.5	11.5x3.33x7.95
Zenoah								
G-23	$289.95	1.3	1.1	1	1.4	3.19.	2.0	7.09x6.67x7.09
G-38	$299.95	1.5	1.3	1	2.3	4.19	2.5	7.72x3.55x5.38
G-45	$399.95	1.7	1.2	1	2.8	4.31	3.3	7.99x3.94x6.78
G-62	$424.95	1.9	1.4	1	3.8	4.56	4.75	8.55x3.94x6.75
GT-80	$999.95	1.2	1.2	2	4.9	6.75	5.8	7.99x3.94x6.78

‡ Manufacturer did not supply info.
‡‡ Height is from crankshaft center to top of cylinder.

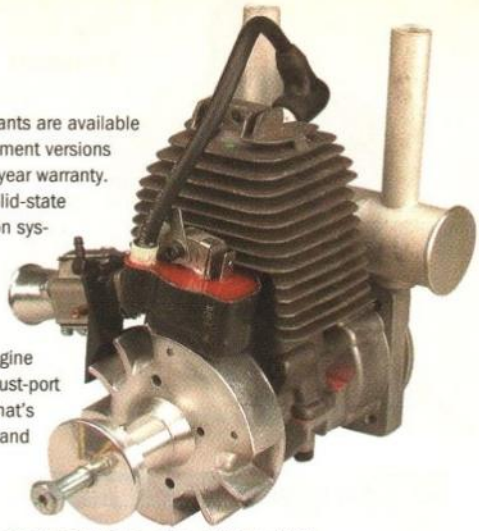
Taurus Engines

Taurus Engines offers single- and twin-cylinder engines. The singles range from the TS 42 (2.6ci) to the TS 95 (5.8ci), while the twins (inline and opposed-cylinder configurations are available) range from the TT 85 (5.2ci) to the TT 240 (14.6ci). Taurus Engines also offers its Signature Series HP engines in displacements of 3.5ci to 7.2ci (call for prices). The 2.6 and 3.2 engines have double-web crankshaft counterbalances, 5-hole radial engine mounts, nicasil cylinder liners, auto-advance ignition systems and single-bolt prop hubs. A full 3-year warranty covers workmanship and defects on all engines.

TS 52 (shown)—$559.95.

Taurus Engines, P.O. Box 1076, Southgate, MI 48195; (734) 283-4813; www.taurus-engines.net.

U.S. Engines



These economical powerplants are available in 35cc and 41cc displacement versions and come with a limited 2-year warranty. Each is equipped with a solid-state capacitive discharge ignition system and a nicasil-coated piston liner. The Walbro carburetor is standard, and throttle linkage for RC use is also included. The engine also comes with a two-exhaust-port muffler, an engine mount that's part of the rear crankcase, and a spring starter. The spark plug comes installed.

U.S.41 (shown)—$249.

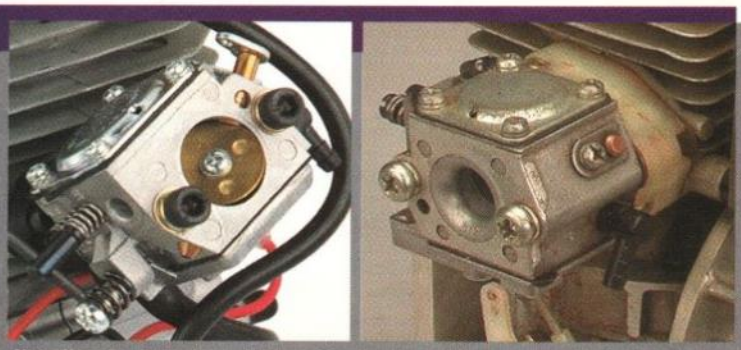
Distributed by Great Planes Model Distributors Co., P.O. Box 9021, Champaign, IL 61826-9021; (800) 637-7660; fax (217) 398-0008; www.bestrc.com/usengines.

PUMPER CARBURETOR BASICS

For a gasoline engine to run reliably and to produce maximum power, the carburetor must be adjusted correctly. The throttle "butterfly" controls how much air enters the engine, and the needle valves meter the fuel. Walbro-type pumper carbs have two needle-valve screws: the low end—identified with an "L"—and a high end—"H"; the marks are stamped into the carb body. Turning the adjustment screws clockwise (in) leans the mixture (restricts fuel flow). When turned counterclockwise (out), the mixture is richened and allows more fuel to flow through the carb.

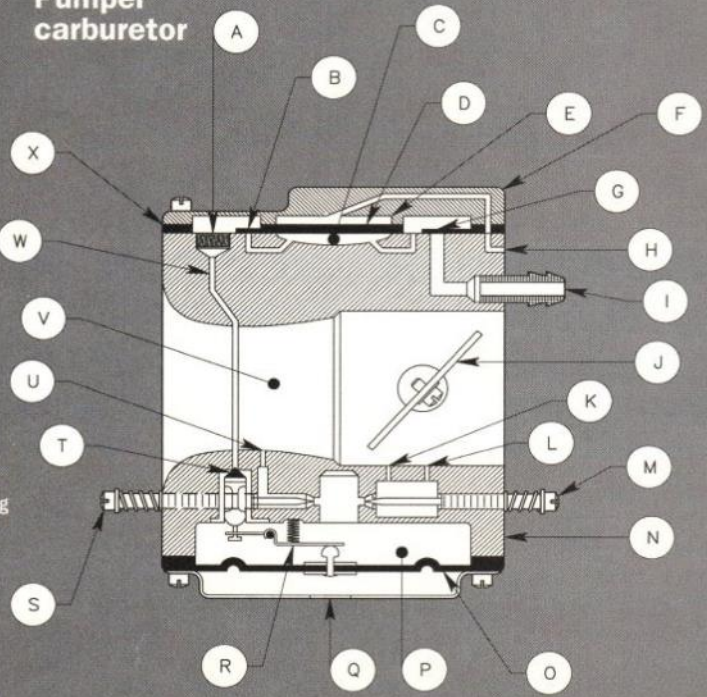
Fuel is constantly delivered to the engine by the low-end (idle) needle. As rpm increase to about 2,000 to 3,000 (the midrange), additional fuel is drawn from the high-end needle. The higher the rpm become, the more fuel is drawn from the high-end needle. A properly adjusted carb will deliver fuel evenly throughout the entire throttle range to produce a smooth throttle transition from idle to full power.

Always adjust the low-end needle first. The low-end mixture should be set as lean as possible but not so lean that the engine doesn't instantly transition from idle to the midrange. If the idle mixture is set too lean, the engine will hesitate and might quit when you advance the throttle quickly. If the idle mixture is set too rich, the engine will sputter and burble with excess fuel as you advance the throttle. You will know the mixture is correct when you advance the throttle quickly and the engine responds cleanly and quickly.



Not all carburetors have chokes; if yours doesn't have a mechanical choke, use your thumb to choke it while you rotate the prop to draw fuel into it.

Pumper carburetor



A. Fuel-inlet filter screen
B. Fuel-outlet valve
C. Fuel chamber
D. Fuel-pump diaphragm
E. Impulse chamber
F. Pump cover
G. Fuel-inlet valve
H. Impulse pressure inlet
I. Fuel-inlet fitting
J. Throttle butterfly
K. Secondary idle-discharge port
L. Primary idle-discharge port
M. Low-end (idle, needle valve)
N. Carburetor body
O. Fuel-metering diaphragm
P. Diaphragm fuel chamber
Q. Atmospheric pressure vent
R. Fuel-inlet-valve control arm and spring
S. High-end needle valve
T. Fuel-inlet needle valve
U. Main fuel-discharge port
V. Venturi
W. Fuel-inlet-supply channel
X. Fuel-pump diaphragm gasket

Set the high-end needle so that the engine will produce maximum rpm without overheating. If the high end is set too lean, the engine will sag and slow down as it overheats. Don't run your engine too lean, as this can damage it. If the high-end mixture is set too rich, the engine will run roughly and won't develop full power.

Make small needle-valve adjustments—1/16 turn at a time for the idle and 1/8 turn for the high end. Use a tachometer to adjust the high end until maximum rpm is achieved. After each new adjustment, allow the engine to run for a short time, and continue to lean the mixture until the rpm begin to drop. When this happens, back the needle off 1/4 turn (rich). Check the idle setting again, and you're done. If you do have to readjust the idle setting, readjust the high end also, as both needles affect overall performance. Once you've set it properly, you shouldn't have to adjust the carb for a long time.

To check the engine's fuel mixture, inspect the spark plug's condition. If the fuel mixture is correct, the electrode should be a light tan color (the color of a brown-paper bag). A lighter color (pasty white) typically indicates a too-lean fuel mixture, and a darker brown (or oily black) indicates an overly rich mixture.

TROUBLESHOOTING

A properly adjusted gasoline engine will run smoothly and produce maximum power for a long time. But sometimes, even a well-running engine can become difficult to start or begin to run erratically. Here are some common problems and fixes.

· **Engine won't start.** Check the fuel, air and ignition system. If any one of these three isn't correct, it will prevent the engine from firing. Make sure the kill switch is off (open). Check for a fuel-line blockage and debris in the needle-valve assemblies. Make sure that the choke and "butterfly" operate properly and that the carb body is firmly bolted into place. The pulse pressure passage between the carb and the crankcase must be clear. If you have an electronic ignition system, be sure the battery is properly charged.

Aftermarket items such as these velocity stacks can help smooth fuel flow through the carb.

· **The engine runs erratically in flight.** If the engine runs properly on the ground but then operates erratically (too rich or lean), especially when climbing or diving, the problem might be uneven airflow into the carburetor. This can cause fuel to be siphoned out of the venturi, and the mixture will be incorrect. A ¾- to 1-inch-long velocity stack will help stabilize the airflow. If this does not improve engine performance, install a small fairing, or a shield, to help direct airflow away from the carb.

To operate a gas engine, use gasoline-proof fuel plumbing. Always replace the fuel-tank stopper and all fuel and vent lines with gas-compatible ones.

· **Engine suddenly runs erratically.** If your engine has been running properly and suddenly starts to act up, you should check several things.

Make sure the ignition battery is fully charged and is supplying the proper voltage. Be sure that all electronic ignition connections are securely plugged in and that the ground strap is still attached to the engine case. Inspect the spark plug and the spark-plug wire and boot. The plug may be fouled with carbon deposits, or the wire connections may be faulty.

Often, the carburetor's internal inlet screen can become blocked, restricting fuel flow. To remedy this, remove the carb's outer cover on the fuel-inlet side, and then carefully remove the gasket. The filter screen sits in a shallow depression and can be inspected easily. If it is clogged, carefully remove and clean it by flushing it with fresh gasoline. Then carefully reinstall it and replace the gasket and cover plate. If it is not clogged, remove both needle valves and flush the entire carb with gasoline.

PREVENTIVE MAINTENANCE

Use only freshly mixed gasoline and oil; if the fuel is several months old, dispose of it properly and mix a new batch. Always drain the fuel out of the tank after every flying session. When you store your model for an extended time, first empty the tank and then run the engine until it quits; this will remove unburned fuel from the carb. Remove the spark plug and squirt some after-run oil into the cylinder, and turn the engine over by hand. Put a few more drops into the carb, and then plug the venturi and exhaust pipes with some small wads of paper towel. Remove the ignition batteries, charge them and store them in a safe place. Store your engines in a warm dry area; avoid areas that are subject to drastic temperature changes and dampness. Remove and inspect the prop occasionally to check for cracks and other damage; always balance a new prop.

QUESTIONS AND ANSWERS

Q: Which gasoline should I use?

A: High-octane gasoline will make your engine run slightly hotter but won't increase power output. I use standard 87 octane. Higher grades of gasoline (premium or ultra) contain fewer impurities and may help your engine to run more cleanly. Do not use gasoline that contains alcohol; it can damage the rubber parts of the carb. Don't use aviation-grade gasoline (AVGAS); it contains lead and has a 100-octane rating. It will make your engine run hotter, and the lead can foul the plugs. Always filter your fuel to remove contaminants and any small particles of debris that can clog your fuel system. Always use gasoline-grade fuel-tank plumbing and gasoline-rated fuel line.

Q: Which type of oil should I use, and at what ratio should I mix it with the gas?

A: Always use top-quality 2-stroke oil for air-cooled engines; it's found at most automotive- and motorcycle-parts stores. There are several brands. I have used Zenoah, Klotz and Honda XP2 high-performance synthetic oil, but you may also use high-quality petroleum-based oils. Check your engine manufacturer's recommendations; many suggest the use of petroleum-based oil during break-in, as it helps the piston rings seat faster. After about 10 hours of break-in, you can switch to synthetic oil. The ratio of gas to oil depends on the oil type (petroleum or synthetic). I usually use a ratio of between 40:1 and 64:1 (gas:oil) when using petroleum-based oils and 75:1 to 100:1 when using high-quality synthetics.

Q: Should I use a soft mount for my engine, or should I hard-mount it directly to the firewall?

A: Whether or not you use soft engine mounts is a personal preference. Most single-cylinder engines produce a fair amount of airframe vibration. Soft engine mounts absorb a certain amount of this and so shield the airframe from it. They also allow the engine to move and shake more. On lightly built aircraft structures, I use very stiff soft mounts, but I do not use them on stronger, stiffer airframes. Try them and see; it's up to you.

Some modelers use soft mounts such as these B&B Specialties mounts to cushion their engine on the firewall, and they isolate the airframe from engine vibration.

Q: Which kind of spark plug should I use, and what should the gap be?

A: Always use a resistor spark plug (indicated by the letter "R" in the model number). I have used Champion RCJ7Y, Bosch WSR6F and NGK BPMR6A and have found them all to work very well. Use a plug of the type and size recommended by the engine's manufacturer. Always check the plug gap before you use it; on most engines, a 0.018- to 0.020-inch gap works well. I use 0.022 on my Brison 3.2 as recommended by its manufacturer. Use an inexpensive spark-plug gap gauge to get it right.

The spark-plug boot and wire should always be in good condition. Here is a standard rubber boot with a grounding strap and a metal boot with shielded wire. Make sure you connect the boot to the spark plug properly.

Spark plugs come in several types and sizes; always use a resistor spark plug to minimize RF noise. Always use a spark-plug wrench to loosen or tighten your glue plugs; if you use the wrong tool, you may damage the plug, and that could increase RF noise.

Q: What is "RF" noise and how can I eliminate it?

A: This refers to radio-frequency noise and its electrical interference created by the firing of the spark plug. It can affect radio reception, but most of the newer receivers are less susceptible to it. Installing a resistor spark plug will minimize RF noise but won't completely eliminate it.

Use a non-metallic throttle pushrod to further help shield the radio from the interference. Also, install your radio gear (including ignition battery packs) as far from your engine as is practical; 8 to 10 inches should be enough (the farther apart, the better). Also check the engine, motor mount, throttle linkage and muffler for any loose metal-to-metal contact. If your electronic ignition system has a ground wire, make sure that it is grounded to the cylinder head or engine case.

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Gowell	Liam
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