

M.A.R.C.S. SPARKS

Monthly Newsletter of the Madison Area Radio Control Society
Madison, Wisconsin AMA Charter #665

Volume 44 - March 2005 - Issue 3

Come Fly With Us

MARCS meetings are held on the first Thursday of every month at 7:00 P.M. in Room 201B of the Madison Labor Temple, 1602 S. Park St. in Madison. Visitors are always welcome. We think we have a great hobby and we invite you to come and see and consider joining us.

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Contribution of articles for publication is encouraged.

Deadline for publication is the 20th of the month.

Minutes of MARCS General Membership Meeting, February 3, 2005

by Patricia McDonald, Secretary

The meeting was called to order at 7:03 by President Tom Lazar with 40 people present.

January Minutes: Minutes of the January meeting as printed in the February issue of SPARKS were accepted as published.

Treasurer's Report: Financial statements were available for review.

There were no guests or visitors. No new members.

New Business: Tom reported that Mark Finley will head up the Adopt a Highway Program.

Dates for the following events have been set:
Screaming Eagles - Big Bird will be held June 11, 2005, War Birds over Dane- Director - John Granberg - July 9, 2005, Scale Rally - Director Don Weigt - August 20, 2005. Directors for these events need help. Volunteers to sell raffle tickets, staff the radio impound area or work on the food crew should contact the directors of the events.

Some dates and events that are still open or questionable are the Boy Scout outing and the Electric Fun Fly (may be held on August 14, 2005). The dates and coordinator for the annual Picnic - Water Fun Fly in Marshall are not definite.

Start and finish times for all events will be posted in the newsletter. The field is reserved for the event for the day, but it is the directors' decision as to when the field is open to other flyers.

Next Month's meeting will be the auction. Come early to trade.

Dave Rush reported the MARCS Banquet is scheduled for February 20, 2005; we need at least 30 attendees. Remember to contact a board Member if you want to nominate someone for special recognition.

The field clean up day is Saturday April 23, 2005. Volunteers should report to the field early.

Wayne Lanphear reported a problem with the

locks. Members have been beating or pounding the lock. Two locks have been replaced at a cost of \$26.00 each. Members should squeeze and then release the latch to open. The new number combination is on back of each membership card.

Board Meetings are the 3rd Thursday of each month. Any member may attend.

Raffle winners: Dave Rush, Pat McDonald, Brad Witt, Ed McDonald, Wendell Hottmann and Nels Wareham

Show and Tell: **Bill Kinney** showed his Air Core Cub with Conoplast construction. The model has been out of production for many years

Dave Rush brought several eclectic planes. He showed a Foamtana S Electric 3D, 14oz., and Axi powered. He also showed his Foamy, indoor F-16 Pylon racers.

Wendell Hottmann brought his ARF Polk's Hornet 3 – 36.5" DR-I Fokker. He then explained how he painted Lozenge Fabric for 1/7 scale Fokker D-VIII.

Tom Lazar described how he constructed home made wheels and tires for 1/4 scale D-VII, they are 8 inches in diameter with ply and rubber material.

Wayne Lanphear showed his new Hanger 9 33% Edge 540 – GT-80, JR radio gear, weighing 24 pounds.

Bill Rewey presented a photo board of his trip to Mojave, CA where he toured the hangers and facilities of innovators in space flight such as Dick Rutan.

Don Weigt explained why and how he built his motor test stand

Philosophy 101

Cold? If the thermometer had been an inch longer we'd all have frozen to death.

Mark Twain

Is MARCS Getting its Due - ah Dues?

I know that those of you who have not paid your dues for 2005 know they are due, but it's part of the job of *ye Olde Editor* to nag you about it. So consider yourself nagged.

Seriously though, as Bob Hope would have said, at the end of March Ed McDonald will purge the membership list of those who have not paid their dues by then. Those purged will not receive the May issue of Sparks (the one to be mailed circa April 20).

Flight Instruction Coordinator Needed

The flying season is fast approaching and that means that we will have some new members who are going to need flight instruction. We have a number of members who have volunteered in the past to be instructors, but we need someone to serve as a central contact point for students who need instruction to get matched up with an instructor who has a somewhat similar schedule to be able to provide that teaching.

The coordinator job does require a certain time commitment, but it isn't excessive and it isn't too difficult. If you would like to contribute to our club's reputation as a friendly place where you can learn to fly and enjoy companionship with others who are interested in aviation, please contact Tom Lazar at 655-3396 and let him know that you can help out. This job is one of our club's most important functions.

Swap Meet and Auction

Don't forget to bring your hangar queens to the March meeting. That's the swap meet meeting, you know. Your trash may be someone's treasure.

Nominating Committee Needed

Ed McDonald is heading up the Nominating Committee to recruit candidates to run for office next November. He needs at least two people to serve with him. Please contact Ed at 249-0734 to volunteer to help him.

Field Work Day

Tentatively, the tasks that we need to take care of on field work day, April 23, are fence mending, brush cutting around the perimeter of the field, repairing surface damage to the field and pruning some trees to the west of the field. By the time field day comes around, it will probably be too dry to be able to accomplish much by rolling the field.

Free lunch will be served.

Contest Directors Needed

The club has a number of contest directors, but we don't have a list of who they are. If you are a CD, please give Tom Lazar a call and let him know so he can make up a roster. Also, if you would like to become a CD, contact Tom and let him know.

MARCS 2005 Calendar of Events

Event	Date	Location
Field Work Day	April 23	Kettle Field
IMAA Big Bird Fly In	June 11	Kettle Field
Thermal Soar	June 18	Long Island Sod Farm
War Birds Over Dane	July 9	Kettle Field
Electric Fun Fly	July 24	Kettle Field
Ken Kindschi Scale Rally	August 21	Kettle Field
Hand Launch and Boy Scouts events scheduling is pending		

Date Change on Scale Rally

Please note that the date of the Ken Kindschi Scale Rally has been changed from August 20 to August 21 to avoid a conflict with a similar event at Fond du Lac.

Name the Plane Contest

As I expected, Craig Lovell was right there as soon as the contest was announced with a complete and correct answer, but as he has done in the past he disqualified himself partly because he couldn't make the banquet and partly because he knows so much and has such a good documentation library that he feels competing is cheating. Still, I really enjoy having him answer the challenge. Beyond that, there were a bunch of wrong answers and four half right ones, three of which were entered at the banquet. Here's the pertinent poop.

By 1934 Adolph Hitler had come to absolute power in Germany and gained fame as a saber rattler. England and France were ill disposed to challenge him and the American public was so isolationist that had FDR seen fit to challenge Hitler he would have been hung in effigy, impeached, tarred and feathered and run out of town on a rail. At the same time, the folks responsible for defense foresaw a situation in which all of western Europe might be under German control and eastern Asia and the Pacific under Japanese domination with the US standing alone between a rock and hard place. We might have need for a "star wars" kind of defense or offense and so it was that the War Department put out a call for an XLRB design -- an eXtra Long Range Bomber.

Boeing was first to respond with XLRB-1, the design of which went to the drawing board in 1934.

Internally, it was designated Model 294 and when it flew for the first time on July 30, 1937 it was the biggest and heaviest airplane ever built in America. It received the military designation of XB-15. Its wings were so thick that there were passages in them that allowed flight engineers to crawl out and do minor engine repairs and tuning in flight. It carried a 10 man crew with sleeping accommodations to allow respite during day and a half long flights. It was never intended for serial production and was finally put in service as a cargo carrier and redesignated XC-105.

It is pictured below. Several contestants incorrectly IDed the contest plane as the Boeing XB-15.



XLRB-1, a/k/a Boeing XB-15

XLRB-3 was a Sikorski design that never got off the drawing board.

Meanwhile, back at the ranch as they say, at Douglas, construction began on XLRB-2 in 1938 (you could have won the contest with that

designation). By now the war clouds were thickening in Europe and the flame of war was sweeping through the Orient. The War Department dithered over just what the Douglas priorities should be as regards the big bomber (it was bigger than the XB-15 by nearly half) in the face of needs for C-47s and Navy dive bombers. So it was that construction stopped and restarted several times. All the while, the huge bomber took up badly needed factory floor space and costs mounted as a result. Cost overruns became so bad that Douglas pleaded for abandonment of the program but the Army was adamant that they wanted it built, seeing it as a test bed for new engineering principles for very large aircraft. They also wanted to test the flight characteristics of so big a flying machine. Its wing span was 220 feet with a fuselage length of 130 feet, 2 inches.

Finally, in the late spring of 1941, it was rolled out of the factory doors and when it flew for the first time on June 27 it was designated XB-19. There was good news and there was bad news.

It had a gross weight lifting ability of over 18,700 pounds and an unloaded ferry range of 7,900 miles. Practically, it could reach out 3,600 miles with a bomb load of 6,000 pounds and return to whence it came. Like the XB-15 it provided sleeping accommodations for a back up crew. In all, it could remain aloft more than two days and carried a crew of up to 18.

The XB-15 had suffered from the fact that suitably powerful engines did not exist for a plane of its size and with the XB-19's far greater size, that problem was exacerbated considerably. It was badly underpowered with a top speed of 224 mph at 15,500 feet, but its cruising speed was only 135 mph with a service ceiling of only 23,000 feet. It would have been a sitting duck for both interceptors and anti-aircraft fire, and because of its range, fighter escort would have been out of the question. It was a really big and beautiful airplane, but it was obsolete before it ever flew.

In 1943 its Wright radial engines were replaced with Pratt and Whitney V-16 inlines. After a few test flights, it was assigned to a long range cargo carrying role and in 1949 it was dismantled and melted down.

To compare the XLRBs to better known values, consider the following:

Plane	Wing		Bomb	
	Span	Range	Load*	Cruise
B-17	104 ft	2,000 mi	2,500#	160 mph
B-29	140	3,200	20,000	220
XB-15	149	5,000	8,000	150
XB-19	220	7,200	6,000	135

* At maximum range

I recall, as a kid, that this plane was hyped as a great technological achievement and I looked forward to hearing of great armadas of them raiding Germany, but it never happened. Actually, I don't recall ever seeing a full view picture of it at that time. I think the principle of CYA may have been in play. It was praised to the heavens and the terrible cost overrun for a useless, obsolete product was quietly and studiously avoided.

I must apologize for a mistake I made in announcing the winner that occurred to me on the way home from the banquet. Chris Spierings was half right in naming it "Boeing B-19" a couple of days after the contest was announced. While it was as good a guess as anyone came up with, the contest rule was that one had to be at the banquet to win and Chris wasn't there. My mistake. Three people named it "B-!9" at the banquet, before dinner. Tom Lazar was the first to do so and thus he is the winner. No one identified it as a Douglas product.. Tom, I'll bring your prize to the next meeting.



XLRB-2, a/k/a Douglas XB-19

It Was a Great A Banquet

The food was the best I can recall having had at any awards banquet. Great chef carved prime rib and ham and an excellent twice baked potato with Mrs.

Rush's chocolate cake for dessert. Unfortunately, only about 26 folks showed up, a few having pulled up lame due to illness. Dave Rush wondered if the low attendance, about half of last year's, was price related. Comments would be welcome in planning for next year. In my own opinion, the price was high, but the facility, the food and the ample parking were top notch and I'd do it again. How do you feel? Send me a brief e mail or snail mail note and I'll pass it on.

Otto Oie wasn't there, but we didn't let that stop us from roasting him over his winning the Submarine Commander Trophy. Actually, not much of his plane wound up in the water. Those who saw it said they thought he was trying to land on the bridge. Instead, he clobbered it at terrific speed. The engine wound up on the field, 50 yards away. He could have gotten either the Smoking Hole or the Submarine Comander, but we had to save something for Ed McDonald.

Ed claimed he was just loafing around when his wing folded up and he crashed heavily in the parking lot, totaling his plane. Fred Bast fished the remains out of the trash barrel, rebuilt it and gave it to Ed's poor wife, Pat, at the January meeting. Seems Ed wrecked a couple of her planes and Ed's not allowed to fly Fred's rebuilt version.

Dave Rush is just like all RC flyers. He lies about his culpability when he goofs. He won the Paul Bunyon Tree Chopper Trophy, but says Ozzie Johnson deserved it more than he. He said Ozzie flew his Pietenpol right into that tree top and Dave was such a Good Sam that he helped get the plane down. On the other hand, Dave lies, he just ran out of battery on his electric and made a controlled landing in the tree top. Question: If he ran out battery, how could he make a controlled landing?

The Scooter Trophy is awarded to the "Nice Guy of the Year." For the first time, we have the trophy shared by two people, Bill Kinney and Frank Baker, neither of whom were in attendance. My personal opinion is that Bill and Frank really are nice guys, but now we're going to see just how nice they really are as they decide how to share custody of the trophy.

Tom Lazar passed out the usual certificates of appreciation for service to MARCS. Those not passed out at the banquet may be picked up at the March meeting.

Don Weigt won the bottle of Chateau du Buss Sweet Red Razzleberry door prize.

Amendment to Show and Tell

By Don Weigt

Some of you saw the big engine test stand I brought to the February meeting. I had tested engines as big as G-45s on it. I mentioned putting it on a pad to prevent it moving around when the engine was running.

What I didn't add, is that I put some weight on the base to help keep it from moving. After starting the engines at idle, I move around behind them before speeding them up. I also stand on the test stand's base to help hold it down. It will take more than a G-45 to pull the stand when it's on a foam rubber pad and there's over a hundred pounds of weight pressing it to the floor!

As Charlie reminded me, a big gas engine could move this stand if it isn't weighted down or staked to secure it. It could even tip over on its nose, hitting the prop on the ground or floor, making an expensive mess and probably even injuring someone.

Do check all the hardware often, to make sure vibration hasn't loosened anything. Wood props on full scale aircraft need to be torqued when the seasons change because the wood swelles when its humid and shrinks when its dry. That could happen to the test stand, too. It's important to wear ear protection, if you want to avoid ringing in your ears and hearing aids later in life. Leather gloves are very helpful for hand starting, especially with sharp props. And, be sure to have enough ventilation to avoid carbon monoxide poisoning.

So, if you put one of these big engines on a test stand, please, be very careful! You don't want to damage the engine or any other property, and you surely don't want to injure yourself or anyone else!

The Bent Bird

Digital and Proportional

By Don Weigt

The day of the modern digital proportional radio had dawned by the late 1960s, when I got out of the Air Force and moved to Madison. They were still expensive, but the basic concept was simple and over time became inexpensive to make.

For the pilot, the biggest improvement was simply that the control surface or throttle position

tracked the stick, knob, lever, or switch position. This was much more intuitive and easier to learn than pushing buttons or levers and counting pulses! Low cost radios sometimes had knobs or single axis levers, but most airplane radios quickly adopted today's standard configuration of two sticks, each with two axes of movement for the primary controls.

Up and down movement of one stick moves a pot (potentiometer, a voltage divider, like a volume control) to control elevator, while sideways movement of the same stick, separately or simultaneously, controls the aileron or rudder pot. Up and down motion of the other stick controls the throttle, while its sideways motion controls rudder or aileron, whichever remains.

Trim levers next to the sticks permit adjusting the control neutrals in flight to make the planes fly straight and at the desired speed without constant pilot inputs. Extra "channels" (servos), if available, were controlled by simple levers, switches, or knobs. These were (and are) used for landing gear, flaps, and so on.

There were other schemes, mainly a 3 axis stick where a knob at the top was twisted for rudder control, the stick was moved sideways for aileron control, and up and down for elevator. These were more expensive. Although a few top fliers used them, almost everyone chose the pair of two axis sticks.

There were choices with two sticks, as well. "Mode 1" radios had rudder and elevator on the left stick and throttle and ailerons on the right. It was claimed superior for aerobatics. For example, to roll, the right stick controlled the rate, while the left stick got the rudder and elevator corrections to hold the nose up. But, most of us settled on "Mode 2", where the right stick is elevator and aileron, or elevator and rudder if the plane has no ailerons. In either case, the right stick is the primary direction control. The left stick is for throttle and rudder, or used just for throttle. I suppose one attraction of Mode 2 is that its right stick functions mimic a full scale airplane's control stick. Radios still can be ordered configured for Mode 1 or Mode 2.

The first proportional radios were still analog designs, using tones to carry information about servo position. Analog servos were controlled by DC voltages, and accurate control meant the signal processing had to produce the same control voltage regardless of the temperature, and as equipment aged.

This was always more difficult to do than to process simple on and off digital signals. Analog processing also meant filters were used to smooth the DC control voltage, and that adds a delay to the signal.

Digital equipment quickly became smaller, lighter, better, and less expensive than analog proportional. It also was easily expanded to control more servos, up to 8 or more. This was difficult to do with analog radio control. Digital control is all about timing. Each servo contains a timing circuit controlled by the position of the output. The circuit produces a pulse when triggered. The pulse's duration depends on the output position. Typically, neutral position is a pulse of 1.5ms (1.5 milliseconds, 1.5 thousandths of a second.) The usual limits are 1.0 and 2.0 milliseconds.

The receiver controls the servo with a pulse. The servo's timing circuit starts its pulse when the pulse from the receiver begins. A simple circuit compares when the pulses end. The servo amplifier drives the motor in the direction that makes the servo pulse match the length (duration) of the pulse from the receiver. Simple feedback slows the motor as the pulses become nearly equal, so the servo doesn't overshoot, then drive back past the proper position and overshoot again, over and over.

The servo's timing circuit is very simple, as are the circuits that compares the pulses and drive the motor. They also are easy to put into an integrated circuit (IC), which makes the servo electronics smaller, lighter, more reliable, and less expensive.

The basic concept of the digital transmitter and receiver was similar to the old CW gear. The carrier was on or off. This is called amplitude modulation (varying the signal strength). No precise tones needed, no "high fidelity" processing. But, reversing the old CW radio's operation, the carrier was on most of the time and pulsed off to transmit information. This reduced interference, because there were only brief times the transmitter signal went away and when it would be easy for interfering signals to come through without competition. It also made receiver design easier.

There was, and is, a timer running in the transmitter to set how often each servo is sent new position pulses. This is called the "frame rate". Typically this happens 50 to 60 times each second, about once for every cycle of household AC power. That is every 16 to 20 thousandths of a second (0.016

to 0.020 seconds, or 16 to 20 milliseconds.) Pretty often! But, it doesn't matter exactly how often this happens, so the frame rate timer can be simple and cheap. In early digital proportional transmitters, this timer was formed by two transistors, two capacitors, and usually four resistors. Total part cost was a buck or two.

Each time the frame rate timer, or "clock" toggled to start the next frame, the carrier was turned off briefly. How long was controlled by another timer, which I will call the RF modulating timer. This timer interrupted the carrier for about 0.3 thousandths of a second (0.3 to 0.5 milliseconds.) There is no control data in the frame rate, but it is the timing reference that makes control possible.

The frame rate timer triggered another timer, controlled by one of the transmitter's controls. It often was the aileron or elevator control. The control position set the length (duration) of this control timer. It set the time of the pulse for the control, and was equal to the servo pulse time in the position the control stick represented. As described earlier, this is usually between one and two milliseconds. When this pulse ended, it also triggered the RF modulating timer, which turned off the carrier for a second time, again for about 0.3 milliseconds. The timing of the carrier pulses is an easy way to send information. The time from the start of the first pulse (carrier interruption) to the start of the second, is equal to the pulse width (duration) that should be sent to the servo to control its position.

Cleverly, when the first servo control (channel) timer pulse ended in the transmitter, it started the timer for the second channel. When that ended, it started the next, and so on, for as many channels as the transmitter had. Each timer produced a pulse equal to the pulse to be sent to its servo. The end of each control pulse triggered the RF modulating timer to interrupt the carrier for 0.3 milliseconds. So, there was almost always one more carrier interruption in the frame than the number of "channels". A 4 channel radio had 5 carrier interruptions per frame, a 5 channel radio had six, and so on.

When the last timer had finished, there was a pause; a longer delay, equal to 2 or more servo pulse widths, before the next frame began. This delay was used to synchronize the receiver's servo pulses with the correct transmitter timers. There was no separate timer for this pause: it was the leftover part of the

frame time after all the servo pulses had been made.

In many transmitters, each servo control pulse was made by a circuit with a single transistor and Capacitor, and two pots, one for the control stick (or lever, or...) and the other to set the neutral pulse width of the channel to be correct. A few cheap parts permitted each control pulse timer to trigger the RF modulating timer, which again was often a single transistor and a few resistors and capacitors. These were very simple and inexpensive radios to make! The control sticks probably cost more than the electronic circuits..

The receivers were early super heterodyne designs, very much like those used in reed receivers. But, instead of audio amplifiers with low distortion to drive reed banks like speakers, digital receivers had less fussy pulse amplifiers. Very simple circuits detected the pause that ended the frame, started the first servo pulse with the first carrier interruption pulse at the beginning of each frame, detected the second carrier interruption to end that servo pulse and begin the one for the second servo, and did the same for every additional channel (servo). Like the servo circuits, these were inexpensive and lent themselves to being made into integrated circuits. So, the receivers kept getting smaller, lighter, cheaper, and more reliable, too.

To detect the first pulse, and synchronize the servo pulses to the frame, there had to be a delay after the last servo pulse before the next frame began. Typically, this had to be at least twice as long as a long servo pulse. So, for an 8 channel radio, the frame time had to be at least as long as ten servo pulses. This limits the number of times per second each servo can receive a control pulse. The more channels, the slower the frame rate has to be. But, this isn't a concern up to about 8 channels. Early radios seldom had more than six channels, so it wasn't a problem.

These early digital control systems had all the basics: fully proportional independent control of multiple servos, with trims on all channels for adjustment in flight of all controls. The flight controls could be trimmed for straight and level normal flight, true tracking through maneuvers, inverted flight with just some down elevator input, and throttle trim giving reliable low idle speeds and engine cutoff when wanted. Most any modern model could be flown well with them.

But, there were limitations. Servos all ran one direction. To reverse a servo required opening it up, reversing the motor and feedback potentiometer wires, and adjusting the servo feedback potentiometer. One transmitter could be used with many models, but only by adjusting all the models' control linkages to work with the same trim settings. They worked great, but there was much room for improvement!

Next time: narrow band, FM replaces AM, dual conversion receivers, transmitters with servo reversing, travel adjustment, model memories, and programmable features.

Collishaw

In September 1917 Ray returned to Europe after having been allowed leave in Canada and was posted to Naval 3 flying Sopwith Camel F1s. It was a hot new fighter plane, but tricky to fly without considerable experience. Once mastered it was a dangerous aircraft to the enemy. And it came with two synchronized Vickers machine guns.

Posted to St. Pol in northern France, there was little action, but even so he downed an Albatros while escorting DH4 bombers. The squadron commander was killed shortly after Ray arrived and he took over. The action for the RNAS in the north typically consisted of escorting bombers over the German ports of Zeebrugge and Ostende. Collishaw shone as a squadron commander. Mel Alexander, who survived the war, remembered him as a charismatic leader and an inspiration to others. He would fly with new pilots letting them spray lead at enemy two-seaters and then with little effort would slip in and down the plane. Back at the base, he would slap the newcomer on the back and congratulate him on his first victory. Fortunately, for the beginners, the action on the coast was not like the RFC had on the front lines.

Collishaw developed a taste for attacking enemies head-on, firing until the other aircraft fell or swerved away, and then using the Camel's right-hand manoeuvrability to pounce on their tail. He downed two Pfalz's and two of the new Fokker DVII's with this technique in two days.

In October, 1917 he was officially "noticed" with a Mention in Despatches for particularly fine work in the air. The flying and fighting kept up throughout the winter of 1917-1918 with brief

respite due to poor weather. Much of the combat in the summer of 1918 was strafing German troops. Flying low over the trenches and firing on the troops was exceedingly hazardous, as many rifles and machine guns would bear on the aircraft. At under 120 mph and with no armor, they were fairly easy targets. Many pilots died in this activity. Ray Collishaw managed to shoot down 4 airplanes and a balloon in August, and five more in September. He led a low level bombing attack with a mixed flight of planes, including Camels, SE5s, and Brisfits, on an airfield at Lieu St. Amand. They set three hangers on fire, and shot down a handful of Fokker pilots, with Collishaw getting two. On the way home they strafed ground troops. As Collishaw put it, "All in all it was a most successful affair". He was awarded the bar to the DFC, indicating a second award of the medal:

COLLISHAW, Major Raymond - Distinguished Flying Cross - awarded as per London Gazette dated 3 August 1918.

This officer is an exceptionally capable and efficient squadron commander, under whose leadership the squadron has maintained a high place in the Army Wing. He has carried out numerous solo patrols and led many offensive patrols, on all occasions engaging the enemy with great bravery and fearlessness. Up to date he has accounted for forty-seven enemy machines, twenty-two in the last twelve months.

His finest day was very much like Billy Bishop's alleged raid on an airfield that earned him the Victoria Cross. Collishaw and Leonard Rochford raided an airfield 15 miles behind enemy lines in Camels each carrying four 25-lb bombs and extra bullets. Rochford swept in low strafing and bombing as Collishaw provided top cover. Once Rochford had shot up the hangers, barracks and mess and lit a large tent on fire, Collishaw swept in and shot up the flight line of Albatroses. Circling up he spotted a large two-seater coming in for a landing, both pilot and observer being very non-observant of the proceedings. He shot the plane down in flames. They returned to home base and Collishaw re-armed with bullets and went back to view the damage. Upon arriving he shot down an Albatros circling above the field, took a look at the damage and headed home.

Collishaw received a Distinguished Service Order and Rochford received the DFC for his part.

COLLISHAW, Major Raymond - Bar to Distinguished Service Order - awarded as per London Gazette dated 21 September 1918.

A brilliant squadron leader of exceptional daring who has destroyed 51 enemy machines. Early one morning he, with another pilot, attacked an enemy aerodrome. Seeing three machines brought out of a burning hangar, he dived five times, firing bursts at these from a very low altitude, and dropping bombs on the living quarters. He then saw an enemy aeroplane descending over the aerodrome; he attacked it and drove it down in flames. Later, when returning from a reconnaissance of the damaged hangars, he was attacked by three Albatross scouts who pursued him to our lines, when he turned and attacked one, which fell out of control and crashed.

The war was nearly over, but Collishaw persisted in attacking enemy aircraft, almost getting shot down in October, 1918. Collishaw was given another Mention in Despatches for exceptionally fine work in the air. He was ordered to report to the Air Ministry in London, and three weeks later the Armistice was signed. He was officially credited with 60 kills, however, that doesn't take into account the 8 balloons he shot down. Balloons were frequently more hazardous to attack than fellow aircraft due to the defensive arms and supporting aircraft they had around them, but for some reason they were not credited as an aircraft kill. Collishaw claimed that he downed 81 aircraft and balloons. Had he flown for the RFC his total would have been closer to this number than to 60, as the RFC was more lenient in awarding kills to pilots. In the RFC Raymond Collishaw would have been the highest ranked ace of the war, and would undoubtedly have been awarded the Victoria Cross. Many pilots in the RFC were given the VC for efforts less heroic or hazardous than many of Collishaw's, but the RNAS pilots were definitely second-class when it came to awards.

Next month, Collishaw and the Russian Revolution

The AEROMART

- ÿ Ohio Kit - 10 S 300 Ultimate Bipe. 62 " span, partly built. **\$175**
- ÿ Big Bingo with Super Tigre 3000 engine and HD Futaba servos. Ready to charge up and fly . **\$500**

Nelson Wareham
255-7057

- *****
- ÿ Fontana 40 with Saito .72 - 4 storke engine, FMA servos, 5 cell 1300 maH battery and switch harness.. Just add a receiver and go fly **\$400**
 - ÿ Ready on Floats, Magnum XL .46 Engine, Futaba and Hi tec servos, 4 cell 600 maH battery & switch harness. Just add a receiver and go fly. **\$225**
 - ÿ Hangar 9 120 Ultra Stik, MOS 148 engine, FMA 36 metal gear servos, 5 cell 1300 maH battery pack, voltage regulator and battery harness. Just add a receiver and go fly. **\$359**

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(608) 837-3498

Mon.-Fri., 8:00 to 5:00



Case lot fuel sale. If you don't need a case, team up with a buddy.

Powermaster comes in 6 quart cases.

Sig comes in 4 quart cases.

10% nitro, 20% lubricant (1/2 castor, 1/2 synthetic) - \$13.95/ gallon

15% nitro, 20% lubricant (1/2 castor, 1/2 synthetic) - \$14.95/ gallon

Pure castor lube is also available

\$1.00 off per gallon in case lots