



The Leading Edge

Monthly Journal of the Connecticut Wing of the
Civil Air Patrol

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August 2016

WING NEWS

Calendar

September 7 – Wing Wide Commanders Call – Wing Headquarters
September 9 – Cadets allowed to wear uniform to school if allowed by school district (in honor of Patriot Day)
September 10th – Paint & Pizza at CTWG headquarters (getting ready for Command Inspection)
September 11 – 9/11 Ceremony in New Fairfield, CT – featuring CT Army Band
September 18 – Simsbury Fly-In and Car Show (Wing Wide Event) – rain date September 25
September 25 – Tunnel to Towers (WCG event) in New York City
October 1: Meriden Markham Fly-in & Public Safety Festival. (Rain Date October 8th)
October 8-CTWG Rifle Safety and Marksmanship training
October 22-CTWG Maintenance Officer and Pilots meeting at MMK.

October 15 & 16 – Command Inspection Onsite Inspection (Wing HQ and Meriden)

October 24-26 -- Tri-State Mass Fatality Exercise

November 5 – Cadet Ball

November 5-CTWG Rifle Safety and Marksmanship training

November 11 (11/10 if school closed 11/11) -- Cadets allowed to wear uniform to school if allowed by school district (in honor of Veterans Day)

December 7 – Wing-wide Command and Staff Meeting and Holiday Party

December 17 – Wreaths Across America

EASTERN GROUP

Command has transferred from Maj Conrad Rustek to Lt Col Ron Rudolf

SQUADRON REPORTS

Joint Danielson-Thames River Field Trip

Danielson and Thames River held a joint field trip on Thursday, July 28th. First, the Cadets heard Lt Col Rocketto's presentation on the similarities and differences between submarines and aircraft. They then adjourned for a barbecue lunch.

The final part of the day was a visit to the Submarine at Library and Museum at the New London Submarine Base. Cadets toured the facilities, boarded the *U.S.S Nautilus*, and watched the arrival of the fast attack boat *U.S.S. Virginia*.



Cadets Davis and Hollingsworth searching for the name of the only fleet ballistic missile submarine named after a "native" American.



The missions marks on the sail of the U.S.S George Washington are studied by Cadets Parkhurst and Waite.



Cadet Simon tries her hand and eyes on a working periscope.



The forward torpedo room of a 50 foot long model of WWII's U.S.S. Gato viewed by Cadets Hadley and Clouter.



U.S.S. Virginia, lead boat of her class, heads for berthing.

Cadets also participated in a “scavenger hunt” answering questions about items on display. Prize winners were Cadets Hadley Clouter, Davis, Hollingworth, Parkhurst, and Waite. Each received a small LED flashlight suitable for carry in a 24 hour pack.

*399th Composite Squadron
Photos and Text submitted by
Maj Peter Milano*

Members of the Danbury and Fairfield squadrons marched in the Independence Day parade sponsored by the Fairfield Lion's Club.



399th Color Guard Team cadets Senior Airman Cassidy Murphy, Technical Sergeant Liam Waldron, Airman Basic Jessica Pereira and Airman Basic Elizabeth Croxford lead Civil Air Patrol cadet and senior members in the New Fairfield Lions Club 4th of July Parade.

The combined contingent, directed by 399th Commander, Major Joseph Bisnov, consisted of twenty one cadet and senior Civil Air Patrol members. The 399th Composite Squadron Color Guard Team, comprised of cadets Senior Airman Cassidy Murphy, Technical Sergeant Liam Waldron, Airman Jessica Pereira and Airman Elizabeth Croxford, led Civil Air Patrol marchers along the route.

Participants proceeded south on Pembroke Road to the center of town to the applause of hundreds of spectators who waved American flags and cheered the marchers on. The parade then turned west onto Brush Hill Road and terminated at Memorial Field

where hot dogs and beverages were served to marchers, courtesy of the New Fairfield Lions Club.

The squadrons had the honor of meeting New Fairfield's First Selectman Susan Chapman, U.S. Representative for Connecticut's 5th congressional district Elizabeth Esty, Connecticut State Representatives Jan Giegler (House District 138) and Richard Smith (House District 108), and Connecticut State Senator Michael McLaughlin (Senate District 24). Cadets also had the privilege of speaking with New Fairfield Veterans who related stories of being in the military and graciously posed for pictures.

Seven Cadets and Seniors were promoted during June and July.



C/Amn Carillo



Cadet Liam Waldron is pinned with Technical Sergeant chevrons by his mom, Christine Waldron.



Cadet Jessica Resendes (c) promoted to Airman. She is pinned with Airman chevrons by Captain Jeff Jenkins (l), 399th Deputy Commander, and First Lieutenant Christina Posca (r)



C/Amn Desalvo



Cadet Henry Mosiej (l) promoted to Airman and is pinned with new chevrons by his dad, Sergeant Radoslaw Mosiej of the 1156 Engineer Company, NY Army National Guard.



2dLt Posca promoted to First Lieutenant



*Major Joseph Bisnov (l), 399th Squadron Commander, holds the Civil Air Patrol Aerospace Education Excellence Award with Second Lieutenant Mike Nolan (r), 399th Aerospace Education Officer.
(Photos by Senior Member Olga Simoncelli)*

399th Cadets Graduate from 2016 NER Honor Guard Academy

Cadet Technical Sergeant Liam Waldron/CT-042

Three cadets from the 399th Composite Squadron attended and graduated from the 2016 Northeast Region Honor Guard Academy. Cadets First Lieutenant Joseph Taylor, Chief Master Sergeant Noah Stillman and Technical Sergeant Liam Waldron spent the week of July 17-24 at Norwich University in Northfield, Vermont, accompanied by ten other cadets from across Northeast Region.

Cadets attended the Academy at Norwich the same time the New Hampshire/Vermont Wing Encampment and Northeast Region NCO Leadership School was underway. The days were rewarding but long, starting at 5:30 a.m. with physical training and ending with lights out around 9 p.m.



Members of the Honor Guard Academy learned teamwork on the obstacle course. 399th Composite Squadron cadets participating in the training include Technical Sergeant Liam Waldron (front row left), First Lieutenant Joseph Taylor (front row, third from left) and Chief Master Sergeant Noah Stillman (back row, third from left). (Photo: Northeast Region Honor Guard Academy Staff)

*Thames River Composite Squadron
submitted by
Capt James Cook*

Cadet 2dLt Alexander deAndrade earned his FAA Private Certificate.



John Ackerman, FAA Designated Pilot Examiner congratulates the newly fledged private pilot, Alec deAndrade.

Pfizer announced that a \$500 grant has been awarded to TRCS to support the Aerospace Education STEM Program.

Lt Col Rocketto served as a ground instructor and public information officer at the first Glider Academy in Springfield, Vermont. Upon return, he participated in the CTWG Encampment and then returned to Vermont for the second glider academy.

Thames River put on a strong CAP appearance at the National Aviation Day at Groton-New London Airport. The event not only celebrated the birthday of Wilbur Wright but the 100th anniversary of the establishment of the submarine base. The squadron helped with parking and set up three information booths to acquaint the public with the CAP mission.



C/MSgt Benjamin Ramsey allows young to operate the robotic arm which the Squadron built as part of the STEM initiative. (All photos by 2nd Lt David Pineau)



Capt Meers and C/2nd Lt Hollingsworth display search and rescue gear.



Maj Farley demonstrates the wonders of the G1000 system to future CAP members

REGIONAL STAFF COLLEGE NEWS

The Region Staff College (RSC) is underway at Joint Base McGuire-Dix-Lakehurst and is under the direction of Lt Col James Ridley, Sr.

Region Staff College is one week in-residence course designed to prepare members to accept the responsibilities of senior management and a requirement for achieving Level IV. The curriculum consists of a wide range of management skills such as mentoring, critical thinking, and group seminars in which the members work on resolving a special issue pertinent to CAP.

CADET SAFETY AND RIFLE MARKSMANSHIP

Two new dates have been selected for the CTWG Rifle Safety and Marksmanship Program. Tentatively, these are 8 October and 5 November, both Saturdays. Complete information will be sent to all Squadron Commanders at a later date.

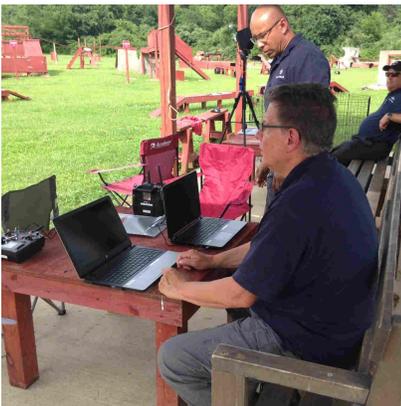
sUAV PROJECT

Capt David Meers and Lt Jay Lavoie attended a two day training session at Camp Atterbury, Indiana during which they received instruction in the operation of a hexcopter, a small unmanned aerial vehicle.. The six rotor aircraft can carry a real-time camera and CAP is interested in exploring the possibilities its utility to ground teams during search and rescue missions.



Lt Lavoie and Our Drone

Wings have been selected to participate in the pilot project. Project Director Lt Col Stephen Rocketto has announced that after our original crew have mastered the vehicle, a few seniors with good emergency service backgrounds will be selected to fly the aircraft.



Capt Meers at the Controls

POLICE USE OF sUAS TO SEARCH FOR LOST PERSON

While working at the NER Glider flight Academy, Lt Col Rocketto discussed remote piloted aircraft with Maj Alan Frazier, one of the glider flight instructors. Frazier is a former CAP cadet (Mitchell 1976) and a current CAP senior member assigned as the North

Dakota Wing Standardization and Evaluation Officer. He is an FAA rated airline transport pilot and CAP command pilot. Maj. Frazier teaches aviation courses at the University of North Dakota and serves as a deputy sheriff-pilot with the Grand Forks County Sheriff's Department. In that capacity, Maj. Frazier supervises the Northeast Region UAS Unit, a multi-jurisdictional law enforcement UAS unit operating 3 sUAS in Eastern North Dakota. Maj Frazier may be reached at afrazier@aero.und.edu.



Deputy Sheriff Frazier and the Department Raven sUAS

One evening a call came in from his bailiwick in North Dakota requesting approval of a mission to launch a sUAS in search of a lost man. Frazier took out a sectional and plotted out the parameters of the mission: avoiding a nearby control zone, establishing a search pattern, and contacting key officials. He then e-mailed, from Vermont, the pertinent information to a deputy sheriff in North Dakota who launched the mission. His remarks on flying a remote piloted aircraft follow.

SO YOU WANT TO BE A DRONE PILOT?

*by
Maj Alan Frazier*

Small unmanned aircraft systems (sUAS) are commonly, but incorrectly, called "drones" by the media. The word "drone" conjures up images of mindless flying robots or heavily armed military grade multi-million dollar aircraft. In reality, sUAS do not fit into either of these categories. sUAS are much more similar to the model airplanes and helicopters that have been operated by remote control (RC) hobbyists for over 70 years. Most commonly single engine airplanes or multi-rotor helicopters, sUAS are gaining popularity in commercial

operations such as inspection of towers and windmills as well as public safety applications including searches for missing persons and post-disaster assessments. Commonly equipped with digital electro-optical and infrared cameras, sUAS can perform many of the missions currently completed by manned aircraft at a fraction of the purchase and operating costs of those larger aircraft.

Hobbyists flying sUAS for purely recreational purposes need only voluntarily comply with the FAA guidelines outlined in Advisory Circular 91-57. Those guidelines include a maximum altitude of 400' AGL, no overflight of open-air assemblages of people, avoiding manned aircraft, and notifying appropriate ATC and/or airport officials when operating within 5 miles of an airport.

Until very recently, sUAS operators wishing to use their aircraft for commercial or governmental purposes had to seek Federal Aviation Administration approval through a "333 Exemption" (a reference to Section 333 of the 2012 FAA Modernization and Reform Act) for commercial operations or a "Certificate of Authorization or Waiver (COA)" for government operations. Both the 333 and COA application processes were quite lengthy and resulted in significant delays.

After an 8 year wait, the Federal Aviation Administration (FAA) released the Final Small Unmanned Aircraft Systems (sUAS) Rule in June 2016. The Final Rule creates a new set of sUAS specific regulations: 14 CFR, Part 107. The actual regulations became law in late August 2016. Commercial sUAS operations may now operate in compliance with Part 107 and a 333 Exemption is no longer needed. The FAA has clearly stated that government agencies may choose (on a mission by mission basis) to operate in compliance with 14 CFR, Part 107 or operate as a public aircraft in compliance with a COA. Part 107 includes creation of an FAA "Remote Pilot Certificate". FAA licensed pilots may receive a remote pilot certificate by completing 3 steps: 1.) Complete the FAA's sUAS Course found online at www.faa.gov 2.) Complete an online airman certificate application on the FAA's Integrated Airman Certification and Rating Application (IACRA) site. 3.) Have a certified flight

instructor, or designated pilot examiner, verify that the applicant has a current biennial flight review and then certify that fact by logging into the IACRA site using the unique application number provided by the applicant.

Individuals not currently possessing FAA airman certificates must pass a 60 question knowledge exam administered at an FAA authorized knowledge test center. Knowledge areas to be tested are listed in FAA Advisory Circular AC 107-2. After successful completion of the knowledge exam, an airman certificate application must be submitted via IACRA or submitted in-person to an FAA Flight Standards District Office (FSDO). There is no oral or practical exam.

In addition to detailing pilot requirements, 14 CFR, Part 107 states that sUAS operations are permitted, daytime only, or during civil twilight if the UAS has appropriate lighting, below 400' AGL in all (except Class-A) airspaces. Class-G airspace operations do not require any notification of air traffic control (ATC). Operations in Class B, C, D and, if associated with an ATC facility, Class-E airspaces require coordination with the associated ATC facility.

A Civil Air Patrol pilot project is researching the feasibility of utilizing sUAS for aerospace education and potentially operationally for searches and disaster assessments. The results of this project will likely be groundbreaking and usher a new technology into the livery of tools available to Civil Air Patrol Emergency Services.

CTWG HOSTS NORTHEAST REGION'S SUMMER CADET LEADERSHIP ACADEMY

*submitted by
Lt Col James Ridley*

On July 11th thirty two cadets entered the doors of the Connecticut Fire Academy in Windsor Locks, CT and on the 17th of July they walked out of those same doors as graduates of the 2016 Northeast Region's Summer Cadet Leadership Academy. This was the first time in recent memory that the school was held in Connecticut and based upon the feedback of students, staff and parents the school was a giant success. The cadets were instructed by region and wing command personnel, U.S. Army field grade

officers, senior ranking Air Force, Non Commissioned Officers, a retired U.S. Air Force Major General and the Director of the Fire Academy.



Modeled after Civil Air Patrol's senior level Region and National Staff Colleges the RCLS as it is known broke the student cadets into group's called seminars which consisted of 8 cadets each and just as the senior level courses were constructed these seminars were guided and mentored by seminar advisors made up of senior ranked cadets all of whom were graduates of previous RCLSs. The cadet seminar advisors were not alone they each were mentored by senior advisors. "This was a great model" noted the school's director Lt Col James Ridley, Sr. the CTWG Chief of Staff. "We made this an academic environment and entrusted the students to be in class at the right time, in the right uniform and prepared and our faith in them paid off as these cadets were extremely responsible and appreciated the trust we placed in them" Ridley said.

Courses taught at the school included topics in leadership, communication, project management, conflict resolution and public speaking among others. Students would return from class into the seminar groups and put what they learned into practical exercises given to them by their seminar advisors, this technique allowed the cadets to put their knowledge to use which reinforced what they had learned.

One student c/2nd Lt Alexis Hoerness from New York put what she learned into good use at both the New York and Connecticut Wing Encampments which she

served as staff. Another student, c/CMSgt Andrius Burnelis from Pennsylvania stated that when he returned to his squadron after the RCLS he was tasked to be the acting cadet commander and he was "able to use the knowledge that I gained and planned out a very successful meeting. I had used the class "The Long Trip Home" as a situational leadership activity and the cadets loved it!" This story he shared with the RCLS cadre adding "I am telling you this to prove that the classes you taught at RCLS worked. Thank you very much for sharing that knowledge and I will do great things with it."

The students didn't simply sit in class all day and on two separate occasions they were treated to field trips, one to the New England Air Museum and one to the New England Disaster Training Center. "The school senior and cadet cadre deserve the credit for this incredible experience" noted the school's director who added "I hope we have the honor of hosting this school again in Connecticut. We had a great venue, a great staff, great instructors and a group of students I am proud to have attend this course" said Lt Col Ridley.

The next RCLS will be held in the winter at Fort Devens, MA and will be hosted by the New Hampshire Wing.

SIMBURY FLY-IN

The annual Simsbury Fly-In and Car Show will be held on 18 September at the Simsbury Airport. CTWG is requesting seniors and cadets to volunteer to help.

Reporting time is 0800 and CAP has been assigned to cover the flight line. Additional volunteers will man a recruiting booth. Lunch will be provided.

RECRUITING AND RETENTION

by

Col Kenneth Chapman, CTWG Commander

One of the most successful techniques for recruiting new cadets is to conduct a cadet recruiting promotion drive several times a year. Between now and the end

of September, I would like all units focused on a "back to school or Fall sign up" for new cadets. During this period all CAP units should advertise/communicate sign up for new cadets just like other youth organizations in your area (youth sports, scouts, youth activities). The beginning of the school year is when many of the youth organizations sign up new members, we should do the same. If you need help putting together an advertisement in a local paper or would like to have a yard sign, please communicate up through your chain of command. I suggest holding a "Great Start" program for all the new cadets towards the end of September.

Rewards:

Recruiter Ribbons. Awarded by the unit commander to cadets and senior members in recognition of outstanding efforts to recruit new members for CAP.

Cadet Ribbon. Awarded to cadets who recruit two new qualified cadets or senior members for CAP.

A bronze clasp is awarded for each additional two members recruited. A silver clasp replaces five bronze clasps. Bronze clasps are not worn after the silver clasp is awarded. An additional silver clasp will be awarded for each additional 10 members recruited.

Senior Ribbon. Awarded to senior members who recruit seven new qualified cadets or senior members for CAP. A bronze clasp is awarded for each additional 10 members recruited. A silver clasp replaces five bronze clasps. Bronze clasps are not worn after the silver clasp is awarded. An additional silver clasp is awarded for each additional 50 members recruited. Members recruited as a cadet may be included in determining entitlement in the case of senior members who were former cadets

For the cadet and senior member who recruit the most members between August 1, 2016 and Dec 31, 2016 they will be awarded a Wing Commander's Commendation award/ribbon and the Cadet or Senior Member Recruiter of the Year (2016) award.

Cadets should take advantage of wearing uniforms to school to raise awareness of CAP. Between now and the end of the year, below are recommended dates for

cadets to wear their uniform to school (if allowed by the school district). The Group Commanders can approve "one off" requests for the wear of the uniform to school. The school units (New Fairfield and Bridgeport Military Academy) are allowed to wear the uniform to school as necessary to support the CAP program in the school.

September 9 – Cadets allowed to wear uniform to school if allowed by school district (in honor of Patriot Day).

November 11 (11/10 if school closed 11/11) -- Cadets allowed to wear uniform to school if allowed by school district (in honor of Veterans Day).

CTWG EARNS TWO NER MISSION AWARDS

Col Kenneth Chapman, CTWG Commander has announced that the Wing has won two Northeast Region mission awards.

Cadet Programs was named on the basis that the program metrics reflect a strong cadet program.

Search and Rescue was cited primarily for our performance on the examination of Operations Evaluation. The Wing scored an "outstanding" on the last assessment.

The awards will be presented on 12 August at the National Conference.

CWG ENCAMPMENT

Eighty-two basis cadets and 75 staff participated in a range of activities including work in leadership, character development, physical training, and aerospace education.

The Orientation Flight Program was highly successful. As many as 11 aircraft from Connecticut, New Jersey, and New York gathered at Groton-New London Airport on different days. Some 57 sorties were launched, some carrying as many as three cadets.



Checking Fuel

Cadet staff and senior members presented a series of classes on topics in aerospace education, CAP history, customs and courtesies of the service, and many topics of special importance to CAP cadets.

Col Lukowski, an engineering officer with the Connecticut National Guard, spoke about his military career from enlistment and Reserve Officer Training Program. Lukowski oversaw much of the construction at Camp Niantic.

Lt Col Carl Stidsen, CAP, and a former USAF missile man, described the first of our intercontinental ballistic missiles, the Atlas. He then took us on a tour of one of the Plattsburg AFB missile field, two of which are in Vermont.



Rachael Manzer, who in 2007 was named as CAP's Teacher of the Year, spoke about the Perlan Project, the effort to fly a glider as high as 90,000 feet above sea level. Two of her students who designed experiments which will be carried by the glider were both at the Encampment.



Manzer Explains the Perlan Project.



C/CMSgt Jonathan Bell explains details of his experiment while Manzer and C/AB Christopher Reed look on.

Mr. Stephen Socolosky, President of Experimental Aircraft Association Chapter 166 spoke about the EAA's Young Eagles adventure which has flown over two million young people since its inception. Socolosky teaches with Manzer at the CREC Aerospace Academy of Science and Engineering. Currently, his students are building a Richard VanGrunsven designed experimental aircraft.



Socolosky Explains His Student's Aircraft Project.

State Representative Cara Christine Pavalock of the 77th District visited and spoke to a number of the Cadets.



Caucusing



Sharing Pizza



Sharing Ideas and Information

Campers have been asked about their favorite activities. The intensive program is tiring and several of them said that their favorite activity was sleep.



The drone of the engine and the smooth control movements of the Cadet at the controls of the Cessna 182 lull rear seat passenger Cadet Cantor into a somnolent state. (Photo Credit: R. Kornutik)



C/Ist Lt Sarah Eriksson Explaining Airfoils to the Basic Cadets.

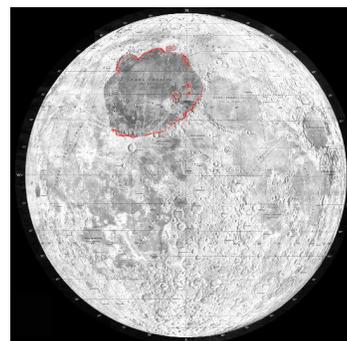
But among the staff, the most hard working group must be Service. They are up early to prepare breakfast, man the chow line and then prepare two more meals. Afterwards, they stay late to cleanup and prepare for the morrow but they are high-spirited and efficient workers.



In the dish room, the wash-up crew understand Col Saito' when he recalls General Yamashita's motto: "Be happy in your work."

CURRENT EVENTS

NASA scientists have estimated that the lunar impact site known as the Imbrium Basin may have been caused by an object ten times more massive than originally calculated.



The Imbrium Basin Outlined in Red. (Credit: srbauer)

NASA's Ames Research Center has been using a device called the Vertical Range Gun to study impacts at extreme velocities. The device is a 14 foot long cannon that can fire projectiles at speeds of up to 16,000 mph. The scientist use high speed cameras, impact on targets, and analysis of the patterns on the moon to conclude that the Imbrium Basin, 775 miles in diameter, was formed by the crash of a proto-planet 150 miles in diameter and ten times more massive than the previous estimates. Computer modeling suggest that the furrows in the southeast quadrant of the basin indicate that the impactor approached from the northwest.

The new findings indicate that many of the other impact sites observed on the moon and planets may have been caused by more massive objects that previously believed. Most of these sites occurred during a period of time known as the Late Heavy Bombardment, some four billion years ago.

AEROSPACE HISTORY

Firebombing: An Ambiguous Verb!

Prologue

Ironically, the verb “firebombing” has two meanings which are antonyms. Firebombing can refer to an aerial raid intended to burn enemy structures. It might also refer to the practice of dropping water and fire retardants to control and put fires out.

In a typical fire bomb attack by the military, incendiaries are combined with high explosives. The explosives splinter structures and make them more vulnerable to the incendiaries which set them alight. Some of the earliest examples are the Nazi attack on Guernica during the Spanish Civil War and their World War II campaigns against London, the “Blitz.” The Royal Air Force responded accordingly, operation Gomorrah. In July of 1943, Hamburg was attacked. A lack of firefighting resources and the intensity of the raid led to a firestorm. In about a hour, four and a half million pounds of bombs rained down on the city. The enormous fire created a low pressure area and winds up to hurricane force not

only spread the flames but fanned the also. Temperatures in the center of the storm reached 1,500 degrees Fahrenheit. Estimated deaths totaled 43,000.

The most well-known firebombing raids conducted by the United States Army Air Force were directed against Japanese cities. The B-29s, a strategic bomber designed for high altitude “pinpoint” bombing was found lacking. From 25,000 feet, the east flowing jet stream not only disrupted the path of the falling bombs but under certain circumstances, reduced the speed of the bombers to unacceptable levels. General Curtis LeMay, in command of the XXI Bomber Command new tactics using incendiaries to set alight the wooden structures prevalent in Japan's cities. He eliminated much of the defensive armament of the planes which were not needed for the night raids. This allowed the aircraft to carry a heavier payload. LeMay then sent them in at low altitudes, under 10,000 feet. The planes carried combinations of incendiaries, napalm, white phosphorous, and thermite bombs.

In March of 1945, he launch “Operation Meetinghouse,” probably the most destructive air raid in World War II. This one attack, three million pounds of bomb, resulted in 100,000 deaths and the destruction of 250,000 structures. The immediate deaths at Hiroshima and Nagasaki were estimated to be in the same range! But the firebombing was a continuous campaign. One estimate is that 230,000 more deaths can be attributed to firebombing.

The Early Days



Fairchild KR-34

In Canada in 1921, a ranger and his fire fighting equipment was delivered to the site of a fire and managed to extinguish it, the first known incident of an aircraft used to fight a fire. But the aircraft was

just a transport, not a water bomber. The earliest water bombing attempt can be traced back to the State of Washington, attempt, in 1930, to put out fires by dropping water filled wooded kegs. The aircraft employed could not carry enough payload to make a difference. During the late '30s and early '40s, a Fairchild KR-34 was used experimentally by Carl Crossley to drop water bags and use a 45 gallon drum placed in the front seat of the Fairchild. Three to five gallon water bags were also used and a conveyor system was installed in a Norduyn Norseman. In 1945, Crossley extinguished a small fire at Elk Lake, Canada. A DeHavilland of Canada (DNC) Beaver was employed in 1950 and had some success. However, slow response time, poor accuracy, and limited coverage ended these early attempts. Five years later, Tom Cooke of the Ontario Provincial Fire Service (OPAS) developed tanks which could be fitted on the top of floats and filled while the seaplane was in motion. Water delivery was much improved and within five more years the OPAS fitted the tanks to all of its 25 Beavers and eight DHC Otters.

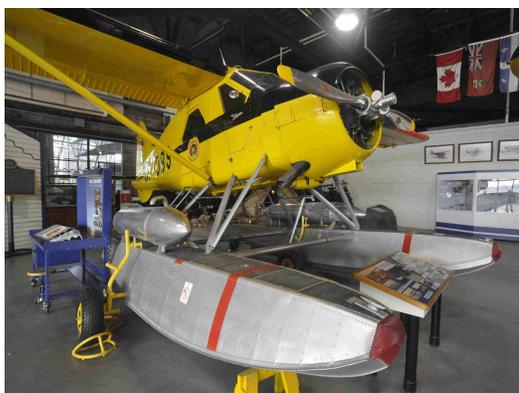


A CL-215 flanked by two B-17s.



Hawkins & Powers Privateer at their Greybull Base

The gap in between was filled by a host of twin engine aircraft such as the North American B-25 Mitchell, and the Douglas A-26 Invader. Aircraft which did not see active service due to their late development were also added to the fire-fighting fleet, one example being the Grumman F7F TigerCat. Transport aircraft which were modified included the giant Martin JRM Mars the Douglas DC-7, and the jet augmented Fairchild C-119 Packet.



Beaver with Float Mounted Roll-Over Tanks

The Era of Development

Canada, rich in lakes, specialized in float aircraft. In the United States, with fewer lakes, land-based aircraft predominated. The vast number of cheap surplus aircraft left over from World War II now entered service. The aircraft ranged from the single engine Grumman TBM Avengers large four engine bombers such as the Boeing B-17 and the Consolidated PB4Y Privateer.



Mars at Its Sproat Lake Base



Last of the Line of Piston Powered Douglas Transports-A DC-7B Sporting an External Tank



A jet equipped Packet Awaits Maintenance

By the 1970s, newer aircraft were converted to fire-bombers. Seven Grumman S2F Tracker was adopted by the Canadians and modified with in-fuselage tanks. DHC developed a new aircraft specifically for the fire fighting missions, the Canadair CL-215.



A Flight Line of CALFIRE Trackers (Credit:CALFIRE)

Tactics were improving. In general, drops are not made directly on a fire but along the edges or ahead of it to stop its spread. A lead plane, the air attack plane, is often called a “bird dog” is used to carry the supervisor to determine critical aspects of the fire and sometimes, lead the air tanker to the correct site. Lead planes range from the piston powered Cessna 337 Skymaster to the turbo prop North American OV-10 Bronco to the jet Cessna Citation.



Part of the CALFIRE Bronco Fleet (Credit CALFIRE)

Water is used but it is not as effective as dedicated chemical mixtures. The drops are inaccurate, too diffuse, and the water evaporates quickly. The new chemicals contain thickeners which improve the characteristics of the water and enhancers which increase the ability of the water to “stick” to surfaces. Past practice used borate salts but they rendered the soil sterile and were toxic to wildlife. Now, ammonium sulfate and ammonium polyphosphate are commonly used and actually fertilize the soil. The red color marks the drop site to provide guidance to subsequent drops. The chemicals must be loaded on the ground. Aircraft which pick up water directly while “on the fly” sometimes carry tanks of guar gum to “thicken” the water which improves accuracy.

The most modern aircraft include modified Lockheed Electras, the Douglas DC-10, and even a Boeing 747.



A DC-10 Passes it King Air Bird Dog. (Credit: 10 Tanker Corporation)

The Lockheed C-130 Hercules is sometimes called up from Air National Guard and Air Force Reserve units. When this is done, the “Herc” is equipped with a Modular Airborne Fire Fighting System or MAFFS. The palletized MAFFS unit contains tanks of

retardant and pressurized air tanks which propel the retardant through two nozzles mounted on the rear cargo ramp. The newest systems discharges the retardants through the paratroop door, a change which improves the aerodynamics of the aircraft.



North Carolina Air National Guard C-130 on Duty

Helicopters such as Sikorsky's S-61 Sea King and the Boeing CH-46 Chinook are also part of the battery of airborne fire fighters.



One of Coulson's S-61s Fills its Belly Tank at Sprout Lake, British Columbia.

The twin engine jet Beriev Be-200 is a Russian contribution and the Japanese ShinMaywa US-2, a four engine turbo prop amphibian has seen limited service. Even single engine aircraft may be found on the fire line, notably the PT-6 powered Ayers Thrush and Grumman S-T2.



Two Thrushes Await the Call at Custer State Park. South Dakota.

Older aircraft are still utilized. The piston powered Lockheed P2V Neptune modified with the addition of two jet engines are used by at least two U.S. operators.



Neptune Depositing its Suppressant Payload (Credit: Jeremy Ulloa)

In the United States, the U.S. Forest Service (USFS) and the Bureau of Land Management contract private corporations to fight the fires such as Aero Union, Neptune, and Erickson Aero. Canadian corporations, some of which fly in the United States include Coulson and Conair.

The State of California has its own "air force." The California Department of Forestry and Fire Protection, CAL FIRE, owns a fleet of over 50 aircraft: Trackers, Broncos, King Airs, and Super Hueys at 13 different bases. The pilots and maintenance personnel are contracted employees and a number of aircraft are "on-call" and available

through private companies. Other nations maintain water bomber aircraft, some as national assets. In France, the *Direction de la Défense de la Sécurité Civile* flies the Bombardier 415, the Grumman Turbo Cat, and the Bombardier Dash-8. In Israel, the Air Force has established Unit 249 and equipped them with Air Tractors AT-802F.

In the United States alone, the USFS spends almost 300 million dollars a year to finance the service. Around 50,000 dollars/day is need as a retainer fee for the private companies. Aircraft on call may run over \$10,000/day. When one counts ground crews and equipment the bill for suppressing wildfires works out to about 1.2 billion dollars. But the economic losses can be counted in the many billions and include property damage, insurance payments, labor market and transportation disruption and losses in the tourist trade. Epilogue

Some of the other aircraft used in aerial fire fighting are worth viewing.



These Florida based aircrews joust with death and survive. Are they here to try their luck at the casinos?



Former Navy Lockheed Orion (fireengineering.com)



The Douglas MD-87



This Italian based Bombardier 415, on the step, in the act of scooping up water. (Credit: Horticultural marxist) A Sikorsky S-70 Firehawk Visiting Groton.



Russian IL76 (Credit: Tech. Sgt. Joselito Aribuabo)



Sikorsky S-64 Aircrane (Credit: Etan Tal)