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The Mediterranean countries are often harrassed by forrest fires in the summer season. Long dry periods and hot onshore winds are high-risk factors in this. Beside this there is a human factor, by accident or not. Fire-fighter planes have a crucial role in fighting these fires and south European authorities know this. They have taken their precautions by having special squadrons with fire-fighter planes on alert which each year unhappily find their way to the newspapers. Sometimes tourists who act unresponsable cause the fires, and this year in Italy and Greede they even suspect criminal intentions in creating fire. This story is about the successful Canadair fire-fighter plane.

Canadair CL-215/415 is a famous concept.

Though several existing types of planes were reconstructed in the past to firefighters, while also helicopters contribute with their baskets, there is no other airplane so suitable designed especially for this task as the ultimate Canadair CL-215/415. Canadair originally was part of the American General Dynamics, a consortium with experience in manufacturing flying-boats but later on it was bought off by the Canadian government.

The CL-215 which was nick-named 'Scoop' had already been designed by that time and there appeared to be a need. Firefighting was done at the time by reconstructed land-planes but anyone will understand that a flying boat which can refill it's tanks in no-time on a nearby lake or at sea results much more efficient when every second counts. Totally, 125 CL-215's were built which did not only serve the Canadian regions, but also were delivered in a smaller scale to several other countries. Amongst them, the military authorities of France, Greece, Italy, Yugoslavia (later on Croatia), Venezuela and Thailand.

Keep up with the times

When a need existed at the end of the eighties for an improved version with much more powerful and trustworthy turboprop engines, they immediately started to work on this. At first, some 17 CL-215 planes received reconstruction with special retrofitkits to the CL-215T version, amongst them most Spanish examples. But simply to improve the old ones by mounting new engines wasn't enough for Canadair and the much improved CL-415 was introduced. As for appearance not so very drastic different compared to the CL-215T, which already had the characteristic aerodynamic improvements of the tail-section of the CL-415. The CL-415 however had been renewed in several other aspects and so the 'Scoop' became the 'Superscoop', meanwhile built by Bombardier.

How does it work ?

Two pilots head for a landing on the water. With the new more powerful Pratt & Whitney Canada PW123AF turboprops with 4 bladed Hamilton propellor (15 % more power) the plane became very manoeuvrable and was capable in flying very short turns. The CL-415 – depending on the waves – can fill its four tanks in about 10 to 12 seconds (the CL-215 has only two tanks and loads less water) via inlets under the belly of the fuselage with about 6140 liters to lift off immediately afterwards and head for the disaster area. Landing means a firm speed of 65 – 70 knots, which at the same time remains the speed for the lift-off. Main advantage is that they don't have to get back to any airbase to load extinguish fluid and several sorties can be made to collect water and drop it over the flames in relatively short time. Fresh water as well as sea water can be taken in. Ofcourse the plane is made as much as possible of anti-corrosion material but transporting sweet water is 'a miracle to the airplane' as Charis Charousis, a Greek 113 Combat Wing CL-415 pilot from Thessaloniki described it to us. Eyecatcher was a 100 PSI mounting cap on the side of the fuselage and Charis explains that the procedures of washing the engines are a real necessity after an adventure at sea.

Foam

The water in the tanks is mixed with foam which combination increases the fire extinguish capacity with the factor two to three times. Firefighting this way requires a minimum height of 100 feet to drop because the 'bubble' of the liquid has to develop, and on the other hand you would'nt like to singe the plane in the meters high flames. This so-called 'minimal safe altitude' can be flown in a sharp angle and that is necessary because you want to try to avoid flying through the thick smoke. For the case you would want to do so anyway, this trick requires special features which are called handling bleed valves. These valves have to avoid compressor stall. The optimal drop speed is 110 – 115 knots. All water can be released at once, but also combinations of for instance tank 2 and 4 or 1 and 3. The mixing system and the dropping system of the CL415 has been improved. Still it is straining work with calculated risks, which demands much of the pilot. The work can be sometimes very lasting because big fires sometimes are not extinguised but only held under control for expansion to inhabited area's. The average end of a working day about 15.00 hrs is not relevant for these guys.

The very challaging occupation gives the crew a strong kick of adrenaline and when the job is done it creates an extremely satisfied feeling ! Often the pilots are military like in Spain (431/432 Escuadron, Spanish airforce at Torrejon with CL-215T), Croatia (855 PEE, Croatian Airforce at Zadar and Dubrovnik with CL-415) and Greece (airforce units 355 mira with CL-215 at Elefsis and 383 mira with the CL-415 at Thessaloniki). Sometimes the planes that are military property are flown by civil organisations like in Italy where the Societa Recherche Esperienze Meteorolo (SOREM) maintains the CL-415 planes of the Italian Airforce under the Dipartimento Protezione Civile (DPC) and operates from the many different airfields spread all over Italy. The other way around this specific work sometimes is executed by governamental related civil organisations like in France with the Securite Civile (CL-215 as well as CL-415 from Marignane) where the planes act next to other firefighters like the

Catalina and the TurboTracker. Ofcourse the main operator is Canada itself where every provincial authority has it's own small fleet. With so large afforested area's a large capacity is needed ofcourse. Though almost everywhere the 'Tweety-bird-yellow' color is used, Canada also operates some white examples.

Danger for life

How dangerous this work is in reality was made clear this summer because though speaking of calculated risks two CL-415's crashed during extinguishing fires. Not only dryness but also carelessness or 'just a little playing with fire' can just end up in an enormous disaster. Geographically seen you won't always have the most ideal mission area's. What if a fire nests on a mount partition or over and over again you have to pass a mount peak to reach the nearest suitable water area ? So much extra effort is demanded from the pilots ! Having the most of help and primacy from traffic-control in flight manoeuvring you feel that you have everything at your arrangement but still local situations can be treacherous apart from different (bad) weather conditions. Sometimes a fire demands very difficult and dangerous angle to fly in, and next to that the heat causes unpredictable turbulences in the different air layers. 23rd of July was such a day of disaster, because at first the Italian firefighter team lost a CL-415 and later on the Hellenic Airforce at the same day. Eyewitnesses saw the plane crash on the South part of the isle of Evia, north of Athens. It had just emptied it's tanks over a fire near the village of Dileso when for some reason it could not get enough height and it crashed on the mount partition. Charis' colleagues the 34 year old Flight Lieutenant Dimitris Stoilidis and the 27 year old Flying Officer Yiannis Hatzoudis died in the armour. Whatever caused this terrible accident is hard to find out. Were they too tired ? Was it a technical failure ? Or was it perhaps a quite impossible mission which they would never refuse because they had too much character for that ? We absolutely had the impression that the best pilots fly the firefighters because Charis varied effortlessly between the CL-415 with a jet-fighter and in the weekend the beautiful DC-3 of the Hellenic Airforce for fun, he more or less 'played' with the planes. If they can't do it, nobody can !

Future with different tasks ?

The CL-415 has an air-conditioned 'glass cockpit' with electronic flight systems (EFIS) and liquid crystal displays. (LCD). Present are a flight management system (FMS), moderne navigation and communication-equipment like VOR/DME, ILS, GPS, FM and HF-VHF radio's and advanced radar. For surveillance there is FLIR equipment and if required a SLAR supply. The 'Superscoop' has aerodynamic improvements in the tailsection, because especially with very low and speed passes the plane must be extremely stable so that violent turbulence should not be a too heavy problem. Because the flying conditions are heavy and many landings have to be made at sea on quite high speeds, these facts have to be found back in a tight maintainance schedule. Every 50-100 flying-hours an intensive check is made and there is a yearly maintainance program. Next to that, there is a six-years cycle in factory-maintainance (PDM). When this is executed you can hardly find back the plane between the scaffolds.... In general with firefighting the flight is made with two pilots but Bombardier tries to make more tasks operational for the plane which implicates the crew is to be extended. Because it concerns a flying boat rescues at

sea can be easily done, and in that case two extra SAR operators are added. Within this task a rubberboat can be transported internal, and a hoist can be mounted. In this version the plane is called CL-415MP. Finally there is a version the CL-415GR, the most advanced version with a higher operational weight and suitable for CSAR tasks. Customers for the CL-415 versions are again a number of already mentioned countries like Canada, France, Greece, Italy, Croatia and Spain, but also newcomers like Argentine. Greece has next to the common version called CL-415 MP two CL-415GR in use that are able to recover pilots out of enemy sea-territory. The number of delivered aircraft is just beneath 100, and orders don't come so easily because though one of the best in firefighting, where there is a need for a certain number of this planes, it is also of interest that for the mentioned secondary tasks many other competitive planes are in the market. However the extremely disastrous summer season with extensively use of de airplanes seems to force authorities to think about extending their fire-fighting forces.

Wim Das & Kees Otten

CL-215 in short

Crew:	2
Engines:	2 Pratt & Whitney R2800 83AM 18 cylinder radial piston
Propellor:	3-bladed constant speed propellers
Power:	2 x 1565 Kw (2100 pk)
Maximum cruising speed:	290 km/u (157 kt)
Rising speed:	1000 voet/min.
Range:	with maximum cruisespeed 1715 km (925 nm.)
Range:	with 'long range' cruisespeed 2095 km (1130 nm.)
Weight (empty):	12.220 kg.
Maximum startingweight:	17.100kg van uit het water en 19.730kg vanaf het land
Wingspan:	28.60m.
Length:	19.82m.
Height:	8.98m.
Wingsurface:	100.3 square meter

CL-415 in short

Crew:	2
Passengers:	8, without tanks 30
Engines:	2 Pratt & Whitney Canada PW123AF turboprops
Propellor:	Hamilton Standard 14SF-19 4-bladed constant speed propellor diameter 3,97m
Power:	2x 1775 Kw (2380 pk)
Length:	19.82m
Height:	8.98m
Wingspan :	28,61m
Wingsurface:	100.33 square meter
Operational empty weight:	12861 kg

Watertank capacity: 6160 liter
Maximum startingweight: 19,848 kg.
Maximum weight after scoop:20865 kg.
Maximum landingweight: 16783 kg.
Cruisespeed: 296-315 km/u
Maximum cruisespeed: 376 km/u
Minimum runway take-off: 844 m (op water 814 m)
Minimum runway landing: 674 m. (664m. op water)
Maximum range: 2427 km (1310 NM)
Waterdropping per hour: 54140 liter (within 11 km from the fire)
Consumption: 840 liter per uur
Maximum freightcapaciteit:6123kg.
Ceiling: 4.500 m. (6100 m. Voor de GR-versie)
Climbing speed: 420 m./min
Startingspeed: 163 km/u
Landingspeed: 157 km/u
Design limits: + 3,25/-1 G.
