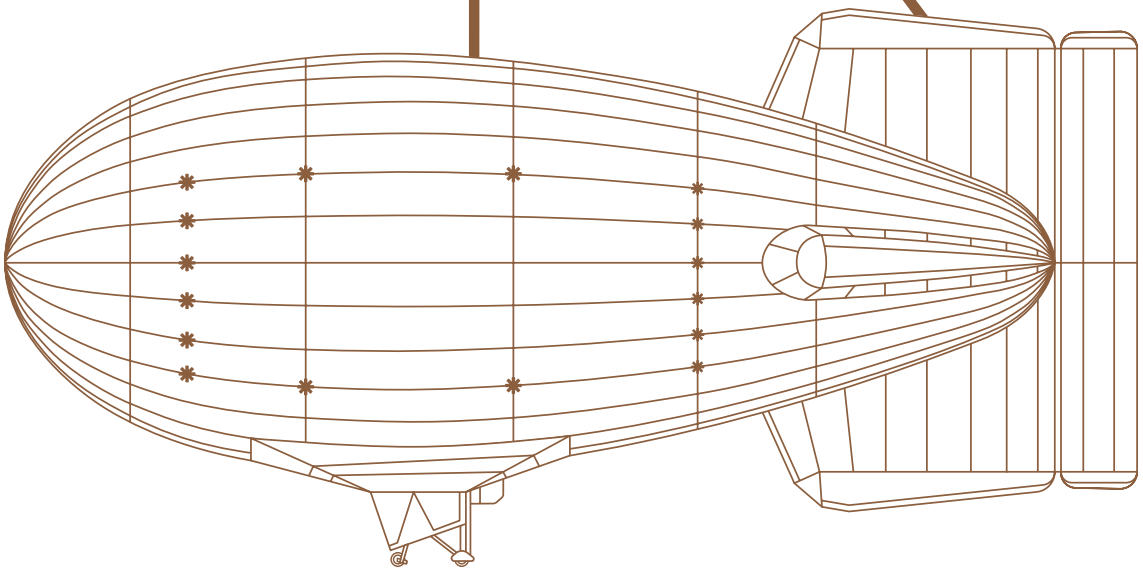
HOT-AIR AIRSHIP PIONEERS



INTERNATIONAL MANUFACTURERS, AIRSHIPS IN LUXEMBOURG

Commune Aérostatique du Grand-Duché de Luxembourg

Compiled by Pit Thibo in collaboration with Guy Moyano

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SUMMARY

PREFACE

The recent history of hot-air airships is closely connected with Luxembourg and even more so with the country's enthusiasts, whose far-sightedness, innovative mindset, passion and friendliness created the ideal conditions for their ideas to spread far and wide.

These conditions—which developed over the course of the 1970s and 1980s—were founded on three bodies whose complementary natures enabled each one to bring its expertise to bear in the most effective way possible and to enhance that expertise by working together on joint projects. The first of these bodies was the Commune Aérostatique du Grand-Duché de Luxembourg. The first ballooning association to be founded in Luxembourg, with goal of making ballooning in general more widespread, in- and outside the Grand Duchy, the Commune enabled ballooning enthusiasts to live their passion to the fullest and share it with others. It also drew on the communication potential of hot-air balloons to open up opportunities for a new form of sponsorship. The growing interest in airships and hot-air balloons led to Luxembourg being, at the time, the country with the largest number of balloons per head of population in the world.

In contrast with hot-air balloons, the advertising potential of hot-air airships has always been clear. However, operating them requires far more logistical support and a much larger team, making them costlier, often to the extent that an association like the Commune cannot justify the expense.

This challenge was overcome by means of the foundation of an airship- and balloon-marketing firm in the 1980s, with a view to exploiting this marketing and communication niche. Compagnie Aéronautique du Grand-Duché de Luxembourg S.A. played a huge role in fine-tuning the hot-air airships themselves, making the advertising campaigns that use them more effective and boosting their overall popularity.

The last of the three bodies to be founded enabled continuous technological innovation in the field of hot-air airships: Cameron Balloons Luxembourg S.à r.l. This partnership with the world's largest manufacturer of hot-air balloons and airships gave the Grand Duchy's enthusiasts direct access to huge amounts of expertise. Together with the main Cameron Balloons company, headquartered in Bristol (UK), Cameron Luxembourg played a big part in the continued evolution of airships and will keep doing so.

Thanks, then, to enthusiasts like Alfi Feltes, Jang Sauber, Norri Theisen, Pit Thibo, Poully Emering, Guy Moyano, Don Cameron and their respective teams, whose farsightedness, skill and energy made possible a whole chapter in the history of hot-air airships.

Claude Sauber, Goy Feltes
Commune Aérostatique du Grand-Duché de Luxembourg

INTRODUCTION

This booklet has been compiled for enthusiasts of thermal airships, also called hot-air airships, for all friends of the Commune Aérostatique (the first ballooning association to be founded in Luxembourg), for all organizers of airship events and, in particular, for the former team and crew members of Guy Moyano—whether he knew them from his job as a professional pilot or from flying in competitions. This explains why this book has been published in English and why descriptions of the international history of hot-air airships are interwoven with notes on events in Luxembourg.

In this endeavor, we thought it would be useful to summarize the efforts made worldwide by manufacturers to get thermal airships off the ground and to develop them for practical use. Of course, the first word should go to Don Cameron, who started it all in 1973 when he flew the first ever thermal airship. His notes span a period of more than 40 years. The US-based manufacturer Raven was a major player early on, developing a craft with considerable input from engineers, which is why we have reproduced excerpts from a technical paper the company presented to the American Institute of Aeronautics and Astronautics (AIAA) in 1975. It gives a sense of the complexity of bringing a dirigible airship into active service. We have also added a simple explanation of the difference between gas airships and thermal airships; this should help the reader to understand what each type of airship can and cannot do. The last section focuses on Guy Moyano's involvement in the scene, mainly within Luxembourg, but also internationally.

PIONEERS AND MANUFACTURERS

DEFINITIONS: GAS AND THERMAL AIRSHIPS

While heavier-than-air aircraft (airplanes, helicopters, gliders, etc.) need to be in motion to create the aerodynamic forces necessary for their lift, aerostats do not need this. Aerostats, or lighter-than-air aircraft, obtain their lift from a natural source: a light gas contained in an envelope (helium, hydrogen, hot air) displaces an identical volume of a heavier gas—in this case, ambient air—to exert a lifting force equal to the difference in weight between those two gases.

All aerostats have this same characteristic, but only airships can control their movement in relation to the wind direction. Balloons, on the other hand, are tied to the wind and cannot move without its help. The word "airship" describes an aerostat that has propulsion and is dirigible (from the Latin verb dirigere: "to steer"). The World Air Sports Federation (FAI) distinguishes between several different categories of airship:

1) Categories in relation to the ways they are constructed:

- Airship with a soft envelope, filled with gas (blimp)	*subclass BA (FAI)*
- Airship with a rigid structure for its envelope, filled with gas (Zeppelin)	*subclass BR (FAI)*
- Airship filled with hot air	*subclass BX (FAI)*
- All other airships	*subclass BT (FAI)*

2) Categories in relation to envelope volume, from 500 to more than 100,000 m^3:
In contrast with gas airships, which can be rigid or non-rigid, all hot-air airships have a non-rigid envelope nowadays. There are two ways of designing hot-air airship envelopes, namely:

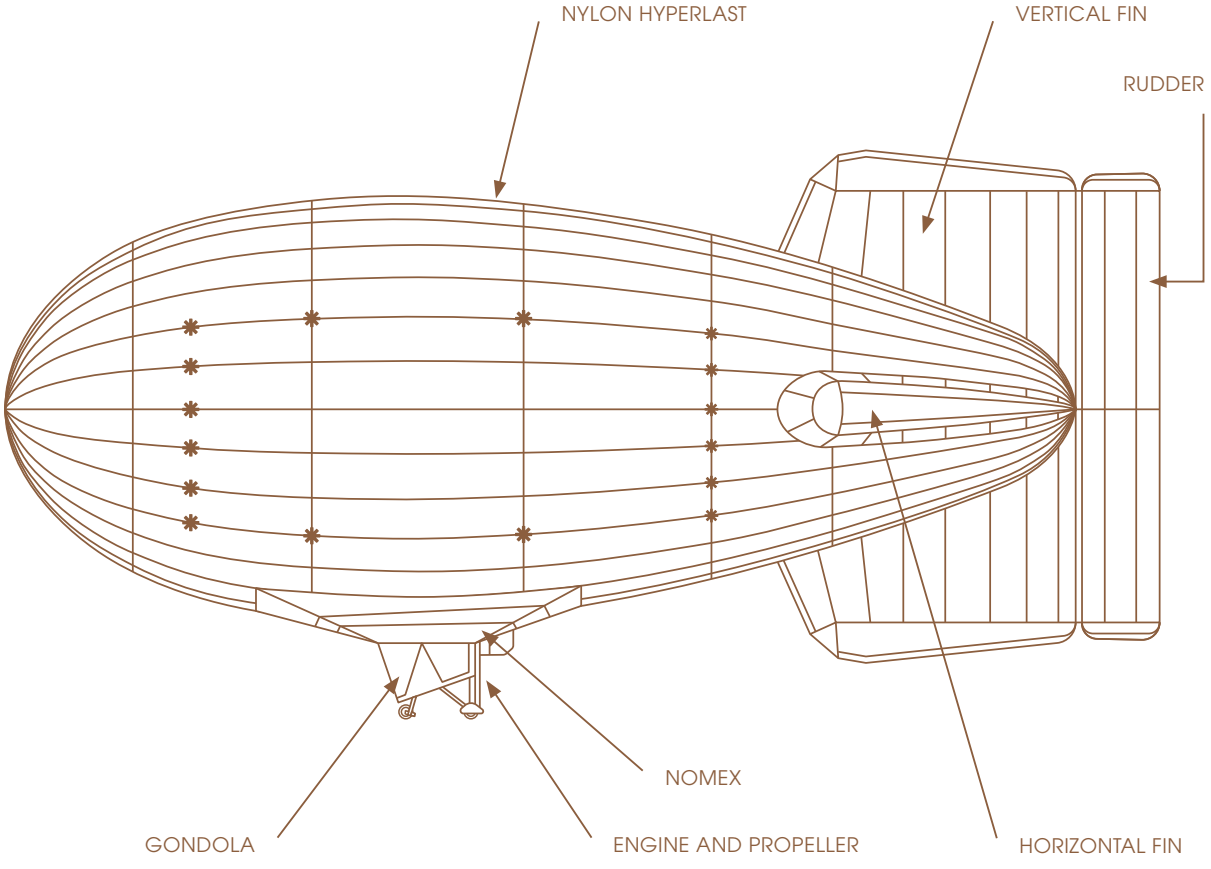
- Pressurized envelopes
- Non-pressurized envelopes

Gas airships are capable of flying into winds at speeds exceeding 100 knots, since the pressurization of their closed envelope gives them a degree of rigidity, enabling the envelope to withstand the significant forces caused by external pressure.

This is not the case for hot-air airships, for the good reason that, rather than a light gas, they use ambient air heated up in a non-closed envelope. When a hot-air airship's envelope is non-pressurized, the internal pressure is very close to the atmospheric pressure of 1 bar; it is slightly higher (less than 2 bar) for pressurized envelopes. This very low internal pressure cannot absorb large external forces without risking deformation and, consequently, emptying the non-closed envelope. Hot-air airships are only capable of fairly low speeds, rarely exceeding 18 knots (33 km/h).

The air inside the envelope is heated with a propane burner, which makes it lighter, producing a lifting force for taking off or gaining height. The propane, as well as the pilot and passengers, are carried in a gondola suspended under the envelope, which also includes a propulsion engine, making it possible to steer the aerostat by adjusting the tail fins.

Owing to the low speed, directional control is slow to respond and the pilot needs to use a high degree of anticipation when steering the airship. Also owing to the low speed, the tail fins have to be fairly large, in order to enable better control. For both of these reasons, piloting is very delicate work and pilots, in addition to their ability to fly the airship, must be prepared for considerable physical work.



THE MAJOR MANUFACTURERS OF HOT-AIR AIRSHIPS

CAMERON BALLOONS, UK

As Don Cameron tells it, the idea dates back to the early 1960s. In classical ballooning, steering is a question of harnessing the wind direction at different altitudes; it is the ultimate challenge of ballooning. Yet most balloonists have wondered whether they could have more control. What if there were a craft that, while steerable, retained the balloon's ease of transportation, unpacking and inflation? It is no surprise that development ideas for hot air airships first came from the experienced hot air balloon pilots who founded the WASP project.

The WASP project

The Warm Air Ship Project (WASP) was an early attempt to build a hot-air airship. In the early 1960s, Anthony Smith and Malcolm Brighton made some good progress, although they did not succeed in making a flight.

Malcolm Brighton had considerable ballooning experience and was a good practical engineer. He was a leading member of the group that built the *Bristol Belle*. The WASP envelope was built in appropriate black and yellow colors. Malcolm also developed a very successful burner, which was the forerunner of many later hot-air-balloon burners. Although much good work was done, it did not succeed and the last anyone heard about it was that the envelope had been sold to someone who wanted to hold parties inside it.

THE WORLD'S FIRST HOT-AIR AIRSHIP – JANUARY 7, 1973

Donald Cameron writes up the story of his first and subsequent developments on hot-air airships:

"It seemed so very obvious. There were gas balloons and gas airships. There were hot-air balloons and an empty space waiting to be filled. Just as the hot-air balloon had made ballooning affordable and easier to do, why could we not do the same for the airship? The potential advantages were even greater. A gas airship has to be filled with expensive helium and, because this could not be discarded at the end of every flight, an airship has to be kept in a large and expensive hangar. A hot-air airship in contrast could be deflated and stored in its trailer when not in use, costing nothing.

Of course, there were disadvantages. The main one was that a hot-air balloon has to be three-and-a-half times the volume of a gas balloon to generate the same lift. This is no problem for a free balloon, but for an airship, which must use motor power to drive it through the air, it is quite a snag. And all airships are more difficult to develop. Anthony Smith once said that, although you would expect an airship to be twice as much work to develop as a balloon, it is actually more like a hundred times. He was right.

Mindful of these factors, and of the WASP project, I nevertheless decided to try to make a hot-air airship. I made an elongated envelope in red, white and blue, and began to weld an airship car from square steel tubing. Fuel tanks and burner would be standard balloon

DONALD CAMERON
Founder of Cameron Balloons Ltd in 1971

parts and the engine would be an air-cooled Volkswagen Beetle engine. This needed a speed reduction arrangement and a propeller, and that was proving difficult for my limited workshop facilities.

The solution was to team up with our first balloon customer, Professor Teddy Hall. His scientific instrument company had every mechanical technology imaginable, together with some that I could not imagine. He took on the job of finishing the airship car.

On November 1, 1972 we made a trial inflation at Wantage. At this stage, the envelope had no fins. Over the next few days, a single steering fin was added to the base of the envelope at the rear and, on December 20, 1972, we flew again from Wantage, making a series of flights including 'S' turns. On January 4, 1973, we met at Wantage again. Teddy Hall and I flew the D-96 airship for one and a half hours. In calm air, we made many short flights with good steering control, but at low power. We were satisfied with progress and decided we could reveal our secret project.

January 7, 1973 was the second day of the Icicle meet, the only balloon meet held in the winter months in the UK. We secretly chose a field upwind of the Icicle launch field where the participating balloons were beginning to lay out. We launched the airship and immediately found that, at the speed necessary to counter the modest wind, it became very unstable and difficult to steer. Our flight was mostly backwards as the wind drove us towards the Icicle crowd, but we managed to control it enough to make a victorious landing on the balloon field. We decided not to take off again.

Almost everyone who was interested in lighter-than-air flight in the UK at that time was there. Interest and curiosity were immense. It was photographed, one picture appearing on the front cover of the next issue of *Aerostat*, the British Balloon and Airship Club magazine. Tim Godfrey, a member of the London Balloon Club suggested that we should name it 'Isibidbi'. It stands for 'I see it, but I don't believe it'. (Tim was an original thinker. For example, noticing that leaves are always in motion on windy days, he discovered that the cause of wind was that trees conspired to flap their leaves, driving the air along.)

It was not a complete coincidence that we staged this event at the exact moment when the newly established Thunder Balloons were about to present their first balloon, which was built in the colors of the Union Flag. Ann Lewis-Smith, writing the report of the meeting in *Aerostat* magazine said, 'But alas Thunder Balloons had such competition that had it flown upside down it would have been hardly noticed because with at least five balloons half inflated and twelve laid out, the excitement began. Behind the winter-thin thicket edging the field could be seen a huge red, white and blue balloon – balloon? As it turned we could see it was slightly elongated, people began running across the field to get a better look and above the questioning voices could be heard a slight whirr. Slowly over the trees rose the new Cameron-Hall baby, a HOT-AIR DIRIGIBLE. The gondola with the big propeller and two low slung seats looked in the best Heart Robinson tradition, and the fin was semi-limp as she was driven through the misty sky. There could not have been one of us who didn't feel pride on seeing the A of the BBAC become a reality.'

Later versions of the airship had more and larger fins, finally achieving the stability in direction and pitch that was needed. The technique of having an open base with the burner situated in an air intake scoop worked well, but caused drag and limited possible speed. The more complicated solution of a sealed, pressurized envelope was later adopted.

Many D-96 airships were made and a single-seat version was made as a D-38 and, later, a D-50. These single seat versions were very convenient to operate and great fun to fly but, like all the ramair pressurised versions, they were outclassed by the fully pressurized airships. We then manufactured the DP airships in a range of sizes.

With the rise of the GEFA airship company in Aachen, we recognized that Mucky Busemeyer was putting more development effort into hot-air airships than was practical for us, so it became better to sell GEFA airships instead of our own. Following the closure of the GEFA company, Cameron Balloons holds the Type Certificate on behalf of the Mexican owner of the intellectual property.

Since 2017, Cameron Balloons has developed a new pressurized airship design which aimed to simplify the high level of complication of the latest designs. The D-77 is a practical, easily operated airship, which has full pressurized airship performance and is about half the price of the GEFA versions."

D.CAMERON, NOVEMBER 2020

MODEL D-96

1972 November 1

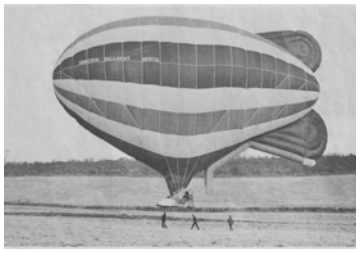
Trial inflation, envelope without any fin

1972, December 20

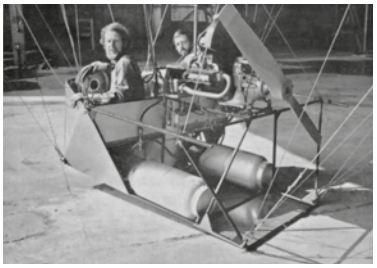
Trial flights with one vertical steering fin added

1973, January 4

D-96, G-BAMK (2,718 m³, VW engine, two-seater, two vertical fins) at Wantage, Berkshire: WORLD'S FIRST HOT-AIR AIRSHIP FLIGHT, Pilot: Don Cameron. Flown by Don Cameron and Professor Teddy Hall



First gondola on prototype D-96 built by Professor Hall at the controls: Messrs. Nigel Tasker and Chris Lee, engineer at Cameron

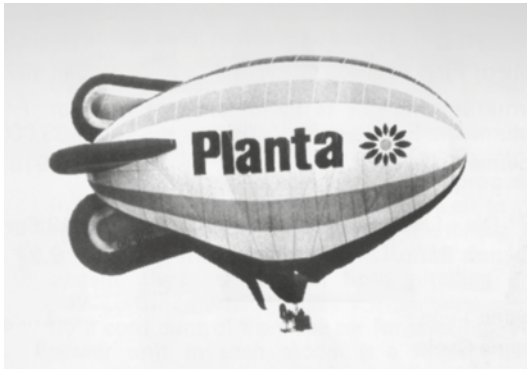


1973, January 7

Presentation of D-96, G-BAMK at Newbury, Icicle Meet, for the World's first hot-air airship public and official flight

D-96 at icicle Meet

D-96 for Belgium



1978

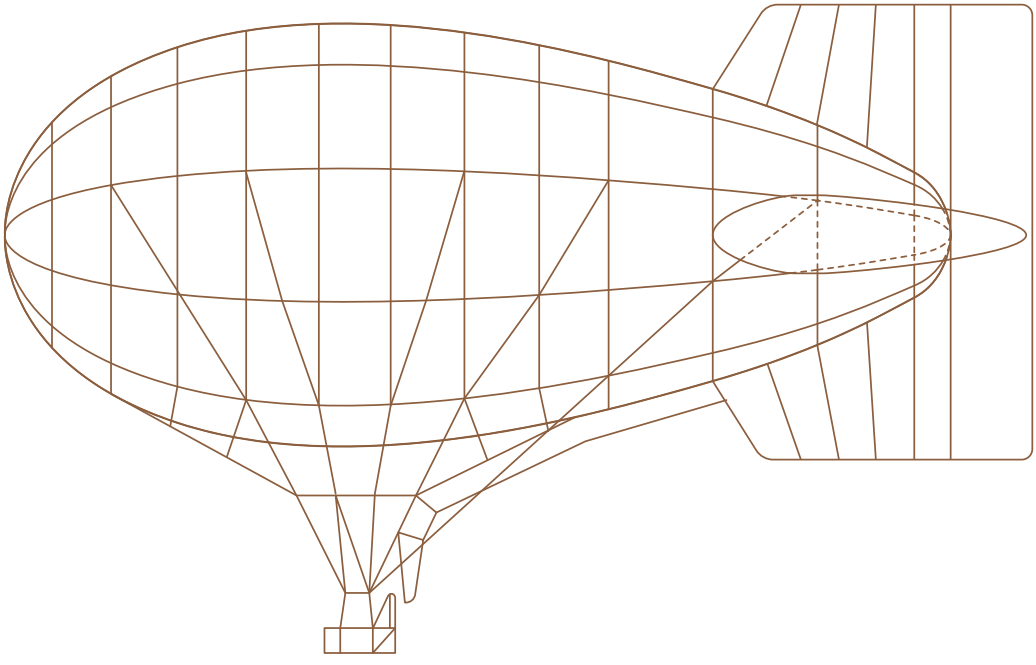
Modifications on prototype (two vert. fins, two horiz. fins, gondola suspension, envelope) lead to production model, of which 16 are sold in the USA, Australia, Belgium, Japan, France, Spain and the UK. This includes D-96 Planta OO-GDM, the first hot-air airship to fly in Luxembourg on July 10, 1977

MODEL D-38 AND D-50

MODEL DESIGNATION

	D-96	D-50	D-38
LENGTH	31.0 m	25.0 m	22.8 m
HEIGHT, INCLUDING CAR	18.6 m	16.8 m	15.3 m
MAX CREW	2 to 3	1	1
GROUND CREW REQUIRED	2	1	1
LIFTING GAS	Hot air	Hot air	Hot air
DATE OF FIRST FLIGHT	Jan. 1973	Sept. 1981	Oct. 1980
VOLUME CU FT.	103,000	50,000	38,000
VOLUME CU M.	2,918	1,416	1,075
MAX DIA OF HULL	13.6 m	10.9 m	10 m
FINENESS RATIO	2.27	2.28	2.28

Cameron D38/50 showing revised fin layout



Open, fabric-covered gondola

1980, September 25

First flight of model D-38 G-BGEP (single seater, 1,078 m³ envelope, Fuji-Robin single cyl.)

Cameron D-38

1986, November 28/29

In airship G-BGEP, the first Luxembourg pilots Pit Thibo and Guy Moyano acquire their hot-air airship licenses with instructor Giovanni Aimo in Italy.

Giovanni Aimo in D-38, pilot and instructor

1981, September 2

First flight of model D-50 (single seater, 1,416 m³ envelope)—11 units of model D-50 are completed by 1984.

D-50 flown here by Michel Brédy from France

THE DP SKYSTAR SERIES

1986, April 25

DP-50 SkyStar (single seater, 1,416 m³ envelope), first flight by Don Cameron in Bristol, UK

DP-50 single seater

Gondola conceived by Tom Sage Bristol

1987, January 7

DP-60 First flight of Skystar G-INCF *Cactus* (two-seater, 1,700 m³, König engine), piloted by Don Cameron in Bristol, UK

1987, January 19

DP-60 G-INCF—first production model (*Cactus*) makes its official inaugural flight in Château-d'Œx. When transferred to Luxembourg, it was registered as *LX-UFO*.

Competition wins for the DP series:

1988 DP-60 *Cactus* takes second place at the Worlds in Luxembourg, flown by Guy Moyano.

1990 DP-70 *Besançon* takes World Champion Title at Clumber Park, Nottingham, UK, flown by Vincent Dupuis, France.

Hofbräuhaus Traunstein piloted by Guy Moyano DP-90 flown to second place at the 1990 Worlds at Nottingham, UK

1991 DP-80 LX-PST *Lux-Post* takes European Champion title in Mondorf, Luxembourg, flown by Guy Moyano, Luxembourg.

Lux-Post being inflated

1992 DP-80 LX-PST *Lux-Post* takes World Champion title in Besançon, France, flown by Guy Moyano, Luxembourg.

DP-80 LX-PST *Lux-Post* beats the duration hot-air airship world record, with a flight of five hours, six minutes 42 seconds in Luxembourg, flown by Guy Moyano.

Lux-Post during record attempt

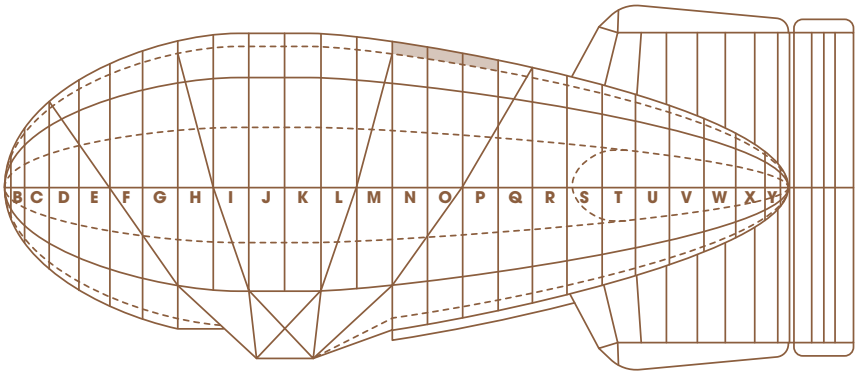
1993 DP-80 LX-GUY *CK* takes second place at the Grand Prix of Luxembourg in Meysembourg, Larochette.

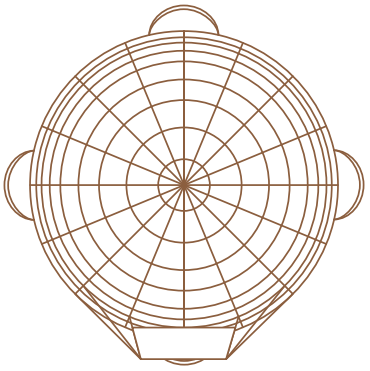
1994 DP-80 LX-GUY *CK* World Championship in Château-d'Œx, Switzerland, takes sixth place.

MODEL D-77

2015, June 4

D-77 (envelope of 2,180 m³, engine Polini Thor 250 two-stroke, two-seater, Helix three-blade propeller, max. take-off weight 699 kg, envelope weight 168 kg, gondola plus burner weight 131 kg, plus two cylinders and passengers) EASA certified





The D-77 is the most recent design by Cameron and, with its cost dramatically reduced thanks to design simplicity, it offers new opportunities for the future of hot-air airships. Cameron keeps one unit available for training and familiarization flights. By the end of 2020, the Cameron factory in Bristol had, over the years, produced 36 D-Series like the D-96, D-38 and D-50; 32 DP-Series like the DP-70, DP-90 and D-77; and 24 AS-type airships from designs by both T+C and GEFA FLUG. This totals close to 100 airships!

RAVEN INDUSTRIES INC., USA

In late 1974, Raven started to design and build a hot-air airship designated STAR (short for Small Thermal Airship by Raven), which achieved its maiden flight on January 7, 1975, piloted by Jim Winker.
The most comprehensive information available comes from two sources:

1) A letter from Jim Winker to Pit Thibo, dated January 3, 1991 (see below) on the history and fate of the only STAR airship built

RAVEN INDUSTRIES, INC.

RAVEN

17 JAN. 1991

3 January 1991

Mr. Pit Thibo
CAGDL
B.P. 2 L-6101 Junglinster
LUXEMBOURG

Dear Mr. Thibo:

I have your letter of December 12th directed to Mr. Christensen. Your name is well familiar to me, having followed European ballooning activities for many years.

Fortunately, I have readily available some written materials and a few slides of our STARship hot air airship which I will be happy to enclose. I think the writeups are fairly complete, so I won't elaborate further here, except for a couple of comments.

The 1977 report was presented at a symposium sponsored by the Association of Balloon and Airship Constructors. By that time it was fairly obvious that our momentum had been lost. We never did receive the interest necessary to revive the project. Thus, the airship described ended up as a one-of-a-kind prototype.

Nevertheless, that one ship did have a useful and productive life. It flew extensively for two years for the bank mentioned. It was then sold to individuals in California, and to the best of our knowledge had little use after that. We had inquiries about it a few years ago, so it was still in existance then, but the envelope was undoubtedly not airworthy.

Some of the people in our Aerostar subsidiary were planning to go to the symposium in Aachen, but I am not certain they have been able to commit to the trip yet.

It seems I have heard rumors that Luxembourg may be the site of a future HAB World Championship -- 1993 or '95. If so, I will probably be there.

Sincerely,

Jim Winker

Jim Winker
Vice President
Raven Industries, Inc.

(I MET MR. FELTES WHEN HE WAS HERE IN SEPTEMBER)

Applied Technology Division / Electronic Systems Division / Plastics Division / Sportswear Division

LETTER FROM RAVEN (JIM WINKER)

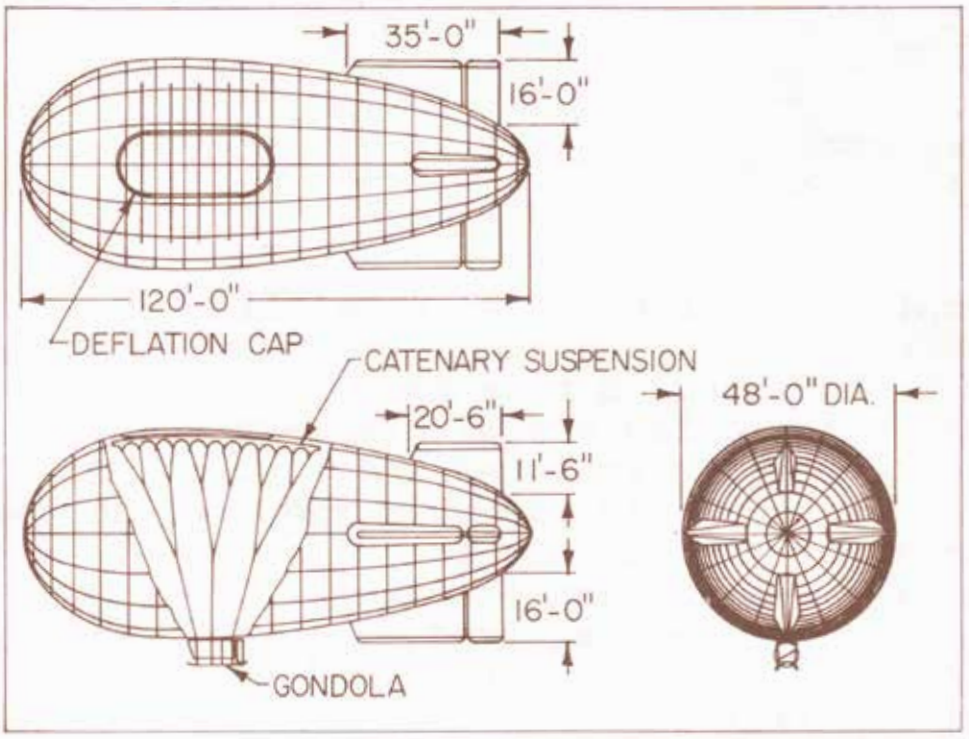
2) Excerpts from a technical paper presented to AIAA (No. 75-925) in 1975 by Roger Parsons, co-pilot on the maiden flight, which provides excellent information on the system design, specifications, detailed design features of the envelope (hull), gondola and operations and performance

EXCERPTS FROM PAPER BY ROGER PARSONS

DETAILED TECHNICAL DESCRIPTION OF THE RAVEN STAR AIRSHIP

SYSTEM DESIGN

The original design parameters for the STAR airship were low initial and operating costs, ease of maintenance, and relatively simple logistics; these have all been achieved. This is the first manned airship to be constructed that can be stored in a small fabric bag and, within less than an hour's time, be inflated and flying. The only in-the-field assembly required is the mating of the gondola to the balloon. Expensive rigging and mooring devices for storage are not required. And only a very small ground crew is required to get the airship flying.



STAR airship assembly

THE STAR AIRSHIP SPECIFICATIONS

CHARACTERISTICS & PERFORMANCE	
LENGTH	120 ft
DIAMETER	46 ft
NUMBER OF GORES	16
NUMBER OF FINS	4
RUDDERS	1
ELEVATORS	2
BALLOON FABRIC	2.9 oz/yd^2 urethane coated Dacron
BALLOON VOLUME	140,000 m^3
BALLOON WEIGHT	600 lb
GONDOLA WEIGHT	1,300 lb (full fuel)
GROSS LIFT	2,400 lb
USEFUL LIFT	500 lb
SPEED (MAX)	25 mph
ENDURANCE	3 hours
DESIGN ALTITUDE	5,000 m
PROPULSION ENGINE	VW 65hp 3,000 rpm
FUEL CONSUMPTION	3-4 gal./hr
PROPELLER	2-blade, adjustable pitch, 56 dia, Ducted
FUEL CAPACITY	20 gal.
BURNERS	11 x 10^6 BTU/hr each
PROPANE CAPACITY	80 gal.

HULL (ENVELOPE)

The shape of the STAR airship hull is based on the conventional Navy Class-C shape, which is aerodynamically efficient and well known. The hull has a fineness ratio (length to diameter ratio) of 2.5:1 and a volume of 3,964 m^3, resulting in a length of 120 ft and a diameter of 48 ft.

The fabric used in the construction of the hull is a urethane-coated Dacron polyester ripstop with a weight of 2.9 oz/yd^2. A UV inhibitor is added to the urethane coating, so that the fabric not only has zero porosity, but it is protected from ultraviolet rays. The hull is comprised of 16 panelled gores, which results in a very smooth shape. The selected fabric has approximately 50% higher tensile strength in its machine direction than it does in the transverse direction. Since the circumferential stress in a balloon of this shape is twice that of the longitudinal stress, maximum fabric properties could be utilized by running the machine direction of the material circumferentially, resulting in paneled gores. Circumferential high-strength load tapes are sewn longitudinally through the hull for strength reinforcement and to act as additional ripstops. These same load tapes are also sewn into every gore seam. The fabric has high tear-strength properties, however; if a tear developed and were not terminated by the ripstops in the fabric, it could only proceed as far as a local tape, which would prevent a catastrophic failure.

Two lines of catenary load patches are located near the top of the hull. These catenary patches distribute the load of the gondola evenly for a length of 50 feet each, resulting in a material loading of approximately 1.4 lb/in. These patches are constructed of the same fabric as the balloon and are sewn to the hull, employing a "T" tape construction. 24 cables eventually merge into six load attachment points on the gondola.

Centered between the catenary patches, at the top of the hull, is the deflation cap. This fabric cap is held in place with a Velcro fastener and is actuated by pulling from both ends toward the centre. A nylon netting is sewn over the whole opening on the outside to prevent the cap from being forced out as a result of the internal pressure of the hull. Pressure-relief vents, for hull overpressure, are located fore and aft of the gondola on the longitudinal axis.

Four inflatable fins are located on the aft of the hull section for stability and directional control. The fins are inflated through openings in the fin root/hull interface. The movable rudder and elevators are inflated through a fabric hinge to the fins, thus allowing for easy movement. The size of the control surfaces was selected on the basis of those surfaces which have provided controllability in previous airships. Actuation is provided by cables that run from the rudder and elevators, through the hull, to hand cranks in the gondola, which provide some mechanical advantage in deflecting the surfaces.

Additional attachments on the hull include holding line patches for the ground crew and Velcro fastener strips for advertising displays.

GONDOLA

The gondola can accommodate a pilot and co-pilot, is 12 feet long and weighs 1,300 pounds with full fuel, which includes 80 gallons of propane and 20 gallons of aviation fuel. Liquid propane, stored in stainless steel tanks, is used as the fuel for the twin 11-million-BTU/hr burners to heat the air in the hull. The burners sit on the top of the gondola and are inside the balloon. The fan for pressurizing the hull is located beneath the burners to provide an adequate supply of air for propane combustion. The fan is driven by a seven-hp, four-cycle engine. Since pressurization is important for controllability of the airship, a redundant drive for the fan is employed. A clutch engageable power take-off drive from the propulsion engine is used for this purpose.

The propulsion engine, mounted at the tapered aft end of the gondola, is a Volkswagen single ignition engine converted for aircraft use. The engine develops 65 hp at 3,000 rpm and up to 78 hp at 3,500 rpm. This engine offers excellent reliability and performance, acceptable weight and reasonable cost. Aviation 100-octane gasoline is used as the fuel for both the propulsion and fan engines.

A five-foot diameter propeller is employed as the thruster, directly coupled to the propulsion engine. A relatively simple lightweight shroud, constructed of low-density urethane foam covered with fiberglass, is attached directly to the gondola to produce the advantages accruing to a ducted fan. They are:

1. Increased fan kinetic efficiency by reducing fan tip speed (smaller diameter) and fan blade tip loss
2. Decreased fan diameter resulting in a minimum ground clearance requirement
3. Protection of ground personnel by shroud
4. Reduced sonic vibration and noise
5. Better flight-speed range with a fixed blade pitch

The aft end of the gondola is purposely formed into a symmetrical wedge to improve performance of the ducted fan. An air-intake slot, for the pressurizing fan, is disposed vertically just aft of where the gondola begins to taper. By creating a pressure differential across the gondola with the suction method, the boundary layer of the gondola is removed, thus preventing heavy asymmetrical vortex shedding.

The pilot and co-pilot are positioned side by side with clear visibility to both sides and front. The instrument panel sits just below the front windshield and is easily read and reached by either the pilot or co-pilot. Instrumentation includes an altimeter, rate-of-climb, hull pressure, fuel gauges, airspeed indicator, hull temperature, and a complete set of propulsion engine monitoring gauges. In addition to instrumentation, controls for the airship include rudder and elevator, propane flow to burners, propulsion engine throttle, blower speed, thermostatic burner controller, burner override, and pressure-relief vents. The basic controls result in yaw, pitch, and altitude control.

OPERATIONS AND PERFORMANCE

Mating of the balloon to the gondola is a relatively simple task, requiring very little time. The interfacing ring, which is permanently attached to the balloon, and carries the material stress across the opening in the hull, as well as the load suspension cables, are joined to the gondola with "quick pins" at six load-carrying locations. Plumbing for the burner and thermocouple also utilizes quick couplers. Inflation of the hull then proceeds while the deflation cap is being reinstalled, from the previous flight, and all systems are checked. Inflation has been performed in winds up to 10 mph; however, it is very important that the nose be pointed into the wind. The balloon then weathercocks at +/- 15° about this point. The pressurizing fan produces a flow of 5,500 cfm at zero pressure and thus requires less than thirty minutes to fill the envelope. As the hull becomes half inflated, the burners are ignited electrically, and the balloon begins to rise over the gondola as inflation continues and it is brought to its buoyant condition.

Take-off is usually accomplished without forward thrust. A nose down attitude of 3° is designed into the system with a full fuel load. As fuel is burned off, the centre of gravity shifts back until it is aligned directly below the centre of buoyancy and the pitch angle becomes zero. Consequently, negative aerodynamic lift would be created if the propulsion engine were used on take-off.

Once the airship is off the ground, the propulsion engine is accelerated to give directional control. Depending on wind conditions and propeller speed, the pitch of the airship varies +/- 10° to 12°; however, this reaction is very slow and only happens with a severe

wind gust, or quick acceleration or deceleration. This degree of pitch variation is not uncomfortable and should be expected in a non-rigid low-pressure airship.

The elevator deflection angle required to trim the airship is a function of airspeed; however, under most conditions, 5° deflection will trim the airship at a response rate of 1° to 2° per second. The elevators are set at zero on take-off and are not generally actuated except to trim the pitch angle. The elevators are the co-pilot's responsibility. The single rudder is located on the bottom fin to take advantage of propeller wash. Thus, by increasing airspeed, the response to rudder deflection is increased. Turning rates have been checked on several occasions and result in 3° per second at half power and 4° per second at 75 % power (approx. 15 knots). Both pitch and yaw control of the airship have proved to be acceptable.

Only one of the top 11-million-BTU burners is plumbed for use by the pilot for flying. The second burner is plumbed independently and is used only during inflation and as a redundant or emergency feature. In a slow flight condition, a climb rate of 500 feet per minute is attainable with a single burner. As power is applied to the airship, the heater is required to burn more frequently due to cooling caused by the increased air flow. Consequently, an altitude gain can be achieved by slowing down the forward motion.

The primary functions of the pilot, then, are the burner (altitude control), yaw control (rudder), and forward speed. And the primary duties of the co-pilot are pitch control (elevators), hull pressurization (fan speed and pressure vents), as well as burner control which includes monitoring propane usage. The airship can be flown by either the pilot or co-pilot, as all instruments and controls are accessible to both individuals. Additionally, the airship can be flown automatically, as far as altitude control is concerned, simply by given hull temperature setting. Thus, the burner will "blast" anytime the hull temperature falls 2° below the present temperature. A 'deltaT' of approximatively 170° F (temperature of balloon minus ambient) is required to fly the airship.

Radio equipment is carried aboard for communicating with the ground crew, which is especially helpful for landing. Normal flight operations are VFR day only, in light to moderate wind conditions. The airship has been flown in winds up to 20 mph. Landing the airship is accomplished by pointing into the wind and cutting power just prior to touching down. The deflation panel is pulled as soon as the balloon has stabilized with the ground and deflation of the hull then requires approximately one minute. It then requires about as much time to fold and package the system as it does to prepare it for flight. A ground crew of six is required to launch and package the airship without any equipment other than the self-contained system and a small truck and trailer for transportation.

The fact that his airship, with its technical sophistication, was somewhat ahead of its time, coupled with insufficient promotion of it, caused it to be a commercial failure.

BOLAND BALLOON COMPANY, USA

Brian Boland has designed and built a number of experimental balloons, of which some types were very successful and some were exported. He succeeded in finding lightweight fabrics and concentrated on easy transportation conditions for hot-air balloons and airships.

A-1 – *Albatross*

Brian Boland started developing hot-air airships with the same lightweight principles in mind on his first airship—A-1, *Albatross*— which accomplished its first flight on October 11, 1975. It had an envelope volume of 3,965 m³. It was powered by a 40-hp Rockwell engine. Many modifications and improvements were made over the years and, by August 1979, it was flown in its final version.

Boland A2

A-2 – *Rover*

Work began in 1982. The envelope volume was close to 2,265 m³, the Rockwell engine from the A-1 was initially used. In 1988, the A-2 participated, with Brian as pilot, in the first World Championship for Hot-Air Balloons in Luxembourg, where it placed 15th. During those championships, it established an officially recognized World Altitude Record by reaching 5,059 m above sea level, piloted by Brian Boland himself. This record was officially verified and recognized by the Fédération Aéronautique Internationale (FAI).

Taking off for **world record flight in Luxembourg**, 1988

A3 – Pocket Blimp

A3 – *Pocket Blimp*

This model flew first in 1994. It had an envelope of 1,585 m³.

A-5

The A-5 featured a pressurized envelope of 1,585 m³. It made its first flight on February 28, 1998. It had two 15-hp engines with contra-rotating propellers. It was originally planned to have a single-seat gondola, which was later replaced with a tandem-seater gondola with a 28-hp pusher engine. (Info sources: *Jane's All the World's Aircraft 1984-85;* Pit Thibo's airship journal)

Brian Boland with Norri Theisen and Prime Minister of Luxembourg, Mr. Jacques Santer

HAMMARS, SWEDEN

Hammlätt at
Mr. Forbes's Meeting,
Château de Balleroy,
Normandy, France

The *Hammlätt* airship was designed and built in 1976 by an enthusiastic group of Swedes, calling themselves the Scandinavian Lighter than Air Society. This group was comprised of Janne Balkedal, Hans Åkerstedt, brothers Mikael and Wilhelm Klingberg, and Kurt Dahlström. Cameron Balloons of Bristol, UK, assisted with stress calculations and manufactured the envelope to their design. The airship was designated a Cameron DS-140, serial number 200. The "D" stood for Dirigible, "S" for Swedish, and "140" for the volume of the envelope, 140,000 cubic feet. The airship was sponsored by Hammars, a housebuilding and demolition company in Gothenburg. The name "Hammlätt" is a combination of the sponsor's name and "lätt", the Swedish word for "light".

At the time of its construction, there were not yet any written requirements for the manufacturing of balloons in Sweden, so the existing rules for the UK were used. As Cameron Balloons was an approved manufacturer, that company was the manufacturer of the airship for approval purposes. Despite this airship's roots in the UK, it is still regarded as a Swedish design. Nothing about the design of the airship was changed as a result of the joint venture with Cameron, but many design elements were initially borrowed directly from the Cameron D-96.

Janne Balkedal,
airship and balloon pilot,
co-author of Hammlätt
airship

Propulsion was provided by a 60-hp Volkswagen engine converted for propane, and the fins were pressurized by means of a fabric tube positioned in the propeller slipstream behind the gondola. The gondola hung from a unique aluminum

1977, April 4
First Flight of *Hammlätt* (up to four seats, 4,000 m., engine VW 60 hp)

Hans Akerstedt, airship captain (also a jet liner captain by trade)

frame, which spread the payload evenly between 14 attachment points at the base of the envelope. This is the only hot-air airship built to date which has used a suspension system of this type. Up to four occupants could be carried by the airship, but pilot and one passenger appears to have been the norm. The airship's typical measured speed was 13 knots (24 km/h).

The airship was first registered in England as G-BEHI on October 25, 1976. The first flight took place on April 4, 1977, at Sundbro airport in Sweden. All flights were considered test flights until August 7, 1979, when it was issued an Export Certificate of Airworthiness. It was then registered in Sweden as SE-ZAA. Swedish Type Acceptance was issued on September 25, 1979, and the Swedish Certificate of Airworthiness was issued on the 26th. The Hammlätt had logged approximately 150 hours as of 1985 and, at that time, it was leased to an advertising company in Reims, France. It has flown in Scandinavia, the USA, Portugal and France.

Additional info was received by Pit Thibo from Hans Akerstedt, one of the originators of the Hammars airship on February 24, 2014:

"Hello.
I found some info on internet: http://www.hotairships.com/airships/hammars/
I have no idea how it ended up there but it is fairly correct and saves a lot of work for me.
The pictures at the top are from a flight in Norway in 1980, taken by me.
I have no idea how they found its way to internet and I do not know how they got all the facts.
The airship was leased to a French group during a few years about 1985 and then returned.
The envelope was scrapped and used to cover dirty fields when inflating balloons.
The car was stored in Janne Balkedals farm and just a few months sold.
The new owner has restored it and even run the engine.
He plans to get it airborne again under a balloon envelope.
Hans"

THUNDER BALLOONS/COLT/THUNDER & COLT/ LINDSTRAND BALLOONS, UK

Dick Wirth, Tom Donnelly and K. Simmonds were the founders of the manufacturer Thunder. They started working together in 1970 and, in 1972, produced their first hot-air balloon—the Jumping Jack—which first flew in early January 1971 at the Icicle meet in the UK.

Per Lindstrand and Hakan Colting joined forces to build Colt Hot-Air Balloons in Ireland, which operated from 1976 until 1978. When Hakan Colting moved to Canada, Per Lindstrand continued to operate, in the UK, under the name of Colt Balloons. Colt developed the group's first hot-air airship.

1980

First inflation of Colt AS 80 (Bedford, UK, hangar No. 2)

1982/1983

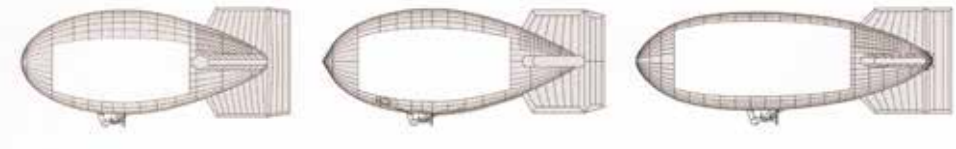
Thunder and Colt merge

Thunder Colt
two-seater gondola

AS-80

The AS-80 had an envelope of 2,265 m³, a two-seater gondola, inside-envelope catenary, suspended gondola, twin burners inclined to the front and to the rear, with a 5-hp electric fan for pressurization underneath

DETAILED TECHNICAL DATA ENVELOPE



TYPE	AS105MKII	AS120MKII	AS105GD
VOLUME M3 (FT3)	3,000 (105,000)	3,400 (120,000)	3,000 (105,000)
OVERALL LENGTH M (FT)	36 (118)	39 (128)	44 (144)
MAZIMUM DIA. M (FT)	12.4 (41)	13 (43)	12.5 (41)
WEIGHT KG (LB)	250 (550)	300 (660)	205 (451)

AS-105 Mk 2
Built in 1992, piloted by Fabien Droz of Switerland, also used many times for archeological research

AS-105
One of Jacques-Antoine Besnard's airships, four-times winner of World Championships for Switzerland

the burners, two deflation parachutes and a Honda 50-hp engine. It was available in several sizes: AS-42, AS-56, AS-80, AS-90, AS-105, etc. Large numbers of the successful AS series were built and inspired the GEFA FLUG airships produced later.

After 1984
Colt AS-105 (same as AS-90, but three-seater), envelope of 2,973 m³

1984
certified AS-42 and AS-52 (single-seater, scaled down from AS-105, Koenig engine)

1989
Thunder Colt AS-261 (envelope of 8,500 m³) Rainforest Tree Canopy Research Project

Airships of the AS series have won several European and World Championships, mainly with the Swiss pilot Jacques Antoine Besnard at the controls. With his highly experienced team, Jacques Antoine Besnard won four World Champion titles.

Cameron Balloons took over Thunder and Colt, before taking a two-thirds stake in Lindstrand Balloons. At that time Per Lindstrand formed Lindstrand Technologies, which produced its first airship envelope: the AS 300.

AS-56
World Champion in 1988, piloted by Oscar Lindström, Sweden

Cindy and Rick Wallace at a briefing

AS 90, piloted by Rick Wallace, USA

AS-42
with Tom Donnelly, flown to third place in 1988 Worlds in Luxembourg AS-90 1984

Thunder Colt AS-105 by Besnard, Switzerland

LINDSTRAND TECHNOLOGIES, UK

The **AS 300** airborne during flight tests

AS 300

A replacement envelope for the Rainforest Tree Canopy Research Project's Thunder Colt AS 261 was designed and manufactured. Its envelope volume of 8,500 m³ made it the largest hot-air airship ever built and flown. Some modifications were made to the original AS 261 gondola.

HS 110
Designed for use in advertising

HS 110

In 1995, the HS 110 was built, with an envelope of 3,125 m³, scaled down from the AS 300. It has a gondola for two occupants. It is designed for use in advertising and had a reasonable amount of commercial success. At least eight units were sold.

BEIJING INSTITUTE OF AERONAUTICS AND ASTRONAUTICS (BIAA), CHINA

Pilot Xin Cheng Gao flying a prototype dating from 1985 at Gatineau in 1998

1986

First flight of the BIAA Mifeng/Bee-6 (four-seater, 2,983 m³ envelope, Rotax 447 engine). It went into series production in 1987. At least four were built. A prototype with a modified envelope from a hot-air balloon apparently flew first on December 20, 1985.

One Bee-6 airship placed 12th at the first World Championship in Luxembourg in 1988, piloted by Mr. Ji-Bo Luo and Mr. Yong Kang Wu of Beijing University's Research Group of Light Aircraft Design. It was equipped with a Barnes-type twin burner. Even though it came late to the Championship, it placed well thanks to its high speed, which was achieved with a high internal envelope pressure—in excess of 2 bar—in contrast with most other ships present, which were designed for internal pressure of 1 bar.

Bee-6 four-seater gondola

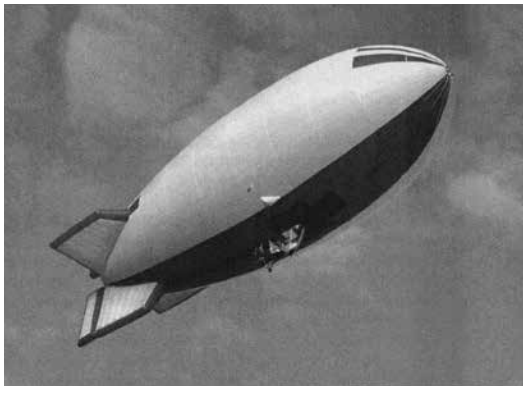
Chinese team at the award ceremony in Luxembourg

GEFA FLUG, GERMANY

GEFA FLUG was founded by Karl-Ludwig "Mucky" Busemeyer with some friends in December 1980. For years, he experimented with radio-controlled model airships, including model hot-air airships, before starting to rebuild balloon envelopes and, eventually, having his first hot-air airship experience in a Cameron DP-70. He later started to fly a one-seater Thunder Colt AS-80.

On March 1, 1990, the AS 80 GD—the first real GEFA FLUG airship—had its maiden flight. This two-seater with a 2,265 m³ envelope was a joint venture, with Thunder Colt supplying the gondola and GEFA FLUG using its newly developed AS80 GD envelope, derived from a Thunder Colt envelope (slimmer cross-section, stretched, ratio length/diameter 3:1, with one inner vertical partition and certified by the Luftfahrt-Bundesamt (LBA) in Germany).

Mr. Busemeyer's first T&C **AS-80**



First GEFA FLUG **AS-80** envelope

One-seater gondola on an **AS 80**, with Mucky Busemeyer

AS-105 GD
four-seater flown
by Gennady Oparin,
Russia

AS-105 GD
four-seater flown by
Ludmilla Ushakova, Russia

AS-90 GDs piloted by Wojtek Bambersky, Poland and Rimas Kostecivicius, Lithuania in St. Petersburg

AS-105 flown by Pietro Contegiacomo from Italy 1995: certification of new AS 105 GD 4 with GEFA-designed four-seater gondola (2,973 m. envelope; Rotax engine)

GEFA FLUG 4-seater gondola

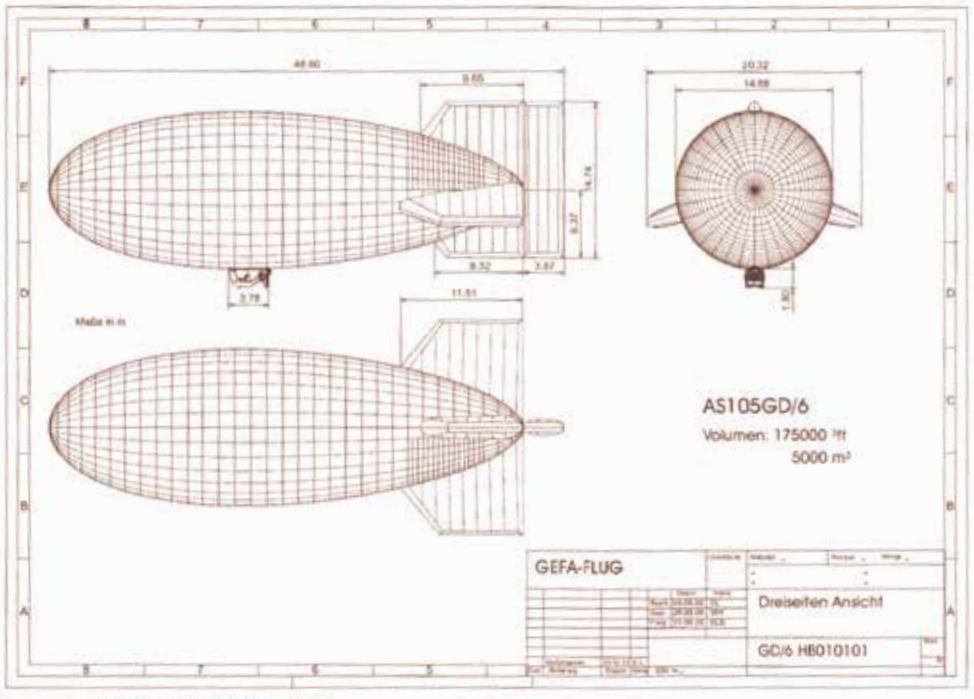
Six-seater gondola on the ground

On May 10, 2010, EASA certification was obtained for the AS-180 GD/6, the first six-seater hot-air airship ever. The EASA certification included passenger transport and night flying.

The factory was able to deliver several orders for production before it went out of business, including a four-seater for the Bayer Group for a one-year promotional world tour.

On August 31, 2015, financial circumstances forced GEFA FLUG to stop production. Up to that date, 70 airships had been completed and delivered by GEFA FLUG. No other manufacturer except Cameron has been able to sell as many hot-air airships. The company was officially dissolved in 2017. At that point, Cameron Balloons, Bristol, became the owner of the type certifications. Sales are accepted by Cameron for airships of the GEFA FLUG range that are to be registered in countries requiring type certification. In Mexico, the Merino Group produces airship gondolas and, potentially, envelopes according to GEFA FLUG specs. A number of countries in South America do not require type certification. Presently, there is active cooperation between Mexico and Bristol factories. Airships of the AS-GD type can still be ordered today.

Memoirs and biography of K. L. Busemeyer, Copyright 2019, Karl-Ludwig Busemeyer, k.l.busemeyer@airtopia.org. Available from the publisher tredition GmbH, Hamburg.



Zeichnung LS Hülle Sechssitzer – 2010

Envelope cross-section of the **AS-105 GD/6**

AUGUR ROSAERO
(RUSSIAN AERONAUTICAL SOCIETY), RUSSIA

Rosaero has been building both gas and thermal airships for a number of years. The company specialized in designing airships to set world records. In 2005, it designed and built the Augur 29 thermal airship.

AUGUR 29 *Ziablik* (meaning "chaffinch")

This model was built in 2005, for the purpose of setting a world speed record for thermal airships. Its envelope volume of 860 m³ allowed a single-seater gondola. Pilot Nikolai Galkin successfully set the world speed record of 27.5 km/h in 2005, a record officially recognized by FAI. The previous record had been held by a Cameron DP-70, piloted by David Hempelmann-Adams of the UK.

AUGUR 29

Augur 35 *Snow Goose* (also *Polar Goose*)

This airship was specially designed and built for setting a new world altitude record. The record was successfully set on August 17, 2006, by reaching 8,108 m above sea level. The record has been officially certified by FAI. The record-setting flight was piloted by Stanislaw Fuodoroff, a long-time partner in Rosaero and driving force in the company. The gondola could take up to three people and envelope volume was 2,950 m³. It was equipped with a "Raket" engine made by Aero and its first flight was in 2005.

Stanislaw Fuodorof,
Pilot of AUGUR 35

AUGUR 35

Augur 37 *Besposchadny* (meaning "ruthless")

In 2007, Augur developed a hot-air airship to be flown in competitions by pilot Leonid Tukhtiaev: the Augur 37. This airship placed seventh at the World Championships in St. Petersburg (Russia), in 2008, and sixth at the Worlds in Dole (France), in 2010.

Augur Rosaero has been taken over by Atlas LTA, of Israel, though the facilities remain in Russia.

AUGUR 37

Kubiček AV hot-air airships

In the early 1980s, a group of local balloon enthusiasts met in Brno and determined that they would build their own balloon. Ales Kubiček was a founding member of what became the Brno Aviatik Group and he took the lead in designing and building the club's first balloon. In 1983, after a process of trial and error, the first Czech hot-air balloon flew as part of the Aviatik club. The club prospered and further successes followed.

In 1985, an unmanned hot-air airship prototype flew; it was an unpressurised craft with a small motor on either side of the gondola. Information on this airship appeared in *Jane's All the World's Aircraft 1986-87*. In order to keep the sport of ballooning alive, Ales Kubiček moved the production of balloons and the flying of them under the supervision of Aerotechnik, which was owned by the state military organization, and thus controlled by the government.

He built 30 balloons for the Eastern European market. When this difficult period came to a sudden end with the Velvet Revolution in 1989, Kubiček and his team continued building balloons in the Brno area, under the name of Kubicek Balloons. Since then, the company has continued to grow and has moved to new premises in the eastern part of Brno. Kubiček has built two pressurized hot-air airships; after experimenting with an unmanned prototype, the company built its first manned airship.

Type AV1:

This airship first flew on October 16, 1993. It had an envelope of 2,800 m³ and a two-seater side-by-side cabin, and was equipped with a 50-hp Rotax engine. Following the AV1, a larger envelope was developed.

Type AV 2:

It was first flown on May 26, 1999. The volume of the envelope was now 3,500 m³ and designed to fly with an internal pressure of 1.5 bar, with a side-by-side two-seater gondola and a Rotax engine.

AV2 gondola

It is believed that only these two airships were built, with the company concentrating on producing hot-air balloons, but remaining open to airship ventures, such as producing the envelope for the world's first Rozière airship, RFR-1, designed by Russian Aeronautical Society engineers and first flown by pilot Leonid Tukhtiaev near Kiev, Ukraine, on December 16, 2013.

Type **AV1**

Type **AV2**

SKYACHT AIRCRAFT INC., USA

Skyacht
Alberto blimp

This company developed an innovative concept for hot-air airship of the semi-rigid construction type. An aluminum tensile membrane structure maintains the stiffness of the airship's nylon envelope. The tensile membrane structure supports the tail-mounted steerable engine/propeller unit, providing propulsion and vectored thrust for maneuvering. The heating of the envelope is provided by a conventional a propane burner. The gondola is laid out as a two-seater.

The Skyacht Personal Blimp was first flown on October 27, 2006; the airship was christened *Alberto*. It is a very slow airship, but highly steerable at low speeds, which is more difficult with other airships. Of all recently developed hot-air airships, the Skyacht's innovative technical concept is offering new prospects for the development of airships in general.

In summary, in roughly 50 years, progress has been made on:

- envelope shape (slimmer)
- burner orientation inside the envelope, enabling heat to be directed towards the fore or aft of the envelope
- internal envelope curtains to maintain equal heat distribution along the whole envelope length
- safety features such as overpressure valves and deflation parachutes
- stronger envelope fabrics
- more efficient propellers
- techniques for inflation through tunnels from fan to envelope and corresponding gear to hold the envelope in place

Nevertheless, hot-air airships remain relatively slow machines, rarely exceeding speeds of 30 km/h, but ideal for precision flights for photography and, in particular, for advertising flights over densely populated areas, using exchangeable banners, so that different messages can be displayed by the same airship.

The main obstacle to greater expansion is the lack of higher speeds, requiring more internal pressure in envelopes for rigidity which, in turn, requires stronger, heat-resistant, but still lightweight materials or other envelope coverings. Noise abatement could possibly be achieved with electric engines

The number of manufacturers is currently very limited, but technological progress can and will be made. Can we dream of an airship with a jet engine used for forward thrust but also as a heat supply for a higher-pressure and higher-temperature envelope? And what about nose cone stiffening by means of air-inflated tubes down to the gondola to increase speed and prevent nose cave-in?

Competitions are a good way to promote thermal airships. The FAI Ballooning Commission's Airship Working Group has developed a simple flyer for promoting competitions as individual events or as an annual circuit. The flyer was distributed to all representatives of the Ballooning Commission.

FAI/CIA BX working group proposal

AIRSHIPS IN LUXEMBOURG AND GUY MOYANO

A BIT OF HISTORY

The first time any airship is reported to have been sighted from Luxembourg—flying over the Moselle River from Trier to Metz and back again—was on November 20, 1909. The Moselle was the river separating Luxembourg from Germany at that time and Metz was a center for the German military. On that day, two airships were identified: the Parseval PL1 (4,200 m^3) and the Groß-Basenach M.II (5,200 m^3).

The first time any airship is reported to have actually overflown Luxembourg was on April 28, 1913. It was observed three times that day, flying over Echternach and heading back to Germany. A report of this event was published in the newspaper *Obermosel-Zeitung*. It is believed to have been a Zeppelin L 2 (info and newspaper article from the archives of Claude Schmit). On May 3 and 5, 1913, more airships were sighted patrolling over the Moselle. Shortly before the outbreak of the First World War, a Zeppelin Z-VIII—with Crown Prince Wilhelm II on board—was seen flying to Metz.

The next sighting of a gas airship was on March 21, 1915—during the First World War, obviously—at night; the reports mention the noise of its engines. A postcard went on sale later, showing a Zeppelin-style craft over Luxembourg City, but it looks very much like a cut-out picture of a Zeppelin glued onto a photograph of the city.

The next flight was better documented by press reports and a collection of—this time genuine—postcards. It happened on April 22, 1930, and again involved a Zeppelin airship, the LZ 127, piloted by Ernst Lehmann. Pictures exist; crowds were out watching the big airship flying over the city and the countryside. Coming from the east, it circled around the city's German Embassy—where the German flag had been hoisted—and disappeared again to where it had come from.

Marie Anne Werner has conducted in-depth research into the history of gas airships, in general, and the presence of airships in Luxembourg, in particular. This research covers all the major developments relating to gas airships, from Frenchman Henri Giffard in 1852, to Alberto Santos Dumont at the turn of the 20th century, up to all Zeppelins, not forgetting the brilliance of the British airship R101 and its eventual crash in Beauvais, France. Marie Anne Werner's report was published in the general welcome brochure for the first Hot-Air Airship World Championship in Luxembourg in 1988.

It took until a while after the Second World War for gas airships to be seen over Luxembourg again. This time, the country played host to a Goodyear blimp, visiting a new Goodyear tire investment and production plant in the central-Luxembourg town of Colmar-Berg. There were regular stop-overs by Goodyear airships in 1972-1986, finding a welcoming harbor in Useldange, Luxembourg's only center for gliders.

Zeppelin over Syren, Luxembourg, 1930

Goodyear airship in Nospelt, Luxembourg, 1981

First flight in Luxembourg on July 15, 1978

The Belgium-registered **Cameron D-96—OO-GDM**—with advertising for Planta, on the ground and in the air at the Journée de l'Air in Wiltz-Noertrange, July 10, 1977

Then, in the 1970s, a new type of airship appeared: the hot-air airship. It was easy to transport, easy to unfold for a flight, not so easy to fly, and easy to pack up again to take to the next event. It was first seen on July 10, 1977, at a local airshow called Journée de l'Air in Wiltz-Noertrange, a small airfield in northern Luxembourg. A Belgium-registered Cameron D-96—OO-GDM—with advertising for Planta, was unpacked and inflated, but pilot Gérard Delforge decided to wait for the wind to die down, since there was a steady north-easterly blowing at about 20 knots. The wind did not die down. Pack it back up again! Did we say "easy"? But enough people had been enthused by the attempts to inflate it, and by its imposing size, to create a real lasting interest in airships of this kind, especially among the people already involved in hot-air ballooning.

On July 15, 1978, the hot-air ballooning group the Commune Aérostatique du Grand-Duché de Luxembourg organized a picnic for all of its members and invited the same pilot to bring the same Planta-sponsored to the same little airport for another attempt and, this time, it flew! That was the first recorded hot-air airship flight in the country!

The next visit by a hot-air airship was in 1982, when the Fédération Aéronautique Internationale (FAI) entrusted the same group of people from the Commune Aérostatique with organizing the third European Hot-Air Balloon Championship in Ettelbruck-Warken, in the center of the country. Besides the 41 competing balloons, invitations were sent to Fiesta flyers. Among them came Tom Sage from the UK, who brought a Cameron D-38 airship, flying leisurely circles over an unexpectedly large crowd of 15,000 spectators.

The people of the Commune realized how big an attraction an airship could be and that it could be an excellent marketing tool for promoting consumer goods.

A **Cameron D-38** airship at the third European Hot-Air Balloon Championship in Ettelbruck-Warken, 1982

AIRSHIP ADVERTISING AND THE MAKING OF A PILOT

In 1985, the Commune Aérostatique decided to incorporate its growing commercial ballooning activities—encompassing passenger and advertising flights—into a second unit: the Compagnie Aéronautique du Grand-Duché de Luxembourg, S.A. (CAGDL SA). The founding members were P. Emering, A. Feltes, J. Sauber, N. Theisen, P. Thibo and J. C. Weber. Later shareholders were pilots from the Commune group, motivated more by desire to fly balloons at little or no cost to themselves than by return on investment. Full-time staff became necessary to manage the new organization.

Marketing efforts were made, arousing interest from the first supermarket chain established in Luxembourg: the Cactus Group. Cactus was undertaking a major expansion. Its management was searching for new and striking ways to advertise the company's success. CAGDL suggested using an airship in the company's colors. This required several elements to come together: an airship, a series of airship-advertising flights and, very importantly, one or more pilots to carry out this series of advertising flights. Here is how it happened.

THE AIRSHIP

Cameron Balloons had just designed and built a new airship with pressurized hull, a two-seater cabin and a small engine: the Cameron DP Starship series, available in envelope sizes of 1,416 m³, 1,700 m³ and 2,550 m³. Over the years, CAGDL had come to appreciate Cameron's knowhow, reliability and customer service capabilities.

The eventual choice was the DP-60 (1,700 m³), none of which had been manufactured (only one DP-50 had been produced and flown, judged to be too small to realistically be able to handle a two-seater capability). Once the airship had been chosen, in order to make it operational for a series of advertising flights, a small truck was required, specially equipped with rails for loading/unloading, storage space for a number of propane cylinders and an electric hoist to pull the envelope and the cabin into the truck. A Mitsubishi Canter was deemed suitable.

The cabin and loading area were fitted out by Garage Bouquet, and the internal equipment was installed by Ateliers Comes of Junglinster.

Crew man **Armand Oswald** loading cylinders into the truck

The **Cameron DP-60** during an advertising flight, Château-d'OEx area, January 1987

A precious tool...

Loading the gondola into the truck

THE ADVERTISING FLIGHT SCHEDULE

Two main parts were defined:

a) Launch

It had to be spectacular, unique and widely covered by the entire Luxembourg press. CAGDL had, for some time, been fostering good relations with the local press, so its ballooning activities had always been very well covered and many personal relationships had been established. This meant that getting the press interested in new ballooning ventures was no problem.

The delivery date of the DP-60 was scheduled to be late December 1986 or early January 1987. Where to do it in this winter period? It had to be a spectacular event, to create the right impression on the press. As usual, the big balloon meet in Château-d'Œx (Switzerland) was scheduled for end of January 1987. This was the right setting for an innovative press presentation. Cactus agreed to hire a luxury bus to carry 30 press people from Luxembourg to Château-d'Œx, put them up in nice hotels and lay on quality food and wine... For two days, Cactus arranged for entertainment in the take-off area by inviting traditional Swiss bands to accompany the airship demonstration with their shows, while the Château-d'Œx organizers, scenting an opportunity to score widespread press and TV coverage, proved valuable allies. It became a huge publicity success for all, especially Cactus, which had sent its most experienced managers—Mr. Strock and Miss Putz—as representatives. All guests were offered a short tour of Château-d'Œx in the *Cactus* airship.

b) Follow-up advertising flights

A three-year contract was drawn up between Cactus and CAGDL. Every year, 60 flights over Luxembourg were to take place, either for special occasions, like delivering Santa Claus to their shop locations, or—mainly—to display the Cactus colors flying alongside freeways in and out of Luxembourg city at rush hour, or circling over exhibition parking lots. CAGDL had the right to use the airship occasionally for some of its own flights, like local meets or competitions.

The **DP-60** *Cactus* airship over Château-d'OEx area, January 1987


Cactus

THE PILOT

While there were some professionals in Europe, the preference within GAGDL was to go local, even though, at the time, no Luxembourgers were qualified. In addition to piloting an airship, the person to be hired would be required to fly passenger and advertising balloons for CAGDL's other businesses.

It so happened that, in 1982, for the European Balloon Championship in Ettelbruck-Warken, each competitor had had to be accompanied by an official observer on each competition flight. A large number of people—who had done this job previously all over Europe, the USA and South Africa—had volunteered to participate. However, since not enough people came forward, invitations had been sent out to Luxembourg's Scout groups and police associations, looking for outdoorsy people with a strong sense of discipline and organization.

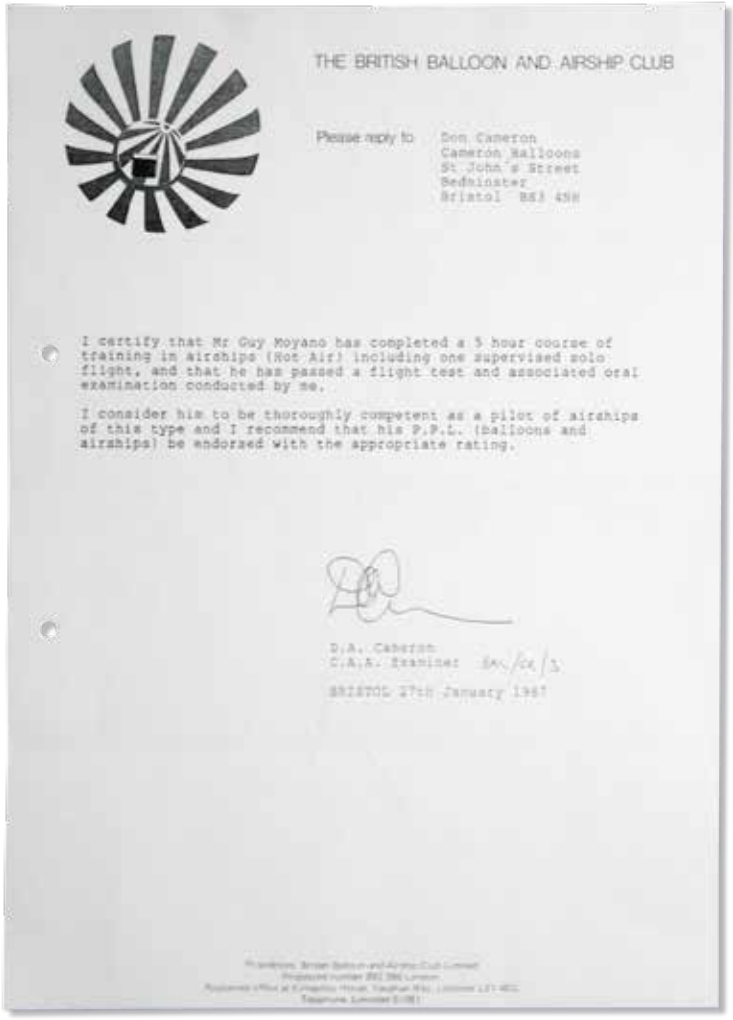
One of the local Scout leaders was a man by the name of Guy Moyano, a Luxembourg national, born on August 13, 1952, in Luxembourg City, where he had lived all his life. Guy had a steady job at one of Luxembourg's major banks. He had experienced his first ever balloon flight at that meet in Warken, where he had been invited to fly with German pilot Hans Kordel and, later, to fly in Malcolm Forbes' special shape, the *Château de Balleroy*. After those championships, he wanted to get more involved in ballooning and he quickly became a crew member for other pilots; before long, he was interested in becoming a pilot himself.

In those days, the Luxembourg Ministry of Transportation had just begun to organize the establishment of rules for balloon pilot licenses, yet there was no provision for theory exams. Student balloon pilots became pilots simply by a licensed pilot recommending them to the Ministry. But the time had come for the Ministry to demand practical and theory courses. There were no syllabuses or exam papers. Guy was smart enough to propose an alternative: Luxembourg had some official private pilot flying schools, well-equipped and with a long tradition of weekly theory courses. One of them was the Aérosport flying club, located at the country's main airport, then known as Luxembourg-Findel. The Ministry agreed to accept those courses also for balloon licenses and, even though the word "balloon" was not mentioned anywhere in the syllabus, at least some courses were useful for future balloon pilots, such as navigation, meteorology, radio communication and airspace regulations.

As it turns out, Guy took his first flying lessons in a Cessna 150 aeroplane. On March 23, 1983, he successfully passed the theory exams. By then, he had also built up 12 hours and 25 minutes of flying time for a Private Pilot License with instructor Raym Botzem of Aérosport. That year, Guy continued to crew intensively at meets attended by balloon pilot/instructor Pit Thibo, such as Bains-les-Bains (France), Annonay (France), the Bristol Balloon Fiesta (UK), the World Championship in Nantes (France) and Le Puy (France). He quickly became the crew leader.

Now there was a man with credentials, needing only an airship qualification to meet the requirements for the Cactus flights! While negotiations started with Cactus, Guy had to consider whether to accept the job opportunity at CAGDL, primarily flying the

Don Cameron certifies that **Guy Moyano** is capable of piloting an airship, 1987



THE BRITISH BALLOON AND AIRSHIP CLUB

Please reply to: Don Cameron
Cameron Balloons
St John's Street
Bedminster
Bristol BS3 4NH

I certify that Mr Guy Moyano has completed a 5 hour course of training in airships (Hot Air) including one supervised solo flight, and that he has passed a flight test and associated oral examination conducted by me.

I consider him to be thoroughly competent as a pilot of airships of this type and I recommend that his P.P.L. (balloons and airships) be endorsed with the appropriate rating.

D.A. Cameron
C.A.A. Examiner

BRISTOL 27th January 1987

Guy Moyano's private pilot licence (balloons and airships) issued by the UK Civil Aviation Authority , 1990

United Kingdom Civil Aviation Authority

PRIVATE PILOT'S LICENCE
(BALLOONS AND AIRSHIPS)

Certificate delivered by Giovanni Aimo to **Guy Moyano** in 1986

club aerostatico italiano

associazione sportiva per il volo in pallone libero

Ente aggregato all'Aero Club d'Italia

Levaldigi,3-12-1986

To whom it may concern:

This is to certify that Mr.Guy Moyano,born 13-8-1952 in Luxembourg,has flown solo in our hot air airship under my instructions for a total flight time of 5 hours and 55 minutes.
The flights took place in Levaldigi airfield,near Cuneo, in Italy.
The airship used was a Cameron D-38 registered G-BGEP.

certified correct

Giovanni Aimo

Giovanni Aimo
airship pilot and instructor
licence n.PP460 B CAA
licence n.3 Civilavia

airship, or to stay in his steady job at the bank. It was a difficult decision for a young man, whose family and friends were baffled by his "crazy" idea but, in the end, Guy was more drawn to a big challenge in the great outdoors than to remaining in a desk job for the rest of his life (as told by Guy himself, in a 2017 interview about his career in Luxembourg's main paper the *Luxemburger Wort*). He decided to take up the challenge and became a CAGDL employee on November 15, 1986. The issue of the airship license remained unresolved.

About Guy Moyano:

- On October 22, 1983, he had his first student pilot flight with Pit Thibo.
- Guy soloed on June 26, 1984, in a Comte de Luxembourg Cameron V-65 LX-HIT, after 22 training flights.
- On July 6, 1984, the Ministry issued balloon pilot license No. 9 to Guy.
- On January 27, 1987, Don Cameron certified that, having undergone the necessary checks in compliance with UK standards, Guy was capable of piloting an airship.
- On March 23, 1989, he received the first Airship Instructor License in Luxembourg, which the government issued together with his Balloon Instructor license.
- On October 24, 1990, the UK Civil Aviation Authority issued a Balloon and Airship License to Guy, including ratings to fly Balloons, Hot-Air Airships and Gas Airships.
- In 1991, French and Portuguese licenses were also issued.

Don Cameron introduced him to an Italian, Mr. Giovanni Aimo, who had purchased an early-production D-38 G-BGEP and who was available to teach interested balloon pilots the art of handling an airship. The arrangements were made and, on November 28 and 29, 1986, Guy Moyano and Pit Thibo met Giovanni with his airship at Levaldigi, Airport—near

Turin—for flying lessons. Since the airship was a single-seater, Giovanni explained in great detail how to inflate it and how to handle it in flight. Each of their first flights was, of course, a solo flight. The weather was beautifully cooperative.

The end result was that both candidates obtained their certificates from Giovanni, labelled in such a way that the Luxembourg Ministry of Transport would accept them and issue the corresponding qualification for airships. With that, all the conditions for the contract with Cactus had been met. The contract was signed in July 1986. No one could have realized that, for Guy and his partners, this was the beginning of a life lived in the sky.

Back to the airship: after the first flight of a DP-50, which was on April 25, 1986, piloted by Don Cameron, the second pressurized airship to fly was the DP-60—initially registered as G-INCF—and it was *Cactus*! Its first flight, again with Don Cameron as test pilot, took place on January 7, 1987, in Bristol, UK. Only 12 days later, the airship was officially presented to its owners and to the Luxembourg press at Château-d'Œx, where it was flown by Tom Sage, who had been instrumental in readying it at the Cameron factory. After the event in Switzerland, the DP-60 came to Luxembourg, where the registration was changed to LX-UFO and where the truck was being prepared to house all the gear.

It was now ready to start flying the agreed series of flights for Cactus supermarkets. The Cactus management expressed great satisfaction with the show in Switzerland and, in particular, with the coverage by the invited journalists. The first advertising flight over Luxembourg took place on April 1, 1987. It flew for 74 hours and 15 minutes before the end of that year.

Inaugural flight in Château-d'Œx, 1987

LUXEMBOURG BALLOON JAMBOREE, 1988

In 1987, the Commune Aérostatique had received permission from FAI to organize the first World Championship for hot-air airships in 1988 in Luxembourg. This would be the first airship competition ever to be held. The rules for the competition had to be invented from scratch. In order to get the feel for this sort of event and try out some ideas, a small "Pre-Worlds" event was called for. Of course, not involving Giovanni Aimo was unthinkable. Mucki Busemeyer, from nearby Aachen, Germany, was also invited and, together with *Cactus*, that made three airships. The event took place (without any press) on August 16–19, 1987. Several flights took place, several competition ideas were tried out—as were the food and wine! Everybody had a good time and everybody was wondering what the following year's championships would be like. What was clear to everyone was that, at the very least, the three airships involved in the "pre-Worlds" would be there again.

Preparation of the first Worlds began. Invitations to participate were sent to all national aero clubs and federations affiliated with FAI. Not knowing how many airships would compete, the organizers decided to put on a big event anyway, referred to as the Balloon Jamboree, and called for a special shape show. In fact, over 20 special shapes turned up and a competition to find the best-looking was held; the spectators voted and chose Jacques Soukup's *Uncle Sam* to win first prize.

On top of that, about 20 balloons sponsored by international banks came to take part in a Banker's Balloon competition, run by Claude Sauber, and a regular balloon competition was also organized, using FAI rules, with Jean Claude Weber as event director and Less Purfield as competition director. All these efforts resulted in a total of over 130 balloons—enough to cover up the low attendance, if only a few airships made it to Luxembourg!

Chic-I-Boom

Uncle Sam

INVENTING COMPETITION RULES

The next job was to create the competition rules for an airship contest. Inspiration was drawn from three fairly varied sources.

Source one: The FAI AX balloon competition rules—which were excellent—were the main source of the administrative and procedural aspects of the rules.

Source two: The organizers' accumulated experience of flying in light airplane competitions was the principal inspiration for the specific courses to fly and timings required. The tasks had to be flexible enough to combine tests of speed with tests of precision landing. The organizers had to make provision for single-seaters versus two-seaters, 15-hp to 35-hp engines, envelope lengths of 10 m to 30 m, and pressurized envelopes against non-pressurized ones.

Le Mans start: T-minus 30 minutes

Source three: In a pragmatic borrowing from motor racing, a Le Mans-style start was copied and proved to be very exciting for both spectators and pilots.

Walferdange start: T-minus five minutes

Walferdange start

Walferdange start: T-plus five minutes

In another pragmatic borrowing, this time from archery, bullseye targets were used. Just 1 m in diameter, they were sometimes raised 2 m off the ground and made out of Plexiglas, so that journalists could take pictures from underneath, when the pilot threw a marker or picked up an object handed over in flight by an official; towards the end of the flight, this was often a bottle of Champagne!

These pictures are of Don Cameron—a jury member—waiting for the competitors to arrive at a checkpoint, and Don handing over a traffic cone as proof that the pilot had flown the correct course, so demonstrating precise steering... without harming the jury members in the process! The picture on p. 66 was taken on *Cactus*'s penultimate flight; later, after over 200 flight hours at temperatures generally exceeding 140°C, it split open during the final pylon-race task, 100 m from the finish line.

The most interesting borrowing, however, was the introduction of pitstops, enabling flights lasting over two hours and requiring the organization of crews with spare propane cylinders following along in support cars.

At the designated pitstop area, the competitor would be given a second task sheet for the rest of the route.

As it was a pioneering competition, it would offer a lot of lessons about the most technologically beneficial combinations for hot-air airships, and most manufacturers were watching the event to compare their airships' performances. After the first flights and having measured speeds ranging from 10 to 25 km/h, the organizers had to set tasks that combined speed and prevision, in order to give all those involved equal chances of success.

Some tasks were a combination of a airships racing against each other and a racing against a pilot-declared time —the latter was probably the task during which pilots could best demonstrate mastery of the performance of their airship, the wind conditions and competition tactics.

Jury member comfortably waiting (Walferdange)

Elevated bullseye target with journalist underneath in Gatineau, 1998,
with **Guy Moyano** in the *Astra* airship

Last *Cactus* flight—note the wear on the nylon

Elevated bullseye

Bullseye on the ground, Besançon

Crew exchanging propane cylinders at a pitstop (World Championship, Besançon, 1992)

THE FIRST WORLD HOT-AIR AIRSHIP CHAMPIONSHIP, 1988, LUXEMBOURG

At the end of the registration period, a surprising 19 airships had registered. By the time of the first general briefing, 16 airships had arrived. An unexpected airship from China arrived a couple of days later. It was extraordinary: it flew with a four-person crew, had an envelope with an internal pressure of over 2 bar and was the fastest ship of the lot. The story of how this airship made it to Luxembourg is another long tale demonstrating international friendship: the Commune Aérostatique's truck picked them up in East Berlin with the airship after a train journey from Beijing to Germany—and they had no return ticket.

Official logo

The event started as scheduled. A total of nine flights could be flown, involving 20 tasks. The competition, as witnessed by Guy Moyano, is best described in his own words: "Of course, I was tense at the start. There had never been any airship competitions anywhere and I did not know what to expect. But all the other pilots must have had similar feelings. I had made about 40 flights for my sponsor before, in that same year, and I had confidence in the technical condition of my airship, and I was motivated to do well. I had additional pressure, since I was flying at home, in front of my friends, officials, Cactus sponsors, politicians and journalists.

The first flight was in the early morning, with two rather uncomplicated tasks: navigational precision over 7.4 km and precision marker drops on bullseyes or X crosses. The wind was light, the weather was good. The sponsor flights had given me the opportunity to train my ground crew for inflation and packing-up. The crew followed my flights in a 4x4... in a separate Lada car. After the flight, the notice board showed that I had done second best and it gave a boost to my self-confidence.

Approaching the marker drop targets was revealing a number of tricks. Low-speed approaches to the target were necessary to achieve precision but, at low speed, even subtle wind changes could make it difficult to achieve the best score on the targets. I learned that I should fly as low as possible over the target center, so that I could actually lay the marker right on the center of the bullseye. I also learned to do this in higher speed flights, but realized that the precision was hazardous. Most pilots scored with less than 50 centimeters from the goal. Good lessons learned!

The second flight was quite similar to the first, but extended to a track of 8.8 km. An additional task was called for: a speed race. This put more pressure on the competitors since, now, several airships would approach the targets at the same time and pilots had to judge how to line up, not to be disturbed by preceding pilots and maintaining their eye sight on achieving the shortest overall time. Priorities on targets were sometimes severally fought for. More lessons learned!

"They all look at me, they all watch me...", **Guy Moyano** (Walferdange, 1988)

Welcome brochure

Early morning pitstop in Walferdange, 1988

In any case it was necessary to know the wind direction close at the target. We decided to use a fishing rod with a nylon strip attached, positioned by the crew, maybe 50 m downwind of the target. This would help the pilot in his judgment.

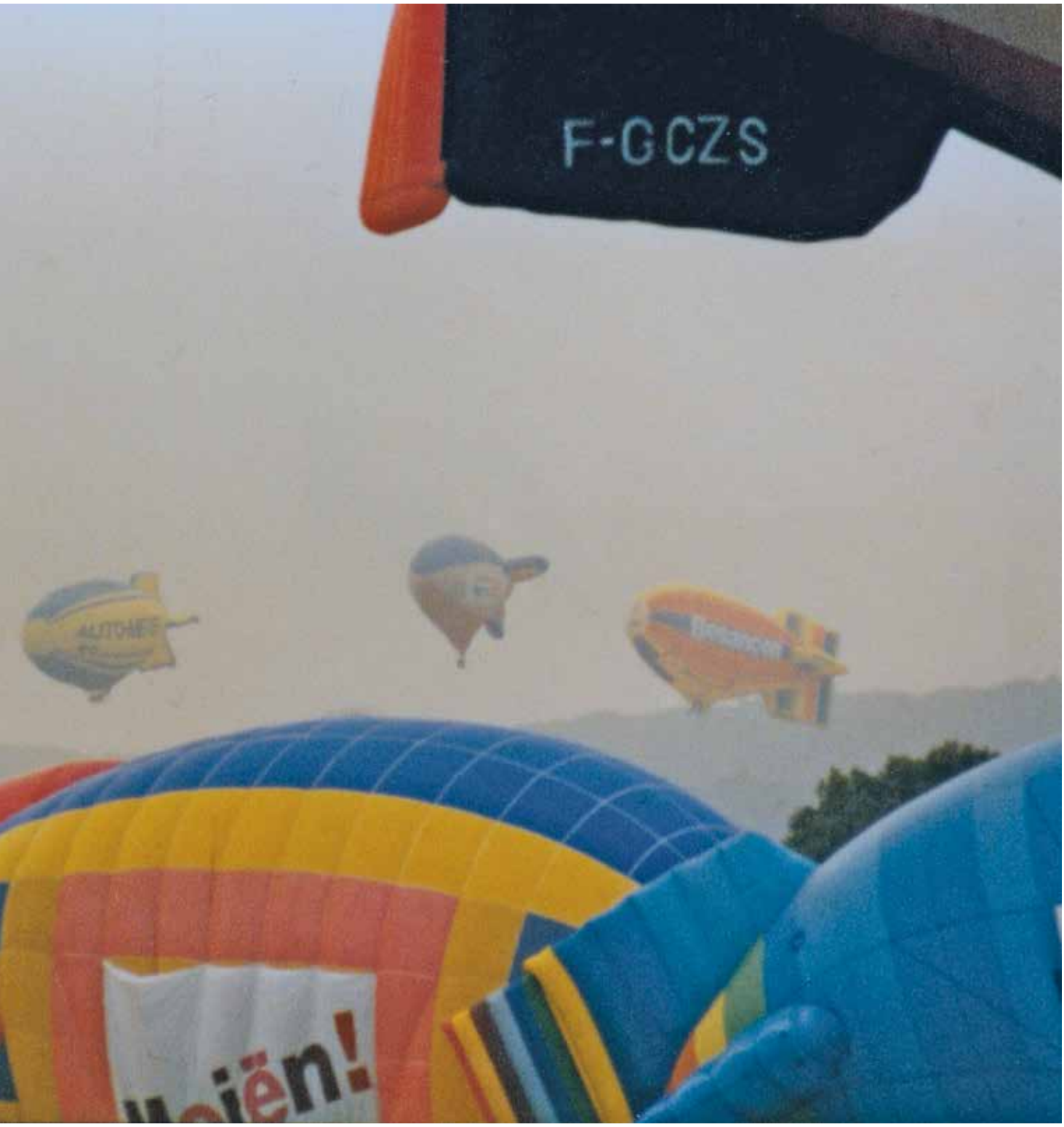
During the week, nine flights could be made with 20 tasks to be achieved. Among them was a pilot-declared time for the flight combined with a speed race and precision targets over 12.3 km. Pilots would calculate/estimate the time it would take them and to be back at the finish line or pole as predicted by themselves. Estimating too long time would of course penalize the pilot in the speed race taking place at the same time—most difficult task, where the crew had to measure wind speed and transmit to the pilot.

Later, one such flight went over 21.1 km. The average time needed by pilots was 2 hours 20 minutes. This required a pitstop for refueling, both with gasoline for the engine, as well as full propane cylinders to be installed replacing the empty ones. I realized then the importance of a well-organized crew, a term which I now changed to the term "team"!

The pitstop area was announced at the task briefing; at this area an official would hand over an additional task briefing sheet explaining the tasks to be flown after the pitstop. On later events, the pitstop area could be at pilots' will, putting more stress on the crew running with their tanks sometimes hundreds of meters through the fields with the propane cylinders on their backs. This type of action was very demanding on the crew but really ended up creating a solid team.

Finally, on the last flight, the organizers surprised us with a new element. Victor Thorne from the UK, Steward to Pit Thibo, Competition Director, came up with the following idea: The Le Mans start.

For takeoff, airships were lined up parallel to each other and inflated. 50 m ahead of each airship, a person, generally an attractive-looking lady, was waiting with a bottle of


F-GCZS

Le Mans mass start in Walferdange, 1988

Guy Moyano at supplementary field briefing

Victor Thorne, Assistant Competition Director
briefing official observers A. Smith and A. Walch

champagne. When airships were buoyant, engines running, and ready to take off, the pilot would get out of the gondola replacing his weight with that of a crew member, who would also maintain the airship at takeoff temperature. Then the pilot would stand next to the airship. At the sound of a horn, pilots would race towards the champagne ladies, pick up a bottle, race back to the airship, replace the crew member at the controls with himself and take off!

This required a perfect organization for each team. This type of takeoff would, of course, be used preceding a speed race. It is left to your imagination what was going on in the pilots' and crews' minds in such stress situations! Airships left and right, maybe overtaking above, everybody trying to be first out of the "starting blocks" and aligning for the correct heading... You can imagine what happened to the champagne after the flight!

During this week, we competed during 12 hours and 30 minutes in the air and covered over 100 km. Yes, at the start the tasks looked simple, but became more complicated and demanding over the week. Most pilots performed flights they had never thought to be able to do before coming to this World Championship. I was no exception. At the end I finished runner-up to Oscar Lindstrom from Sweden, who proved to dominate his airship but also the rules, taking good advantage of both capabilities. CONGRATULATIONS OSCAR! I hope to meet you again."

The *Cactus* DP-60 continued to fly its scheduled sponsor flights with Guy as a pilot. But the high temperatures generated by flying took a heavy toll on the Hyperlast envelope. Propane consumption kept on increasing and so did the internal temperatures in the envelope. Porosity tests were conducted: first every 20 flight hours, later every 10 hours. It became undeniable that the envelope was nearing the end of its life. Fortunately, the publicity flights for *Cactus* were finished as planned, but now there was another opportunity for Guy to fly in a competition.

Lining up for the right heading (Walferdange, 1988)

Guy Moyano racing back to the airship

Runner-up Guy Moyano receiving a specially designed silk scarf in front of A. Feltes, P. Klein, K. Stefan (FAI Chairman), a representative of sponsor ISP, P. Thibo and D. Nicola (Walferdange, 1988)

THE MAKING OF A CHAMPION

The city of Besançon, France, had invited Guy to the First European Championship, to be held in 1989. He really wanted to carry on his adventure. Would the envelope hold up long enough? Weeks before the event, doubts were starting to emerge, confirmed by the regular porosity tests. Shortly before the championship, an unusual idea was floated: trying to reduce porosity by putting talcum powder inside the envelope. The first attempts were hilarious. The team walked inside the envelope with bags of talc which they rubbed onto the fabric. The first test flight showed promise but, when the team came out of the envelope, they were totally white! More tests followed, along with a few more flights.

This could only end one way, however: the more talc was used, the more porous the envelope became. Talcum powder is made of very finely crushed rock. As the internal pressure pushed the talcum powder out through the pores in the Hyperlast, they were enlarged every time the airship flew. The team had mixed feelings about the championship, but Guy decided to participate anyway. During the flight before driving to Besançon, the freshly talcumed envelope trailed white fumes from its top and rear, with the talc coming out straight after launch. It was letting off so many fumes that spectators thought it was on fire.

There were 11 airships taking part in the Besançon championship. The first flights went alright for Guy, although he did notice, while flying, increasing internal temperatures of well over 140 degrees centigrade. As the days went on, the ambient temperature kept on going up. The airship suffered.

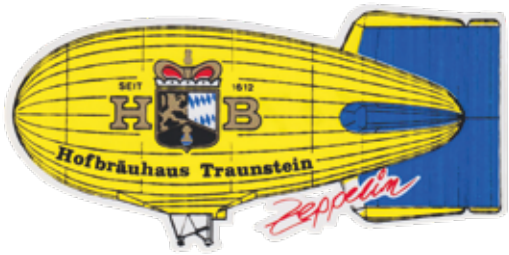
Guy tested several improvements, like suspending a 10-kg weight from the nose cone of the envelope, which made it fly just with a nose-down attitude, giving more speed and less aerodynamic lift. Also, a Plexiglas bottom had been fitted to the gondola, to avoid markers or maps being missed, since the bottom of the gondola had originally been open. The team worked incredibly hard and, even though their chances of winning grew less every day, it became almost an obsession for them: "We will not give up, we will keep fighting, we are here to win!" In addition, the difficult circumstances convinced all those involved that there was no room for mistakes in a high-level competition, and they all knew that the slightest error could cost them the win. This was an important step in Guy's preparation for the future: "We are here to win, no mistakes allowed". This attitude would prove useful at future events.

But back to the Besançon event: the penultimate flight involved a pylon race. Boldly, Guy flew fast—with the envelope at high internal temperatures—to keep the airship aloft and to defend his position; he was not in the lead, but close to it. Then, disaster struck: the top of the envelope split open and good old *Cactus* drifted down to the ground, about one hundred meters short of the finish line. That was the end of the competition and the end of the airship. He later reported that, in the last rounds of the race, the envelope temperature had exceeded 210 degrees centigrade. The gondola was undamaged, so was the pilot. Nevertheless, Guy finished fourth.

What now? Guy had a few fans—interested people from all walks of life. One of them worked for a weekly newspaper called *Lux-Post*. Guy was searching for a sponsor for a new envelope to use at the second World Championship, to be held in Nottingham, UK. After a while, his contact had convinced the owners of *Lux-Post* to put up the necessary funds. It was not long until the 1990 championship in Nottingham, so the Cameron factory could not finish the new

Guy Moyano packing up *Cactus* for good...

Lux-Post envelope in time. However, Hofbräuhaus Traunstein—one of Cameron Balloons Luxembourg's customers—had just started an airship advertising campaign and they were willing to lend Guy their envelope.



Hofbräuhaus Traunstein
advertising airship

So, the *Traunstein* envelope—fitting perfectly above the Cactus gondola—was registered for the competition, which was organized by Neil Robertson, with Les Purfield as the Competition Director. Pit Thibo accepted the position of Steward.

Again, some improvements were made to the airship. With a view to ever longer flights, the original gasoline tank was connected to an additional, higher-capacity tank to minimize work at pitstops.

The competition in the UK provided a lot of surprises. In another creative idea from Victor Thorne, the slalom task was introduced. Airships were to slalom between eight poles (50 m apart), once upwind and back downwind. The fastest time was the winner. Pilots' ability to adjust for wind differences and at the midway turning point were tested to the extreme. This showed that there was an optimal pace to identify, which was different when flying downwind from when flying upwind. Guy did very well; the best pilots just sliced through, without touching a pole.

The next unscheduled surprise came from a task where a small lake had to be crossed, with a target on a boat out in the middle of the water. The first pilots there opted for a low approach. The first to arrive was Guy Moyano, coming in at maybe two meters above the water surface.

Vic Thorne, originator of Le Mans start and slalom task

It was an early morning flight and the temperature over the water at this low altitude was a few degrees higher than on the preceding land surface. Before reaching the target boat, Guy lost altitude and dipped the whole gondola into the water, with the envelope staying airborne. The damage caused quite a bit of discomfort: first, the pilot was soaked in very cold water and, second, the Plexiglas windshield at the front of the gondola was destroyed, so it could no longer protect the pilot from the wind. Several of the other pilots who came after Guy also went home with wet pants.

After the flight, repairs were carried out, which involved the team making trips to suppliers. Later, when trying to get the engine running, it turned out that the alternator connected to Guy's König engine had given up the ghost. Again, the team proved very efficient. One of them—Freddy Ernst—had come to Nottingham in his Austin Mini. It turned out that a similar alternator was installed in the Mini. Freddy transplanted it and it worked to perfection.

Despite all the mishaps, Guy again finished as runner-up, behind the new World Champion, Vincent Dupuis of France. Guy must have felt like anybody coming second at two consecutive World Championship: a bit disappointed. Nevertheless, the will to win was unbroken and team spirit kept their morale up.

Guy Moyano with pilot Leocadio from Sevilla in 1992

R. P.

MINISTÉRIO DAS COMUNICAÇÕES

DIRECÇÃO-GERAL DA AERONÁUTICA CIVIL

CERTIFICADO DE VALIDADE DE LICENÇA AERONÁUTICA ESTRANGEIRA

É concedida validade nos territórios portugueses à licença de Piloto Particular de Balão emitida por Entidades Aeronáuticas do Luxemburgo a 6 de Julho de 19 84, sob o N.º - 9 - de que é titular MOYANO GUY de nacionalidade Luxemburguesa domiciliado em 38, Rue Clemenceau - LUXEMBURGO

A concessão é válida até 16 de Outubro de 19 92, para voos em balão de ar quente.

O Director dos Serviços Técnicos

Lisboa, 17 de Maio de 19 91

Guy Moyano's Portuguese license

Guy's experience started to become well-known, so pilots from all over Europe asked to receive their airship license instruction from Guy, a certified instructor and examiner of the Luxembourg Ministry of Transportation. After training Claude Sauber within Luxembourg, Guy had the opportunity to give airship flight instruction to balloon pilots from Portugal, Italy, France, Spain, Belgium, the Czech Republic, Hungary, and Germany. This enabled him to gain experience with airships of various sizes, sold by different manufacturers. This activity added about a hundred flight hours to Guy's logbook.

Then Luxembourg suggested to FAI holding the second European Hot-Air Airship Championship in Mondorf, Luxembourg, during the summer of 1991. Guy and his team were, of course, motivated like never before. He had a brand new airship, an experienced team, the backing of fans, and coverage from journalists. What had been a burden three years before, at the 1988 World Championship at home, had become an advantage. Also, Guy had not forgotten finishing second 1988 and 1990. This time, "WE ARE HERE TO WIN" could be spelled out in capital letters.

The forecast was for unsettled weather. Conditions were OK for the first flight and Guy ended up at the top of the rankings. Later, morning fog and wind complicated the event, so only seven of the hoped-for 11 flights could take place. Guy was leading the competition all the way through, but just a few points ahead of surprise package Phil Porter, from the UK. One morning flight packed in as many intricate tasks as you could think of. The course would take the airships into nearby France and Germany, crossing the Moselle River, with the same result as the lake in Nottingham: some airships took a bath—not Guy, though! The river is just under 100 m wide and the next part of the course, just a few meters from the riverbank, took in almost vertical rock wall. Airships had to pull up and fly almost straight upwards to clear the 150-m height differential and, when they emerged over the top, with more targets to find, they ran into thick fog. Some airships could not pull up suddenly enough and had to zigzag before reaching the top, so wasting precious time for the speed task.

The ranking did not change much. Guy was still in the lead, just a few points ahead of Phil Porter. It was a heroic flight for those who made it home and a nightmare for those who did not.

In the afternoon, the weather cleared up but a consistent six-knot wind and a bad forecast for the next and final day seemed to indicate that this afternoon flight was going to be the last and deciding one. The task was simply laid out: a pylon race with pylons roughly 800 m apart, with several laps of the course to be completed. To the joy of spectators as well as pilots, it kicked off with a Le Mans start. Guy was not the first over the start line, but kept himself in one of the top positions. Phil Porter made

a perfect start. At the turning points, the six-knot wind pushed airships too far in or out. Coming in to turn after the downwind lag, pilots had to reduce their speed a good distance before the turning pole to turn as close as possible to it.

In the end, this would prove decisive. At the last turning point Guy overtook his opponents with a perfect turn, very tight to the pole. His crew proved their worth by keeping him updated by radio on how his competitors were handling the task. Guy won the task and stayed in first place, ultimately winning the competition because all the next day's tasks were cancelled in view of the heavy rain and strong winds, as had been feared the day before.

Guy commented later that this day of flying—morning and afternoon—had been the most demanding in his career, but also the most rewarding. In the pylon race, he said, his experience of racing sailing boats had really given him an advantage. So, there was Guy, with his first winner's medal!

The next opportunity would be the subsequent World Championship, to be held again in Besançon, France, the following year, 1992. For the European Championship,some useful changes had been made to the gondola. Fixtures for more propane cylinders had been installed and all fixtures for cylinders had been changed to accommodate larger 40-kg cylinders, extending the flight range considerably. A small, 5-kg propane cylinder had been fitted to supply the burner's pilot light separately.

But, before the Besançon event, another initiative came up. On the retired *Cactus*, tests had been conducted to measure propane consumption. It had been found that flying at high speeds used much more propane than going slowly; the boundary layer on the upper portion of the envelope was more disturbed at higher speeds, considerably increasing heat loss. So, to optimize propane usage, fly at low speed!

This idea was at the heart of Guy's next project: the World Duration Record! The ship had been modified to take large cylinders and more cylinders were attached with

Nach dem «Le Mans»-Start: bei der anschließenden Aufholjagd sichert Guy Moyano (im «Lux-Post»-Luftschiff) sich den Titel.

Ein strahlender Europameister: Guy Moyano mit dem von Josette Reggi entworfenen Pokal.

Quasi von Anfang bis zum Schluß dominierte Guy Moyano auf seinem Luftschiff «Lux-Post» die zweite Europameisterschaft für lenkbare Heißluft-Luftschiffe (was für ein Name!), die letzte Woche in und um Mondorf ausgetragen wurde.

Tausende von Schaulustigen verfolgten die spannenden Wettkämpfe und das farbenprächtige Schauspiel, denen lediglich das Wetter in die Quere kam, so daß von elf vorgesehenen Starts deren nur sieben stattfinden konnten und Aufgaben abgebrochen werden mußten.

Die Aufgaben, die die Piloten und ihre Mannschaften auf dem Boden zu lösen hatten, fanden wegen der Temperatur und der Luftströmungen morgens und abends statt und bestanden keineswegs nur aus Geschwindigkeitsrennen. Geschicklichkeit ist denn auch der halbe Sieg. Die andere Hälfte, wurde uns versichert, sei eine gute Mannschaft.

Die Aufgaben der Teilnehmer bestanden zum Beispiel darin, daß die Piloten vor dem Start

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carabiners to the exterior of the gondola, but were accessible to the pilot for disconnecting and connecting. He knew it was necessary to fly slowly, meaning it had to be somewhere sheltered from the wind. Guy found a large valley close to a village called Nommern, in the center of Luxembourg. Upon inspection, a triangular course totalling approximately 5 km was decided on. The formalities were expertly handled by Alfi Feltes, Luxembourg's representative at FAI. Then, on January 24, 1992, everything came together: the weather, the well-equipped airship, the team, the FAI controller and a warmly dressed pilot, prepared to sit still for hours with an outside temperature of four degrees centigrade above zero. The big moment came closer: take off, climb to 20 m, set the airship on the correct heading and start circling the course.

Preparing to turn around the pylon during pylon race, final flight of the competition, (Mondorf, 1991)

Jostling for first place… (Mondorf, 1991)

Morning fog at the second European Championship Hard-to-find target—pilots had to be perfectly on course (Mondorf, 1991)

Le Mans start at the European Championship in Mondorf (Luxembourg), 1991

Lux-Post on track in Nommern


LUX-POST
145 000 lecteurs par semaine

Plenty of cylinders squashing the pilot in place

The spectators started to dwindle away—oh yes, it was time for lunch. What about the pilot? All he had was a few Mars bars and Twixes, plus a bottle of water. There were no breaks for Alfi Feltes. He had to be present and watching out for any potential contact with the ground. He could, however, use his car to follow Guy around the course to observe him. A team member, in radio contact with Guy, was counting cylinders emptied and full cylinders remaining. All cylinders had to stay on board until the end of the attempt.

Guy finally landed with just a few kilos of propane left, after four hours and 11 minutes in the air... Hurrah! The world record had been broken! Guy looked frozen—because he was! Celebrations could wait. After returning to the Luxembourg offices of Cameron Balloons, Guy and Pit Thibo sat down and looked at many more full propane cylinders. Somebody said, "Could we put on more cylinders?" A way to fix them (awkwardly) onto the gondola exterior was found.

The decision was made to call Don Cameron and have him calculate how much more weight could be added. This was on a Friday evening at about 10 p.m. Miraculously, Don picked up the phone, asked for 30 minutes' calculation time and called back to indicate the number of cylinders that could be put on in addition to the ones used during that day's attempt. Guy called all concerned, including Alfi Feltes. They were all prepared to try again the following day, Saturday.

Final landing, after five hours, six minutes and 42 seconds

The next morning, the weather was perfect and the temperature was the same. A feeling of enjoyment

An exhausted but happy pilot

Over Besançon

started creeping into the souls of all involved. It would last right to the ending, and what a happy ending it was! Guy flew non-stop for five hours, six minutes and 42 seconds. This was on January 25, 1992.

The record had been broken again! The team member in charge of counting how much propane had been used found out a couple of days later that there had actually been enough propane left for another 20-25 minutes of flight. No one was sorry; everyone was happy with the performance achieved. That record has stood unbroken for many years. No one from Luxembourg had ever set a world record in any aeronautical sport and it still stands at the end of 2020.

Philippe Ronzy
(right) and his staff

But the year 1992 was not yet over for Guy Moyano. In the summer of 1992, the city of Besançon had again applied to hold the third World Championship, in view of their enormous success with the Europeans in 1989. It was organized again on the initiative of Philippe Ronzy (a city official) who was also behind the *Besançon* airship, flown by Vincent Dupuis, incumbent World Champion since 1990. Guy and his team were highly motivated to finally win the title of World Champion. He had a fairly new airship available—the *LX-PST*—with the modifications designed by Guy and his

FÉDÉRATION AÉRONAUTIQUE INTERNATIONALE

Diplôme de Record

NOUS SOUSSIGNÉS CERTIFIONS QUE Guy Moyano

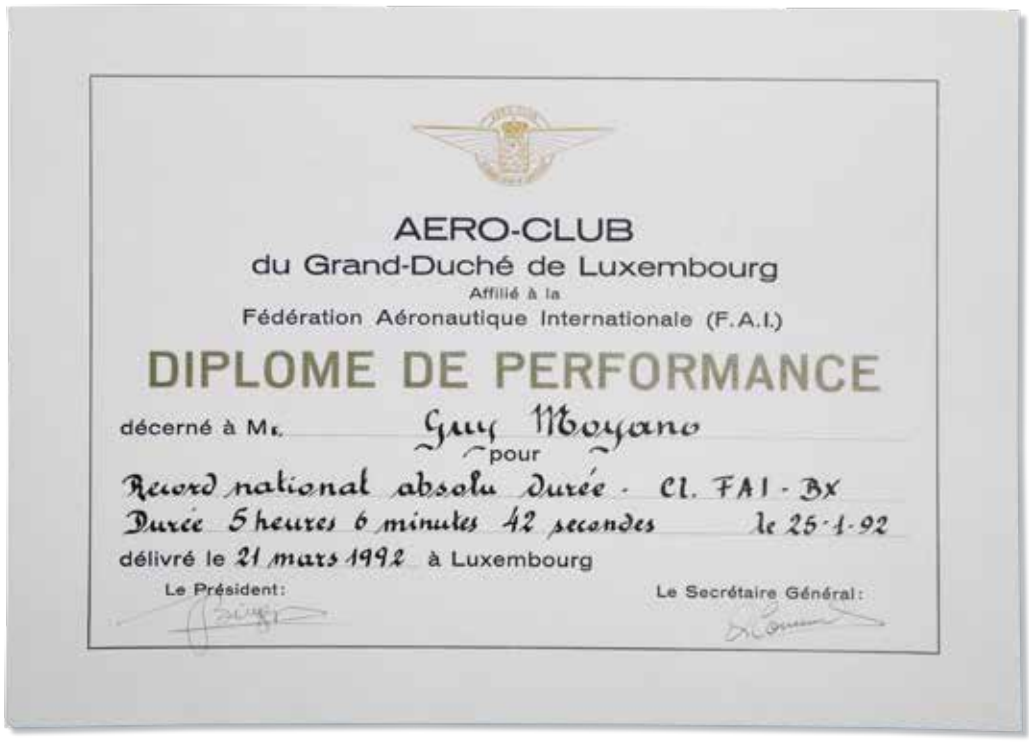
SOUS-CLASSE BX-4 (DIRIGEABLE A AIR CHAUD -1600 à 3000m3) SUR CAMERON DP 80

ÉTABLI LE 25 JANVIER 1992

LE RECORD DU MONDE SUIVANT DURÉE: ... 5 heures 6 minutes 42 secondes

A LUXEMBOURG

LE PRÉSIDENT LE SECRÉTAIRE GÉNÉRAL DE LA F.A.I. LE PRÉSIDENT DE LA F.A.I.



AERO-CLUB

du Grand-Duché de Luxembourg

Affilié à la

Fédération Aéronautique Internationale (F.A.I.)

DIPLOME DE PERFORMANCE

décerné à M. Guy Moyano

pour

Record national absolu durée - Cl. FAI - BX

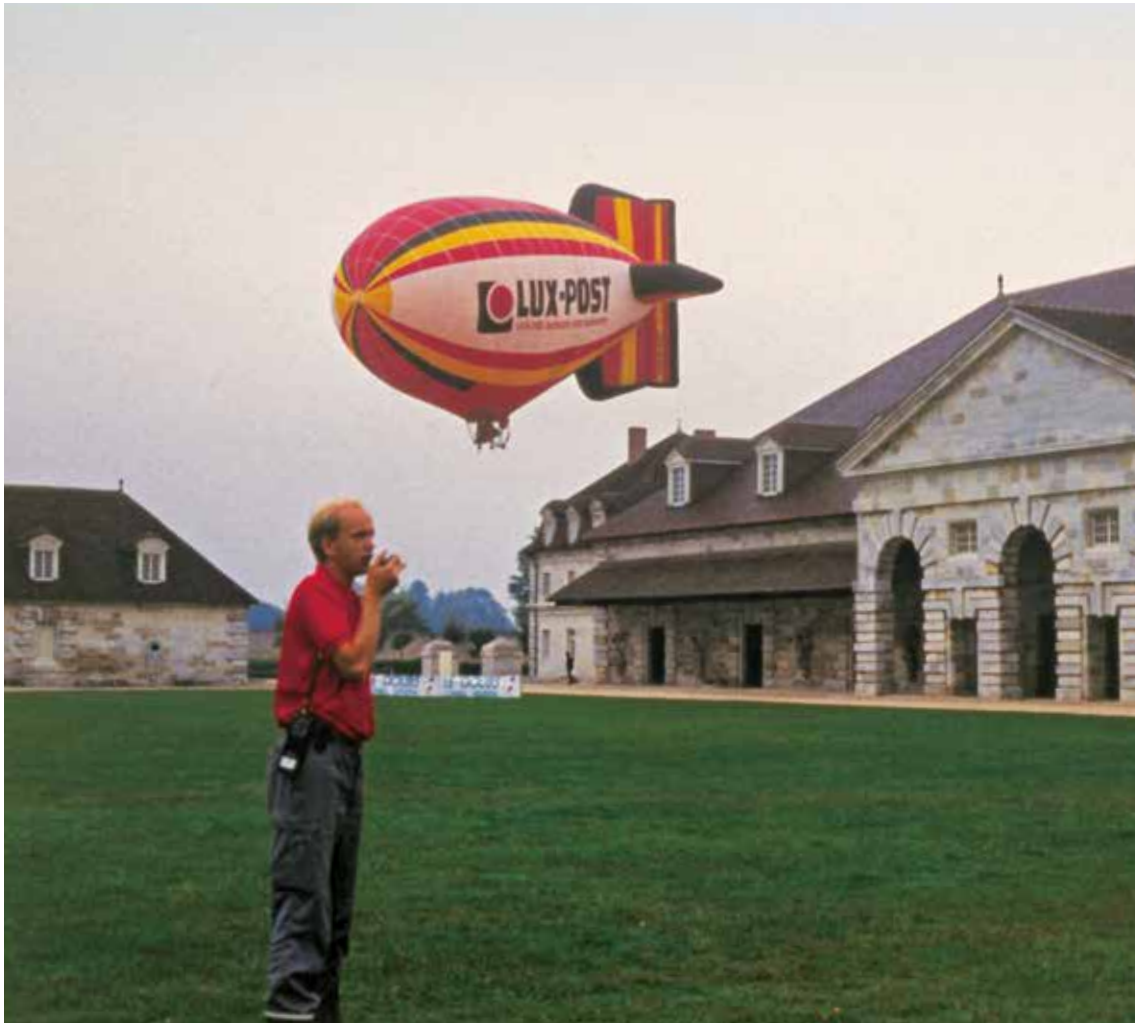
Durée 5 heures 6 minutes 42 secondes le 25-1-92

délivré le 21 mars 1992 à Luxembourg

Le Président: Le Secrétaire Général:

Guy Moyano's World Record certificates

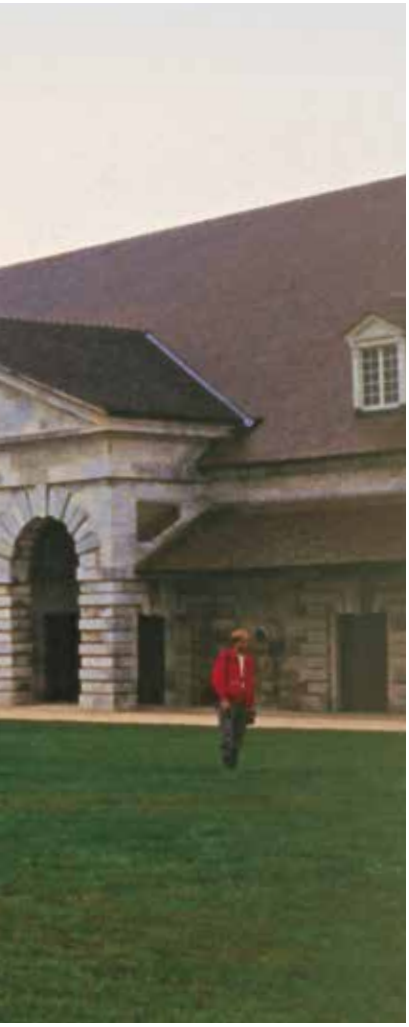
At the Arc-et-Senans saltworks



team. Philippe Ronzy had appointed Pit Thibo as Competition Director. The area around Besançon is very hilly, with deep valleys. This time Philippe Ronzy had made available two more take-off sites (two light aviation airports), in addition to the traditional one, so that the airships could fly over the biggest part of the city and be visible to the largest possible number of people.

The weather forecast was reasonably good, albeit with some foggy days. A total of 14 airships from nine countries had registered, including the two previous world champions: Oscar Lindström and Vincent Dupuis. In one of the first flights, the task was, after normal start, a long-distance speed flight with final landing in front of the saltworks in Arc-et-Senans, a very touristy place 34 km from the take-off site. Obviously, pitstops were permitted any time the pilot wanted and the whole course was equipped with a series of bullseyes and crosses for marker drops.

Right after take-off, a low mountain pass had to be crossed, followed by a sharp turn into a steep valley, at the bottom of which flowed a wild river. The night breeze came down

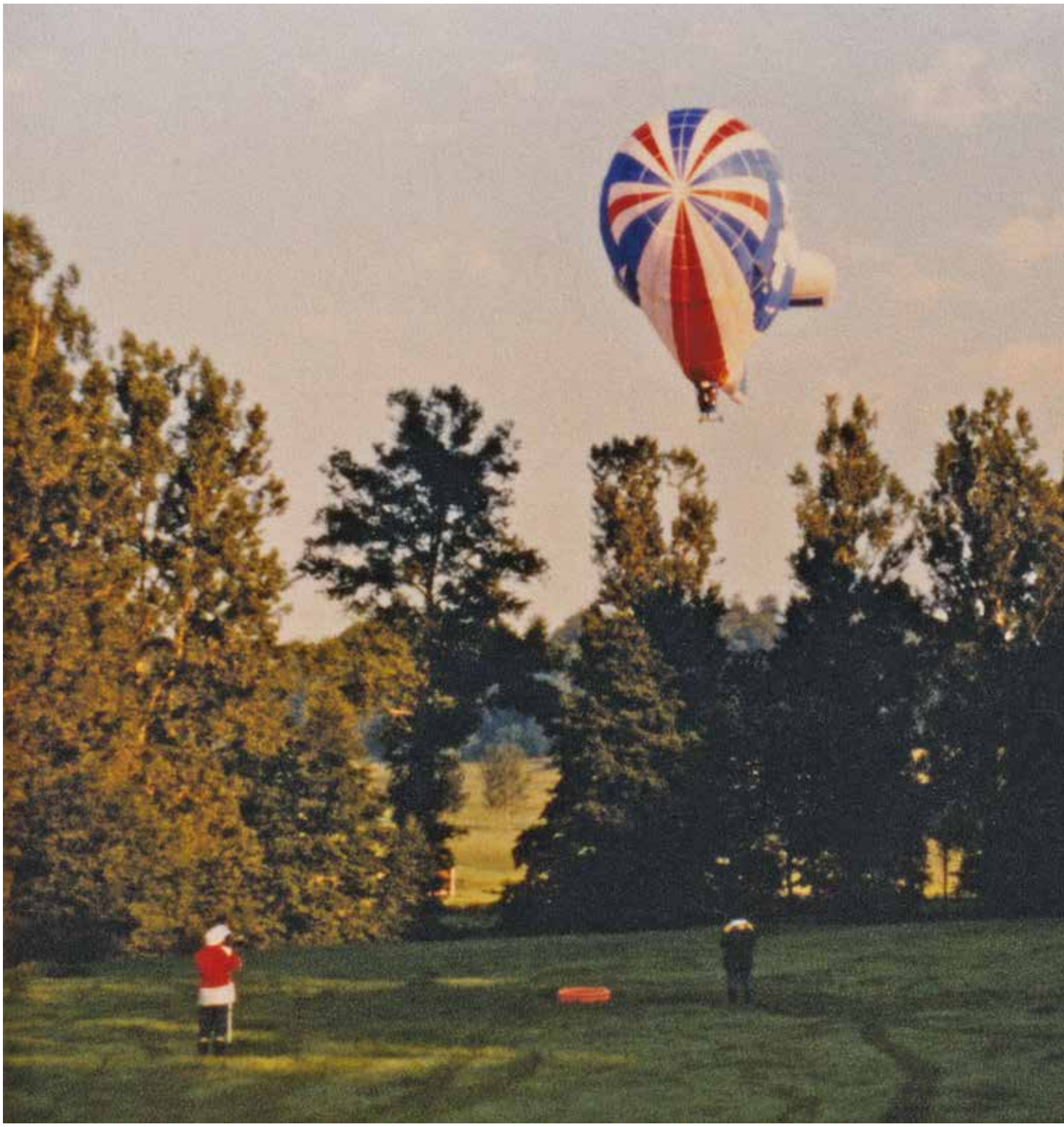


Tricky target on a bridge

High-speed marker drop

the mountain pass and the first airships were practically stalled, while they tried to cross 50 m above ground. Guy was the first to find out that, at 5 m above ground, there was hardly any headwind; he took the lead. During the flight, pilot Jens Petersen from Germany, gave a demonstration of perfect organization. While coming in for one if his pitstops, his engine stalled and broke. His team were there and they pulled a brand-new engine out of his truck, fitted it and he flew on. It was brilliant, but he lost time in the speed race. Another element of Guy's performance was a target on a bridge over the river, where a 1-m-diameter kid's paddling pool was placed as a marker drop. The fastest route would have called for flying along the length of the bridge. However, there were trees so close to the bridge that the pilot had to drop down quickly and with no hesitation to try to get to the target. Guy, advised by his team, took a small detour, losing just a few minutes to come in, flying across the bridge widthways. He was the only one to score.

There was one very interesting flight took across the whole city. Airships would fly up to the hill on which the city's citadel was built. At the peak, the pilots were to drop



Approaching hidden targets

Approaching
a hidden target

a marker before crossing a deep valley, in which the Doubs River flows. After the river had been crossed, there was a hill just as high as the citadel, where another marker was to be dropped.
The citadel is some 100 m above the valley floor; the rock wall drops vertically and some pilots reported that they experienced vertigo briefly while coming over the rim.

More marker drops were planned. The area was heavily wooded, with clearings that were hard to find and approach because of the rows of trees.

On the last day of the competition, Philippe Ronzy and his communications team had run a major advertising campaign to attract spectators to one of the airports (Thise) to watch the final flight. A huge mass of people showed up, creating chaos on the road. The task was to fly several laps of a triangular pylon race. Once again, Guy was the fastest in this type of race. He won the task and the title of World Champion, 1992.

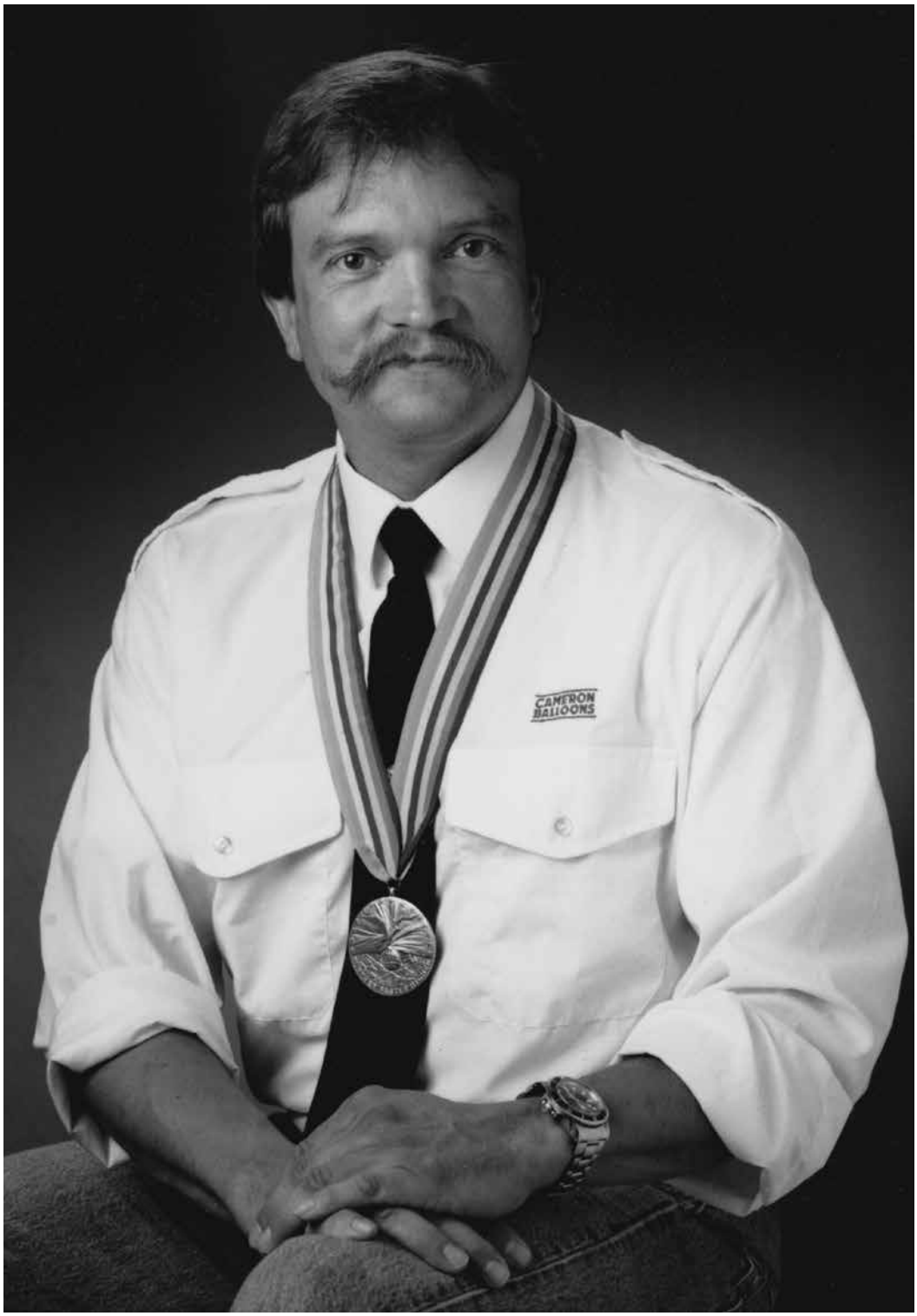
Prize-giving ceremony: Mayor of Luxembourg Mrs. Lydie Polfer (left), Alfy Feltes and Mr. Jean Birgen, Chairman of the Luxembourg Federation

Guy Moyano was... WORLD CHAMPION! The ultimate goal of the "We are here to win" team had been achieved.

After the final lap, while all airships were still in the air, pilot Oscar Lindström radioed all of them, and made the great suggestion that they line up in convoy and fly at low altitude over the crowd, which numbered more than 40,000, as a tribute to them. The pilots loved seeing and hearing the crowd cheering them. It was a beautiful ending to a successful meet.

Of course, that night belonged to the celebrations of Guy and his team. At the prize-giving, Guy received the bronze cup that the Fédération Aéronautique Luxembourgeoise had offered to the first World Champion in 1988. The only way a pilot could keep the cup permanently was to win it three times. This was finally achieved in 2010, in St. Petersburg, by Jacques-Antoine Besnard of Switzerland.

Cup offered by Luxembourg to the World Champion in 1988, now in the permanent possession of Jacques Antoine Besnard, its three-times winner. This bronze sculpture was designed and created by Luxembourg artist Lucien Wercollier (1908-2002).



Guy Moyano, World Champion, 1992

The following years were different from the preceding ones: in 1993, Luxembourg held the 11th World Hot Air Balloon Championship in the city of Larochette-Meysemburg. It was to be a great event and Guy was very much involved in site organization and preparations. He was also running CAGDL's balloon-repair station, producing most of the advertising banners to be displayed, on the balloons and on the ground. In late 1992, negotiations on the acquisition of an additional airship envelope had started; they resulted in an agreement with CK, a leading office equipment supplier.

The *CK* airship DP 80, registered as LX-GUY, was ordered and delivered just days before the 1993 event opened its doors to welcome 105 balloons to compete in the 11th World Hot Air Balloon Championship, plus 125 fiesta balloons, special shapes, one-man hopper balloons and 12 airships to compete in the Grand Prix de Luxembourg. All in all, 242 aerostats turned up.

Guy was busy on all fronts, finishing second in the Grand Prix, despite a fault with the envelope: a sewing error during assembly gave the tail a twisted look, in which also had an effect on control over flight direction. The Grand Prix was run by the experienced Victor Thorne from the UK. The event enjoyed perfect flying conditions throughout the week and welcomed over 300,000 visitors.

The next Hot-Air Airship World Championship was organized in Château-d'Œx in 1994, a year in which Guy was very busy:

- He registered the *CK* airship and flew it to sixth place, despite the fault with the envelope.
- He gave flying lessons to some of his crew members, like Marc Adler, Freddy Ernst, Val Henckes and Jean Claude Theisen.
- He had the opportunity to fly the small single-seater DG-14 gas airship developed by Don Cameron, which he flew for a total of 22 hours over Orléans, France, for an advertising contract. It was an amazing machine, which proved its value for marketing but was not promoted much by its manufacturer.
- For the French TV series *Ushuaïa*, he piloted the *Lux-Post* airship, over and around the magnificent Neuschwanstein Castle in Bavaria, Germany, with the participation of Nicolas Hulot, who was later to become French Minister for the Environment. Guy piloted jointly with Vincent Dupuis.
- He became the central figure in and main pilot for a special shape promotional campaign, first for several weeks in the Ruhr area of Germany, than for six weeks on an advertising tour throughout Spain. The Spanish experience was exhausting: up to three flights or shows per day and night in venues such as golf courses, university campuses, nightclub parking lots (at night), train stations and huge traffic circles. It was a campaign ordered by Rothman, a Netherlands cigarette maker. Built by Don Cameron, the special shape—an attractive 25-m-tall *American Eagle* with "one thump up"—was, by design, asymmetrical, with the result that it was difficult to fly and needed constant use of side vents to control the turning. It was a highly successful show. Press, TV and radio reporters were eager to get on board, so it received widespread media coverage. The whole adventure was spiced up by nightly transfers of the airship by car from city to city, all around Spain and to the center of Madrid.

New envelope

Repainted truck

Then a new professional opportunity turned up for Guy. He was offered the job of running a Nautical Center owned by the Luxembourg Government, training young people to sail boats. The opportunity was a good match with many of Guy's interests, capabilities and experiences: outdoors activity, Scout leadership, sail-boat racing, technical expertise, team leadership and working towards goals. Guy said yes to this new challenge in 1995. His activities for CAGDL were taken over by Guy Gilles from Luxembourg after having been trained by German instructors A. Weiser and R. Boelling and certified by Jean Sauber, examiner of the Luxembourg Ministry of Transport. Guy Gilles accumulated about 30 flight hours from 1995 till 1999 before the gondola was sold to Japan.

American Eagle, during a special shape promotional campaign in Germany and Spain, piloted by Guy Moyano (1994)

***Lux-Post* airship**, piloted by Guy Moyano and Vincent Dupuis around Neuschwanstein Castle in Germany (1994)

DP 80 LX-PST, with Astra banner, in 1998 at the World Championship in Gatineau (Canada) takes third place.

LAST COMPETITION AND SUCCESSORS

Guy had his last go at airship competitions in 1998 at the World Championship in Gatineau, Canada. Since he had been unhappy with the *CK* airship's performances, Guy registered the *Lux-Post*, which was ageing—particularly the engine. The *Lux-Post* was fitted with the banner of a new sponsor: Astra. Since Astra was operated by SES—Luxembourg's satellite company—the Eurosport TV channel installed a video recorder in the airship gondola during the event.

Guy finished third, behind second-placed Benoit Siméons of Belgium and the new champion: Jacques-Antoine Besnard of Swizerland. Jacques Antoine's victory was his first World Champion title, which was to be followed by three more.

Jacques Antoine is the son of Charles André Besnard, who first took part in a major competition in 1990 in Nottingham. He is still ranked fifth in the world. Charles André got involved with airships by taking over an airship owned by a press group, which did not have a pilot to fly it. It was a Thunder Colt AS-105. He soon became involved in the circle of competitive airship-flying and flew in six World or European events, finishing as runner-up three times.

Jacques-Antoine Besnard, Jens Petersen, Charles-André Besnard

AS-105 *Le Valais,* flown by Jacques-Antoine Besnard

His son, Jacques Antoine, followed in his footsteps, winning four World Championships in a row. The Besnards initially used a two-seater, side-by-side, Thunder Colt gondola. They had several envelopes, including *Le Matin*, *24 heures* and *Le Valais*. Later, they changed to a tandem-seat gondola. Jacques-Antoine won the 2008 Worlds in St. Petersburg, held on the initiative of Gennady Oparin, an enthusiastic Russian airship pilot. He also won in 2010, in Dole, France, in an event held on the initiative of Olivier Cuenot, who comes from a family steeped in ballooning. For both events, Pit Thibo was Competition Director, assisted by Jerzy Czerniawki of Poland, a devoted balloon and airship pilot, as well as a very experienced event organizer and competitor.

Jacques-Antoine
Besnard

...and his team
at the 2010 Worlds
in Dole, France

Olga, chief meteorologist of St. Petersburg, Dominique, assistant and Jerzy Czerniawski, Deputy Competition director at the St. Petersburg Worlds in 2008

Gennadi Oparin, Russia, pilot of Baltika and Megafon airships

Martin Harris, UK meteorologist, Dominique Petitpère, Pit Thibo, Alexandra Galchenko, Maria Gurasova, staff at the St. Petersburg, 2008

P. Contegiacomo
giving a ride to Olivier,
Paul and Camille Cuenot

Michel Leblanc,
Deputy Competition
Director, Dole

Pit Thibo and Dimitri Klokoff,
main organizer of
the 2008 World Championship

Olivier Cuenot,
main organizer of the Dole,
France, Worlds, 2010

AWARDS AND MEDALS

In 1994, Guy was awarded the FAI Santos Dumont medal and certificate. To conclude this report, there follows an extract from the World Pilot Ranking List. This is as far as the Guy Moyano story goes. The outstanding successes he has enjoyed and the large number of setbacks he has endured—remaining a model of team spirit throughout—make it a tale worth telling. He has made numerous and diverse contri-

PILOTS WORLD TANKING LIST (UP TO NOVEMBER 2020)

PILOTS				WORLDS				
RANK	NAME	COUNTRY	TOTAL POINT	LUX. 1988 1ST WORLDS	UK 1990 2ND WORLDS	FRANCE 1992 3RD WORLDS	SWITZERL. 1994 4TH WORLDS	ITALY 1996 5TH WORLDS
1	LINDSTRÖM Oscar	SWE	159	25	11	16	16	8
2	BESNARD J. Antoine	SUI	141					16
3	MOYANO Guy	LUX	127	20	20	25	8	
4	DUPUIS Vincent	FRA	92	13	25	7	25	
5	BESNARD C. André	SUI	90		2	20	10	20
6	PETERSEN Jens	GBR	78		13	13	20	25
7	SAGE Tom	GBR	74	11	16		13	11
8	BAMBERSKI Wojtek	POL	73					
9	KOSTIUSKEVICIUS R.	LIY	63					
10	BUSEMEYER Mucky	GER	54	10	6	5	5	

Please note that the number-one ranked pilot is Oscar Lindström of Sweden, who was the first World Champion, and has since scored at all major events except one. Second placed is Jacques-Antoine Besnard of Switzerland, who won the title of World Champion four times in a row, as well as one European Champion title in 2016. Guy Moyano is third, having twice been runner-up in the World Championship, and been once European Champion and once World Champion.

butions to the field of hot-air airships, whether in competitions, in instruction and education, in demonstrating effective marketing or in displaying technical imagination as regards improving airships.

Guy wishes to express his appreciation for his teammates who displayed dogged determination, with the philosophy: "We are here to win!" *Merci, dir Jongen!*

WORLDS					WAG	EUROPEANS		
CANADA 1998 6TH WORLDS	AUSTRIA 2000 7TH WORLDS	RUSSIA 2008 8TH WORLDS	FRANCE 2010 9TH WORLDS	GERMANY 2018 10TH WORLDS	WORLD AIR GAMES DUBAI 2015	FRANCE 1989 1ST EUROP.	LUX. 1991 2ND EUROP.	GERMANY 2016 3RD EUROP.
9		7	8	8	13	16	16	6
25	25	25	25					25
16						13	25	
						11	11	
11	20					7		
							7	
						10	13	
		13	13	11	25			11
		8	20	9	16			10
						20	8	

Total of 66 entrants
(ranking system established by FAI / CIA airship working group under the chairpersonships of P. Thibo and L. Van Geyte)

Guy Moyano's 1994 Santos Dumont medal

Guy Moyano's FAI Medals—two silver (1988 and 1990), two gold (1991 and 1992) and one bronze (1998)

FEDERATION AERONAUTIQUE INTERNATIONALE

Championship Diploma

FIRST WORLD HOT AIR AIRSHIP CHAMPIONSHIP

JULY 29 – AUGUST 7, 1988

held in the GRAND DUCHY OF LUXEMBOURG

This is to certify that

Guy Moyano

took 2nd place and is Vice World Champion

Luxembourg August 7th, 1988

Fédération Aéronautique Internationale

Fédération Aéronautique Luxembourgeoise

FÉDÉRATION AÉRONAUTIQUE LUXEMBOURGEOISE

MEMBRE DE LA FÉDÉRATION AÉRONAUTIQUE INTERNATIONALE (F.A.I.)

DIPLOME DE PERFORMANCE

décerné à Mr. Moyano Guy

pour son titre de "Champion du Monde"

3. Championnat du Monde de Dirigeables à Air Chaud

Délivré le 11 mars 1993 à Luxembourg

Le Président:

Le Secrétaire Général:

Guy Moyano's World Champion certificates

TEAM MEMBERS OVER THE YEARS

- Marc ADLER	’90, ’91, ’92
- Aly ALLARD	’88
- Hugo ARELANO	’94
- Jeannot BARTHEL	’89
- Georges BECK	’88, ’89
- Steve BUBEL	’91, ’92
- Freddy ERNST	’89, ’90, ’92, ’93, ’94, ’98
- Paul FEDERMEYER	’88
- Christian KIRSCH	’89, ’91, ’93
- Georges KLOMP	’94
- Lex KLOOS	’98
- Philippe KLOOS	’98
- Jeannot LOEWEN	’88
- Norbert MEYER	’90, ’91, ’93
- Armand OSWALD	’91, ’92, ’93, ’94, ’98
- Patrick PFEILSTUECKER	’93, ’94
- Fernand SCHAACK	’88
- Claude WEBER	’90

Luxembourg Grand Prix, 1993
Guy Moyano, Norbert Meyer, Freddy Ernst, Christian Kirsch, Ernst Schreiber

Worlds
Château-d'Œx, 1994
Patrick Pfeilstuecker,
Guy Moyano,
Freddy Ernst,
Georges Klomp,
Armand Oswald,
Hugo Arelano

European Champion
Team, 1991
Steve Bubel, Guy Moyano,
Marc Adler, Christian Kirsch,
Norbert Meyer,
Ernst Schreiber,
Armand Oswald

World Champion
Team, 1992
Steve Bubel, Freddy Ernst,
Guy Moyano,
Ernst Schreiber,
Marc Adler,
Armand Oswald

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This book takes a detailed look at hot-air airships, as pioneered around the world since 1973, and at the contributions made to the sport by Luxembourgers, in particular the pilot Guy MOYANO. Groundbreaking developments in Luxembourg included: the first professional marketing campaign using a hot-air airship, the first use of a pressurized airship, the first airship competition—drawing thousands of spectators—and airship competition rules, and the first World Championships. Luxembourgers have done so much for the sport that they have earned the country a mention in the *Guinness Book of Records*. Guy Moyano was involved right from the start as pilot, promoter and competitor. He won the World Championship, set a world record for longest flight in a hot-air airship, and trained dozens of pilots from around the world in the art of flying airships. Luxembourgers deserve to be proud of their country's outsize influence on this sport and of their fellow countryman's excellence as a pilot.