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The development of the Italian Airforce

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PLAN

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TEXTE

- ¹ In August 1914, the airplane had just entered the inventory of the main European armies and its contribution to military operations was related to a manoeuvre warfare scenario, according to the general view of the characteristics of a possible future conflict. In 1911-1912, the Libyan campaign had seen the first use of planes on a battlefield and underlined their potential with regards to reconnaissance as well as artillery spotting and even bombing missions.¹ It was also well understood that in a more challenging environment, such as a European war, air combat would certainly be involved, in order to provide freedom of action to one's own reconnaissance aircraft and to negate the same capability for the enemy, which led to some experiments in air-to-air combat. *In generale però l'inquadramento dottrinale delle componenti aeronautiche dei diversi eserciti era ancora di là da venire, e di massima i regolamenti dell'epoca si limitavano a prospettarne un impiego finalizzato alla ricognizione ed all'esplorazione, ad integrazione ed a supporto dell'attività tradizionalmente affidata alla cavalleria.* However, due also to the current technology state of the art, air warfare and air doctrine were little more than subjects for academic discussion, and in Italy, as well as in other countries, existing service regulations considered the airplane only as a means to expand the radius of action of the cavalry in its traditional reconnaissance and

search for contact operations. *The Questa era la situazione anche in Italia dove le Norme per il servizio di guerra diramate con regio decreto il 25 ottobre 1914 ed intese a fornire ai quadri del Regio Esercito delle linee guida alle quali attenersi nel caso di una sempre più probabile discesa in campo, prevedevano soltanto l'azione esplorante, lasciando peraltro intendere come l'intera materia fosse ancora oggetto di studio: Norme per il servizio di guerra (War Service Regulations) issued by Royal Decree on 25 October 1914, stated: "Aircraft can effectively support both long range and short range reconnaissance thanks to the capability to observe from above. But these machines are still under development; therefore the few hints that are given below for their use have to be considered as a rough reference."*²

- 2 The short manoeuver warfare season of summer 1914 followed along these lines. But when the Western Front became locked in the trench stalemate, both sides were forced to rely on aircraft not only to find out and anticipate the enemy's intentions, but most of all to conduct continuous surveillance of the front line, aimed at mapping enemy positions in preparation for any offensive operation. Aircraft were also used to closely cooperate with artillery, providing the data required to solve the indirect firing problem, which means firing at targets that cannot be seen by the gunners or by ground observation posts. For this purpose, some sort of communications link between the observer on board the aircraft and the firing batteries was required, which by the end of 1914 was granted by radiotelegraphy. At the same time, it was clear that air photography was the only suitable answer for a detailed study of the enemy's trench system. In order to satisfy these new emerging operational requirements, the airplane, in itself one of the most advanced results of technological progress, therefore had to be supported by two more important findings of modern technology: radiotelegraphy and air photography. This clearly demonstrates the close connection between technology and doctrine.

The Italian military aviation at the beginning of the war: organisation, practices, standards and airplanes

- 3 In August 1914, the *Regio Esercito* could deploy no more than 8 mobile *squadriglie* (squadrons), 4 of them equipped with Nieuport monoplanes and 4 with Blériot monoplanes. All of them were intended to be attached to the field armies and to follow them on the ground as part of manoeuvre warfare, along with 3 Farman MF1912 biplane position *squadriglie*, which were supposed to operate from fixed airfields.³ By the end of the year, however, an acquisition program was launched taking into account the lessons from the Western Front. It was planned to replace the Farman MF1912 with 40 Farman MF1914s, equipped with an 100 hp FIAT engine, and to acquire 30 Caproni Parasol monoplanes, also powered by a 100 hp engine, for the reconnaissance units, 20 Voisin biplanes with the Canton-Unnè 130 hp engine for the so-called combat units, 12 Caproni three-engine biplanes for the bombardment units, and 30 Macchi Parasol monoplanes for artillery spotting. Another critical factor was personnel: in May 1915, when Italy declared war on Austria-Hungary, there were only 116 pilots out of the 170 needed, and the only observers were the 20 officers qualified at an experimental course held in March 1915 on the airport of Centocelle, next to Rome.⁴
- 4 The Royal Bill n° 11 dated 7 January 1915 established the *Corpo Aeronautico Militare* as a separate branch from the Engineers Corps, which until then had managed all aeronautical activities of the Italian Army. It was organized in a General Directorate of Aeronautics (*Direzione Generale d'Aeronautica*), which was part of the War Ministry, two separate commands for airships and aviation, and the Aeronautics Central Institute (*Istituto Centrale Aeronautico*). The general directorate was a technical and administrative body whose area of responsibility included both personnel and equipment, while the institute had study, research and testing tasks, and the two commands were in charge of all operational aspects including training and logistics. The Aeronautical Construction Establishment (*Stabilimento*

Costruzioni Aeronautiche), which was responsible for airships and balloons, was part of the airships command, while the Military Aviation Technical Directorate (*Direzione Tecnica dell'Aviazione Militare*), with the mission to provide the *squadriglie* with the required aircraft and to support them in terms of supply and maintenance, was under the authority of the aviation command. The January 1915 Royal Bill increased the available budget and thereby increased the number of aircraft in order to procure 30 more Voisins and 73 more Farmans, together with 15 Aviatik biplanes and 36 Macchi Parasol monoplanes, all of them planned to be delivered between March and August thanks to a fast growing aeronautical industry.⁵ Altogether, companies like Savoia (Farman), SIT (Voisin), and Caproni e Macchi had 1,500 workers with a monthly production of 15 aircraft.

The birth of specialties: observation and adjustment of artillery fire, hunting, bombing

- 5 On 23 May 1915, when Italy declared war on Austria-Hungary, an Aeronautical Services Office (*Ufficio Servizi Aeronautici*) was established within the Supreme Command and the 12 available *squadriglie* were deployed along the Isonzo front, where general Luigi Cadorna intended to produce the maximum effort. Some of them were under the direct control of the Supreme Command, but most were distributed among the two relevant field army headquarters (2nd Army and 3rd Army).⁶ The aircraft were still the Blériot XI and Nieuport IVM twin-seat monoplanes, together with some Farman MF1912, and Italian aviators were not yet properly equipped for trench warfare since they lacked airborne wireless stations and had only a handful of cameras. On 2 July, however, an important achievement was the arrival at Medeuza of the first two *squadriglie* aptly trained for the so-called artillery service, one of them mounted on Caudron G.3 and the other on Macchi Parasol.⁷
- 6 In the First Battle of the Isonzo (23 June 23 – 7 July), when the Italian Army crossed the river and began to climb the Carso plateau, aircraft were used not only to identify enemy positions and to attack active batteries and approaching reinforcements, but also to direct artillery

fire. The lack of medium and heavy guns, which was to plague the *Regio Esercito* well into 1916, was a serious handicap. This was worsened by the impossibility to optimize the use of the few available ones, since it was very difficult to localize the main elements of the enemy's defensive organization, and especially because the batteries were well-concealed on the Carso plateau, in the forested area east of Gorizia and behind the mountain ridge north of the city. Upgrading the artillery service was therefore a top priority and it was considered as such by the *Comando Supremo*, with Cadorna in the lead.⁸ It was not enough to increase the number of *squadriglie* and to equip them with new machines such as the Caudron and the Farman, more reliable and easier to fly than the Macchi Parasol; an efficient air-to-ground communications net also had to be organised, with wireless receiving stations spread out along the front line to relay air observers' firing data to the artillerymen via dedicated telephonic lines. Most of all, the artillerymen had to be trained to trust the airmen and make use of the information they could provide, which in turn required purposely defined procedures and intensive training.⁹ This was not possible before the outbreak of Second Battle of the Isonzo (18 July – 3 August). Yet in the summer the situation slowly improved, thanks also to the first airborne wireless transmitting stations that, operating at a 100-150 meter wavelength, allowed Morse code messages to be transmitted a distance of a few tens of kilometres. Even through white sheets were still to be used for ground-to-air communications, radiotelegraphy was a true quantum leap for the artillery service.¹⁰

- 7 The obsolete monoplane aircraft were eventually withdrawn from front line service, and starting in June, a Farman MF1914 *squadriglia* was deployed at Asiago, in the Trentino sector of the front. On August 20, the first two Caproni Ca.1 trimotors, powered by 100 hp FIAT A.10 engines, carried out their first bombing mission against the airfield at Aisovizza in retaliation for an Austro-Hungarian raid on the city of Udine.¹¹ It was a line of action that the Supreme Command would have followed to the end of the conflict, replying immediately to enemy air raids, but with the clear intention to privilege military targets and avoid any collateral damage, since most of the urban targets within the bombers' radius of action were the Italian cities then under Austro-Hungarian rule. In order to defend Udine, which was

the seat of the Supreme Command and a very important logistics base, the 8^a *Squadriglia* was activated at Santa Caterina at the end of August. This squadron was equipped with the Nieuport Ni.10 twin-seat biplane, soon to be replaced by the Ni.11 monoplane, which was to be the first fighter used by Italian aviation. The availability of a proper single-seat fighter allowed for the creation of a true fighter component, once again providing the solution required to support a clear operational requirement and encouraging the definition of specific combat procedures.

- 8 During the Third Battle of the Isonzo (18 October – 4 November) the availability of 5 *squadriglie d'artiglieria* allowed more spotting missions but the results were very often unsatisfactory. The complex procedures of the so-called artillery service still had to be registered and the aircraft were used mostly for tactical reconnaissance and front line surveillance. The same also happened in the Fourth Battle of the Isonzo (10 November – 2 December), due also to appalling weather conditions. Radiotelegraphy was now commonly used and cameras vertically installed in the fuselage allowed for precisely mapping enemy positions.
- 9 In 1915, with the Caproni Ca.1, Italy was the only nation to deploy an aircraft that had been designed as a bomber. On November 11, the Aeronautical Services Office stated it was a “strategic” weapon and that as such, it was to be under the direct control of the Supreme Command and used for mass attacks, as far as the number of available aircraft, never more than a few tens of those three-engine planes, would allow, against targets which could have a relevant effect on the overall conduct of military operations.¹² Having anticipated in this way the basic concepts of centralized planning and concentrated efforts, the Aeronautical Services Office stated the requirement to operate mostly at night, in order to avoid anti-aircraft artillery. Yet this was a way to operate that could only be adopted at the end of 1916 due to technical shortcomings and lack of training. Again, technology was lagging behind doctrine, but these urgent requirements pressed for new technical solutions, such as a lighting system for the airfields and dedicated training. At the time, aircraft versus aircraft engagements were still episodic and inconclusive, and even the agile and fast Nieuport biplanes were not the best of the fighters since their Lewis machine-gun was installed on top of the upper wing

in order to fire outside of the propeller arc, which caused significant problems in the aiming process. Technology provided the answer in early 1917 with the Nieuport Ni.17, license-built by Macchi, which was to be the first Italian fighter equipped with a synchronized machine-gun.

- 10 On 1 December 1915, Italian aviation, still not on the same foot as Austro-Hungarian aviation as far as quality was concerned, deployed 9 reconnaissance and combat squadrons, 5 artillery service squadrons, 6 bomber squadrons, 4 fighter squadrons and one hydroplane section on the Garda lake.¹³ The force's structure, with reconnaissance and fighter units allotted to the field armies and the bombers under the direct control of the Supreme Command, was already quite effective and in line with the lessons from the Western Front, while the strength of the air service was slowly but steadily increasing. From May to December 1915, the aeronautical industry, although plagued by organizational difficulties and by a shortage of qualified manpower and raw material, produced 424 aircraft, including 42 Macchi Parasol, which are not listed by many reference sources, and 606 engines.¹⁴ All aircraft, with the exception of 28 three-engine Caproni and a few Aviatik derived from a German model, were of French design.

The rise of aviation as a military tool

- 11 Expansion continued during 1916 notwithstanding, the continued difficulties of manufacturers. Even though orders for bombers and fighters were placed in large numbers, with the building up of a strong bombardment component which was unique to Italian aviation, reconnaissance and artillery spotting were of the greatest interest for Supreme Command, being so important in trench warfare, and three more artillery service *squadriglie* were established in March to partially cover the mountain sector of the front. A new regulation was issued by the Aeronautical Services Office on 5 March 1916 stressing the role of the corps squadrons tasked to map even the smallest detail of the enemy positions with aerial photography.¹⁵ Artillery spotting, mainly for large and medium calibre batteries, was done in a graphic way, with impact points plotted on a squared

1:25,000 map and using the on-board wireless station to transmit adjustments. Targets of opportunity were indicated by dropping smoke signals on them at prearranged heights to help calculate the distance based on the elevation angle.

- 12 In April 1916, Italian aviation was able to deploy 32 *squadriglie* (nine bombers, five fighters for air defence, ten reconnaissance, and eight artillery service *squadriglie*) on the Italian front divided among seven *gruppi*; one, with most bomber squadrons directly controlled by the Supreme Command, and the others distributed among 1st Army, on the Trentino front, 2nd Army and 3rd Army, both on the Isonzo front.¹⁶ Each army had one *gruppo* with the reconnaissance, fighter and air defence *squadriglie* and one devoted to artillery service. One more reconnaissance squadron was attached to the XVI Corps in Albania.
- 13 In early 1916, Austro-Hungarian aviation still had the initiative and the raids on Rimini (11 January), Ravenna (12 February) and most of all on Milan (14 February), even though aimed at legitimate targets such as railway stations and factories, caused collateral damage and casualties prompting the Supreme Command to order a retaliation raid against the railway station of Lubiana.¹⁷ On 18 February, out of the 10 Capronis that took off from La Comina and Aviano armed with 200 kilograms of bombs, three were forced to turn back by engine troubles, five completed their mission, and one was shot down by two Fokker fighters that seriously damaged another three-engine bomber. The two German-built monoplanes with their synchronized machine-guns had quite an easy task since the bombers were not escorted and were not flying in formation; their nose mounted machine-gun could not cover the tail sector. Captain Oreste Salomone, although seriously wounded, was able to return to an Italian airfield with his heavily damaged aircraft and the bodies of his two crew members, Lieutenant Colonel Alfredo Barbieri and Captain Oreste Bailo, both killed in action. For his feat, he was awarded the gold medal for bravery, being the first Italian aviator to be rewarded in this way for his distinguished service.
- 14 Following the raid on Lubiana, the Capronis were equipped with a second machine-gun mounted in such a position to cover the tail sector and the standard crew was set at four men: two pilots, one observer and one gunner.¹⁸ In the coming months, the three-engine

bombers carried out counter-aviation and interdiction missions against airfields, railway stations, depots and staging areas, setting a pattern exemplified by the attack on 16 May by seven Capronis against the railheads at Ovcia Draga and Kostanjevica and the depots at Lokvica and Segeti.¹⁹ It was a sign that things were now going to be different and the turning point in the war in the air on the Italian front was the first victory by an Italian fighter: on 7 April 1916 Lieutenant Francesco Baracca forced a Brandenburg two-seater to land near Medeuza (Udine), while the enemy aircraft was supposed to bomb the railways stations of S. Michele al Tagliamento, Palmanova and Udine.²⁰

- 15 When on 15 May 1916 the Austro-Hungarian Army launched the spring offensive in Trentino, the 1st Army was hastily reinforced with men and materiel taken from the Isonzo front, and the air component was strengthened in the same way. In April, the air component of the 1st Army was reinforced with three Farman squadrons, one taken from the 2nd Army and two from the 3rd Army together with a Nieuport squadron, to be followed in early June by two newly formed bomber squadrons and another fighter squadron. Reconnaissance aircraft were busy not only plotting enemy movements but also joining the Capronis in their interdiction attacks against the railheads in Val Lagarina and the staging areas close to the front line, while artillery aircraft adjusted the firing of medium and heavy guns and mapped the new positions where the enemy withdrew when it was clear the breakthrough attempt had failed.²¹
- 16 Italian aviation held now the initiative with a significant level of air superiority that Italy would maintain till the end of the war, losing it only for a few weeks at the end of 1917. The bomber component, with a few tens of three-engine aircraft, could now to be used for more ambitious goals than battlefield interdiction and counter-aviation, and on 1 August 1916, answering a request from the *Regia Marina*, 24 Capronis headed for Fiume. Five aircraft had to turn back due to engine troubles but the others bombed the Whitehead torpedo factory, the Danubius shipyard and the oil refinery.²² Anti-aircraft fire was not an obstacle and, even though a bomber was shot down by a hydroplane on the way home, the raid was a clear success and had a great impact on Austro-Hungarian public opinion.²³

- 17 Meanwhile at the end of July, most of the troops sent to reinforce the 1st Army had been brought back to the Isonzo front in preparation for the successful offensive that opened the way to the conquest of Gorizia and a large portion of the Carso plateau.²⁴ Before and during the Sixth Battle of the Isonzo (6-17 August), Capronis raided railway stations using from ten to twenty aircraft at a time. IV Group attacked the Opicina railway station during the opening phase of the battle on 6 August, losing one of the four bombers that arrived at the target to enemy fighters.²⁵ But the following raids on the Prvacina and Dornberg stations on 9 August and 15 August were both successful: no aircraft were lost and eighteen bombers in the first raid and twelve in the second hit their targets dropping 2,975 kilograms of bombs in one raid and 2,100 in the other.²⁶ Battlefield interdiction was the main task for the bomber arm during the Isonzo battles and the Capronis were able to carry out these raids with few losses thanks to their defensive armament and Italian air superiority.
- 18 For the first time, the Italian Army could concentrate an impressive number of guns on the attack sector and therefore conduct a true 'battle of equipment.' The four artillery *squadriglie* attached to the 3rd Army were intensively used first to study the enemy's defensive organization with the help of air photography, then to locate the enemy batteries and register firing parameters, and eventually, when the offensive began, to monitor the course of the battle and to direct firing concentrations by signalling movements of troops and targets for counterbattery and interdiction. In summer 1916, the level of integration between artillery and spotting aircraft was quite satisfactory, as this was confirmed during the three autumn offensives ordered by Cadorna as intermittent attacks, which meant that the offensive was to be suspended as soon as it stalled and a new one had to be immediately prepared. In order to support the vital counterbattery effort, new procedures were defined and a dedicated communications network, based on several wireless receiving stations and a complex telephone exchange system, was put in place. Meanwhile, a solution was studied to avoid possible interference between aircraft by assigning different transmission frequencies to the *squadriglie* and by having aircraft in the same sector transmitting in different time slots.²⁷ Once again this was made possible by the most recent developments in wireless equipment.

- 19 The ascendance of the fighter arm implied that it was now time to replace the Caudron G.3, the Farman, and the Voisin with more advanced machines. But for the time being, the tail boom, pushing-propeller formula was maintained, as with the Savoia-Pomilio SP.2, an Italian designed two-seat aircraft that had the same lay-out as the Farman. Yet this plane proved so unsatisfactory in terms of both performance and flying qualities that the project was reassessed, leaving the way open for the lighter version SP.3.²⁸ Even this was less than satisfactory, but nevertheless the SP.3 was pressed into service in spring 1917 when the tail boom formula was undoubtedly obsolete due its vulnerability to tail attacks.²⁹ For a few months, this cumbersome machine was able to hold its own thanks to the overall superiority of the Italian air service fighters.
- 20 At the end of 1916, Italy had 46 *squadriglie* in the front line and, in spite of the shortage of raw material, mainly steel and alloy, production data were of some comfort, most of all for engines that could exploit the existence of well-organised automotive companies. Industrial mobilization also aimed at improving national capacity as far as reconnaissance aircraft were concerned, with the goal to replace French models with aircraft of Italian design. However, this was not the case for the fighters, intentionally equipped with license-built machines, like the Nieuport. As for the bomber arm, Caproni was already busy designing a giant triplane that unfortunately would prove to be too slow and heavy. This failure confirms how technology was not in line with the most advanced visions of air power, and he thus worked on a more powerful variant of his biplane, to be equipped with three 150 hp Isotta-Fraschini engines, that would become the legendary Ca.3. Overall in 1916, Italy built 1,255 aircraft, including 144 Caproni three-engine bombers, 204 Nieuport Ni.11 fighters and not fewer than 462 Farmans, a number that speaks by itself about the need to modernize the reconnaissance component.³⁰ The number of flying schools had grown from 9 to 16 aiming to raise the number of available pilots to one thousand, with one hundred replacements every month.³¹

Air forces serving land operations

- 21 In April 1917, within the context of a comprehensive restructuring of the aeronautical services, a command for aeronautics was established at each army headquarters, with the task of managing the activity of the assigned aircraft and balloon units and granting them the required logistics support in terms of both personnel and material, including all administrative aspects.³² This was an organizational change imposed by the increasingly complex structure of the air service, from both an operational and a logistics point of view. The Supreme Command was still in direct control of the bombing force and some fighter and reconnaissance *squadriglie* deployed between Udine and Pordenone. Within this context, the reconnaissance component was organized in *squadriglie d'armata* (army squadrons) under the direct control of army headquarters. Its task was to keep under surveillance the enemy's rear-guard and lines of communications. *Squadriglie di corpo d'armata* (corps squadrons), under the tactical control of corps headquarters, operated up to a depth of 15-20 kilometers from the line of contact, with tasks that included battlefield surveillance, enemy trench system surveys and mapping, artillery spotting, and the so-called "infantry service".
- 22 At the end of 1916, taking into consideration what was happening on the Western Front, it had been decided to use airplanes to identify one's own infantry lines and to relay simple messages in order to help division and corps commanders maintain control of their troops once they went over the top.³³ To this extent, the two-seaters had to slowly fly at low level over the battlefield, dropping prearranged smoke signals in order to be recognized by the infantrymen, who then used white sheets to allow the observers to plot their positions on a map to be dropped on the relevant command post. The same ground signals, if arranged according to a predefined pattern, could give messages such as "our artillery is firing short," "the enemy is counter-attacking," "we need reinforcements." The observer could then transmit the messages to headquarters by radio.
- 23 The "infantry service" was even more complex than the "artillery service" and the results were often disappointing, but it was one possible

answer to a high priority requirement and as such, it could have been used in all major operations trying to make them more effective with new operating procedures and specific training programs involving troops and aircraft.³⁴ This was a highly specialized task that could not be performed by a general purpose squadron, as the new corps squadrons were intended to be. The same need for specialization applied also to the “artillery service,” as became evident during the spring and summer offensives when the former artillery squadrons obtained by far the best results. Therefore, toward the end of the year many corps squadrons were requalified as “artillery” or “infantry” squadrons, leaving tactical reconnaissance and battlefield surveillance to others.³⁵

- 24 On 10 February 1917 on the Italian, Albanian and Macedonian fronts, there were 20 reconnaissance squadrons equipped with Farmans, Voisins, Caudrons and some Savoia-Pomilio (SP) two-seaters, seven squadrons, and one flight of Nieuport Ni.11 fighters, five air defence Farmans and SAML squadrons, 12 Caproni Ca.1 and Ca.2 bomber squadrons and two FBA seaplane squadrons, with 370 machines total. Most squadrons were due to convert to more capable aircraft, with the Savoia-Pomilio replacing the Farmans, the Voisins and the Caudron G.3 in the reconnaissance units, the 110-hp Nieuport Ni.17 license-built by Macchi the 80-hp Nieuport Ni.11 in the fighter units, and the 450-hp Ca.3 both the Ca.1 and the Ca.2. The aircraft industry was stretched to its limits, but the transition required a few months and it was impossible to achieve the intended expansion in battle strength. In April 1917, following the organizational changes and with more obsolete machines slowly replaced, the order of battle listed 62 *squadriglie* with 14 bomber squadrons, most of them equipped with the Ca.3, 12 fighter squadrons, mounted on the Ni.11 and the Ni.17 together with a few SPAD VII bought from France, 34 reconnaissance and two hydroplane squadrons. One Caproni squadron was in Libya, together with one squadron and two sections equipped with Farmans, while 4 squadrons and 14 sections provided air defence for industrial cities, naval bases and airship stations outside the war zone.³⁶

Fig.



Late spring 1918, Major Francesco Baracca, the leading Italian fighter ace with 34 victories, and his SPAD VII in a famous image.

AUSSMA

- 25 In May 1917 on the eve of the Tenth Battle of the Isonzo (12-26 May), the 3rd Army and the newly formed army group on its left, the Zona di Gorizia, had two groups of squadrons each, reinforced with fighter sections provided by X Group and supported by the three-engine Caproni bombers controlled by the Supreme Command. Both the 3rd Army and the Zona di Gorizia used one of their two organic groups for the artillery service and the other for reconnaissance, combat air patrols and light bombing, according to the type of aircraft that equipped the squadrons and to aircrew experience and training.³⁷ Air photography was now the main source of information and all reconnaissance squadrons were equipped with cameras, while the service structure had photographic laboratories at group level. Trench mapping and artillery spotting required an intense effort during the preparation phase, but when the battle began, the priority task for corps squadrons was to locate the most active enemy batteries in order to support the much needed counterbattery fire. The system remained too slow, as too much time elapsed between the aircraft sending

messages and the artillery opening fire, which did not allow for suppression of enemy batteries before their barrage could stop the infantry's advance.

26 Artillery service squadrons sent their two-seaters with fighter escorts to register long-range targets such as choke points, logistic terminals, command posts. Together with reconnaissance squadrons they kept the battlefield approaches under continuous surveillance in order to timely identify enemy reinforcements and supply columns. Several sorties for infantry liaison were also flown but the results were disappointing as most infantry were not adequately trained and often reluctant to expose ground signals.³⁸ Finally, reconnaissance two-seaters and fighters, together with the Caproni bombers, participated in massive raids on the enemy rear-guard that took place on May 23 on the Carso plateau and on May 25 north of Gorizia, between the Bainsizza plateau and Monte Santo. It was the first time that Italian aviators were directly involved in battle, but from then on, ground attack sorties were to be part of the planning. Though the attacks' lack of precision limited material results, the moral effect was important and prisoners reported panic among Austro-Hungarian troops, while captured papers confirmed that low altitude bombing and strafing had spread havoc among reinforcements marching to the front and logistic personnel in the rear. Several aircraft were hit by ground fire, but none crashed in enemy territory even though some could not make it to their home field due also to engine troubles.³⁹ The same can be said of the bombers that raided the railway stations in the usual battlefield interdiction missions. Even as Austro-Hungarian aviation now deployed a new fighter, the Brandenburg KD.1, soon to be joined by the first Albatros D.IIIs of German design, the bombers were able to hold their own with their machine-guns and with the help of the Nieuports and SPADs on escort duty.

27 By June 1917, the intended re-equipment program was well under way. In the reconnaissance squadrons the number of SPs and SAMLs steadily increased while Caudrons and Farmans dwindled. Fighter squadrons had their Ni.11s replaced by more powerful 110-hp Ni.17s and 120-hp Hanriot HD.1s, both license-built by Macchi, and by the French built 180-hp SPAD VII with its excellent Hispano-Suiza eight-cylinder V-shaped engine.⁴⁰ The bomber arm was standardized with

the 450-hp Ca.3 and the number of these three-engine aircraft was increased to 74 by the end of June.

- 28 Only the weather prevented the Italian aviation from playing a more important role in the Battle of the Ortigara (10-25 June), when the 6th Army's tried to regain terrain lost on the Asiago plateau in the May 1916 Austro-Hungarian offensive. The 6th Army air component was strongly reinforced and the Supreme Command bomber force was tasked to attack the enemy rear as it had done in May during the Tenth Battle of the Isonzo.⁴¹ On the opening day of this offensive, 141 sorties, and out of them 32 by bombers, 53 by reconnaissance two-seaters and 56 by fighters, were carried out, but very few aircraft could penetrate the clouds over the battle area. The weather remained prohibitive in the following days, with the exception of 14 June, when it temporary cleared up, and on 19 June, when the clear morning sky allowed 145 sorties, 30 by bombers, 54 by two-seaters, 61 by fighters, and 5.5 tons of ordnance were dropped on billeting and logistics areas in the immediate rear. Austro-Hungarian aviation tried to interfere but could not significantly limit the Italian aircraft's freedom of action and to this extent, the battle confirmed Italy's air superiority.

The air weapon, tool of interdiction on the battlefield or strategic weapon?

- 29 At the same time, the bomber arm was raiding logistics centres and railway stations in the rear of the Isonzo front with 10-12 aircraft at a time operating both at day and at night. The number of Ca.3s available allowed Supreme Command to consider targets more in line with a strategic use of air power such as the mercury mines at Idria, which were bombed on July 7 and 28, and most of all the stronghold of Pola, the main Austro-Hungarian naval base. On the night of 2 to 3 August, 36 Capronis took off at one-minute intervals to bomb Pola, with Captain Gabriele D'Annunzio, a strong advocate of these bombing operations, flying as the observer aboard one of the bombers.⁴² The cloudy sky and the usual engine troubles forced 16 Ca.3s to turn back, but 20 arrived on target and dropped six tons of bombs. Intense

antiaircraft fire damaged ten bombers and engine problems forced three more to make emergency landings once back in Italian territory. The raid was repeated the following night, with 27 out of 29 bombers dropping 8.5 tons of bombs, and again on the night of 8 August by 25 out of 28 Ca3s, with eight tons of bombs. During both these raids, anti-aircraft fire was less effective than the first night, but three Caproni were forced to head back because of their faulty engines and two crash-landed before reaching their airfields.⁴³

30 Notwithstanding D'Annuzio's stubborn insistence on the strategic importance of these raids, Pola was then set aside to concentrate the bomber force against battlefield interdiction targets in preparation for the Eleventh Battle of the Isonzo (18–26 August). The depots at Chiapovano and several railway terminals were attacked daily by 10–12 Capronis, usually escorted by X Group fighters. Targets listed included the railway junction and the ammunition factory at Assling (now Jasemice) in Slovenia.⁴⁴ For the new offensive, which was to be biggest effort ever produced by the *Regio Esercito*, the 2nd Army had nine reconnaissance and four fighter squadrons, the 3rd Army eleven reconnaissance and three fighter squadrons, supported by IV and XI Group Capronis and by X Group fighters, which were the manoeuvre component controlled by the Supreme Command. Corps and army squadrons carried out their usual tasks and were increasingly used to support counter-battery fire with mixed results due to the usual communications problems. Once more, reconnaissance aircraft were able to exploit the freedom of action granted by the fighter arm, joining the bombers in the attempt to neutralize the enemy's artillery fire and cut off the battlefield from the supply sources. Air superiority above the battlefield was maintained by the fighter squadrons continuously flying four or five aircraft-strong combat patrols in each squadron assigned a 10–15 kilometre sector.⁴⁵ The idea of offensive patrolling over the enemy's territory and of carrying out fighter sweeps was still to come and this, together with the cautious attitude of the Austro-Hungarians, explains the low intensity of air-to-air combat.

31 As in May, all squadrons took part in the battle attacking second-line defensive positions and communication lines. On 19 August, 228 aircraft flew 288 sorties with the loss of a single two-seater. In the 92 ground attack sorties, 24 tons of bombs were dropped by Capronis

and reconnaissance aircraft, many of them going down to 200 meters altitude to strafe enemy troops and the gun crews. The following day, with D'Annunzio again aboard one of the most daring three-engine bombers, the pattern was the same, with 261 aircraft of all types flying 326 sorties and dropping 14 tons of bombs with the loss of one fighter, while 14 Ca.3s dropped four tons of bombs on the railway station at Tarvisio in a failed attempt to stop the flow of reinforcements and supplies for the Isonzo front. On 21 August, 338 sorties were flown by 245 aircraft, with 13 tons of bombs and the raids went on in a similar way for a few days: on 22 August, 283 sorties were flown by 250 aircraft with 11 tons of bombs, on 23 August, 273 sorties by 215 aircraft and 15 tons of bombs, and on 24 August, 233 sorties by 168 aircraft and 15 tons of bombs. Several machines were damaged by ground fire but only two, including a Caproni, were counted as missing. SAML and Pomilio two-seaters, and especially the fighters, proved to be very effective in strafing due to their speed and manoeuvrability and forward-firing synchronized machine guns.⁴⁶

- 32 With the end of the August offensive, the bomber force could again be used in a strategic role while still keeping the enemy railways and logistic system under pressure.⁴⁷ Pola was raided by 28 Capronis on the night of 3 September, by ten the following night and again by nine on 27 September, seven on 28 September, nine on 29 September, 15 on 3 October, the bombers attacking always at night. At night on 4 October, 12 Ca.3s were over the naval base at Cattaro, taking off from Gioia del Colle, in Puglia, and flying over sea for more than 200 kilometres.⁴⁸ By then the summer effort had reduced the number of available bombers so that the last raids were carried out by no more than 10 or 15 aircraft, and the defence was better organized, with the result that in all raids several Ca.3s were hit with anti-aircraft fire and during the 29 September mission, one was shot down by a seaplane. Furthermore, available ordnance of no more than 75 kilograms could not seriously damage heavily armoured battleships and to overcome this problem, a scheme was devised to use torpedoes. On the night of 3 October, one of the 15 bombers was armed with a 700-kg torpedo, but although well-planned this attempt ended as a failure. During the target run, the aircraft was caught by enemy searchlights and the blinded pilot broke away and dropped the torpedo at sea.⁴⁹ To make things worse, two Capronis failed to return. The idea of the torpedo-

bomber was not rejected and was still considered in 1918 because of D'Annunzio's support, although it was not tried again.

- 33 In autumn 1917, Italian aviation was relatively well-balanced with numerous reconnaissance and observation squadrons, increasingly vital for trench warfare, and supported by a fast developing fighter arm and flanked by a bomber arm that, although not very large, had shown the capability to hit well beyond the front lines. There was, however, a clear need to re-establish an artillery specialty, with specialized corps squadrons, and it was also clearly understood that the reconnaissance arm was to be reequipped with fuselage aircraft, such as Pomilio and SIA7b, moving away from the Savoia-Pomilio tail boom design, which performed less well and was too vulnerable to tail attacks. On 1 October 1917, the 650 available aircraft, 570 of them on the Italian front, were organized in 66 squadrons and one section deployed on the Italian, Albanian and Macedonian fronts, 3 squadrons and one section in Libya, 4 squadrons and 14 sections for air defence outside the war zone. The Isonzo front had 14 airfields supported by a complex logistics structure based on forward depots at Codoiripo and Latisana.
- 34 With the end of summer, the weather quickly deteriorated and in this scenario, also because of skilful enemy deception measures, air reconnaissance could not confirm the news about an imminent offensive and did not identify the massing of German and Austro-Hungarian forces in the Plezzo-Tolmino area.⁵⁰ For the Twelfth Battle of the Isonzo, better known with the name of the small village of Caporetto, Germany supported Austria-Hungary not only with several elite divisions, but also with fighter and reconnaissance units, later joined by a bomber group.
- 35 A quick overview of air operations during the battle allows to identify three phases. Initially, in the first two days, all available aircraft were used in a massive interdiction effort that implied heavy losses. Then, from 27 October, while Italian troops retreated behind the Tagliamento, bomber and fighter squadrons were concentrated on the airfields at La Comina and Aviano in an attempt to slow the enemy's advance by bombing and strafing upcoming troops and supply columns while, at the same time, countering enemy aviation with combat air patrols. Within this context, Austro-Hungarian and German aircraft

failed to attack the retreating columns due to the defensive counter-air scheme put in place by the Italians, and also because German and Austrian air units had to move their operating bases forward, which affected their operational readiness for a few days.⁵¹ When the Italian Army regrouped behind the Piave, the pattern was unchanged, with the bomber squadrons ordered to carry on with their interdiction attacks and the fighter squadrons successfully flying combat air patrols and air defence sorties, while the same cannot be said for the escort missions, still suffering communications and coordination problems. These shortfalls became crucial when the air war intensified as the enemy air units moved forward and redeployed on the abandoned Italian airfields, assuming a more aggressive attitude. Italian aviation, in spite of the support of British and French fighter and reconnaissance units, was forced on the defensive well into December. The turning point was the so-called Battle of Istrana on 26 December, when German aircraft attacking that airfield suffered a clear defeat, destroying two aircraft on the ground but having eleven of their number shot down by Italian and British fighters. Together with five British and six French divisions that were initially kept in reserve, eight French and five British squadrons had arrived from the Western Front, and the latter were soon to distinguish themselves for their aggressive attitude.

- 36 It is not easy to precisely quantify Italian aviation losses in the autumn of 1917. In a report to the Parliamentary Inquiry Committee on the October 1917 disaster, it was estimated that between 100 and 120 aircraft were dropped from the inventory from 25 October to 20 November, taking into account also the unserviceable machines that were destroyed when the airfields were abandoned.⁵² It is easier to assess the number of aircraft lost in combat and quantify the effort produced by the squadrons. According to an official after-action report, from 25 October to 14 November 18 bombing missions were flown and 70 air-to-air combats occurred with 39 kills claimed, while 7 bombers, 5 reconnaissance aircraft and 4 fighters went missing with 26 pilots, 8 observers, 7 gunners. The navy lost one of its few Capronis on 2 November and two reconnaissance aircraft that crashed near the Italian lines can also be added to these numbers, raising the total to 19. On the other hand, from 22 October to 21

November, 17 enemy aircraft were shot down in Italian controlled territory.⁵³

Fig.



Spring 1917, a 450-hp Caproni Ca.3 bomber from the 9^a Squadriglia. The forward and rear machine-guns, both 6.5 mm FIAT-Revelli, are clearly visible.

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- 37 At the end of December, when the situation had stabilized, the air component under direct control of the Supreme Command included three bomber groups (IV Group, 1st, 8th, 13th Squadron, at S. Pelagio, XI Group, 4th, 5th, 6th Squadron, at Ghedi, XIV Group, 2nd, 7th, 9th, 10th Squadron, at Padova) and one fighter group (X Group, 70th and 82nd Squadron at Istrana, 91st at Padova). The newly formed XVIII Group, with three Caproni squadrons (3rd, 14th, 15th) was being dispatched to France to take part in the bombing offensive against German lines of communication and industrial plants. The 3rd Army, positioned along the Piave, had two reconnaissance groups (I Group, 112th, 117th, 131st Squadron, V Group, 23rd, 28th, 38th, 39th, 118th Squadron) and one fighter group (XIII Group, 77th, 80th, 83rd Squadron). The air compon-

ent of 4th Army, deployed on the Grappa massif, was also organized with two reconnaissance groups (II Group, 113th, 114th, 132nd, 133rd Squadron, and XII Group, 22nd, 27th, 35th, 36th, 48th Squadron) and one fighter group (VI Group, 76th, 78th, 81st Squadron). V Group in 3rd Army and XII Group in 4th Army grouped corps squadrons dedicated to the artillery service. The 1st Army air component was instead organized according to a territorial, and not functional scheme due to the peculiarity of the mountainous Trentino front: III Group, operating from Pasubio to the Astico Valley, had two reconnaissance squadrons, the 61st and 134th, and the 75th Fighter Squadron, IX Group covered the front from the Stelvio Pass to the Garda Lake, with the 37th, 120th, 135th reconnaissance squadrons and the 72nd Fighter Squadron, while the XVI Group covered the front from the Garda Lake to the Pasubio massif with the 31st and 121st reconnaissance squadrons and the 71st Fighter Squadron. On the Asiago plateau the *Comando Truppe Altipiani* had the XV Group with the 115th and 139th reconnaissance squadrons and the 79th Fighter Squadron, and the VII Group, with the 26th, 32nd and 33rd artillery squadrons.⁵⁴

- Fig.



A Nieuport from the 71^a Squadriglia followed by a Farman MF1914, very likely from the 31^a Squadriglia, taking off from Verona on a cloudy evening in late 1916. Verona was the home base of III Group, operating under the 1st Army on the Trentino front.

- 38 The recovery of the air arm was supported by the programme to re-equip reconnaissance units with such two-seaters as the SIA7b and the Pomilio, which were sufficiently fast and manoeuvrable to hold their own against enemy fighters, together with the speedy single-seat SVA, assigned to strategic reconnaissance duties, and fighter units with the SPAD and the Hanriot HD.1. The program was enabled by growing industrial production that in 1917, manufactured 3,861 planes and 6,276 engines.⁵⁵ The aircraft built in the greatest number were the Pomilio (543) and SAML (448), and these numbers meant that the SAML, very popular with pilots, would play an important role in the future. Fighter production figures were 247 Ni.11s, 150 Ni.17s, 125 Hanriots, with the 80-hp Nieuport progressively withdrawn from front service. Taking into account the SPADs, there were four types of fighters, with several squadrons having a mixed establishment. For the bomber arm, 250 Ca.3s had been built, but the expansion plans were based on the Ca.5 with its three 200-hp FIAT A.12 engines, a machine that was still suffering growing pains mainly related to the engines and the fuel plant. The emphasis on heavy bombers also had doctrinal implications and through the year, Giulio Douhet and Gianni Caproni had underlined the need for a fleet of strategic bombers that could destroy the enemy industrial base and cripple enemy morale annihilating their will to combat.⁵⁶ It was a fascinating view but it was far too advanced, as it was the proposal for a combined Allied air fleet intended to conduct massive destructive raids against Germany,⁵⁷ a proposal elaborated by Douhet while under arrest in the fortress of Fenestrelle.⁵⁸

Fig.



A three-engine bomber Caproni Ca.5. This machine, equipped with three 200-hp FIAT engines, suffered from technical problems that proved quite difficult to solve. Most of the bomber force was therefore equipped with the more reliable Ca. 3 until the end of the war.

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- 39 On 10 January 1918, Douhet, who had completed his term at Fenes-trelle on 15 October 1917, assumed the position of *Direttore Centrale di Aviazione*, Central Director for Aviation, within the *Commissariato Generale per l'Aeronautica*, General Commissariat for Aeronautics. This body formed on 1 November 1917, with the goal to centralize and streamline all activities, was to provide the air services with material and personnel. The General Commissioner was Eugenio Chiesa, a Republican member of the Parliament and not an officer, who answered only to the Minister of War. It was a solution the Government, then led by Vittorio Emanuele Orlando, had wanted in order to avoid misunderstanding and interference from the Supreme Command, while at the same time granting political leaders more influence in aviation-related issues.
- 40 As soon as he took his position, Douhet began to revisit the production program for 1918 as decisions taken the previous summer had to

be revised after the disasters of the fall.⁵⁹ The basic criteria were still valid: to ensure an unchallenged domain in the air, which accentuated the trend that had emerged in 1916, and create a bomber force that could effectively advance the victory through repeated and massive raids into enemy territory. The aircraft due to enter service in 1918 were supposed to grant a significant leap in quality, while the expansion of aircraft factories would support a much larger air fleet, with 30 reconnaissance squadrons, 15 fighter squadrons, 5 escort squadrons, 26 defence squadrons, 19 bomber squadrons, 15 single-engine bomber squadrons and 3 seaplane squadrons. According to Douhet, this program was inherently flawed not only because it was built around too many types of aircraft, which would have a negative impact on logistics, but also because it missed the true nature of air warfare. Therefore, on 24 January, Douhet proposed his own program, supported by a doctrinal document, *Impiego dell'Arma Aerea* (Using the Air Arm). This fundamental essay states that the main goal of the air arm is to win the air war, that all other goals are of secondary interest and can be easily achieved once air supremacy is obtained, and that the air arm by its very nature is an offensive weapon to be used as such. The idea to use the fighter to win air supremacy was therefore inherently wrong, since the fighter, with its limited radius of action, was essentially a defensive weapon. The solution was "battle aircraft," with a balanced mix of speed, armament, protection and range. It would have been able to pave the way for the bomber force that would attack industrial and population targets with the aim of destroying both the enemy's capability and will to fight. According to Douhet, the "battle aircraft" was not a dream since the new SIA9B could easily be converted into such an aircraft and the 600-hp Caproni Ca.5 was an ideal solution for the bomber force. This program helped to shape the future, but in the months to come Douhet had to face reality. Aircraft technology was not yet advanced enough and manufacturing potential was not capable of carrying out such an ambitious project. Both the SIA9B and the Ca.5 were hampered by technical shortfalls that prevented these planes from playing a significant role in the war and made both programs a substantial failure. Disillusioned with his theories, and disappointed with the attitude of the minister hierarchy, on 4 June 1918 Douhet resigned from his post and retired from active service.

- 41 Due to the Ca.5's difficulties, the bomber force would operate the Ca.3 together with a handful of underpowered and cumbersome Ca.4 triplanes and some unreliable SIA9Bs until the end of the war. Since Ca.3 production had stopped, the total strength of the squadrons would never exceed 50-60 aircraft. The guidelines for their use were however coherent with the trend that had been consolidated during 1917, which left aside the most audacious visions of the air power theorists and the reappraisal actions urged by the press as incompatible with available resources. In February 1918, Colonel Riccardo Moizo, in charge of the Office for Aeronautical Services from 24 October 1917, issued a directive that defined targeting priorities, placing railway stations at the top of the list followed by airfields, command posts, depots and other elements of the logistical structure in the enemy rear.⁶⁰ Interdiction and offensive counter-air were to absorb most of the bombing effort, with a mix that depended on the overall situation. Offensive counter-air was top priority until the German bombers of Boghol 4 were recalled to the Western Front in early March, while interdiction targets jumped to the top of the list in April and May because of the foreseen Austro-Hungarian spring offensive. Given the limited number of fighters for escort duties, most raids were carried out at night, usually with moonlight, leaving moonless nights to the airships in order to keep the pressure high on the enemy.
- 42 This approach remained unchanged to the end of the war, with only one concession to the doctrine of the "battle in the harbour", which was conceived by the navy with the aim to hit the enemy fleet in its bases. On 17 July, a force of 18 Ca.3s escorted by 6 SVAs and supported by 9 SIA9Bs, one of them with D'Annunzio as observer, dropped 6,290 kilograms of bombs on the Pola military plants. There was no plan for the strategic bombing of Austro-Hungarian industrial centres.⁶¹ This was not due to some misconception of the Supreme Command, but rather to a realistic assessment of the situation. A large mountain barrier screened the targets of interest, which were located deep inside the Austro-Hungarian Empire, and one could not ignore the limitations of bomb load, speed, range, navigation and weapon aiming.

Aviation's contribution to final victory

- 43 On 11 March, 1918, the Aeronautical Services Office of the Supreme Command became the Superior Command of Aeronautics (*Comando Superiore di Aeronautica*) under Major General Luigi Bongiovanni. In this way, aviation was given the same status as the artillery and engineers corps, although the air service officers were recruited from all arms and continued to belong to them, which created disparities in promotions. Meanwhile, the fighter squadrons, supported by Camel-equipped British squadrons, were re-establishing air superiority both along the Piave and in the mountains. Air reconnaissance constantly mapped enemy positions while providing artillery with accurate firing data that forced the Austro-Hungarian batteries to pull back from the river. The artillery service had a major crisis in the spring, when it became clear that the SIA7B had a serious structural weakness and tended to lose its wings in flight. SIA technicians were brought to the front to reinforce the wing joints and the aircraft stayed operational despite the growing number of fatal incidents, but in June, soon after the end of the Battle of the Solstice (15-23 June), the situation was considered unbearable and the SIA7B was hastily scrapped. The squadrons converted to the Pomilio, another aircraft that had initially caused serious problems, but by August 1918 only 60 percent of the arm's establishment was operational, despite the support of the two British R.E.8 corps squadrons that quite often flew with Italian observers. The Ansaldo SVA, which lacked the manoeuvrability to serve its intended role as a fighter, proved its value as a long-range reconnaissance plane and occasionally as a fast bomber. On 21 February, four SVAs from the 1st Army raided the Innsbruck railway station in daylight and to the end of the war, this single-seater was to be increasingly used as a light bomber to attack all types of targets deep in the enemy rear.

Fig.



Major General Luigi Bongiovanni, at that time the Italian aviation commander, with Major Gabriele D'Annunzio, at his left, and Lieutenant Natale Palli, at his right, after their landing at San Pelagio following a 9 August 1918 raid over Vienna. The SVA in the background was modified from a single-seater to two-seater in order to accommodate D'Annunzio behind Palli.

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- 44 At the outset of the Battle of the Solstice (15-23 June), there were 367 aircraft available for combat, and 301 of them (174 fighters, 34 bombers, 113 reconnaissance planes) were deployed from the Astico Valley to the sea where the enemy was going to attack.⁶² Taking into account all aircraft in the front area whatever their operational status, the total number increased to 553 (221 fighters, 56 bombers, 276 reconnaissance planes). In addition, there were 24 French and 80 British aircraft. To respond to combat losses and the more frequent accidental losses, 288 aircraft were in depots. The order of battle listed 12 bomber squadrons, 14 fighter squadrons, 34 reconnaissance squadrons, six reconnaissance sections, two air defence sections, plus three fighter squadrons, one corps squadron and one reconnaissance flight of the Royal Air Force and two reconnaissance squadrons

of the French Army. Eight fighter squadrons, three from X Group (70th, 82nd, 91st) and five taken from the armies (72nd, 75th, 76th, 79th, 80th) were placed under the direct command of Lieutenant Colonel Pier Ruggero Piccio to be used en masse to win and maintain air superiority over the battlefield through continuous aggressive patrolling and to conduct strafing missions as required.⁶³

Fig.



76^a Squadriglia Nieuport Ni.11s at Borgnano, Isonzo front, in early 1917. The aircraft are equipped with a Lewis machine-gun that is not synchronized.

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- 45 The Austro-Hungarian aviation order of battle listed 65 Fliegerkompanien (Flik) with 623 aircraft, but the number of combat-ready machines was much lower due to poor logistics support. Conrad Army Group, which held the front from the Astico Valley to the Grappa massif, had 19 reconnaissance and 5 fighter Fliks, Boroëvic Army Group along the Piave had 28 reconnaissance and 13 fighter Fliks.
- 46 On 15 June, the Austro-Hungarian attacks stopped and countered on the Asiago plateau and on the Grappa massif, but the Boroëvic Army Group established two bridgeheads across the Piave. Italian aviators bombed and strafed the floating bridges to prevent their reinforce-

ment and supply and the RAF squadrons joined in. Meanwhile Piccio's fighters won back the control of the air and in the following days, air superiority enabled artillery spotters to prevent communications between Austro-Hungarian troops on opposite sides of the river and provided headquarters with a clear picture of the unfolding situation. Battlefield interdiction, together with counter-air and tactical reconnaissance, were the main roles assigned to Italian and Allied squadrons during this victorious battle. However, they were risky tasks and in a strafing pass on Montello, Italy's ace of aces Major Francesco Baracca, who had achieved his 34th victory on 15 June, was killed, likely by ground fire, on 19 June.

- 47 Bomber squadrons were also used in direct support of the 8th and 3rd Army, but in the ground attack role, bombers were less effective than fighters and two-seaters, partly because the ceiling on the battlefield was often too low. The three-engine Capronis were much more successful in bombing the railway terminal at Conegliano,⁶⁴ which they did on June 22, and in carrying out a massive propaganda offensive. This began in June and continued to the end of the conflict, dropping leaflets that exploited the internal difficulties of the Habsburg Empire, caused by the rising of the nationality issue, and the general failure of the Austro-Hungarian and German war effort. The climax of this propaganda offensive was on 9 August when nine SVAs from the 87th Squadron reached Vienna in full daylight to drop thousands of leaflets with the colours of the Italian flag and a message underlining the inanity of the Central Empires effort and announcing their inevitable final defeat. Eight out of nine aircraft completed the round trip to Vienna with the loss of only one to engine failure over Wiener Neustadt.
- 48 During the Battle of the Solstice, Italian aviation was able to make the best of its technical and organizational superiority as it acted in line with modern concepts of air power. Having regained air superiority, the squadrons operated effectively within the context of a joint air and ground effort. The same happened during the Battle of Vittorio Veneto that opened on 24 October, when the Italian Army attacked enemy positions first on the Grappa massif and then along the Piave, and ended on 4 November with Austro-Hungarian capitulation. During the summer, reconnaissance squadrons carefully mapped the Austrian trench systems and registered artillery firing, ranging with

increasing freedom over the front, while the bomber squadrons raided railroads and airfields. In his battle plan issued on 21 October, General Bongiovanni emphasized the importance of carrying out ground attacks by all aircraft, planning to use the SVAs for long-distance reconnaissance and light bombing, the Capronis to bomb airfields and depots, and the fighters and the reconnaissance two-seaters for bombing and strafing the enemy's communication lines. The army air service entered the battle with 398 combat ready aircraft (187 fighters, 52 bombers, 159 reconnaissance planes) deployed in the region from the Astico Valley to the sea together with 63 British and 22 French aircraft. Outside the battle area, the 1st Army and 7th Army had 20 fighters and 32 reconnaissance planes and there were also 205 aircraft in storage at the front or in the rear. Air superiority was quickly established and from 29 October, Austro-Hungarian aviation was no longer capable of conducting any significant actions, partly because the Austrians were forced to hastily evacuate their airfields due to the Italian's ground advance. Italian and Allied squadrons, initially committed to battlefield interdiction, were used to harass the enemy retreat that soon degenerated into a complete rout. In the final operations, ground fire accounted for most of the 24 Italian and 7 British aircraft lost, while 34 enemy aircraft were claimed by Allied fighters.⁶⁵

- 49 As in June, air power proved its worth in a clearly conceived program of air-to-ground cooperation, but an important contribution to this success came from the ability to mobilize industry to achieve the expansion required by the air arm. Although Italy depended on France for its fighters throughout the war, the Italian industry was able to license-build most of French models and was able to supply reconnaissance aircraft and bombers of domestic design in large numbers, even though not always of the expected quality, like the infamous SIA7B. Production figures for 1918 are 14,840 engines and 6,518 airplanes, bringing the overall official total to 23,970 engines and 12,016 aircraft,⁶⁶ compared to 4,457 aircraft and 4,216 engines for Austria-Hungary. In November 1918, 27 companies were involved in aircraft production, 18 produced aviation engines and 62 were delivering propellers, while the whole aeronautical industry had more than 100,000 workers. The urgent need to increase production, together with the lack of know-how and solid engineering practices in that peculiar in-

dustrial sector, caused many problems and lead to wrong decisions, but nevertheless the total production of aircraft and engines was by far larger than the Austro-Hungarian aeronautical industry's production. In the same way, logistics support was more effective, as far as both maintenance and supply chains were concerned; these are decisive factors for air war, due to the close connection that exists among industrial organization, logistics structure, and operational capabilities. The story of Italian aviation in the Great War proves the direct link between technology and doctrine, and the right relationship between them created a well-balanced air force that could perform the tasks assigned in the best possible way within the context of close air-to-ground cooperation. It was clearly understood that a fighter was to be a fast and agile single seat machine, equipped with a couple of synchronized machine-guns, and thrown into the fray in massed formations, while the reconnaissance aircraft had to rely on radiotelegraphy and photography to carry out its mission, but that was possible in a local context of air superiority. Winning air superiority was therefore fundamental to winning the artillery battle and to providing the essential liaison duties between troops and headquarters. Air-to-ground and ground-to-air communication systems were still in their infancy, but wireless technology pointed the way forward. Meanwhile, the great attention paid to bombing enabled the strategic dimension of air power to emerge, even though technology did not yet have the answers for payload and armament, as well as radius of action. But the basic concepts were there and the operational plans of 1918 designed the shape of things to come.

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- 2 B. Di Martino, 'L'aviazione italiana alla vigilia del conflitto', in *L'Italia e la Grande Guerra. La neutralità 1914-1915* (Rome: General Staff Historical Department, 2015), 221-44.
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- 6 Comando Supremo, *Ordine di Operazione n. 1. Impiego dei mezzi aerei*, 16 May 1915, AUSSMA, Direzione Generale di Aeronautica, 1915.
- 7 B. Di Martino, *Ali sulle trincee... op. cit.* 20-21.
- 8 "The absolute shortage of artillery aircraft, an insufficient number of artillery observers, and poor organization of that service have clearly demonstrated what I expected, that is difficulties in discovering and countering enemy batteries. From this followed heavy losses in the infantry and large waste of ammunitions and time, something that today we should not suffer if the artillery service organization had been the subject of as much concern from the Directorate General of Aeronautics as I had demanded. All energies have to be immediately exercised to overcome current deficiencies. I want to be assured". Letter from General Luigi Cadorna to the Minister of War, Lieutenant General Vittorio Italo Zupelli, Ufficio del Capo di Stato Maggiore, n°329 dated June 10, 1915, AUSSMA, Comando Aviazione per l'Artiglieria.

9 The need for specific joint training for aviators and artillerymen had already been recognized in 1914, and it was to be a key point throughout the war. On 24 June, the Supreme Command underlined that too often, “airmen, after the appropriate agreements with the artillery commanders, carried on the reconnaissance, identified targets and remained in flight to observe the results of the shooting, without achieving the intent because the batteries did not fire or did not consider the signals from the airplane.” The service orders issued on 6 July 1915 acknowledged that the artillery service still presented great difficulties, due not only to the novelty of the system but also to the inadequacy of the available equipment and mistrust between airmen and artillerymen. (Comando Supremo, Ufficio Servizi Aeronautici, *Impiego degli aeroplani per la ricerca dei bersagli per l'artiglieria e per l'osservazione del tiro*, 6 July 1915, AUSSMA, Comando Aviazione per l'Artiglieria).

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11 Comando Supremo, Reparto Operazioni, Ufficio Servizi Aeronautici, *Ricognizione ed azione eseguita da 2 apparecchi Caproni 300 HP il 20 agosto 1915*, n° 351 Av. dated August 21, 1915, AUSSMA, 1^a Guerra Mondiale, Ufficio Servizi Aeronautici, Varie, 1915-1916.

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22 Comando Supremo, Reparto Operazioni, Ufficio Servizi Aeronautici, *Azione offensiva sulla città di Fiume*, n° 4263 Av dated August 1, 1916, Diario Storico Ufficio Servizi Aeronautici-Aviatori, AUSSMA.

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- 55 F. Porro, *La guerra nell'aria...* op. cit. 240.
- 56 G. Douhet, *La grande offensiva aerea*, Reclusorio di Fenestrelle, June 30, 1917, AUSSMA. For an analysis of this document and also of the memoranda written by Gianni Caproni on the use of the bombing force see B. Di Martino, 'Il bombardamento aereo e l'aspirazione all'indipendenza', in G. Montinaro and M. Salvetti (eds.), *L'Aeronautica italiana nella I Guerra Mon-*

diale... op. cit. 297-30, and B. Di Martino, *L'aviazione italiana e il bombardamento aereo... op. cit.* 157-59, 259-61.

57 G. Douhet, *Studio concreto sulla costituzione, formazione ed impiego di una armata Aerea dell'Intesa*, Reclusorio di Fenestrelle, June 30, 1917, AUS-SMA.

58 In July 1915, while serving as chief of staff of 5th Division in Val Camonica, Colonel Giulio Douhet proposed to the Supreme Command the formation of a huge fleet of heavy bombers for strategic operations against the enemy war machine to attack military and industrial centres, railroad junctions, arsenals and ports. Transferred to XII Corps in Carnia, in 1916 Giulio Douhet kept arguing for a strong bomber arm, increasingly convinced that only the airplane could break the military deadlock of trench warfare. Despairing that the military would ever listen to him, he wrote a memorandum addressed to a member of the government, Leonida Bissolati, criticizing the Italian war effort and advocating a better strategy. Entrusted to a member of the Parliament, the document, forgotten on a train, was found by the military police. Court-martialled, Douhet was sentenced to one year of detention in a fortress.

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RÉSUMÉS

English

The *Regia Aeronautica* was established as an independent service on 28 March 1923, but this was only the end of a process that can be traced back to 1909 when Louis Blériot proved that the airplane was no longer a circus attraction. The process had gone through the summer manoeuvres of 1911, the Libyan campaign of 1911-1912 and had been accelerated by the Great War. During that conflict, new operational requirements, either dictated by trench warfare, such as tactical reconnaissance and artillery spotting, or suggested by an ambitious vision of a future still to come, such as aerial bombing, shaped an aviation that was thoroughly defined in all its components. At the same time, the basic elements of an airpower doctrine began to emerge, even though technology still lagged behind combat needs. Technology, however, was developing fast enough to support the development of all basic air missions, which in turn required more advanced technical solutions for specific operational requirements, according to a process that was common to all fighting air branches. Meanwhile, a specific logistics infrastructure was created and the aeronautical industry grew out of its infancy, providing needed support to the fledgling air service. Due to these efforts, all air missions were already conceptually defined in 1918, together with the need for a command and control architecture based on the principle of centralized planning, which in turn was strictly related to the more fundamental idea of the unified command of all air resources. Moreover, a specific “aeronautical identity” had been conceptualised, based on the awareness that air power, very much like sea power, requires an approach of its own and therefore a specific “environmental competence.” In this way, doctrine and technology together, in a sort of push-pull game, paved the way for the establishment of an independent air force.

Français

La *Regia Aeronautica* fut établie comme service indépendant au sein de l'armée le 28 mars 1923, concluant un processus que l'on pouvait faire re-

monter à 1909, lorsque Louis Blériot prouva que l'avion n'était pas une simple attraction populaire. Ce processus se poursuivit lors des grandes manœuvres de 1911, ainsi que pendant la campagne libyenne de 1911-1912 et il s'accéléra avec la Grande Guerre. Lors de ce conflit, de nouvelles nécessités opérationnelles, imposées par les techniques propres à la guerre de position ou suggérées par la vision grandiose d'un avenir proche (telles que les vols de reconnaissance pour l'artillerie ou le bombardement aérien) contribuèrent fortement à façonner l'aviation moderne. C'est au même moment qu'émergèrent les éléments de base d'une doctrine de la puissance aérienne, même si la technologie était d'abord essentiellement tirée par les exigences immédiates des combats. Mais cette technologie se développait assez rapidement pour soutenir les principales missions aériennes, qui en retour demandaient des solutions opérationnelles de plus en plus spécifiques. À cette époque, une infrastructure logistique propre fut créée, si bien que l'industrie aéronautique commençait à sortir de l'enfance en offrant son soutien au service naissant de l'armée de l'Air. Grâce à ces efforts, toutes les missions aériennes purent être définies dès les années 1918, parallèlement au besoin d'un commandement et d'une architecture de contrôle basée sur une planification centralisée, c'est-à-dire sur l'idée fondamentale d'un commandement unifié de toutes les ressources aériennes. Enfin, une « identité aéronautique » fut théorisée, basée sur la conscience d'une puissance aérienne, très proche de l'idée de puissance maritime, mais qui demandait une approche propre, et donc une compétence particulière liée à cet environnement. C'est ainsi que la doctrine d'une part et la technologie d'autre part, dans une sorte de jeu de pressions réciproques, ouvrirent la voie à la mise en place d'une armée de l'Air autonome.

INDEX

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