between spectators and performers. Hundreds of thousands of actor–spectators went to stadium cycloramas, where the cameras and lasers illuminated not just the stars but also the wildly excited crowds. Those who came to watch also exhibited themselves, in a way heralding such spectacular actions of the seventies as the assassination of John Lennon.

Today, directors (and politicians) have lost all prominence, and are swallowed up in technical effects, rather like Nicholas Ray in Wim Wenders's *Lightning Over Water*. 'We get our energy from chaos', the Rolling Stones once said. And from everyday terrorism to live-broadcast assassinations, the living pan-cinema is spreading before us that chaos which was once so well concealed by the *orderly* creation of war. Even if our actions are suddenly slipping out of their usual frames of reference, they are not *actes gratuits* but cinema-acts.

With the neutron bomb, urban populations have lost their ultimate value as nuclear hostages and have been abandoned by military planners. There are no more 'immortals of the City'. And cinema itself has lost its initiatory value and ceased to be the black mass of martial aboriginality which can offer cinematic Valhalla to the children of the fatherland in a communion of the quick and the dead. For the commercial distribution of video and audio equipment is destroying the extraordinary technical capacity of the old cinema to shape society through vision, to turn a thousand film-goers into a single spectator.

7

A Travelling Shot over Eighty Years

This story could have begun in 1854, at the siege of Sebastopol during the Crimean War, or seven years later with the American Civil War, since in both conflicts abundant use was made of modern techniques: repeating weapons, photographic records, armoured trains, aerial observation . . . But I have chosen to start in 1904, the first year of the 'war of light'. For it was then, a year after the Wright brothers flew in the *Kitty Hawk*, that a searchlight was used for the first time in history, in the Russo–Japanese war.

Trained on the heights of Port Arthur, the focused incandescence of war's first *projector* seemed to concentrate all the torches and all the fires of all the wars before it. Its beam pierced more than the darkness of the Russo–Japanese war; it illuminated a future where observation and destruction would develop at the same pace. Later the two would merge completely in the target-acquisition techniques of the *Blitzkrieg*, the cine-machineguns of fighter aircraft, and above all the blinding Hiroshima flash which literally photographed the shadow cast by beings and things, so that every surface immediately became war's *recording* surface, its *film*. And from this would come directed-light weapons, the coherent light-beam of the laser.

A number of events combined to make 1904 a historic year. First of all, it witnessed the death of Etienne-Jules Marey, that key link

in joining together repeater-guns and repeater photography, whose chronophoto-graphic rifle was, as we have seen, both precursor of the Lumière brothers' camera and direct descendant of the Colt revolvers and cylindrical guns. The multi-barrelled Gatling gun, invented at the start of the American Civil War, ended its military career in 1904 at the siege of Port Arthur, although an electronic version re-entered active service in Vietnam.

In 1904, too, Marey's assistant, Georges Demeny, then a member of a commission working on an infantry manual, published *L'Education du marcheur* in which he showed the usefulness of chronophotography in proportioning the soldier's expenditure of effort (forced marches, handling of weapons, etc.). Demeny later played an important role in the physical training of the French army before 1914.

Finally, on 18 May 1904 in Cologne, Christian Hülsmeyer tested his 'telemobiloscope', which could alert a remote observer to the presence of metallic objects – the forerunner, in effect, of radio-telemetry and Watson-Watt's 'radio detection and ranging' (Radar).

If we remember that it was an optics professor, Henri Chrétien, whose work during the First World War perfecting naval artillery telemetry laid the foundations for what would become Cinemascope thirty-six years later, we can better grasp the deadly harmony that always establishes itself between the functions of eye and weapon. And, indeed, while the advance of panoramic telemetry resulted in wide-screen cinema, so the progress of radio-telemetry led to an improved picture: the *radar picture*, whose electronic image prefigured the electronic vision of video. From the commanding heights of the earliest natural fortifications, through the architectonic innovation of the watch-tower, and the development of anchored observation balloons, or the aerial reconnaissance of World War I and its 'photographic reconstruction' of the battlefield, right up to President Reagan's latest early warning satellites, there has been no end to the enlargement of the military field of perception. Eyesight and direct vision have gradually given way to optical or opto-electronic processes, to the most sophisticated forms of 'telescopic sight'. The strategic importance of optics was already clear in World War I, one indication being

the dramatic rise during the war in French production of optical glass (for rangefinders, periscopes and camera lenses; for telemetry and goniometry) – from 40 tonnes to 140 tonnes a year, half the total Allied output.

The idea of war as fundamentally a game of hide-and-seek with the enemy was proved to the point of absurdity in those First World War earthworks where millions of men were entrenched and interred for four long years. With the appearance of what came to be called saturation weapons (repeating rifles, machine-guns, rapid-firing field guns) firepower alone determined who would be victorious – rather than the disposition of troops, the strict geometry of their movements. All efforts were made to conceal and disperse one's forces instead of deploying them in maximum concentrations. Hence those endless waves of sacrificial infantrymen who leapt over the parapets and crawled through the mud to their own burial – dead or alive, but anyway safe from enemy eyes and guns.

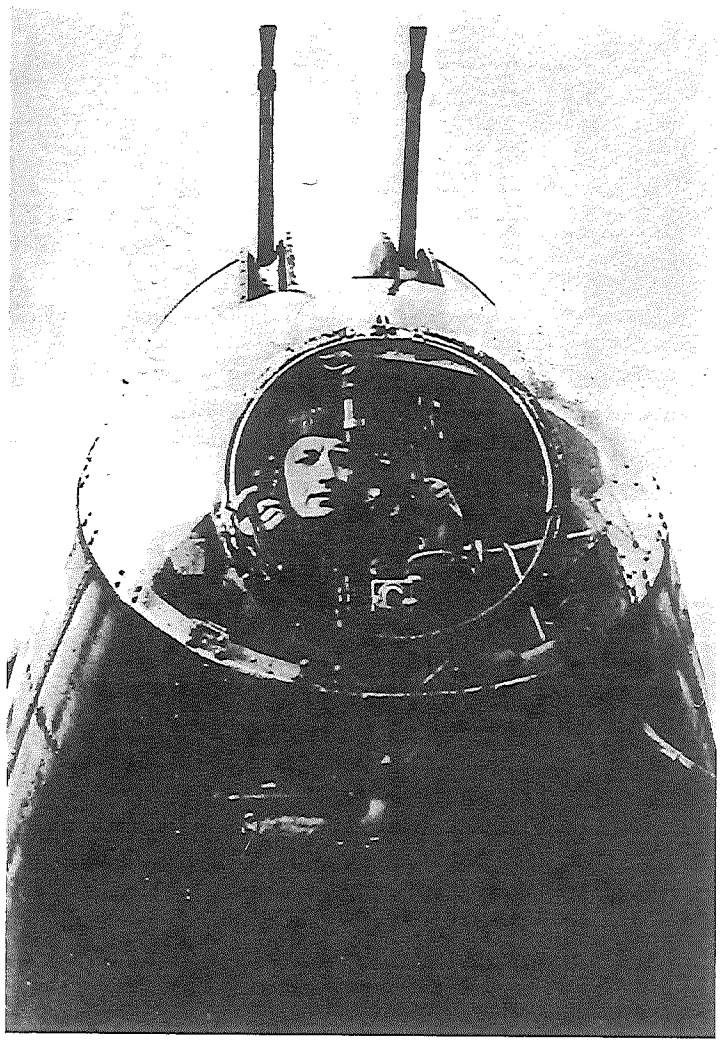
If the First World War can be seen as the first mediated conflict in history, it is because rapid-firing guns largely replaced the plethora of individual weapons.[1] Hand-to-hand fighting and physical confrontation were superseded by long-range butchery, in which the enemy was more or less invisible save for the flash and glow of his own guns. This explains the urgent need that developed for ever more accurate sighting, ever greater magnification, for *filming the war* and photographically reconstructing the battlefield; above all it explains the newly dominant role of aerial observation in operational planning.

In the wars of old, strategy mainly consisted in choosing and marking out a theatre of operations, a battlefield, with the best visual conditions and the greatest scope for movement. In the Great War, however, the main task was to grasp the opposite tendency: to narrow down targets and to create a picture of battle for troops blinded by the massive reach of artillery units, themselves firing blind, and by the ceaseless upheaval of their environment. Hence that multiplicity of trench periscopes, telescopic sights, sound detectors, and so on. The soldiers of the First World War may have been actors in a bloody conflict. But they were also the first spectators of a pyrotechnic fairy-play whose magical, spectacular

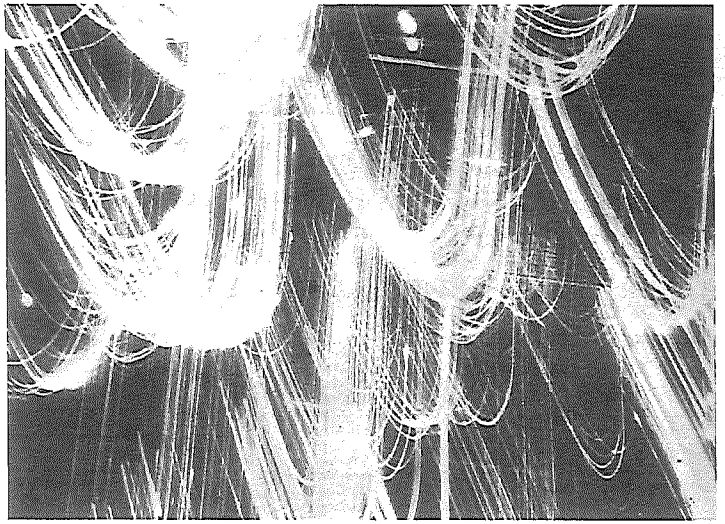
nature some of them could already recognize (I am thinking especially of Ernst Jünger, Apollinaire and Marinetti). Ten years after the siege of Port Arthur, this was the inauguration of total war, a continuous performance, all day and all night.

Indeed, why should there have been any rest after dark? For the enemy's presence made itself known only through the flash of gunfire or the glow from the trenches, and daytime blindness was hardly any different from that which set in at nightfall. As a prelude to the lightning war of 1940, here was a *lighting war*, with the use of the first tracer bullets, flares that lit up no-man's-land for nocturnal targets, powerful searchlights with a range of nine kilometres, and early anti-aircraft defence systems. The old adage, 'The cavalry lights the way, the infantry wins the day', now well and truly belonged to the past. As the front settled into positional warfare, aviation took over the cavalry's functions and reconnaissance planes became the eyes of the high command, a vital prosthesis for the headquarters strategist, illuminating a terrain that was constantly being turned upside down by high explosives. Landmarks vanished: maps lost all accuracy. And as the landscape of war became cinematic, so the first on-board cameras came into their own. For only the lens-shutter could capture the film of events, the fleeting shape of the front line, the sequences of its gradual disintegration. Only serial photography was capable of registering changing troop positions or the impact of long-range artillery, and hence the capacity of new weapons for serial destruction.

Marey's interest in disclosing the successive phases of a body movement here becomes a concern to explain the sequence of a sudden disintegration of the landscape which is not fully visible to any one person. Aerial photography, cinematic photogrammetry – once again we find a conjunction between the power of the modern *war* machine, the aeroplane, and the new technical performance of the *observation* machine. Even though the military film is made to be projected on screen, thus obscuring the practical value of the successive negatives in analysing the phases of the movement in question, it is fundamentally a reversal of Marey's or Muybridge's work. For the point is no longer to study the deformations involved in the movement of a *whole body*,

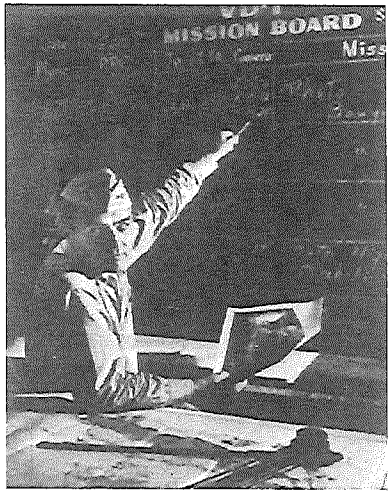


23. Cameraman in the fore-turret of a Lancaster bomber, 1943.

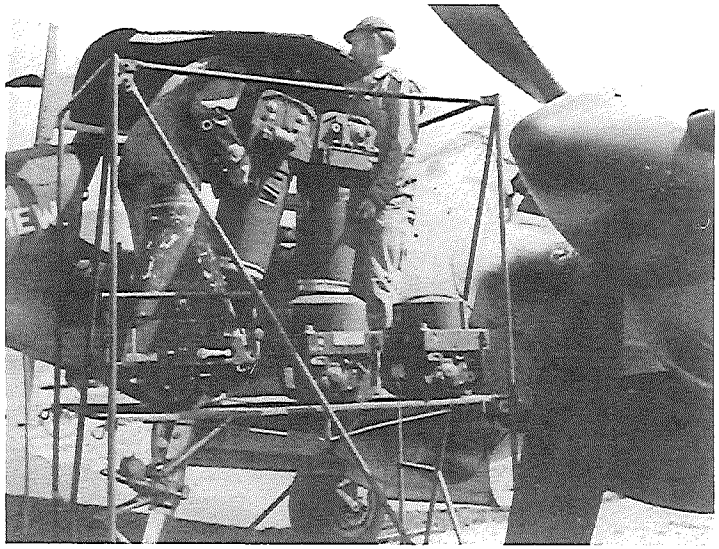


24. Photo taken during the night bombing of Essen on 4 April 1943. The special effects, called silver shrouds by Allied air crews, were part of the intensive German air-defence system.

25. British Pathfinder Force pilots inspecting the results of their night raids on Germany in 1943.

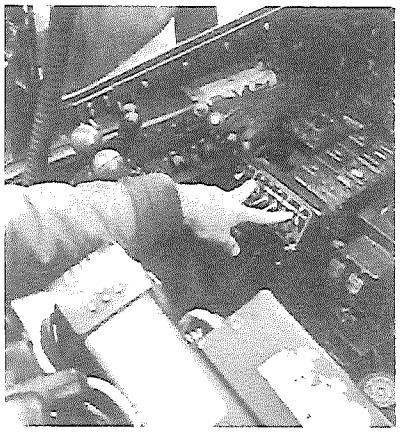


26. Mission board of the US air reconnaissance.

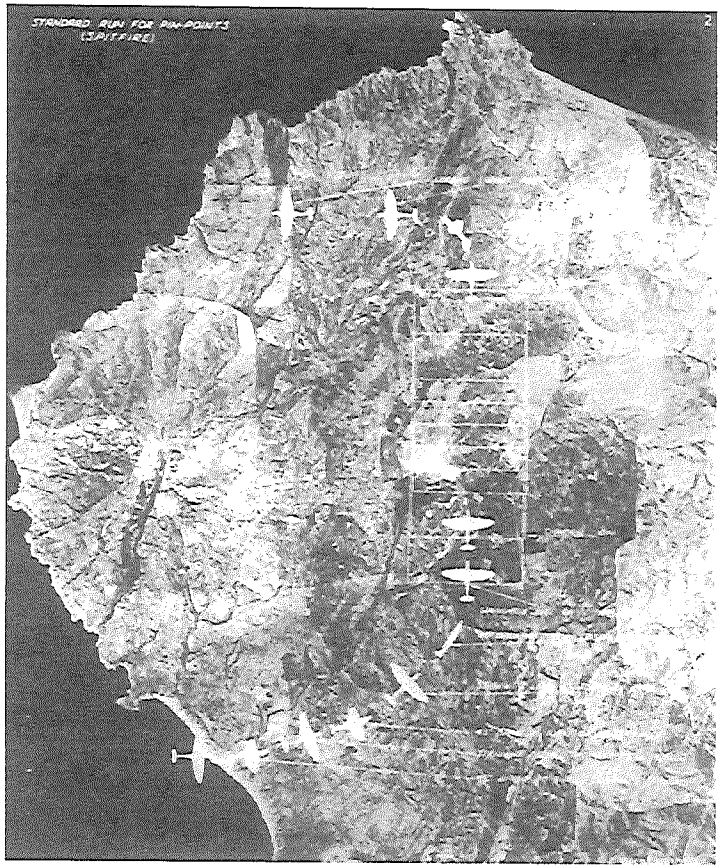


27. Switching cameras in the nose of a US twin-engine F-5: Mount Farm, England, 1 July 1943.

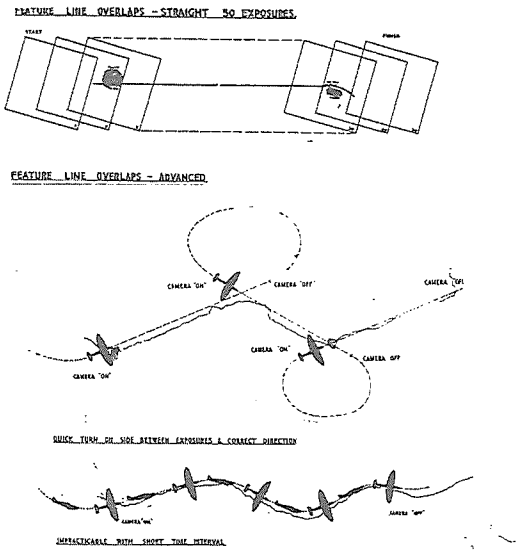
28. Pilot climbing aboard his twin-engine aircraft.



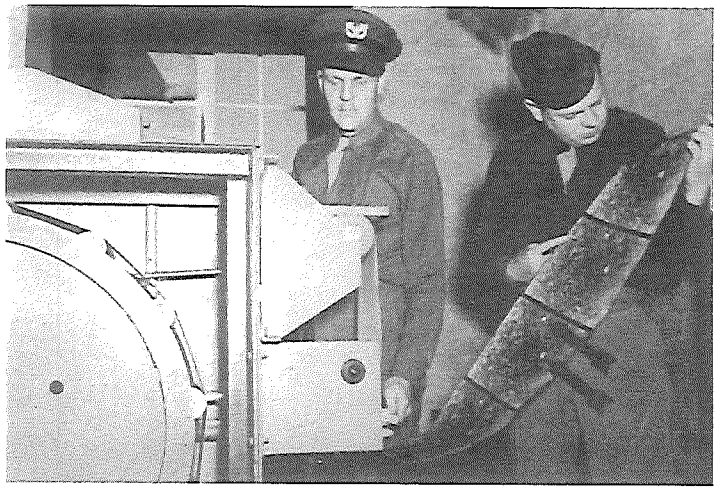
29. *I.* Pre-flight synchronization test of camera and aircraft speeds at Mount Farm, ensuring that the rhythm of machine-gun fire will automatically determine the spacing of photographs and thus leave the pilot free to navigate. *II.* Result of the film test.



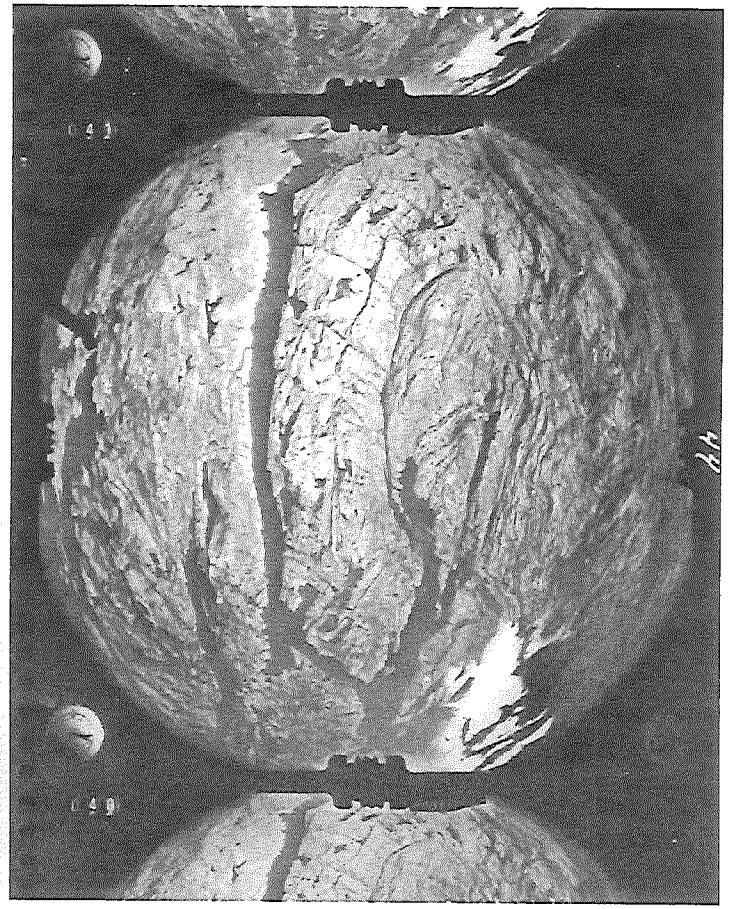
30. A Spitfire's flight and photographing schedule.



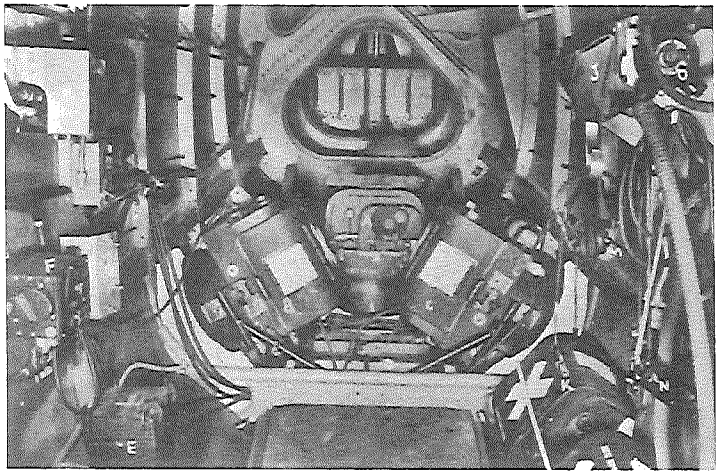
31. Flight plan, giving direction and altitude, to ensure good photographic cover of the military target.



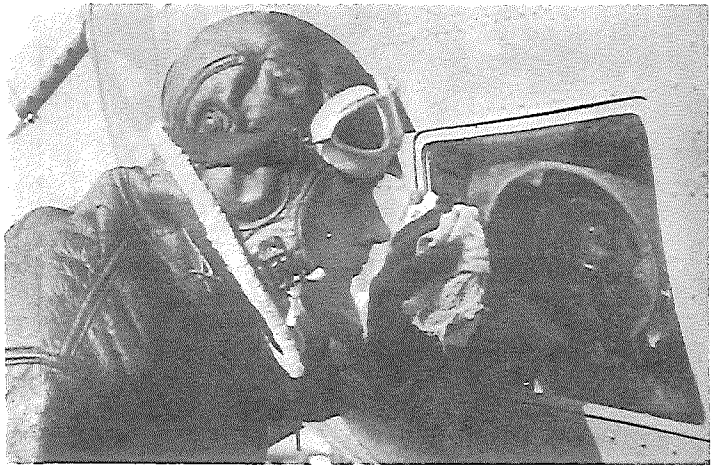
32. American officers examining aerial reconnaissance prints as they come out of a Williamson multiprinter at Mount Farm. 1 July 1943.



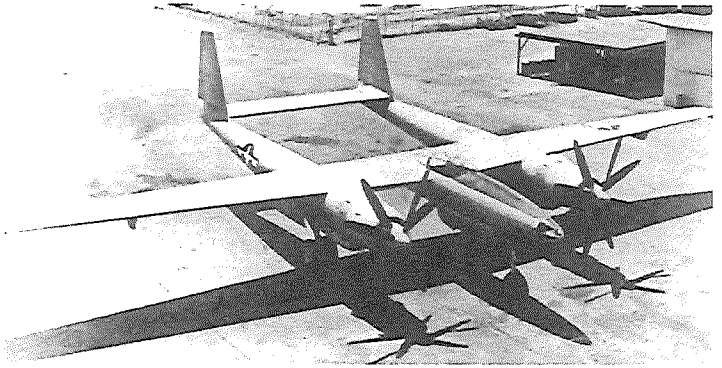
33. Aerial film of Norway, taken in 1943 with 142° lens.



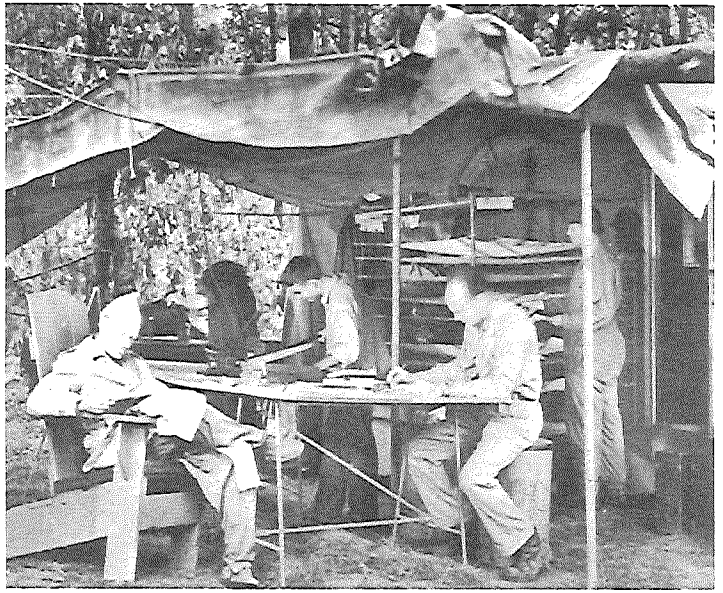
34. A 'Trimetrogon' system (one upright and two sloping cameras) on board a USAF B-17.



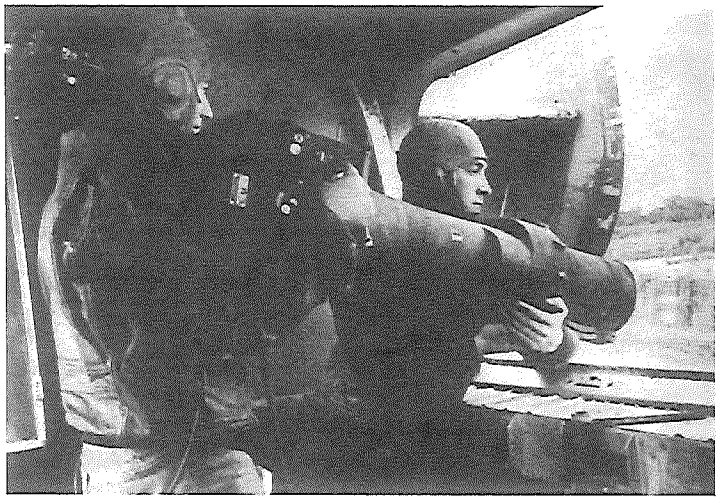
35. Cameraman cleaning the glass lens-cover of a Trimet' sloping camera on board a B-17.



36. The Hughes XF11, prototype of a reconnaissance aircraft developed by Howard Hughes in 1944. Two years later, Hughes crashed it on a test flight in Beverly Hills.



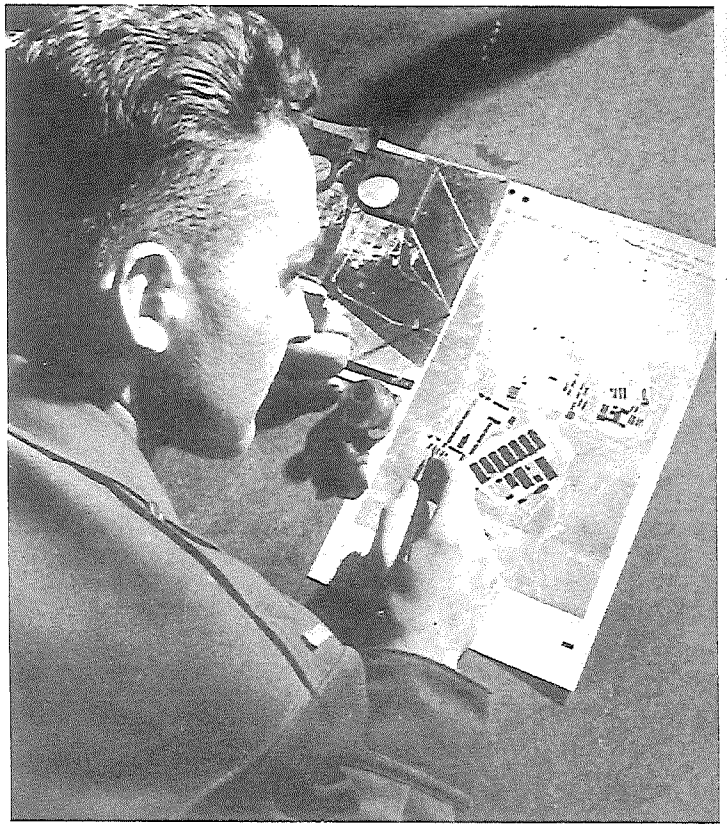
37. Field photo-laboratory of the US Army. Chattanooga, 1940.



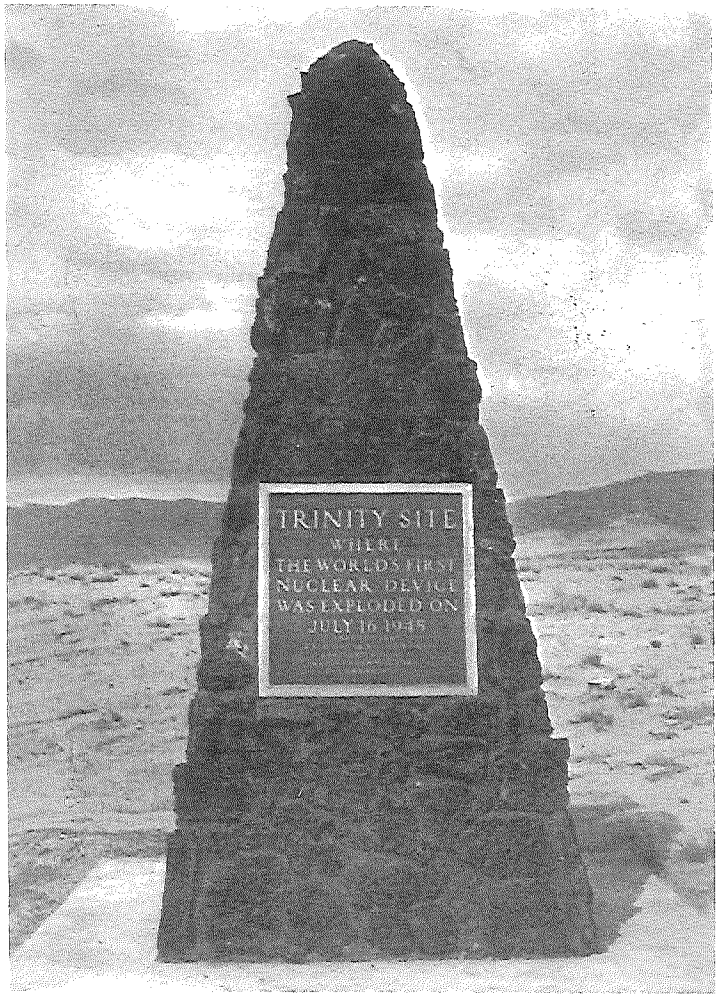
38. Fitting a camera on a Liberator. Guadalcanal, 1943.

39. Small US Navy laboratory at Rendova in the Solomon Isles, June 1943. The camouflage indicates that it is close to the front.

40. Laboratory at Guadalcanal, 1943. An officer is handing over wide-reel film to be destroyed.

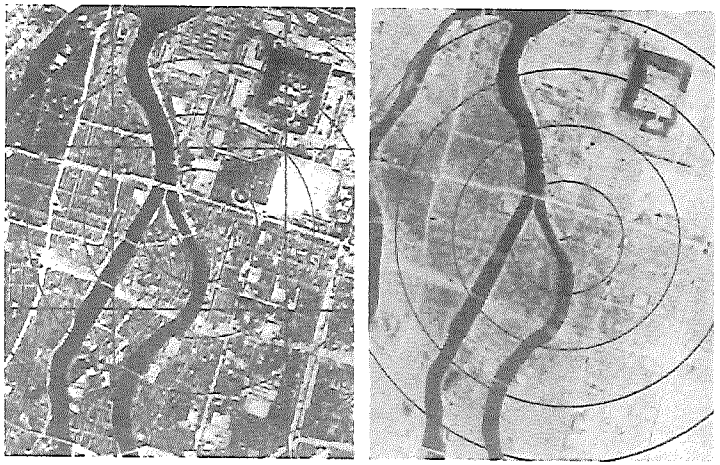


41. American photo-analysis of the raid on Weimar-Buchenwald on 24 August 1943. The dark-shaded buildings were thought to have been seriously damaged. The concentration camp, in the upper right of the picture, was not hit.

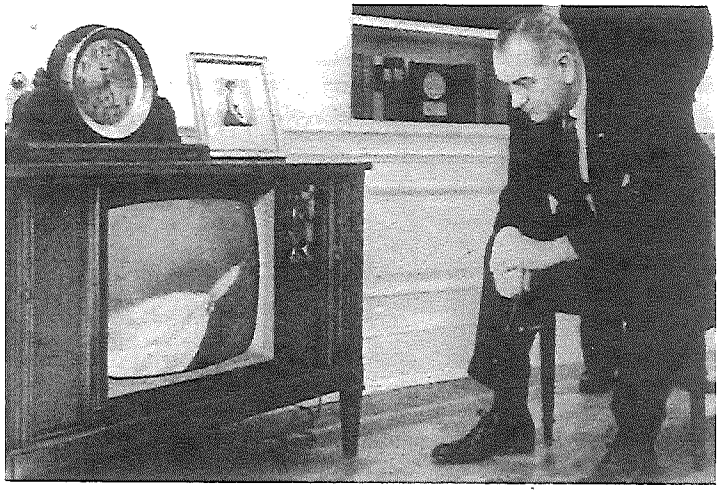


42. Monument in the Oscura Peak area of White Sands Desert.

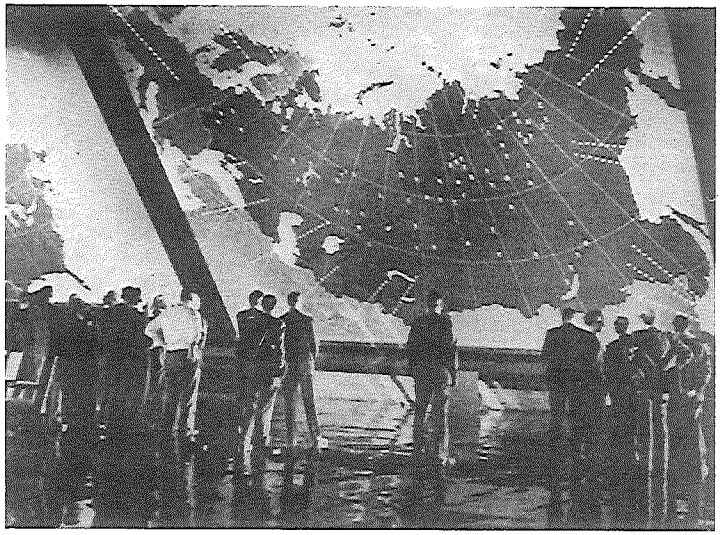
43. The city of Jericho, as depicted in the Hebrew Bible. (Farhi Bible, 1366/1382. Rabbi Solomon, Sassoon Library, Jerusalem.)



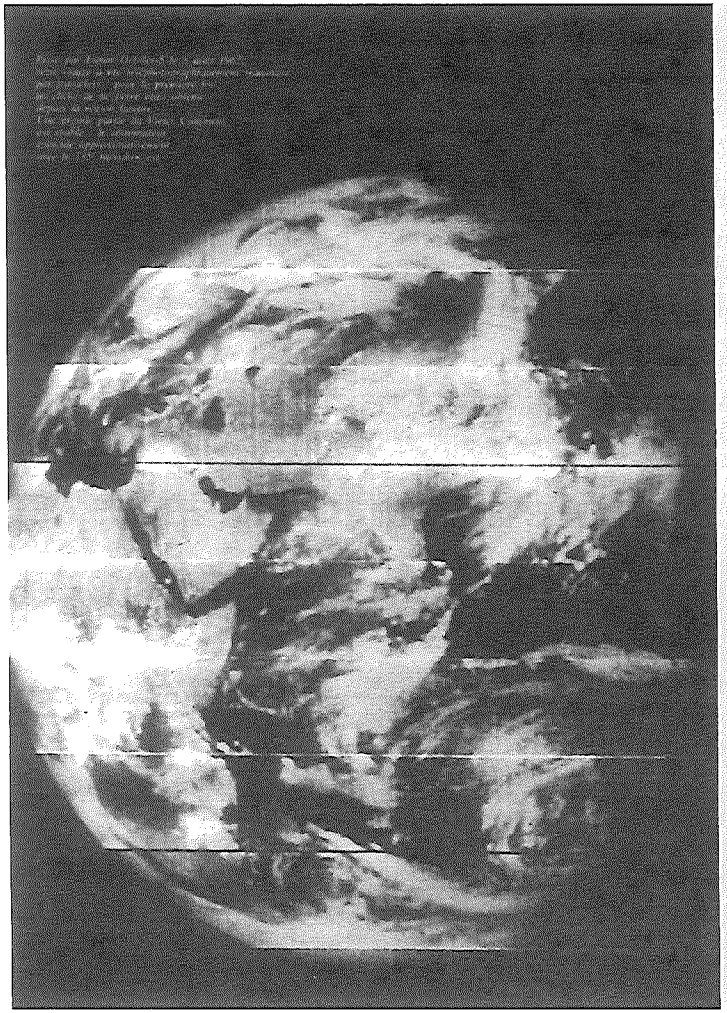
44. Photographs of Hiroshima before and after the first nuclear bombing in history, 6 August 1945.



45. President Lyndon Johnson in the White House watching the Saturn I rocket take-off on 29 January 1964. As André Malraux wrote: 'Caesar could have conversed with Napoleon, but Napoleon has nothing to say to President Johnson.'



46. The War Room in Stanley Kubrick's *Dr Strangelove.*



47. Photograph of the Earth relayed from Lunar Orbiter, 8 August 1967.

whether horse or man, but *to reconstitute the fracture lines of the trenches, to fix the infinite fragmentation of a mined landscape alive with endless potentialities.* Hence the crucial role of photographic reconstruction, and of those military films which were the first, little-known form of macro-cinematography, applied not (as with Painlevé after 1925) to the infinitely small but to the infinitely large. Thus, as the Hachette *Almanach* of 1916 put it, the techniques of representation proved their enormous importance during the war: 'Thanks to negatives and films, it was possible to retrace the whole front with the greatest clarity, from Belfort to the Yser.'

On the one hand, the secret of victory is written in the air by the ballistics of projectiles and the hyper-ballistics of aeronautics; on the other, it is negated by speed since only the speed of film exposure is capable of recording that military secret which each protagonist tries to keep by camouflaging ever larger objects (artillery batteries, railways, marshalling yards, and eventually whole towns as the black-out belatedly responded to the lighting war of 1940).

Just as weapons and armour developed in unison throughout history, so visibility and invisibility now began to evolve together, eventually producing *invisible weapons that make things visible* – radar, sonar, and the high-definition camera of spy satellites. The Duke of Wellington once said he had spent his life guessing what was on the other side of the hill. Today's military decision-makers don't have to guess: their task is to avoid confusing the forms of a representation which, while covering the broadest regions of the front, must take in the minute details always liable to influence the outcome of a conflict. The problem, then, is no longer so much one of masks and screens, of camouflage designed to hinder long-range targeting; rather, it is a problem of ubiquitousness, of handling simultaneous data in a global but unstable environment where the image (photographic or cinematic) is the most concentrated, but also the most stable, form of information.

The camera-recording of the First World War already prefigured the statistical memory of computers, both in the management of aerial observation data and in the ever more rigorous management of the simultaneity of action and reaction.

Was the Bofors predictor of the Second World War not the forerunner of the 'strategic calculator' of the immediate post-war period? In this antiaircraft gun, which improved on telemetry by making the ballistic trajectory coincide with the target aircraft at a certain point in time and space, the deadly result was achieved by means of stereoscopic superimposition, in real time, of the two flight images on a screen.

Thus, the theatre of operations of the Napoleonic Wars, where actors in the bloodbath moved in rhythm and hand-to-hand fighting was conducted by the naked eye and with bare weapons, gave way at the beginning of this century to a camera obscura in which face-to-face confrontation was supplanted by instant interface, and geographical distance by the notion of real time.

Military strategy had earlier involved the division of space, the building of permanent fortifications complete with ditches, ramparts and screens that added up to what one nineteenth-century general called 'a kind of box of surprises'. The twentieth century moved on to the division of time, where the surprise effect came from the sudden appearance of pictures and signs on a monitor, and where screens were designed to simulate, rather than dissimulate, a war that ever more closely resembled non-stop cinema or round-the-clock television. Only with the Second World War and the spread of radio-telephony, however, did the silent cinema of radio-telegraphy finally begin to talk.

In *Steel Storms*, published in 1920, Ernst Jünger draws on his experience at the Front to express this derealization effect of industrialized warfare:

> In this war where fire already attacked space more than men, I felt completely alien to my own person, as if I had been looking at myself through binoculars . . . I could hear the tiny projectiles whistling past my ear as if they were brushing an inanimate object. . . .The landscape had the transparency of glass.

This total transparency affecting object, subject and surrounding space – which makes each of the antagonists feel both that he is watched by invisible stalkers and that he is observing his own body from a distance – illustrates the derangement of perception in an environment where military technology is distorting not only the battlefield, but also, and especially, the space–time

of vision, where the observation machine and the modern war machine are conjoined to such a degree that Jünger can say: 'The faculty of thinking logically and the sense of gravity seemed to be paralysed.'

The radar operator later had this same sensation of looking down from a great height, and it was to cancel this human element that scientists developed 'True Motion Radar' which eliminated any optical image from the monitor. What the video artist Nam June Paik calls the triumph of the electronic image over universal gravity has carried this still further. The sense of weightlessness and suspension of ordinary sensations indicates the growing confusion between 'ocular reality' and its instantaneous, mediated representation. The intensity of automatic weaponry and the new capacities of photographic equipment combine to project *a final image of the world*, a world in the throes of dematerialization and eventual total disintegration, one in which the cinema of the Lumière brothers becomes more reliable than Jünger's melancholy look-out who can no longer believe his eyes.

A highly meaningful incident from the First World War – one which, curiously enough, repeated itself twenty-six years later in a variant itself indicative of the changing battlefield – will confirm the truth of this argument. In 1914 the French and German commands had little faith in aerial observation and greatly preferred the use of ground patrols. At the Battle of the Marne, however, Captain Bellenger, the man in charge of aviation in the fortified area around the capital, responded to General Gallieni's urging and stepped up the number of reconnaissance flights in the vicinity of Paris. A conflict of interpretation then broke out between Gallieni, a specialist in colonial wars who excelled in the use of new technology, and the officers responsible for the front. Seen from the ground, the direction of the German offensive was unclear and the reports of scouts were contradictory (although the general staff took them as gospel). Seen from the sky, the axis or general thrust suddenly became apparent, but the French high command refused to accept the evidence and quite naturally set greater store by horizontal, perspectival vision than by the vertical, panoramic vision of overflying aircraft. Eventually

Gallieni imposed his 'point of view' on enemy movements – not in Paris, but on the Marne. Some writers ascribed the resulting victory at the first battle of the Marne to the Paris region's dense, concentric railway network with its efficient *regulation of traffic*. Today, however, it seems at least plausible that the happy outcome also depended upon *regulation of points of view* – that is, on a definition of the battle image in which the cavalry's perspective suddenly lost out to the perpendicular vision of the reconnaissance aircraft.

Henceforth, as Winston Churchill confirmed, the general tendency prevails over successive episodes. It is like the difference between the invention of cinematography and the invention of chronophotography: since armed clashes could now only be perceived through *projection*, only the photogramme of the war film could reveal their inner dynamic or general line, ground patrols being left to serve as a tactical control. The system of reviewing images and sequences in accelerated motion was then applied to military reviews and exercises, on a training ground which was no more than a screen for projection of the war of movement. Alone capable of making visible the likelihood of attack, cinema became associated with battle in the same way that telescopic sights were attached to rifles or the cine-machine-gun to aerial warfare.

The *Blitzkrieg* brought home this reversal of perspective in a repetition of the episode from the Marne. In the course of spring 1940 – on the 10th of May, to be precise – events followed one another with such rapidity that only the air force could grasp their catastrophic dimensions. On the 12th of May, in a report now kept in the French Air Force archives, Lieutenant Chery from Reconnaissance Group 2/33 (the one in which Saint-Exupéry served) wrote as follows: 'The bridges over the Meuse are intact. Overall impression: the enemy is advancing with armoured divisions in the Ardennes, and is meeting no resistance.' Despite this clear-cut information, the French general staff refused to believe the lieutenant-observer. An old military axiom – 'Ardennes: non-strategic, impenetrable country' – had stopped the Maginot Line from being continued northward, and thus there could be no question of lending credence to Chery's heretical communication. The sequel is well enough known. The issue here is no

longer the scale of the point of view but how pervious certain terrain is to the advance of enemy ardour.

The glass-like transparency of Jünger's war landscape is thus compounded by the piercing of dense country, such that a wooded massif becomes transparent to rolling armoured divisions. This is no longer merely an *optical illusion* affecting a soldier suffering psychic weightlessness; rather, it is a *motor illusion* affecting strategic territory that offers no more resistance to tanks than air space does to dive-bombers.

In his writings as a war pilot, Saint-Exupéry uses some arresting metaphors:

> All I can see on the vertical is curios from another age, beneath clear, untrembling glass. I lean over crystal frames in a museum; I tower above a great sparkling pane, the great pane of my cockpit. Below are men – protozoa on a microscope slide. . . . I am an icy scientist, and for me their war is a laboratory experiment.[2]

The soldier's panic-stricken distancing from static warfare is transferred to the technology of lightning-war, to the telescopic lenses and the stereoscopic glass of military photo-analysis, in a medium which seems aqueous, glass-like, with all its phenomena of refraction and diffraction.

Positional warfare, then, had had its day. The extreme mobility of mechanized armies imparted a new temporal unity that only cinema could apprehend, albeit with occasional difficulty since the greater speed of aircraft extended the flow of images and high altitudes iced up the camera's mechanism. For these reasons, military scientists refined optical scanning methods, assisted the pilot's fallible memory with a tape-recorder while awaiting the onboard computer, and made filming more precise by means of a 'hyposcope' that could readily visualize the aircraft's vertical. Heavy and cumbersome sheet-emulsion was replaced by selfwinding film cartridges. Air speed/film speed adjustors, in-flight marking of negatives and the coupling of photo-electric cells made it easier to interpret documentary output and thus further improved its quality.

The limits of investigation, in both time and space, were being pushed back. The rapid movement of armies meant that their advance had to be detected at the furthest possible point within

an aircraft's range, so that the command would have sufficient time to respond. Gone were the times of the four-kilometre-an-hour infantry, when information remained fresh for a day, a week or even more. Now reports lost their value within a few hours, or even a few minutes. If the secrets of war are always written in the air, only high-speed transmission allows their importance to be usefully deciphered.

After the defeat of France, the British took Sidney Cotton's advice and reorganized their aerial reconnaissance by replacing the heavy, weapons-carrying Blenheim bombers with unarmed Spitfires that could load a spare fuel-tank. This state-of-the-art aeroplane, performing like a veritable flying camera, prefigured today's 'video-missiles' which are capable of detecting, live or in play-back, not only the succession but also the simultaneity of various actions.

It was in 1912 that the German Alfred Maul launched a powder-fuelled rocket with a small photographic device in its nose cone. When it reached its highest point, the rocket took a single photograph and came back to earth at a slower speed (a military experiment which built upon Nadar's first aerostatic pictures). Twenty years later at RCA's laboratories, Vladimir Zworykin invented the 'Iconoscope', the first name for the electronic television. He presented it not as a mass medium but as a way of expanding the range of human vision – indeed, anticipating the Pioneer and Voyager space probes by many years, he even wanted to place a camera on a rocket to observe inaccessible regions.

This urge to expand the range of vision and detection eventually found a scientific answer in the electro-magnetic radar beam, which at the time of the Battle of Britain gave the air the transparency of ether. Watson-Watt spread out a mysterious, invisible screen in the atmosphere, reaching to such a height that no air vessel could pass through without being detected somewhere on the ground, in the form of a blob of light in a darkened room. What had once taken place in the darkroom of Niepce and Daguerre was now happening in the skies of England. The war room in London filled up with senior officers and female assistants – hostesses, one might say, of a strategic office imitating real war – who organized the flow of 'Chain Home' radar information

and coordinated the RAF combat formations. Brief exchanges between crews and their 'war hostesses' passed through the ether, as if the couples were together in the same room. Duly warned, guided and consoled, the fighter-pilots were ceaselessly followed by these offstage voices. It was not only the war film that had become a talkie. For the pilots could visualize the audience in the operations room and punctuated their brilliant feats of arms with exclamations and commentaries. The female assistants contributed to their leader's success, as well as to the derealization of a battle in which ghosts played an ever greater role – screen ghosts of enemy pilots served to confirm that they had been shot down, and ghostly radar images, voices and echoes came through on the screens, radios and sonars. The projection of light and waves had replaced the old projection of arrows and javelins.

Although military force depends on its relationship to outward appearance, this power has over the years lost its verisimilitude in a profusion of camouflage, decoys, jamming, smoke-screens, electronic counter-measures, and so on. The offensive arsenal has equipped itself with new devices for a conflict in which optical and motor illusion have fused in the cinematic delirium of lightning-war. Here what counts is the speed at which objects, images and sounds travel through space, until the moment of the nuclear flash.

In the spring of 1940, unlike 1914–18, reconnaissance aircraft had a constant short-wave radio link with the ground, over a range that would increase from a few dozen kilometres to five hundred by the end of the war. In the autumn of the same year, RAF night-fighters became the first to have onboard radar which enabled pilots to see on cockpit screens a Dornier or Messerschmitt-110 flying through the dark over five kilometres away. The pilot's gift of double sight thus introduced a new doubling of the warrior's personality: with his head up, atmospheric transparency and ocular targeting; head down, the transparency of the ether, long-distance vision. Two military spaces, one close and one faraway, corresponded to a single battle, a single war. Later these technologies led to the development of over-the-horizon weapons systems.

As for the night-bombers, which had to face the blinding light of 200 million candlepower searchlights, they gradually acquired

new resources and procedures to help them accomplish their mission. Whereas in 1940 the Luftwaffe dropped incendiaries to mark the bombing area in London and Coventry, in 1941 the Allies' 'Operation Millennium' used impact flare-bombs to sketch out in the darkness a rectangle of red lights for the Halifaxes and Lancasters to release their destructive load over Cologne.

Subsequently the Allies developed the magnesium flare and the electronic flash, which allowed USAF bombers not only to light up the ground but, more importantly, to dazzle enemy defences for a few moments. (Such innovations were taken further by Sam Cohen in the Vietnam War, when it became possible to blind the enemy for more than an hour: the latest development in this line is the stun grenade used against terrorists in Mogadishu and London.)

By 1942 ground-based electronic devices were able to direct Flying Fortress squadrons over a very long distance, helping them to drop their bomb-loads by day or night and under any weather conditions. The two ground stations involved were known as 'The Cat' and 'Mickey Mouse'. Aircraft fitted with a special receiver picked up the cat's beam and let themselves be passively guided to the vicinity of the target. The mouse, which had so far followed the operation in silence from a distance of some four hundred kilometres, then took over and, having calculated the moment when the bomber should release its load, transmitted the instruction by radar – all with a margin of error of a mere hundred metres.

This sophisticated electronic network covering Western Europe was first known as GEE. But as it continually improved, its name changed to the call-sign OBOE and finally, in 1943, to H2S, by which time it could give pilots not just a radar signal but a 'radar image', a luminous silhouette of the target over which they were flying. The bombing apparatus was equipped with a transmitter that beamed centimetric waves in a perpendicular line to ground level, the echoes then returning and forming on a cathode screen an electronic image of fifteen square kilometres. The system was used for the first time in Operation Gomorrah, which devastated Hamburg.

The visible weapons systems of artillery, machine-guns, and so forth thus became entangled with the invisible weapons systems

of a continent-wide electronic war. No longer were objects on the ground invisible to pilots, who in the past had related to natural conditions both as a source of protective concealment from enemy fire and as a hindrance that masked their own target. Anti-aircraft defences benefited in turn from the ubiquitousness of war: the Kammhuber Line, for example, whose operational centre was at Arnhem in Holland, organized the German fighter response with an air-raid warning system that covered key areas from the North Sea to the Mediterranean. A network of 'panoramic radar' installations, each tracking a circle of three hundred kilometres, could cable an electronic image of the sky to the anti-aircraft batteries of *Festung Europa*. This total visibility, cutting through darkness, distance and natural obstacles, made the space of war translucent and its military commanders clairvoyant, since response time was continually being cut by the technological processes of foresight and anticipation.

The air-raid alert system also played a major psychological role on the Continent. Advance warning could be given to civilian populations as soon as enemy squadrons crossed the coast, and this was translated into a full-scale alert once they veered towards their target city. With the compression of space–time, danger was lived simultaneously by millions of attentive listeners. For want of space to move back into, their only protection was time given to them by the radio.

The Allied air assault on the great European conurbations suddenly became a *son-et-lumiére*, a series of special effects, an atmospheric projection designed to confuse a frightened, blacked-out population. In dark rooms that fully accorded with the scale of the drama, victims-to-be witnessed the most terrifying night-time fairy theatre, hellish displays of an invading cinema that reproduced the Nuremberg architecture of light. Albert Speer, organizer of the Nazi festivities at Zeppelinfeld, wrote as follows of the bombing of Berlin on 22 November 1943:

> The raid offered a spectacle whose memory cannot be erased. You constantly had to remember the appalling face of reality if you were not to let yourself be entranced by this vision. Parachute-rockets – 'Christmas trees', as Berliners called them – suddenly lit up the sky; then came the explosion whose glare was engulfed by the smoke of

> incendiaries. On every side, countless searchlights scoured the night and a gripping duel began when an aeroplane, caught in the pencil of light, tried to make its escape. Sometimes it was hit and for a few moments became a blazing torch. It was an imposing vision of apocalypse.

Hitler's architect was well placed to measure the small distance from the hell of images to the image of hell:

> For the Nuremberg Party Congress in 1935, I used 150 anti-aircraft searchlights whose perpendicular, skyward beams formed a luminous rectangle in the night. Within these walls of light, the first of their kind, the congress unfolded in all its ritual. It was a fairy-like decor, reminding one of the glass castles imagined by poets in the Middle Ages. I now have a strange feeling when I think that my most successful architectural creation was a phantasmagoria, an unreal mirage.

Not a mirage, but rather a dress rehearsal for the war, a holographic harbinger which used material available to the army for more than thirty years.

Transparency, ubiquitousness, instant information – it was the time of the great 'command operas' where, in London as in Berlin, stage-directors moved the naval and air fleets around. 'The headquarters transmission centre was a model of its kind,' writes Speer.

> From his table in the conference room, Hitler was able to command all the divisions on the fields of battle. The worse the situation became, the more this instrument of modern warfare served to underline the divorce between reality on the ground and the fantasy which presided over the conduct of operations at that table.[3]

Commanders were now able to exercise their authority with a minimum of go-betweens. Hitler acted the warlord by radio-telephoning orders to his generals and depriving them of initiative, but in the end the whole system of communications, in both camps, worked to strengthen the supreme commander's control over his subordinates. *Power was now in a direct link-up.* If, as the strategist Se-Ma put it, an army is always strong when it can come and go, move out and back, as it pleases, we have to say that in this period of war the comings and goings were less those of troops than of the output from detection and transmission

equipment. Visual or audiovisual technology now began to reproduce not only the forced march or distant incursion – as it did in the 1914–18 war – but the actual movement of armies, with automatic feed-back and retransmission in real time. How else can we understand the introduction of PK units in the Wehrmacht, or the Allied armies' use not just of war correspondents but of their own cine-commando units – how else but by the need for ever more advanced mediation of military action, so that the pilot's 'gift of double sight' could be extended to a high command at once absent and omnipresent?

In making attack unreal, industrial warfare ceased to be that huge funeral apparatus denounced by moralists and eventually became the greatest mystification of all: an apparatus of deception, the lure of deterrence strategy. Already in the Great War, as we have seen, the industrialization of the repeating image illustrated this cinematic dimension of regional-scale destruction, in which landscapes were continually upturned and had to be reconstituted with the help of successive frames and shots, in a cinematographic pursuit of reality, the decomposition and recomposition of an uncertain territory in which film replaced military maps.

Cinematic derealization now affected the very nature of power, which established itself in a technological Beyond with the space–time not of ordinary mortals but of a single war machine. In this realm sequential perception, like optical phenomena resulting from retinal persistence, is both origin and end of the apprehension of reality, since the seeing of movement is but a statistical process connected with the nature of the segmentation of images and the speed of observation characteristic of humans. The macro-cinematography of aerial reconnaissance, the cable television of panoramic radar, the use of slow or accelerated motion in analysing the phases of an operation – all this converts the commander's plan into an animated cartoon or flow-chart. In the Bayeux Tapestry, itself a model of a pre-cinematic march-past, the logistics of the Norman landing already prefigured *The Longest Day* of 6 June 1944.

Now, it should not be forgotten that inductive statistics developed from the calculations that Marshal Vauban used to make

during his long and repetitive journeys to the same place at different times. On each of these trips, Louis XIV's commissioner-general of fortifications became a kind of 'commissioner for displays'.[5] The kingdom paraded before his eyes, offering itself up for general inspection. This was not just a troop muster for the logistical benefit of the officer in charge of army comportment; it was a full-scale review of the country, a medical examination of its territorial corpus. Instead of the ordinary situation in which serried ranks used to pass back and forth before the watchful gaze of the king's administrator, it was the country's provinces, drawn up as on parade, which were passed in review by his inspector-general. However, these repeated trips, which caused the regional film to unwind, were no more than an artifice or cinematic trick for the sole benefit of the itinerant observer. Alone as he watched the situations and sequences dissolve, he gradually lost sight of local realities and ended up demanding a reform of fiscal law in favour of administrative norms.

Statistics brings us to the dawn of political economy, which rested on the persistence of the sign and of dominant trends, not on the merely chronological succession of facts. It is the same movement of ideas which led from the Enlightenment to photographic recording, Muybridge's multiple chambers, Marey's chronophotography and the Lumière brothers' film-camera, not forgetting Méliès, the inventor of the mystification of montage.

Winston Churchill, it is well known, believed that whereas episodic events used to have greater importance than tendencies, in modern wars the tendency had gained the upper hand over episodes. Mass phenomena do indeed elude immediate apprehension and can only be perceived by means of the computer and interception and recording equipment which did not exist in earlier times (hence the relative character of Churchill's judgement). We should therefore conclude that total war has made an essential contribution to the rise of projection equipment which can reveal and finally make possible the totalitarian tendencies of the moment.

The development of 'secret' weapons, such as the 'flying bomb' and stratospheric rockets, laid the basis for Cruise and

intercontinental missiles, as well as for those invisible weapons which, by using various rays, made visible not only what lay over the horizon, or was hidden by night, but what did not or did not yet exist. Here we can see the strategic fiction of the need for armaments relying on atomic radiation – a fiction which, at the end of the war, led to the 'ultimate weapon'.

As we saw in the first chapter, many epilogues have been written about the nuclear explosions of 6 and 9 August 1945, but few have pointed out that the bombs dropped on Hiroshima and Nagasaki were *light-weapons* that prefigured the enhanced-radiation neutron bomb, the directed-beam laser weapons, and the charged-particle guns currently under development. Moreover, a number of Hiroshima survivors have reported that, shortly after it was detonated, they thought it was a *magnesium bomb* of unimagined power.

The first bomb, set to go off at a height of some five hundred metres, produced a nuclear flash which lasted one fifteen-millionth of a second, and whose brightness penetrated every building down to the cellars. It left its imprint on stone walls, changing their apparent colour through the fusion of certain minerals, although protected surfaces remained curiously unaltered. The same was the case with clothing and bodies, where kimono patters were tattooed on the victims' flesh. If photography, according to its inventor Nicéphore Niepce, was simply a method of engraving with light, where bodies inscribed their traces by virtue of their own luminosity, nuclear weapons inherited both the darkroom of Niepce and Daguerre and the military searchlight. What appears in the heart of darkrooms is no longer a luminous outline but a shadow, one which sometimes, as in Hiroshima, is carried to the depths of cellars and vaults. The Japanese shadows are inscribed not, as in former times, on the screens of a shadow puppet theatre but on a new screen, the walls of the city.

A-bomb, 1945; H-bomb, 1951. Korean War. . . . After the war everything speeded up: firepower referred not just to firearms but to the jet-pipes of fighter aircraft. The sound barrier was crossed in 1952, the 'heat barrier' in 1956. As to the light barrier, that was for later. In the skies, Strategic Air Command bombers were

in constant readiness, and Air Defense Command interceptors spread their protective umbrella for the eventuality of a Soviet long-range attack. The danger was all the greater in that the USSR exploded its first hydrogen bomb on 12 May 1953.

For the United States, it was becoming an urgent matter to have new information-gathering methods at its disposal. And so it was that Eastman Kodak came up with its Mylar-based film and Dr Edwin Land of Hycon Corporation with the high-resolution camera – both of which laid the basis for regular aerial reconnaissance over the Soviet Union. The sequel is well known. October 1961 saw the beginning of the Cuban crisis, with the threat of a third world war. On 29 August 1962, a U-2 aeroplane came back from a mission over Fidel Castro's island with film evidence of Soviet missile installations. This sparked off the confrontation between Khrushchev and Kennedy which, after several months, led to a hot-line link-up between the two heads of state, an instant interface between their operations rooms.

We should remember that the U-2, still in service over Iran and the Persian Gulf, is fitted not only with photographic and electronic surveillance systems but also with a telescopic collimator or 'cine-drift indicator' which allows the spy pilot to follow ground contours at a height of more than twenty-five thousand metres.

Also in 1962, at a time when there were already ten thousand American advisers in Vietnam, the first electronic war in history was devised at Harvard and MIT. It began with the parachute-drops of sensors all along the Ho Chi-Minh Trail, and continued in 1966 with the development of the electronic 'MacNamara Line', consisting of fields of acoustic (Acouboy, Spikeboy) and seismic (Adsid, Acousid) detectors spread along the Laos access routes, around US army bases and especially the Khe Sanh stronghold.

At that time Harvard Professor Roger Fisher developed the strategic concept of a 'land-air dam', relying on up-to-the-minute technology to keep an effective watch on enemy movements. It would use infra-red devices and low-lighting television, combined with the most advanced means of aerial destruction such as the F-105 Thunderchief fighter, the Phantom jet, and the Huey-Cobra helicopter gunship. Transport aircraft (the Douglas

AC-47 and, above all, the Hercules C-130) were converted into flying batteries with the latest electronic equipment: laser targeters capable of guiding bombs with absolute precision; a night-vision and image-enhancer system; and computer-controlled, multi-barrelled Minigums, descendants of the old Gatling gun which could fire six thousand rounds a minute.

With this sophisticated alert-system, made necessary by the fact that enemy movement usually took place by night, the black-out was a thing of the past, and darkness the fighter's best ally, while the daylight theatre also became a darkened cinema for the shadowy combatants. Hence the Americans' frenzied efforts to overcome this blindness by having recourse to pyrotechnic, electrical and electronic devices, most of which employed light intensification, photogrammetry, thermography, infra-red scanning, and even specially invented infra-red film. All these weapons systems resulted in a new staging of war, massive use of synthetic images, and automatic feed-back of data. They also gave rise to chemical defoliation, whereby it finally became possible to empty the screen of parasitic vegetation.

In October 1967, the Nakhon Phanom electronic surveillance centre in Thailand was picking up, interpreting and displaying on screen data sent from ground-interceptors and relayed by Lockheed Bat-Cat aeroplanes. In these offices, the new nodal point of the war, an IBM 360.35 computer automatically sorted the data, producing a 'snapshot' which showed the time and place when the interceptors had been activated. On the basis of this information, analysts drew up a schedule of enemy movement and passed on to fighter-bomber crews the 'Skyspot' combat data that enabled them to go into action with the greatest dispatch and precision. Most interesting from our point of view, however, was the pilotless Drone, an aircraft with a wing-span of approximately three metres whose camera could take two thousand pictures and whose onboard television could broadcast live to a receptor station 240 kilometres away.

'*Ilpleut mon âme, il pleut mais il pleut des yeux marts*',[6] wrote Apollinaire in 1915, referring to enemy fire. With the advent of electronic warfare, this figure has become out of date. Projectiles have awakened and opened their many eyes: heat-seeking missiles,

infra-red or laser guidance systems, warheads fitted with video-cameras that can relay what they see to pilots and to ground-controllers sitting at their consoles. The fusion is complete, the confusion perfect: nothing now distinguishes the functions of the weapon and the eye; the projectile's image and the image's projectile form a single composite. In its tasks of detection and acquisition, pursuit and destruction, the projectile is an image or 'signature' on a screen, and the television picture is an ultra-sonic projectile propagated at the speed of light. The old ballistic projection has been succeeded by the projection of light, of the electronic eye of the guided or 'video' missile. It is the life-size projection of a film which would have overjoyed Eugène Promio, the inventor of the travelling platform, and even more Abel Gance, who wanted to launch his cameras like snowballs into the Battle of Brienne.

Ever since sights were superimposed on gun-barrels, people have never stopped associating the uses of projectiles and light, that light which is the soul of gun-barrels. Recent inventions have included the photon accelerator and the light intensifier, and now there are the laser weapons, directed beams, charged-particle guns, and so on. Not content with barrel-mounting, the experts have inserted a sighting device into the inner tube of artillery in order to improve performance. At ballistic and aerodynamic research laboratories in both France and the United States, 'hyper-ballistic firing tunnels' nearly a hundred metres long can launch scale-models of 're-entry bodies' (the projectiles being tested) at a speed of 5,000 metres a second. 'Cineradiographic' flash equipment, with a capacity for 40 million images a second, is then used to visualize their path in the bore of the gun.[7] This takes us back to the origins of cinema, to Marey's first chrono-photographic rifle which had a lens in the barrel and a cylinder for moving round the light-sensitive plate.

Since Vietnam and throughout the seventies, the mediation of battle has grown ever more pronounced. At the time of the Korean War a USAF Sabre already required more than forty kilometres to turn a Mig-15, but in Vietnam (as in the Six Days War) a Phantom needed an instrument-backed firing system if it was to have any hope of bringing down a Mig-21. The Phantom's targeting

system subsequently led to the 'Fire and Forget' concept and to the Over-the-Horizon weapons systems which allow an attack to be conducted off the field.

The disintegration of the warrior's personality is at a very advanced stage. Looking up, he sees the digital display (opto-electronic or holographic) of the windscreen collimator; looking down, the radar screen, the onboard computer, the radio and the video screen, which enables him to follow the terrain with its four or five simultaneous targets, and to monitor his self-navigating Sidewinder missiles fitted with a camera or infra-red guidance system. However, this war of the waves had some major drawbacks, as Colonel Broughton, an F-105 Thunderchief pilot in Vietnam, has explained:

> The radio chatter was really picking up about this time – in fact, it was so dense with all the Mig and Sam warnings and everyone shouting directions and commands that it was almost impossible to interpret what was going on. This is a real problem and once it starts, it just keeps getting worse and worse and is almost impossible to stop . . . you see something that you know you have to tell other people about in a desperate hurry to protect them and to protect yourself, and the temptation is to blurt it out as quickly as possible without using the proper call sign. The result is that everyone in the air immediately gets a shot of confusion and wonders who is talking about whom.[8]

Such confusion was often exacerbated by poor weather conditions in North Vietnam:

> The weather over there is the thickest I have ever seen and when you get inside one of those big thunder-bumpers you are in for a good ride. Most clouds you fly through have their share of bumps but the visibility inside is usually good enough so that you can sit on the wing of another aircraft and fly formation off him. You just maintain the position you want and when he turns or rolls his aircraft, you roll right along with him. You have no idea where you are if you are on the wing, but that is up to the leader. The only time you get into trouble on the wing is when you try to fly position and also try to outguess the leader. This usually winds up in a case of spatial disorientation called vertigo. If this happens you can be sitting straight and level and swear that you are cocked up in a 60-degree bank going sideways. It is a most distressing sensation and sometimes almost impossible to get rid of. You can shake your head and holler at yourself and sometimes it won't

> go away, and it can be fatal. . . . For a real thrill, I recommend you try this type of flying on a black night.[9]

The weightlessness that Ernst Jünger felt during artillery barrages in the First World War is reproduced in this account. However, the confusion of sensations involves not a panic-stricken terror but a technological vertigo or purely cinematic derealization, which affects the sense of spatial dimension. Tied to his machine, imprisoned in the closed circuits of electronics, the war pilot is no more than a motor-handicapped person temporarily suffering from a kind of possession analogous to the hallucinatory states of primitive warfare. We should not forget that the first stimulants were developed in response to the needs of Luftwaffe pilots.

Narcotics were to become the plague of the US expeditionary corps in Vietnam. From the beginning, they suffered from the hallucination of technological combat-delirium, which blurred the distinction between the real and the imaginary. In this war of images, Broughton writes:

> Unfortunately, the groups known as photo interpreters are not always of the highest level of skill or experience, and their evaluation quite often does not agree with that of the men doing the work. I have bombed, and seen my troops bomb, on specific targets where I have watched the bombs pour in and seen the target blow up, with walls or structures flying across the area, only to be fragged right back into the same place because the film didn't look like that to the lieutenant who read it way back up the line. I have gone back on these targets and lost good people and machines while doing so, and found them just as I expected, smashed. But who listens to a stupid fighter pilot?[10]

People used to die for a coat of arms, an image on a pennant or flag; now they died to improve the sharpness of a film. War has finally become the third dimension of cinema.

It is a curious fact that much of the new materiel – helicopter gunships, missiles, telecommunications, detection systems – was being produced by the Hughes Aircraft Company, whose celebrated founder, Howard Hughes, had directed a film in 1930 about a First World War bomber crew (*Hell's Angels*). This schizophrenic magnate, who died in 1976, built an industrial empire

by associating cinema and aviation, and Hughes Aircraft remains today one of the largest companies in the United States. In 1983, for example, it was working on improvements to the TOW anti-tank missile's guidance system, introducing an optical tracking device that allowed missiles to be precisely aimed despite the pitching and vibrating of the helicopter from which they were fired. But it was also developing equipment for in-flight entertainment, making it possible for infra-red rays to carry music and films to the passengers of regular airlines and business jets.

After the Vietnam defeat, Pentagon scientists and industrialists did not give up their drive to perfect electronic warfare. The MacNamara Line was transferred to the south of the United States – or, more precisely, the border with Mexico – with the supposed aim of detecting illegal immigrant workers. As for the anti-personnel interceptors, they gave birth in 1971 to a wild plan sponsored by the National Security Agency for the development of a personalized tracking device that could be used by the police. This electronic 'transponder', as it was known, was designed to record the distance, speed and path of an offender's movements and to transmit the information several times a minute, via relay-receivers, to a central screen-computer. Having checked these data against the permitted itineraries, the computer could immediately alert the police if the person wearing the 'tracking bug' went elsewhere or tried to remove it. Although the original idea was to use it for prisoners on parole, this system of *electronic incarceration* finally enabled a kind of prison reform. The cell would be replaced by a tiny black box, by confinement to the shadows through the stage direction of everyday life.

In 1974, spurred on by the oil crisis, this process of derealization acquired fantastic proportions with the boom in military flight and combat simulators, which effectively took the place of the old 'home trainer'. The production of synthetic 'daylight' images had meant that at last pilots could be trained without interruption in all aspects of a combat mission, covering the customary phases of navigation, penetration and attack. An instructor could teach them not just to pilot an aircraft with instruments but to pilot a series of startlingly realistic images. This *mise-en-scéne* of war led a few years later to an event that went unnoticed: namely,

the recognition of an equivalence between simulator time and real flight time. If we bear in mind the strictness of certification procedures for aeroplane pilots, we shall better understand the importance of such a decision.

Today, techniques have improved still further and a 'dogfight simulator', consisting of two spherical cabins, can simulate an attack by two enemy aircraft. It should be noted at this point that simulation has long since spread to the other two branches of the military. The Sperry Corporation – one of the main manufacturers, together with Thomson, of this type of equipment – produces for armoured units as well as for the navy and the air force. Moreover, within the East–West framework of direct non-aggression that has resulted from the strategy of nuclear deterrence, military manoeuvres have also gradually taken on the aspect of large-scale electronic games, a *Kriegspiel* requiring whole territories over which the various procedures and materials of modern war are reconstituted.

In the Nevada Desert, a special practice range known as 'Red Flag' has been created to simulate exposure to a Soviet defence system. Authentic Soviet surface-to-air missiles and accompanying radar equipment – whether Israeli war booty or old supplies to Egypt – help to re-create a perfectly realistic electronic environment of radar beams, firing procedures, radio transmissions, and so forth, which the American crews are trained to recognize and then neutralize. The aerial force participating in such exercises includes an AWACS flying control-tower and an Aggressor Squadron made up of aircraft whose features are similar to those of the Mig-21 and Mig-23. Similarly, in the Mojave Desert in California, the Army's National Training Center simulates war in the most life-like way. Thanks to 'Miles' (the Multiple Integrated Laser Engagement System), the soldiers' weapons on both sides project laser or infra-red rays with a range and trajectory roughly comparable to those of real ammunition. The various targets, fitted with silicon plates, are linked up to 'black boxes'. Both the troops and their weaponry also carry sensitive plates on their most vulnerable surfaces, so that when one is hit by a laser beam, the micro-processor in the black box calculates the impact and communicates it to Headquarters, which then adds up the score. A host of other simulation devices and special film effects complete the picture.

In the same order of ideas we should mention the Tactical Mapping System, a video-disc produced by the Advanced Research Project Army. By speeding up or slowing down the procession of fifty-four thousand images, and changing the direction or season as one might switch television channels, the viewer is able to build up a continuous picture of the small Colorado town of Aspen. The town is thus transferred to a sort of ballistic tunnel for tank-pilots, who use this method to train in street combat. Let us not forget that the Dykstraflex camera made by John Dykstra for the film *Star Wars* – a camera in the service of a computer which records its own movements – was actually descended from a pilot training system.

The same kind of technological spin-off lies behind the SPAACE camera, an automatic tracking system that two Frenchmen developed for the cinema on the basis of an anti-aircraft radar platform. This new-style camera, with its powerful telephoto lens, can follow the actors' spontaneous movements without any difficulty, even locking on to the face of a jet pilot executing a low-altitude figure. The fact is that once the energy crisis had made the simulation industry profitable, the pace of technological innovation grew more frantic towards the end of the seventies and culminated in the automation of the war machine.

The complexity of manoeuvres, the ever greater air speeds, the assistance of satellites, and the necessity for ground-attack aircraft to fly super-sonically at very low altitudes eventually led the engineers to automate piloting itself. On the F-16 'AFT1', for example, developed by Robert Swortzel, the pilot never touches the controls but navigates by voice. In return, an on-screen display keeps him informed of his flight plan and 'firing plan' and throws up on the windscreen the anticipated acceleration and countdown time, as well as the kind of manoeuvres that the pilot will have to execute. For the firing operation, the pilot has a special sighting-helmet linked to a laser and infra-red targeting system; all he has to do is fix the target and give a verbal instruction for the weapons to be released.

This revolutionary apparatus, designed in 1982 for the United States Air Force, the Navy and NASA, combines a number of

advanced technologies, particularly in the field of laser-targeting. The Eye-Tracked synchronization system fixes the pilot's gaze, however sudden the movement of his eyes, so that firing can proceed as soon as binocular accommodation is achieved.

Finally, there is the 'homing image', which joins together an infra-red ray and an explosive projectile fitted with a special device. This device acts in the manner of an eye, picking up the image of the infra-red-lit target. The projectile then makes its way towards the image – and thus towards the target for destruction – with all the ease of someone going home. This system, which is attached to the latest missiles, once again illustrates the fateful confusion of eye and weapon.

We can now understand better the concern on both sides to perfect weapons that are as undetectable as a submerged submarine – Stealth bombers, 'smart' missiles, invisible not just to the human eye but above all to the piercing, unerring gaze of technology. In the 1980s there was a significant shift or 'conversion' in global strategy, as East–West conflict passed into North–South confrontation. Notwithstanding the tensions in the Middle East and the Euromissiles controversy, military space is being shifted and organized around the oceans, in the Pacific, the Indian Ocean and the South Atlantic. Indeed, the Malvinas War can be seen as a rehearsal for a nuclear conflict, in the use of American and Soviet satellites, British nuclear submarines, and French missiles capable of destroying highly exposed surface-ships. But it was also a war of electronic counter-measures – naval decoys whose main feature was to superimpose upon the incoming missile's optical or infra-red radar image an entirely manufactured image that would appear both more important and more attractive than the real ship, as well as being equally credible to the enemy missile. Once this was achieved, the missile's automatic navigator locked on to the centre of gravity of the 'decoy-image-cum-ship-image', and all that remained was to exploit the spectre of the decoy to draw the missile far over the ship. The whole operation lasted barely a few seconds.

One could go on for ever listing the technological weapons, the panoply of light-war, the aesthetic of the electronic battlefield, the military use of space whose conquest was ultimately the conquest

of the image – the electronic image of remote detection; the artificial image produced by satellites as they endlessly sweep over the surface of continents drawing automatic maps; life-size cinema in which the day and the light of film-speed succeed the day and the light of astronomical time. It is subliminal light of incomparable transparency, where technology finally exposes the whole world.

In the summer of 1982, the Israeli preventive war in Lebanon, baptized 'Peace in Galilee', drew on all the resources of the scientific arsenal: Grumman 'Hawkeye' aircraft-radar capable of simultaneously locating two hundred and fifty targets for F-15 and F-16 fighter-bombers; and, above all, the remote-piloted 'Scout' automata, with a wing-span of less than two metres, which were massively and systematically deployed for the first time in the history of battle. This toy craft, worthy of Ernst Jünger's *Glass Bees*, was a veritable Tsahal's eye fitted with TV cameras and thermal-image systems. As it skimmed the rooftops of the besieged city of Beirut, flying over the most exposed Palestinian districts, it provided images of population movement and thermal graphics of Palestinian vehicles for Israeli analysts sitting at their video consoles more than a hundred kilometres away.

In the autumn of 1982, the United States established a military high command for space and announced the impending launch of an early-warning satellite. In the spring of 1983, on 23 March to be precise, President Reagan painted a picture of an anti-ballistic-missile system employing nuclear energy, enhanced rays, directed beams and charged particles.

Last summer, on 5 July 1983, an American KC-135 aircraft fitted with a laser system shot down a Sidewinder missile travelling at 3,000 kilometres an hour.

Scan. Freeze frame.