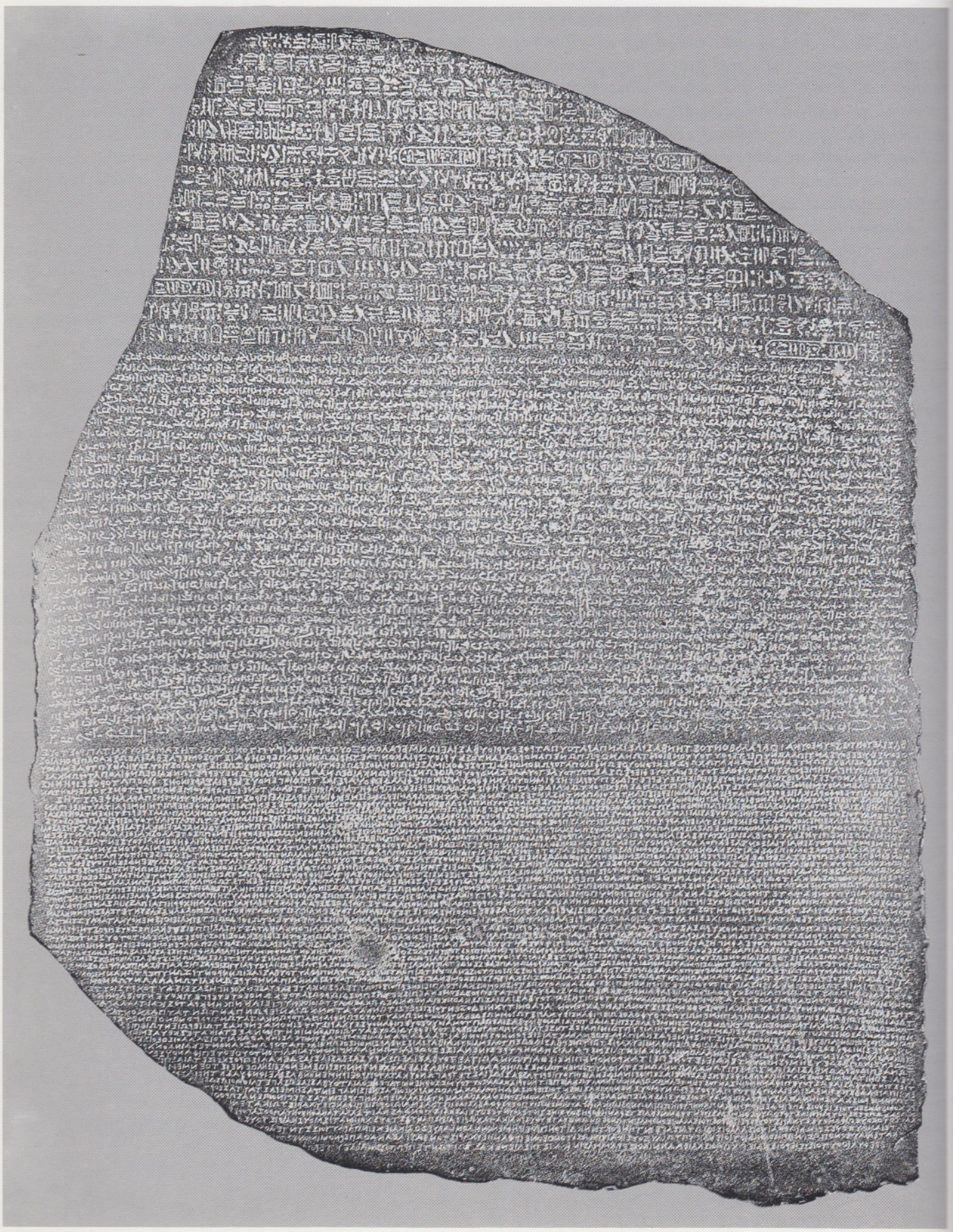
The Rosetta Stone (British Museum, London)



Key/word: Interface

There are "magic words," that emerge in the use of language and then succeed in imposing themselves on the mind. These are key/words, which seem to take the full risk of coagulating in a single term all the lines of force, complex intuitions, shifting concepts, and developing debates — incurring the danger that all of this wealth of notions, still volatile and unstable, be reduced to a simple and closed verbal expression, that it be mortified, trivialized, or used as a skeleton-key to open doors of all sorts. It is inevitable — one of the properties of language is that it lays traps into which we fall all too often.

If we decide to face this risk, however, if we agree to pass through the network of connections and references, and if we commit ourselves to analyzing the matrices of this network, then we shall find that the key/word may prove to be an excellent point of departure for a process of reflection in an effort to understand how reality emerges.

Interface *is one of the "magic words" of the past few years. Whatever "lies between" is called interface, whatever allows us to link two different elements, to reconcile them, to put them into communication.*

Created within the context of information sciences, this term indicates, for instance, the complex of control channels and circuits that connect the central and peripheral units of an electronic processor. It is far from simple to provide a final definition of the term.

If a sophisticated computer scientist like Gianni Degli Antoni, one of the founders of the department of Information Science at the University of Milan, declares that he is ready to "debunk any definition of interface, no matter how correctly it may be formulated," the reason is that the concept itself lies across a critical boundary — between material and immaterial reality. Interface denotes the physical equipment of a computing machinery and, at the same time, a relationship. Interface is a part of a computer, or it can even be (in fifth generation computers) a computer itself. But interface is also the immaterial meeting place between two states of reality, previously extraneous, that merge to exchange information, to interact. It is therefore a term that pertains to computer science, but also (when man is involved) to psychology.

Around the concept of interface, the relationship between man and machine calls up the problem of access — man must have access to the machine, and the machine must have access to the man, in a process that aims at attaining specific objectives. "The world is an assembly of interfaces," Degli Antoni continues to state. And in this world, in our continuous commerce with machines, "interface is the name of a strategic relationship between man and machine."

From the area of computer science, the word interface has overflowed into everyday language. Without expecting to follow all the paths and metamorphoses of the term and to exhaust all of the possible connections, let us propose a transverse journey through the adventures of interface as an actor, *with relation to the activity that is commonly referred to as design.*

The point of departure for our voyage is the narration of a research project — conducted by the designers Perry A. King and Santiago Miranda in order to reach the final form of the control keyboards of Olivetti office machinery. The keyboard is the site of interaction between man and his objects — in short, an interface. Here, design is called upon to give shape not so much to a product as to a place of relations. The narrator of this experience followed the two on the far from straight path of their research, attempting to describe in words the horizontal thread of the narrative development (the birth and realization of a project) as it interweaves with the vertical threads of thematic exploration, of the steps taken, of the descriptions proposed.

The adventure begins with an introduction to the characters and actors — Olivetti, with its long design tradition, and the two designers, King and Miranda, with their specific working style. The meeting between the characters takes place within a complex design network in which ergonomists, designers, technicians, researchers, marketing people, and managers are all at work.

King and Miranda's research has been reconstructed in its various steps, procedures, developments — it is a research process made up of rational analysis but also of impulses and hunches (drawn from the systems of signs and objects tested by man over the long centuries of his history), reflection (about the new "naive" user that is emerging from the development of diffuse electronics, and on the new "relations ergonomics" that is needed to satisfy the needs of this new figure), of analysis of previous attempts (in the now large field of "interface design").

After describing the results of the research project — the solutions proposed for the new Olivetti control keyboards — it becomes clear that design is becoming an interface *between man and his objects. These objects, in years of pervasive electronics and communications, are losing their autonomous physicality and are falling under the creative "discretion" of the designer, who is no longer a sculptor of messages but the planner of* systems of messages. *While objects are becoming less physical, design is called upon to "invent" arbitrary forms, and so* decide *the relationship between men and objects. That is, to design the relationship between man and technics — a crucial undertaking for contemporary culture, and an unresolved problem in recent design history.*

From this knowledge springs the proposal of Interactive Design set forth by Perry King and Santiago Miranda as the basis for a form of design that succeeds in designing — above and beyond mere functionality — a vital relationship between man and his objects.

"From Project to Product" is the name of the series to which this volume belongs. Here too we have tried to live up to that title. We have felt it necessary this time to point out that here (and perhaps always) the product is, rather than an object, a system of information, and that the project follows a path that snakes through fragments of science and bits of invention, fed on memory and intuition, measured against material and marketing, compared with technics, speaking the languages of the society in which it moves.

The volume also contains contributions from several specialists. At the end of the first chapter Ettore Sottsass jr — a designer who, ever since 1957, has greatly shaped the Olivetti style — recalls several of the important steps in his work, viewed in the light of his new cultural awareness of the relationship between design and technology, design and machinery.
At the end of the second chapter Piera Ferioli and Enrica Fiandra write about the procedures of ancient administration and the recent discoveries on the use of clay sealings. These discoveries were one of the most fruitful stimuli in the research done by Perry King and Santiago Miranda. An essay by Etienne Grandjean is devoted to the new frontiers of ergonomics in the relationship between man and video-electronic machinery, while an essay by Herman Hauser examines the fundamental stages of the hystory of the interface between man and computer. Giorgetto Giugiaro considers a special, everyday, but intriguing area — the design of the driver's post, the interface between man and automobile.
At the end of the fourth chapter, the designers Achille Castiglioni and Richard Sapper and the manufacturer Sergio Gandini, write about industry and design, planning and manufacturing.

G.B.
February 1987

Ancient administration had already developed forms of accounting that used plastic volumetric elements ("clay sealings") that functioned as communicative filters, interfaces between man and his operations. This Egyptian door was sealed by a clay sealing which secured the cord wrapped around the handles of the two wings of the door. Temple of Deir el Medineh, plastered wood model (Museo Egizio, Turin).

"The first step we took in our preparatory research for the creation of new Olivetti keyboards," Perry King recalls, " was, naturally enough, a rational analysis of the characteristics of communications between man and machine. But it was certainly not the only step." At least three other components immediately entered into the research — the flow of suggestions prompted in the designers by communication and its signs; several reflections upon microelectronics innovations and on the new ergonomics that must be developed in order to respond to the needs generated by the new figure of the user that has appeared on the horizon; and lastly a rapid analysis of several experiments that have already taken place in the field of "interface design."

"We were faced by two usable fields of reference, which we perceived as two opposed ideal models: the professional alphanumerical keyboard, 'serious,' and 'mature,' in use on typewriters and the 'evocative' console used on hi-fi equipment for the distribution of music."

The former represented the closest model to what King and Miranda were working on. Professional keyboards have been developed over time with an eye to functionality, in the context of a quantitative ergonomic science that defined as a functionally acceptable apparatus one that had been tested to establish the characteristics necessary to allow an operator to write as fast as possible with the lowest number of errors. The average number of characters per minute and the average number of errors committed when writing quickly were offered as objective, quantitative, unquestionable data in order to judge the quality of a professional keyboard.

The second ideal model taken into consideration was constituted by the console of hi-fi equipment — the standards were not essential, the use was by definition not professional. Impact on the other hand was fundamental — more than functionality, hi-fi keyboards show the power of technology, and celebrate its mysteries ("Not human," stated a headline in a hi-fi ad several years ago). King and Miranda were fascinated by the possibility of using technology as play through design, but they rejected the glorification of power, the undefinable and esoteric aura that clicks in to form what might be called the "hi-fi effect."

On the other hand, it seemed evident to them that the diffusion of electronics was to lead to the obsolescence of the very concept of the traditional professional keyboard, and would lead to a new user, not specialized but at once *ingenuous* and *demanding*. Both reference models offered by the context were therefore judged insufficient. "And so we decided to abandon the context. We allowed numerous stimuli that had almost accidentally attracted us in those months to flow uninterrupted."

The suggestions

First off, there was the work done by an Italian archeologist, Enrica Fiandra, who had studied the procedures of economic management and records-keeping of ancient Mediterranean societies.[1]

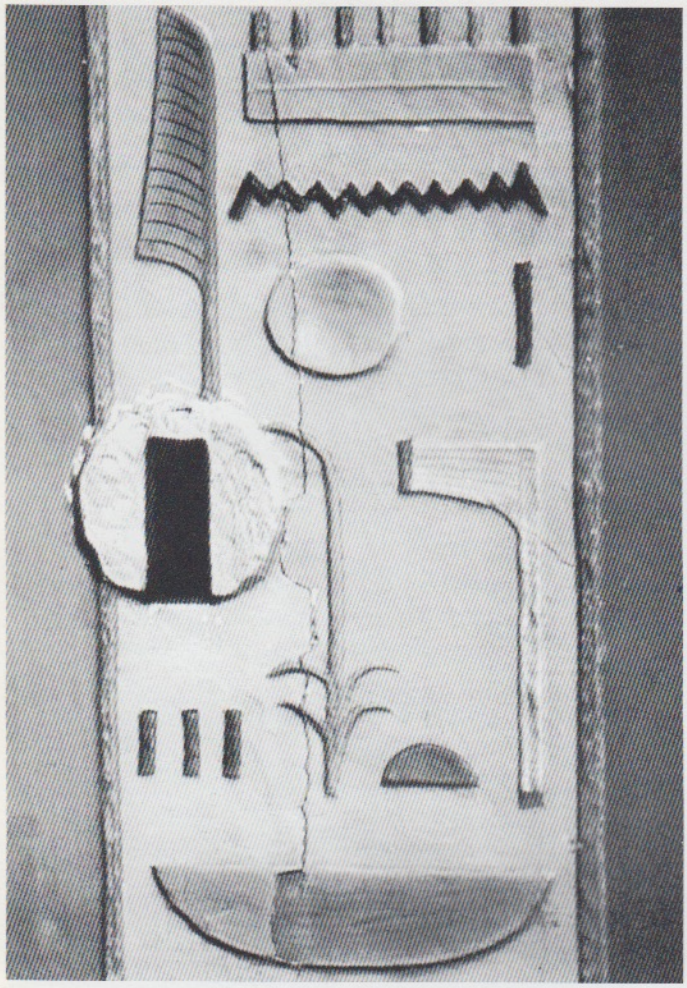
Already in the fourth millennium B.C. the vast area that stretches from the Eastern Mediterranean all the way to the Indus valley had developed complex control systems by means of clay sealings, that were meant to witness, guarantee, and record administrative operations. The clay placed on the covers of containers, on thresholds and doorways of warehouses where ancient officials impressed their seal, already functioned as the site of an early symbolic abstraction of the relationship between man and objects, between the operator and his operations — the first console, as it were.

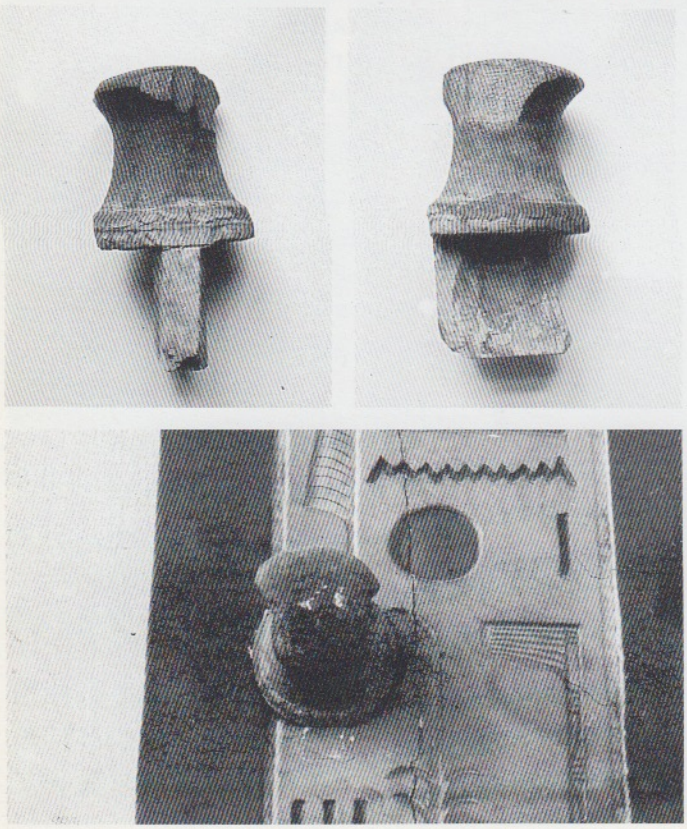
Accounting certainly does not date from the invention of calculators, nor does it originate with the silent and watchful ranks of accountants generated by the first Industrial Revolution. Already in ancient times, economic systems had created administrative procedures that were so advanced as to require complex elements to which a graphic and durable representation of the accounting operations could be entrusted.

Clay sealings, that is, clay nuclei with impressed seals and part of the object itself were discovered in 1955 in Phaestos on the island of Crete. It was then established that the clay sealings belonged to the warehouses of the first palace, dating from the mid-Minoan age, which were well preserved, and it was relatively easy to discover (by means of the shape left on the back of the clay sealing, which had retained a negative impression of the object upon which it had been placed) that the clay sealings had been used to seal handles, door latches, bolts, and recipients... all in all no more than sixteen different objects. On the front of the clay sealings were impressed an enormous variety of seals, spanning a range of more than three hundred different designs. There were therefore a limited number of objects to be sealed, and a great quantity of information to be imparted through the seal, and there were

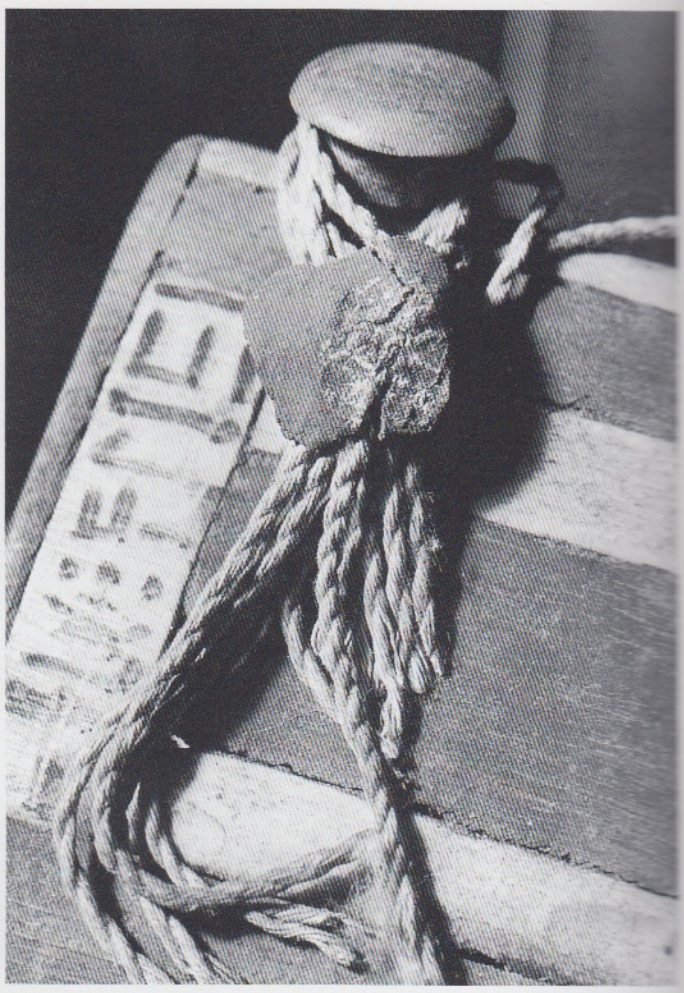
1. See P. Ferioli and E. Fiandra, "Proposal for a Multistage Approach to Research on Clay Sealings in Protohistorical Administrative Procedures," in *South Asian Archaeology 1981*, ed. Allighin (Cambridge: 1983); E.Fiandra, "L'archeologia dei sistemi economici," in *Le Scienze* 169, September 1982.

On the twisted cord wrapped around the handle was set the clay sealing with the seal impressed upon it (Egyptian Museum, Turin). At bottom, an example of a modern use of a seal impressed on plastilene (Archeological Museum, Adana, Turkey).

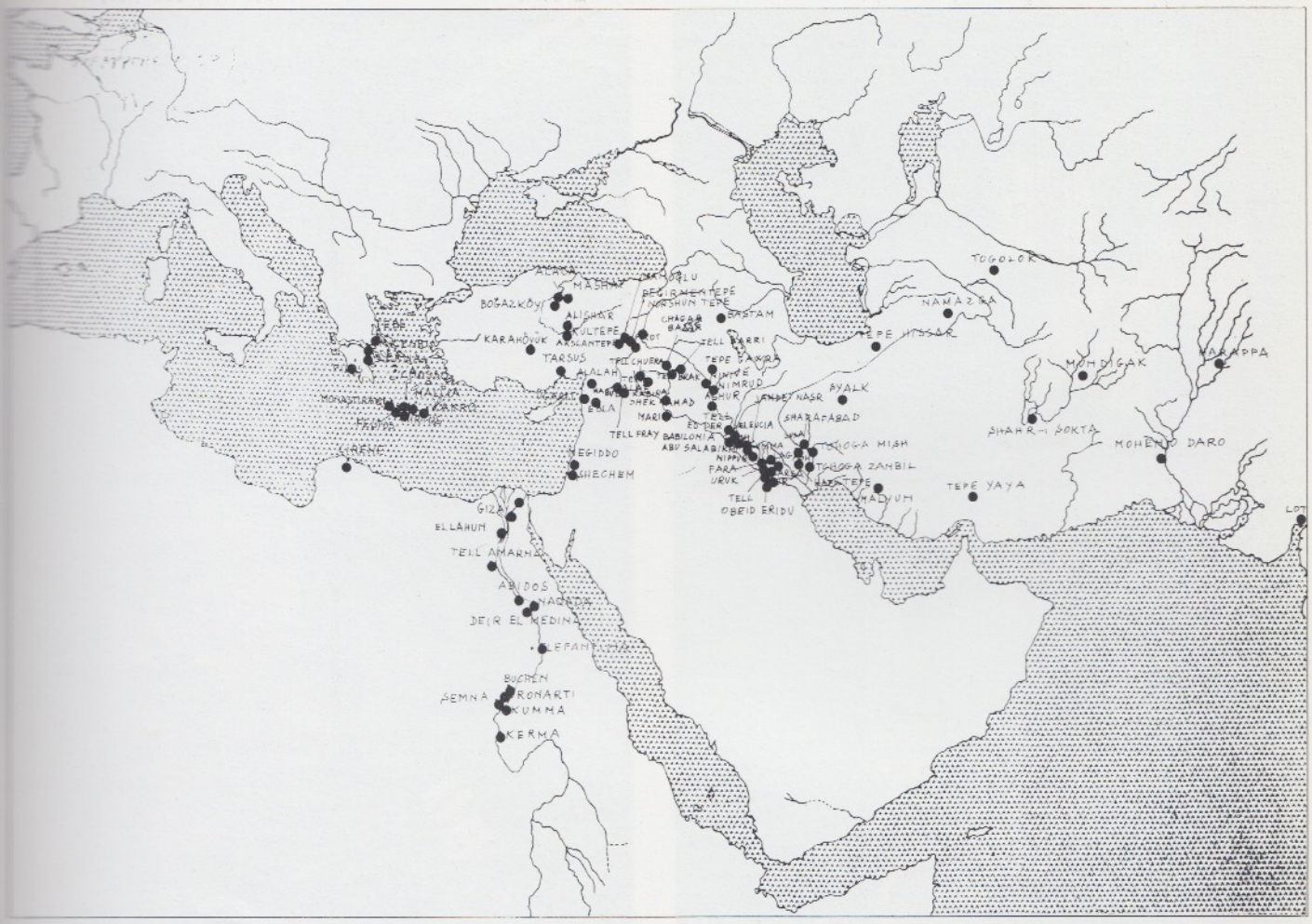




Detail of the frame of a door in the temple of Deir el Medina, showing the housing of the wooden handle.
Below, two wooden handles taken from the frame and, at bottom, the handle in place.



The map shows the sites where digs have uncovered clay sealings with a seal imprint, used in administrative functions.
In reality the sites of clay sealing use should be distributed uniformly across the East, and continuing research ought to show this. Up till now, no sites have yielded clay sealings in the West. The Balkan region, however, has yielded seals whose existence presupposes a use in administrative procedures.

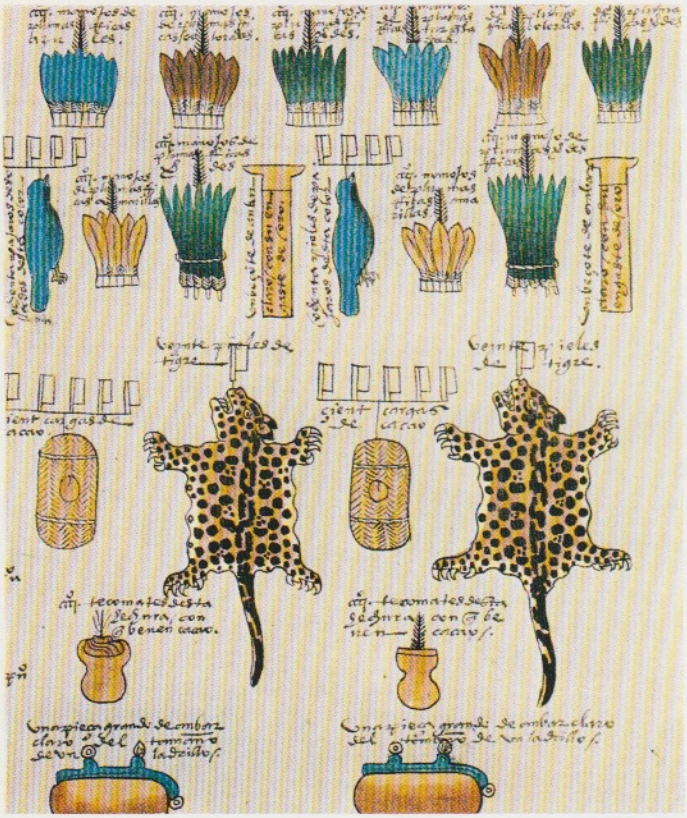


numerous closing and impressing operations, followed by the removal of the clay sealing, the inserton of a new clay nucleus, and so on. Enrica Fiandra, at that time an architect at the Scuola Archeologica Italiana in Athens, lost no time in setting forth her interpretative hypothesis — the clay sealings were used to seal the cords that ensured the closure of doors of warehouses, urns, recipients, strongboxes; the seal indicated the identity of the person who had taken it upon himself to open (and thereafter close), an operation which took place frequently, perhaps several times a day; the clay sealings that had been removed were then stored. Therefore the seal was not merely a method of ensuring against misdeeds — it was also a cipher in a complex system of administrative procedures regarding the management of merchandise, the loading and unloading of warehouses. We know that this was a common system, not limited to the island of Crete, as demostrated by analogous discoveries made at Karahoyuk and Bogazkoy in Turkey, at Ur, Lagash, Kish, and Fara in Iraq, at Haft Tepe, Shahr-i Sokhta, and Susa in Iran, at Lerna in the Peloponnesus, at Mundigak in Afghanistan, at Lothal in India, at Uronarti in Nubia, at Togolok in the Karakum Desert in the U.S.S.R.

The architecture of the great palaces of the Mediterranean and of the East offers the most faithful reflection of the palace's economic system; indeed the plan of the palace is an exact description of the economic system, in its perfect correspondence between the architectural and spatial model and the productive and organizational model of society. Today we discover surprising similarities between the plans of great palaces (in Crete, Mari, Hattusa, Ugarit) which then prove to be quite different one from another, but only in terms of the material employed in their construction, chosen from among the materials available in each location.

In these centralized societies, palace administration constituted the hub of social and economic organization and managed all the complex movements of goods — the opening of the warehouse for deposits or withdrawals, the distribution of goods to the officials responsible for the "payroll" of the workers, the closure of the warehouse. Each action became public, social, through the placement of the seal upon a new clay sealing and through the

Writing and drawing double the information content in this Aztec list. The drawing of each object is repeated according to the number expressed in the list. The effect obtained is at once informative and decorative.

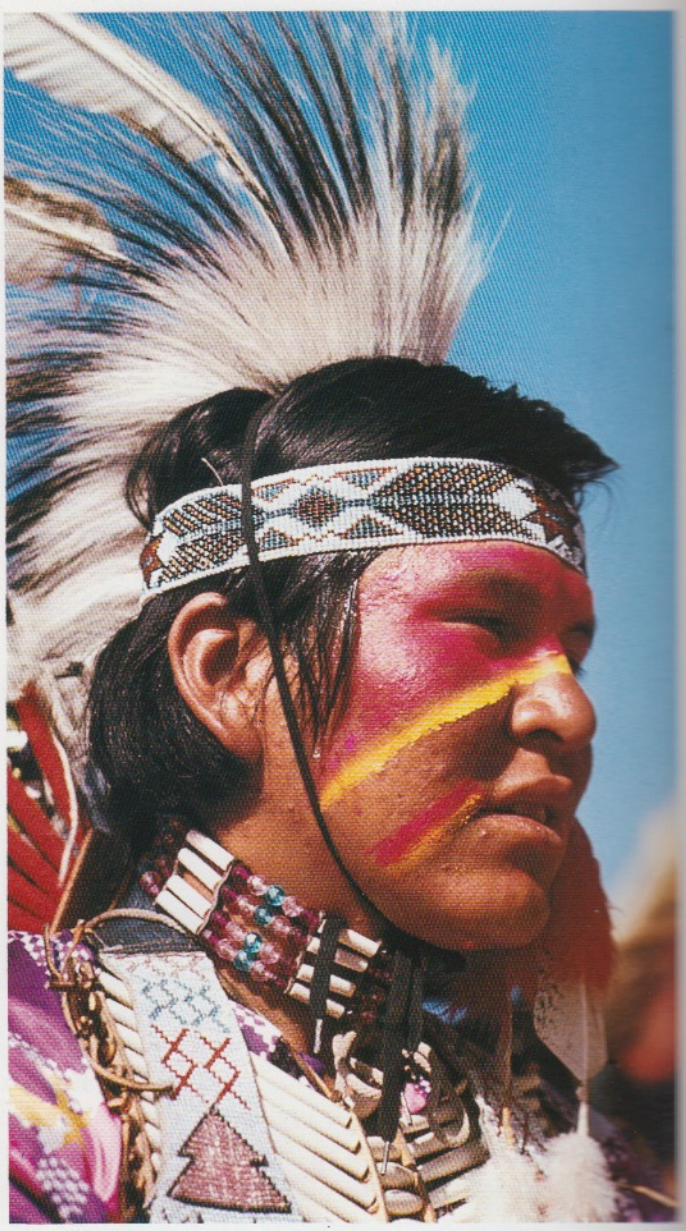


corresponding registration of the operation upon a tablet and upon its holder; the tablet, holder, and the old, detached clay sealing were all placed in an archive, which was periodically checked and inventoried in order to ensure that the tablets and the clay sealings corresponded. The media and the signs impressed upon those media constituted an extremely ancient system of symbolization that, while ensuring the economic equilibrium of the social organization, established a complex relationship between men and objects. The clay sealings bearing impressed designs and the tablets with the legends *subati* ("received") and *kisib* ("seal"), are abstractions of organized movements, filters of complex human operations which can be manipulated and checked.

In Incan Peru something analogous took place — mathematical calculations and perhaps narrations of events were entrusted to the *quipu*, a sophisticated system of communications made of knots and interwoven cords, whose meaning was given by the path followed among the various knots.

"Many centuries later, before Cortez decided to destroy anything that was not Castillian," writes Miranda, "the Aztecs were compiling lists of goods and offerings by drawing the objects and repeating the drawing as many times as there were objects to list: six jaguar pelts, twelve feathered blankets, thirteen vases for beer, two obsidian knives..."[2]

The talking body. Alongside alphabetic language and writing, men have developed other codes of communication in which the body itself "speaks" through signs and colors. Thus the Indian in the image below is dressed for war, while the character on the right is prepared to dance.



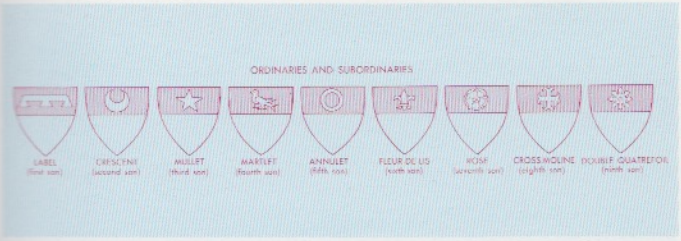
In search of signs

Enrica Fiandra's archeological discoveries left a deep impression on the imaginations of King and Miranda. Their research went on in search of signs capable of great synthesis, rich in an evocative content that has been deposited like sediment over long seasons, distilled through the thousand metamorphoses possible for a graphic symbol.

The search for these signs had been a constant occupation for King and Miranda even before being asked to create new keyboards for Olivetti, but now it became a central concern, because if design is always communication, in this case it had become even more specific, "interface design," the design of the very possibility of communication between men and machines.

The symbolic relationship between men and their

Ancient heraldic symbols may be read as an example of communication in which given designs offer information about the origins, history, and characteristics of a family or a personage, in a form that has been slightly transfigured in the evocative context of a code that can generate emotion and sentiment.
An illuminated capital letter (below) by Cristoforo de Predis for the Borromeo Book of Hours (now in the Biblioteca Ambrosiana, SP 42, Milan). The code of writing overflows into the code of illustration, the letters of the alphabet intertwine with visual communication.

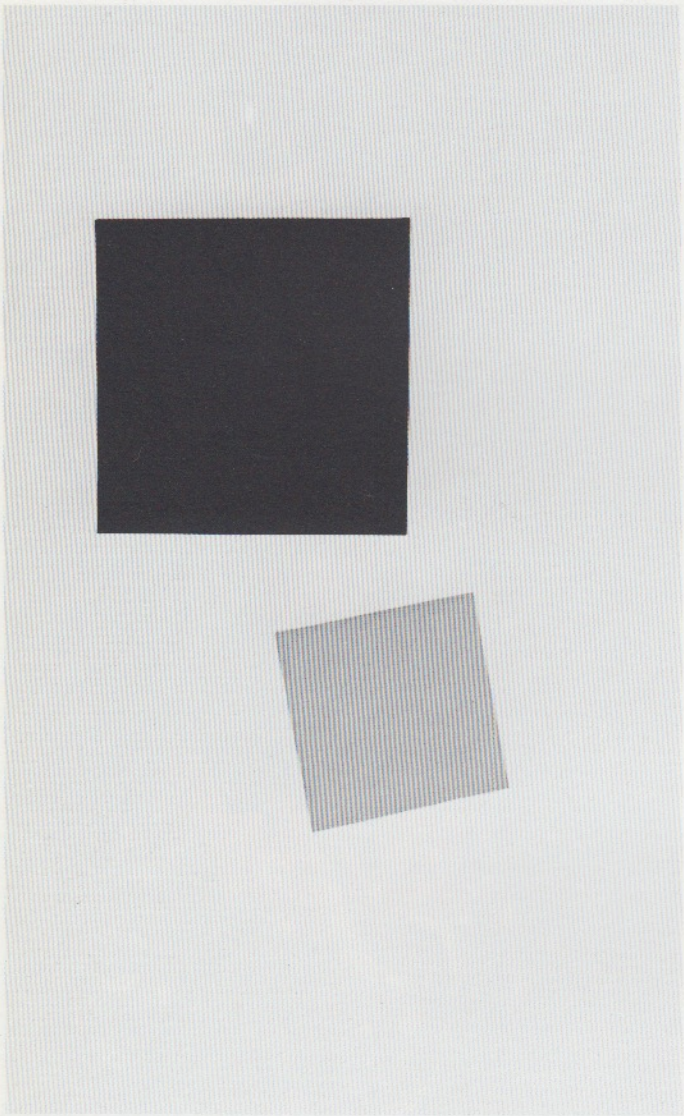


objects has always been rational, but also evocative; there is always a *surplus* of meaning that enriches the arid message that is to be communicated.
"Beginning with this observation, we set off to understand the nexus that existed between signs and the procedures of communication." In order to attain that result King and Miranda, without the slightest scientific pretence, launched enthusiastically into the broad sea of evocations provided by signs — a disorderly but extremely fruitful plundering raid through history.
Heraldry, for instance, is nothing if not the study of the way in which for centuries messages and images were communicated and preserved for their own sake, through symbols (crosses, stars, the Sun, the Moon, rings...) or powerfully emblematic creatures and plants (lions, eagles, doves, roses, lilies...).

What comes down to us is merely a faded recollection of a distant past, and yet just a glimpse of the insignia embroidered on banners or painted on shields was sufficient to impose models of behavior or evoke enthusiasm or terror. Modern trademarks, basically, do nothing but follow the example, with a feebler emotional content, of that long-lost model. What secrets are tucked away in the indelible inks that are used to tattoo skin, in order to produce a "talking body?" It is the same body that men have painted for centuries — in preparation for the adventure of war or to evoke the magic of theater.
Communication has rules that are more complex than those of the simple transmission of data. Otherwise what would be the reason for enriching a page of an illuminated manuscript with "braiding,

2. S. Miranda, "Storia di un progetto," in *Domus* 638, April 1983.

Kasimir Malevič, "Suprematist Composition: Red Square and Black Square", oil on canvas, 1914 or 1915, Museum of Modern Art, New York. Abstract painting tried to pursue the "inexpressible" which language pursues with words.



scrolls, and the maws of monsters," destined to become a message where "like a flash of light from a Byzantine mosaic or a German enamel, a certain shade of color takes flame or a surface is quartered in heraldic tints?"[3] After perusing the pages of the Codex of Beatus Warmundus, Bishop of Ivrea, painted between 969 and 1002 and preserved in the bishop's curia of that city, Franco Fortini wrote: "That awareness of the formal value of the stroke of a pen or pencil, which accompanies the act of writing in the Arab world and in the Far East has disappeared from most of our culture with the advent of printing. Modern art must rediscover the act of writing, the taste for emblems, the elementary values associated with logical and geometric procedures of script, a sense of its course and logic, in order to help a growing portion of the public to learn how to look for and appreciate the quality of writing — be it manual or mechanical — and sense its weight and importance."[4]

The decoration of tombstones usually communicate information on the deceased (name, date of birth, and date of death). But beyond this level of communication, tombstones evoke an emotional aura that allow them to operate as "filters" between man and death.

Beyond the word

Modern art has done even more. It has tended to express in *icons* the Word that has always been sought by philosophers, the Inexpressible against which the waves of the unending adventure of language broke and broke again, unable to name the absolute otherness, incapable of uttering Silence without breaking it. In this tension lies the key to the reflections on art of Pavel Florensky, who described iconic space by using the image of the magnet: "Through the window of the icon a vortex is created that abstracts every thing into invisibility. The ikon 'imagines' this instant — 'imagines' the very power of the magnet, in the purity of its principle: lines, forces, energies that derive from it and that it unleashes."[5]

From this vortex abstract art is born. The roots of the concept of "composition" used by Vasily Kandinsky sink deep into the tradition of thought on icons. "The *Blue Rider* takes flights, transfigured into line-sign-color, through the window of the icon, 'abstracted' by the invisible magnet that it carries within it beyond any perceivable image of itself."[6]

In a different direction, Malevich offered his *Black Square* as a supreme victory of light in a black hole, a "formidable *implosion*" that "sucks all sensation through the window of the icon and it condenses it in the invisible point where every direction, every meaning, every dimension are simultaneously possible."[7]

Abstraction is a decision of order within a universe conceived as infinite layers of pure possibility — this is how Mondrian constructed his paintings, black perpendiculars and rectangles in primary colors that combine like a mathematical rhythm above and beyond naturalness and the everyday world, perfect Crosses or Trees or Labyrinths that are displayed as Signs-of-Nothing.[8] And if Klee, at the far extreme, rejected abstract art because he

Alphabetic inscriptions add information or attempt to alter the meaning of architectural monuments with powerful semantic impact. So, on the Arch of Titus, we find two inscriptions from different periods — on one side a classical Roman inscription, and on the other a papal inscription.

saw in it the danger of falling into a new formalism built on the academic imitation of scientific exactitude, in reality he simply took essentially the same path as Malevich — his colors, his signs, sail off in search of "the prehistory of the visible," in an attempt to land — beyond naturalism and even beyond the abstract — the "root of things."[9]

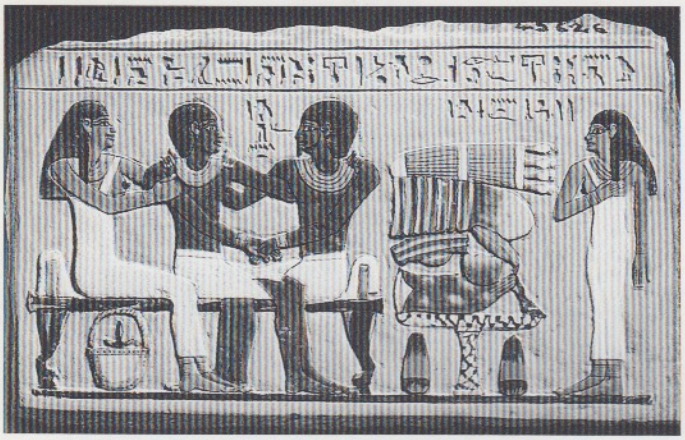
Algorithms and hermeneutics

The writing of the ancient Egyptians combined phonograms with ideograms, and hieroglyphics were also used for their decorative power. The name of the pharaoh Ramses III (1198-1166 B.C.) became an integral part of the frieze of the temple in Medinet Habu, and the names of Queen Hatshepsut (1503-1482 B.C.) were written in an illogical order with respect to the way in which they are read, purely for esthetic purposes.

There are numerous examples of signs proposed by King and Miranda being used, not to facilitate the reading of their message, but to amplify the volume of their meaning, and there is no end to the cases of communication systems being linked by man to objects of everyday use or background objects — from the inscriptions carved into Roman arches all the way down to the oft-cited metropolitan graffiti; tomb inscriptions are filters between man and death, just as the subversive shrubbery created in the final scene by the main character in Karel Reisz' *Morgan, Fit to Be Tied* was intended as a filter between man and life.

3. F. Fortini, "A Ivrea caratteri di mille anni fa," in *Notizie Olivetti* 86, May 1966.
4. Ibid.
5. M. Cacciari, *Icone della legge* (Milan: Adelphi, 1985, p. 193).
6. Ibid., p. 194.
7. Ibid., p. 208.
8. See ibid., pp. 232-59.
9. See ibid., pp. 283-98. On the authors cited by Cacciari, see P. Florenskij, *La colonna e il fondamento della verità*, ed. P. Modesto ed E. Zolla (Milan: Rusconi, 1974), and *Le porte regali*, ed. E. Zolla (Milan: Adelphi, 1977); V. Kandinsky, *Tutti gli scritti*, ed. Ph. Sers (Milan: Feltrinelli, 1973-74); K.S. Malevic, *Scritti*, ed. A.B. Nakov (Milan: Feltrinelli, 1977); P. Mondrian, *Tutti gli scritti*, ed. H. Holtzmann (Milan: Feltrinelli, 1975); P. Klee, *Teoria della forma e della figurazione* (Milan: Feltrinelli, 1959).

Egyptian writing and painting of the middle empire communicated through the order and symmetry of the figures, and through several codified conventions. Thus the living (the wife and son) gaze from left to right, while the dead (Amenemhet) from right to left. Stele of Amenemhet, ca. 2000 B.C. (Cairo Museum).



Urban graffiti in the New York subway. They are a spontaneous, anonymous, wildcat expression in which communication takes possession of public spaces and becomes a message.

An extremely powerful and everyday filter is the clock, the first "machine" made available to all, from high atop a tower, ready to "interface" man and time. Clocks tore man away from lived-time marked by natural rhythms and by the duties of seasonal social labor, and delivered him into the power of measured-time, objective and abstract: the work-time of urban merchants, the interest-time of the money lender, the factory-time of industry. First the bells of the city clocktower, later the mill siren, erased cyclical time that moved to the rhythm of the seasonal return of a certain kind of game, the ripening of a plant, the dependable rising of the sun and the gradual cycles of the moon and of women's menstruation. Cyclical time was a great exorcism of death — the moon that returns is the first dead man returning, repetition is the life of the world, history is nothing but the reiteration of a single original event; time is Kronos, the great primordial judge who, with his long curved scythe, cuts away the testicles of his father, Uranus — the Heavens.

After the arrival of the clock all of that became a memory and a myth. Time became linear, homogeneous, empty, irreversible, cumulative, eschatological, oriented towards a goal. Even modern mechanical thought prefers rectilinear motion to circular motion. Clocks mark the separation between work time (the value-time of production) and free time, but today even the *physicality* of the chimes of the clocktower is obscured by the *digital* information-time, the absolute acceleration of the discontinuity in the contemporaneity of computer time.[10]

Olivetti's first large computer (built in 1959) was called Elea, after the colony in Magna Graecia where, in the fifth century B.C. the school of philosophy of Parmenides and Zeno was born. *Elea Computer* — the name itself is like saying mathematical rationality *and* philosophical discourse, algorithm *and* hermeneutics.

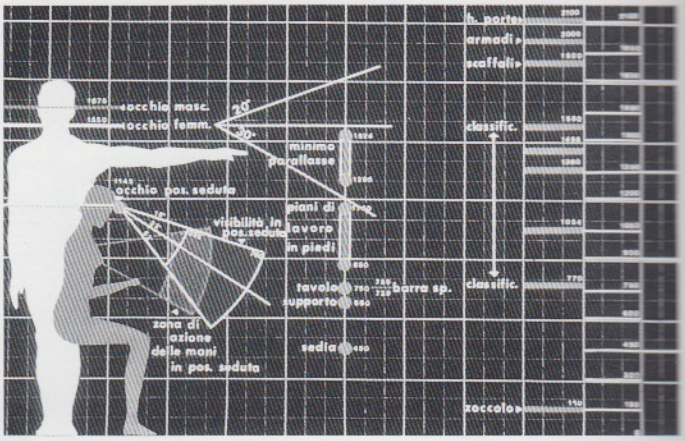
It is this impossible synthesis that communicative signs seek to attain — extreme formalization of the message and infinite production of meaning. According to the same divarication, Western history is crossed by two parallel and antagonistic trends. The first is a continual pursuit of formal definition: it constructs technical and scientific knowledge by organizing systems of neutral, instrumental, unequivocal signs. The use of the alphabet, begun in Greece in the eighth century B.C. pushed aside oral tradition and the significance of speech to entrust knowledge to writing, and to a form of writing that was to become pure reference, a neutral sign, an instrumental system of signs that file past as mere containers of communication. The Galileian revolution called for a special scientific language, different and separate from common language — mathematics, a system of signs that seem impossible to misunderstand. Today we have attained the absolute unequivocality of binary language, the rationality of computers that operate on signs that proceed only according to a yes-or-no alternative — algorithmic communication has reached the far edge of formalization, and communication has been reduced to an algorithm; we have attained the peak informative power ever made available to man; the knowledge of the West has become effective and definite with respect to its objects. The second trend is interwoven with other values, fed by art, silence, madness.

Are we, perhaps, here *just for saying: House, Bridge, Fountain, Gate, Jug, Olive Tree, Window, possibly: Pillar, Tower?... but for saying, remember, oh, for* such *saying as never the things themselves hoped so intensely to be.*

10. See G. Agamben, "Tempo e storia," in *Infanzia e storia* (Turin: Einaudi, 1978); M. Eliade, *Immagini e simboli* (Milan: Jaca Book, 1981); J. Le Goff, *Tempo della chiesa e tempo del mercante* (Turin: Einaudi, 1977); the entries "Ritmo," by G. Baratta, and "Reversibile/irreversibile," by F. Guerra, in *Enciclopedia* (Turin: Einaudi, 1980). See also the articles by M. Jacquemet and A. Mangano in *Alfabeta* 35, April 1982.

The Clocktower in St. Mark's Square in Venice. With public display of clocks on city towers, the first "machines" made available to the populace at large, the relationship of men with time began to change. "Cyclical," lunar, and seasonal time was replaced by an image of linear, progressive, and cumulative time.

Beginning with anthropometric studies of standing and seated men and women, ergonomics determines the standard sizes and shapes of chairs, work surfaces, cabinets, files, shelves, and doors.



With these words Rainer Maria Rilke[11] confirmed that a language exists that can state the meaning of things, that meaning which the things themselves lack. It is the open and inexhaustible language of hermeneutics, which proceeds in its interminable labor, constructing correspondences between signs and meanings, operating where the symptoms first appeared of the impasse that has characterized the culture of this century — in the relationship between the name and the object.

The conflict between algorithm and hermeneutics, between the power of formalization and the richness of the production of meaning is the rhythm of Western history, and there can be no pacification or simplification — we live within this conflict.

The computer, as Renzo Zorzi points out, by gathering and processing quantitative data with respect to a single function is capable of "proposing the single solution or the finite range of compatible solutions that its form directly dictates." And he immediately adds: "Directly? Of course, not directly, for otherwise man would still be at his beginnings, he would not have learned to stand upright, nor to speak, write, or make tools, leave the earth, or give names to death that make it symbolic and tolerable. This, I believe, is the heart of the matter, the reason why a civilization of pure numeric reasoning — of simple series of yes-and-no multiplied by the infinite speed of machinery — is not conceivable."[12]

Designing communication signs must also mean bridging the gap between algorithm and hermeneutics. Within this conflict, even design (and especially the design of the privileged point of exchange between man and technology which is interface) is a meeting ground between two levels of communication, the necessary power of formalization and the infinite evocativity of the sign.

Reflections

Along with the other suggestions that fed the research done by King and Miranda, there was a series of reflections, which first attempted to define the contributions offered and the limitations set by ergonomics, as well as, in more general terms, tracing the outlines of the office of the future.

Ergonomics presents certain inescapable limitations for the designer, which he cannot ignore in his work, first of all represented by the necessity of having the products conform to the specifications established by the various standards (the German DIN and GS, the American ANSI, the Italian UNI, the international ISO...) Olivetti, however, also abides by its own internal standards — as well as by the indications of the national and international institutes of standards — which have been developed during Olivetti's independent and specific experience in the field of ergonomics, developed organically beginning in 1968, the year in which the Ergonomics Office in Ivrea first began operation, availing itself of prestigious outside consultants.

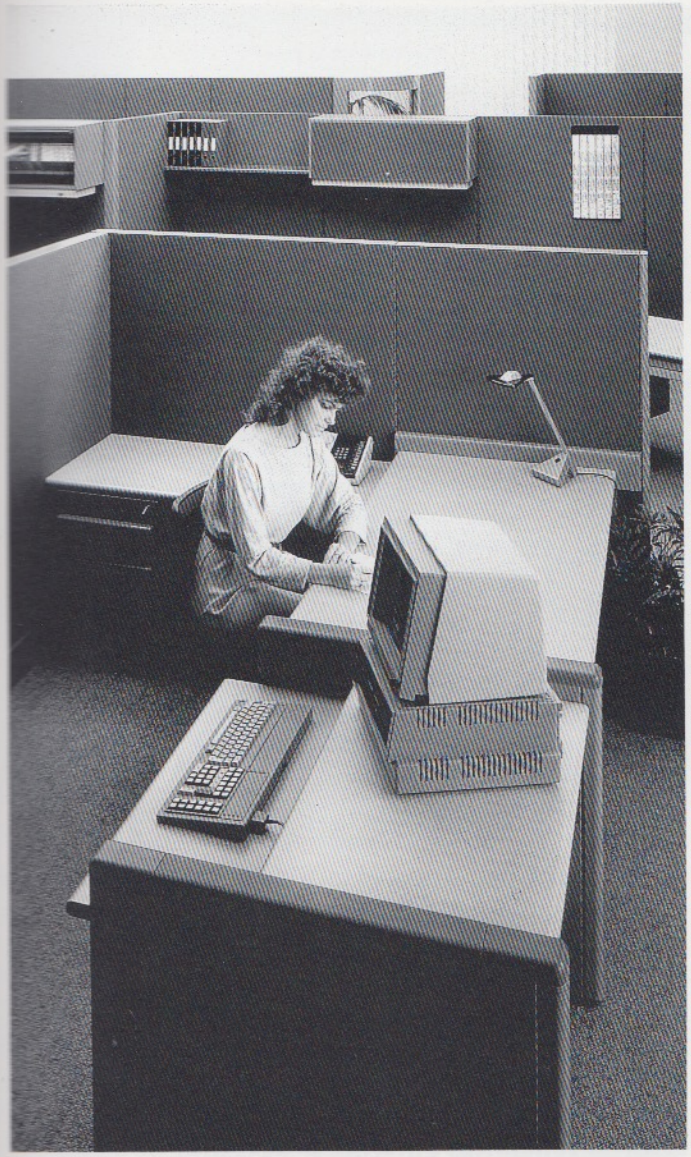
Classic ergonomics

Of the three chief traditional elements in man/machine interface (the alphanumerical keyboard, the control console, the video screen), the first is certainly the one for which the greatest amount of experience has been accumulated, at Olivetti just as elsewhere. Taking into account the standards and regulations on one hand, and developing an ongoing program of direct experimentation on the other (in laboratories and in the field), Olivetti's ergonomics experts have established a quite extensive series of ergonomics rules for office environments that constitute a set of limitations.

The form is limited to some extent (for example, the corners of the machine must be rounded according to a radius whose minimum values are expressed by the standards), as is the color (maximum and minimum levels of surface reflectivity are established), and the finish (for example, reflectivity must fall below given values, and so shiny surfaces are not acceptable).

Furthermore, it is preferred that the keyboards be slim, the "H" key some three centimeters away from the work surface, and with an inclination of not less than five and not more than fifteen degrees with respect to the work surface. It is also preferable that the keyboard have a "sculptured," that is, concave, surface. It is also preferred that the cap of the key be concave, and that its vertical stroke be

An Olivetti work station with a computer and Synthesis Icarus furnishings. The relationships between the operator, the machines, and the surroundings are physical — but also psychic and emotional — relationships.



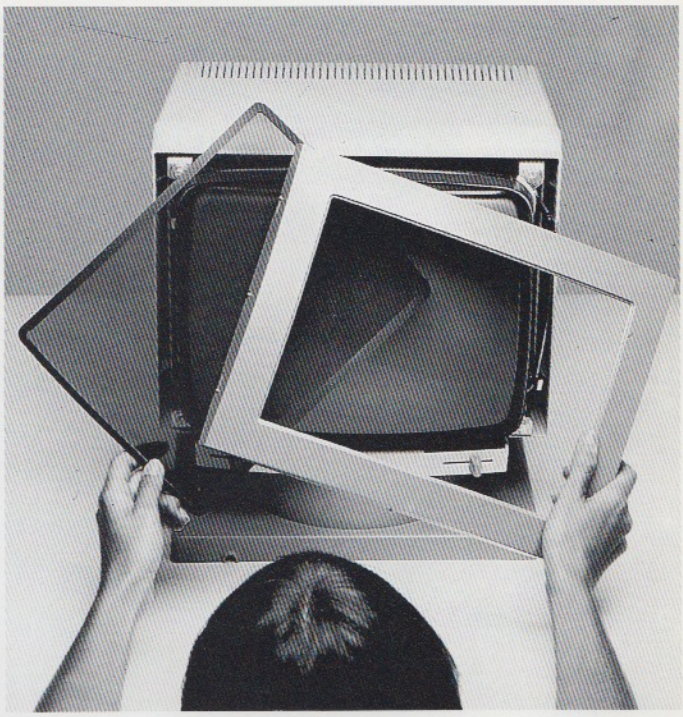
1-5 millimeters, and that the striking force required be between 60 and 80 grams. It is also important that the keyboard provide adequate tactile and acoustic feedback.

Careful laboratory comparison testing is employed to evaluate the keyboards with two criteria: the average typing speed which they allow, and the average number of errors (especially omissions or repetitions of a letter) which they provoke. Tests have by now certified the characteristics and the quantitative values that a keyboard must meet in order to provide good typing speed, a limited number of errors, and acceptable operator comfort.

The introduction into office work of the new element in man/machine interface, the video terminal (VDU) has opened a wide-ranging debate on ergonomics and safety which has, correctly, involved not only the specialists.

The number of video terminals in use is rapidly

The video terminal has proved to be the most important presence in the new forms of office work. Ergonomic studies have sought new ways of reducing eyestrain and its consquences; various types of filters for the video screen have been tested.



growing, and it should be expected to continue to grow in the next few years, with the diffusion of information processing in private industry and in public administration. It is above all in office work, therefore, that the greatest changes are taking place. "At a traditional desk," the ergonomist Etienne Grandjean wrote, "an employee can carry out a great number of physical activities and can assume various positions and perform numerous movements : he can search for documents, take notes, use the telephone, read texts, exchange information with his colleagues, type, and carry out all those jobs that fill his workday. A desk that is too high or too low or in some other way ergonomically inappropriate will not necessarily cause great discomfort or any physical problems. The situation however is completely different for an operator who works for hours at a time — sometimes the whole day — in front of a video terminal. In this case he is an element in a man/machine system; he has extremely limited possibilities of movement; the link between the machine and the operator is much closer. His gaze is always directed at the screen and his hands are always on the keys."[13]

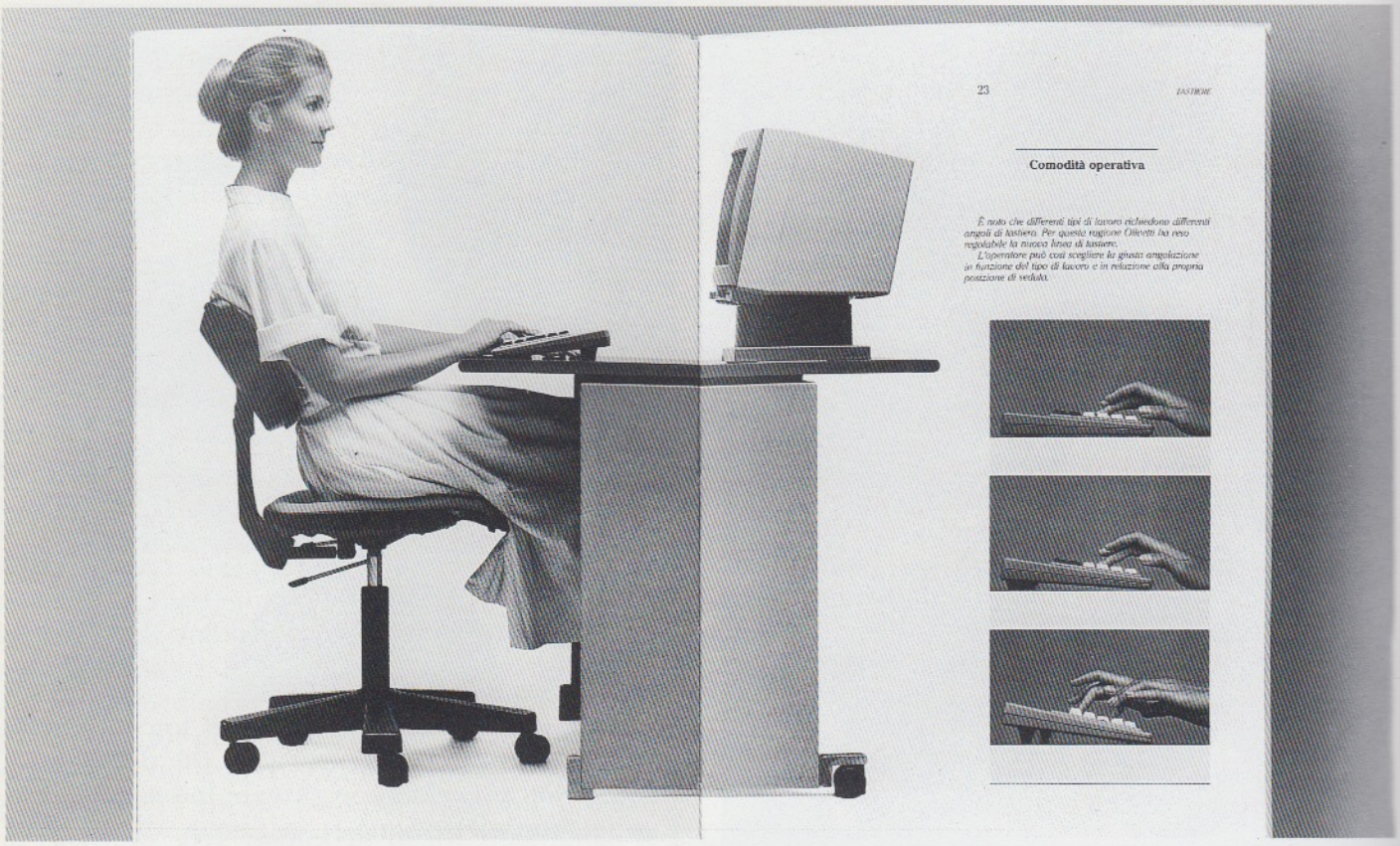
The consequences for the operators are, chiefly,

11. R.M. Rilke, *Duino Elegies*, tr. by I.B. Leishman and Stephen Spender (New York: W.W. Norton, 1963), elegy 9, p. 75.

12. R. Zorzi, "Il nuovo paesaggio industriale nella rivoluzione informatica," talk delivered at the symposium "L'oggetto abitato. L'industrial design nella prospettiva degli anni '80," held by the Centro Studi e Ricerche Busnelli, (Milan, Museo Nazionale della Scienza e della Tecnica, 12 May 1983); now in *Caleidoscopio* 29.

13. E. Grandjean, "L'ergonomia nell'ufficio: oggi e domani," in *Album* 2 (Milan: Electa, 1983).

A double page from the volume "Ergonomics at Olivetti", edited by Bruno Scagliola in 1981.
The strain of working with a video terminal can vary according to such factors as the position of the seat, the height of the work surface, the size and quality of the keyboards, the ambient lighting as well as the size and quality of the screen itself. Ergonomic research attempt to improve the relationship between the operator and his tools.



the absorption of VDU radiations, tired eyes, and psycho-physical stress. Grandjean records the results of studies conducted in many countries on video terminal work conditions — approximately one third of the operators who spend many hours a day at a video terminal complain of physical tension in the area of the neck, the shoulders, and the arms; a similar percentage complain of burning sensations in the eyes.[14]

What are the causes? Not only the quality of the VDU and the size and configuration of the equipment (keyboard, screen, disk units, etc.), but also the characteristics of the surrounding environment, above all the incorrect lighting of the workplace, second of all, the incorrect size and shape of the furniture (chairs and work surfaces). The ergonomic research aimed at reducing eye fatigue in VDU operators led to the introduction of anti-glare filters to be placed in front of the screen, or to special treatments of the screen itself.

Olivetti has done ergonomic studies in this field as well, beginning in the mid-1970s, when the Ivrea-based company introduced its first generation of VDUs on the market. Since then there have been numerous significant results which impose limitations on the designer.

Comparative testing developed by Olivetti's ergonomics office, directed by Anna Maria Paci, have quantified the performance attainable with the various solutions tested — the luminous screen, the micromesh filter, colored plastic filters, the treated screen (etching treatment). The last-mentioned has proved the best in terms of anti-glare results, while the micromesh and colored plastic screens both allowed pretty similar performances, but still better than those obtained just with a reflective untreated screen.[15]

Among the results that ergonomic studies offer designers, there is, for example, the separation of the keyboard from the rest of the equipment (monitor, disc unit, etc.) which makes the machine more flexible and easier to maneuver, easier to move around and adaptable to the operator's needs.

But it is the entire office panorama that has been radically modified by the massive introduction of electronics, and so the office's material coordinates change as well. For example: typing tables are replaced by the new work stations for VDU operators, which are different in terms of typology and size. The interior wiring of the furniture — which carries energy and links each operator to the overall flow of data and information — becomes extremely important; alongside the traditional office typing chair we see new typologies such as the advanced task chair for advanced worked stations in contact with video information technology.

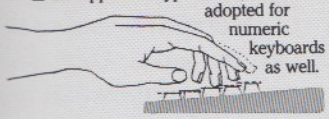
A page from the volume "Ergonomics at Olivetti", devoted to the shape of the keyboards. A great deal of comparative testing and decades of experience have made it possible to canonize the cirteria and standards necessary to create an alphanumeric keyboard that is easy to use, fast, and relatively error-free.
The ergonomics of relations is a complex of relationships — not merely physical and dimensional, but also psychic and emotional — between man and his environment.

Shape of the keyboard

The shape of the keyboard depends on the conformation of the keys and can be any of the following: sloped, stepped, dished or sculptured.

The sloped keyboard, which first appeared on calculators, was originally used for both numeric and function keys. Typing tests have proved that this conformation is more suitable for the functional part of a keyboard, especially when this is of a specialized nature.

The stepped keyboard, which was first applied to typewriters, was later adopted for numeric keyboards as well.

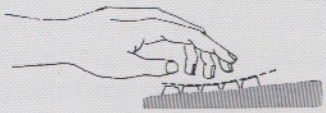


The dished or sculptured keyboard, a recent development, was designed to suit the movement of the fingers better and it has proved particularly useful on alphabetic keyboards.

The surface of the keys on each row is at different angles because the fingers touch each row at a different angle.

In this way the movements of the hand and fingers are facilitated in reaching each row of keys.

From the psychological point of view, the operator has a greater sense of confidence, which is translated into higher typing speeds especially with professional typists.



Inclination of keyboard surface

The optimum inclination of the keyboard surface is between 5 and 15°.

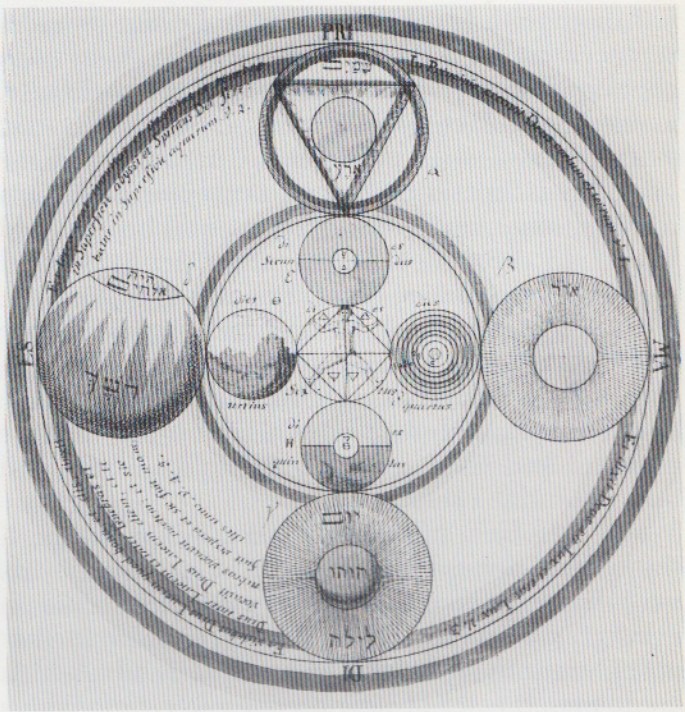
Slim, free-standing keyboards, at an angle of about 5°, permit the operator to rest his arms on the work surface, therefore preventing unnatural upward bending of the wrist.

"Relation ergonomics"

A simplistic view of ergonomics is therefore insufficient to fully resolve the new problems presented. The objective, anthropometric, quantitative criteria of traditional ergonomics are for the most part insufficient on their own to indicate the ideal characteristics of the new office environment. Anti-glare filters, for example, cannot be the only response to fatigued eyes. This problem can only be resolved by the overall consideration of the entire office environment, beginning with the lighting, which (for video terminal work) must be diffuse and not direct, and must be delivered with special characteristics of lighting technology. The office environment must be taken into consideration as an overall landscape for a correct ergonomic evaluation and response.

The greatest failure, however, of traditional ergonomic thought, which is for the most part accustomed to dealing with anthropometric relations between individual objects or individual parts of objects, is that it does not deal with the complexity involved, the awareness that the relationship between man and machine is no longer the Cartesian relationship between a subject and its objects ("res extensa" available to "res cogitans") but that it is now a relationship between systems of signs, management of information flow. This is just that

There is a new sort of man at the center of a network of relations, an individual rich in needs instead of an abstract methodic Cartesian subject. Thus we recover in a more mature form the tension that was present in alchemical tradition.
"Anthropos" with the four elements, from Georg von Welling's "Opus mago cabalisticum et theologicum" (Amsterdam: Bibliotheca Philosophica Hermetica, 1708).



much more true with respect to those objects capable of forms of interaction with their user by virtue of sensitive areas (=interface) which contain the possibilities of communication, processing, data management. Here the heavy qualities of objects — the subject matter of anthropometric science — give up the field to the soft "relation" qualities, fertile soil for the development of a new ergonomics that can take into account the physical aspects but also logical, functional, emotional, evocative, and symbolic aspects. There are relationships which cannot easily be measured and yet which are real — the contact of men and women with systems of information management (which is what work increasingly consists of), in order to be satisfying, must comply with given physical/anthropometric prerequisites, but it must also satisfy other requirements, which have to do with corporeal, visual, tactile, emotional, symbolic levels of communication.

Alongside anthropometric ergonomics, which establishes size parameters and formal standards with a view to optimal output, a new form of ergonomics is taking hold which we might call "relation ergonomics," a soft ergonomics which pays close attention to the quality of the perceptions of man and — overall — his living and work environment. We do not propose abolishing years of ergonomic research in the name of a (presumed) decline and

14. Ibid.
15. See A.M. Paci, "Contribution of Ergonomics to the Design of Antireflection Devices in the Development of VDU Workplace," in *Behaviour and Information Technology*, 1984, vol.34, pp. 381-85.

fall of the world of objects and a programmatic replacement of structural characteristics by perception characteristics (color, light, microclimate, acoustics, olofactory qualities ...); a chair — at least for now — is still a chair, or rather, in the office landscape, it becomes so complex as to turn into a sitting machine; and it must still be designed within the context of the limitations set by anthropometric ergonomics which ensure the persistence of the form-structure-function relationship. Aside from this however an object has its own expressivity, a value as a sign, its relations within the environment, with respect to other objects and the physical and corporeal characteristics of the real and potential users.

When the object in question is a console, that is, a pure signal-zone, a communicative structure by its very nature, then those aspects necessarily take on ever greater importance. But there is a further consideration, made by King and Miranda, which completes the set of new ergonomic relationships necessary to the evaluation of an advanced project such as the new Olivetti control keyboards; and it is reflection on "disseminated electronics."

The new user

"Electronics has been on the horizon of our world for many years now, but today," remarks Perry King, "we have crossed the threshold of a different relation with it." Indeed, electronics has emerged from specialized environments, inhabited only by specialists, and it has entered our daily life; it has ceased to be merely a specific response to given needs within the defined context of technology management and it has instead overlapped into ordinary existence, it has taken its place as a constant and decisive presence in our domestic, urban, social, productive, and communications landscapes. Electronics was, until yesterday, simply an appropriate form of technology used in particular and ultraspecialized productive segments; today it has already become something completely different, a presence that imposes itself, that cuts across every sector of production and reaches all the way to the area of day to day existence. It is used to manage large-scale production but — at the same time — it has entered our homes, it has become a tool in our workplace, a curiosity, a plaything. There is a great deal of mythology that has sprung up around the presence of the computer in our world, and there is much ideologically based exaggeration of its importance; part of the aura that was lost in the process of secularization of the world

Disseminated electronics begins to delineate a landscape in which technology is present in everyday life and where new "ingenuous" users inaugurate "wildcat," non-specialized uses of sophisticated technology.
In the film "Blade Runner", an extreme example: streetcorner consumption of electronics, amidst crowds and fast food.

— in the elimination of the gods from everyday life — has been transferred to electronic tools, the catalyzers of great fears and great hopes. Certainly both the fears and the hopes are exaggerated, but both play a very tangible role in the formation of Western imagination in the 1980s.

Western imagination constitutes a background to a very real landscape — that of "disseminated" electronics, typified by the figure of a new user. No longer are there only — or even mainly — specialized users, professional operators dressed in white labcoats, master of complex languages and experts in a limited segment of the production process. The development of electronic technologies and the configuration of the international market have today brought about the diffusion of electronic objects destined to ordinary, non-specialized users — and this is called *distributive* or *diffusional* innovation.[16] Calculators, typewriters, copiers, data and information processors and transmitters are all being used today (and will be more and more in the near future) not only by specific operators but by a great number of generic operators. The development of electronics, while enriching the internal operating processes of machinery, has also simplified communications procedures with the outside and with the user. Sophistication — which originally stood for the most part between the user and the machine — is progressively being withdrawn into the "interior" of the machine — thus the need for mastery of special codes and languages is gradually decreasing. As a result, a new user is emerging, "ingenuous" but demanding, who wants to use technology in a rapid and immediate fashion; electronic machinery is still a professional tool both in its use and in the results, but more and more it is in the hands of a non-specialized operator.

The relationship of man and automobile, to take an example from a mechanical, pre-electronic

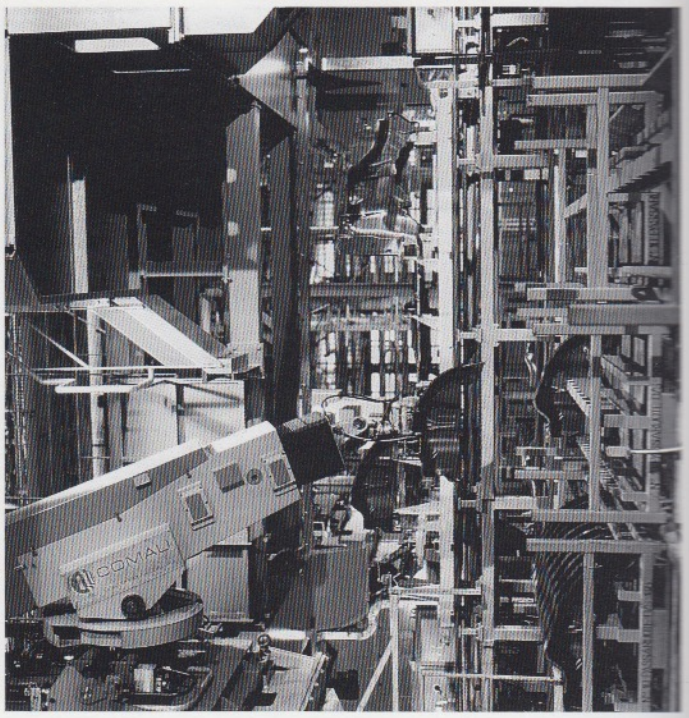
area, may serve to delineate the trends common to disseminated electronics. When one drives a car, one neither feels like a race driver nor is there any need for one to be an expert mechanic; it never enters a person's mind that he is using pistons, cylinders, a starter motor, a differential, power steering... The procedures for using a car have been simplified and separated from the complexity of the machine's internal operation.
Likewise, people that use personal computers nowadays need not wear lab coats, nor do they feel themselves to be professional operators — more often the user is a member of a profession who wishes to obtain certain results by making certain moves — as it were — on an electronic chessboard.
The dissemination of electronic technologies and the emergence of a new type of user — whom we have described briefly — will necessarily push the designer to alter his attitude with respect to the goals of his research. The parameters on which traditional ergonomics is based become less essential, although they remain important; the quantitative precision of the machine/user relationship becomes less well-defined and a sort of "wildcat" use of technological equipment becomes more common. In this context, the role of emotions and relationships become more important elements in the interplay between machine and user.

Standards and Taylorism

The concept of standards, upon which classic ergonomics is based, immediately calls to mind Taylorism — it was the introduction of "the scientific organization of labor" (which culminates in Taylorism) that imposed standardization (the definition of the one best way) as a necessary aspect of work; once functions had been separated, and the overall process had been split up into linear and sequential operative phases, all was ready for the incorporation of human labor into machinery — that is, for the attainment of Taylorism by Ford.
"Nature does not construct machinery, she does not construct locomotives, railways, electric telegraphs, automatic spinning mills, etc. These are all produced by human industry: natural materials, transformed into organs of human will over nature. They are organs of the human brain created by the human hand; objectified scientific capacities."[17]
Man is an animal capable of using tools, prosthetic devices that extend his inadequate hand; and he is capable of constructing his tools, and of canonizing the things that he does with those tools as "arts." An extreme prosthesis is constituted by the pen, which men use as the farthest reaching organ of their body.
Machines, on the other hand, having incorporated the old abilities of the artisan into the new forms of science, use man as an organ, a living accessory to the machine's extraneous, "objective" operations. Ergonomic standards appear at this point, within the context of Taylorism made flesh, as "objective" rules used to attain the optimal state of relations between man and his objects.
Behind this ergonomics we can catch a glimpse, upon the horizon, of the thought of Descartes and Galileo which, while establishing modern science, also established the non-essentiality of qualities (and of colors, odors...)
What is quantitative is powerful, and that is how the West establishes its structure as knowledge/power over the world; it is to this approach that we owe our history, and there is no desire of a different history that is other than impotent nostalgia. What has remained on the sidelines, or has flowed along like a subterranean river, is the unstable area of taste, art, poetry, and madness... Territories that cannot be crossed with the rules of the quantitative, rivers that however are always ready to surge to the surface, to allow us to listen to their terrible silences or their unpronounceable words.
Design culture as well has adopted the language of Descartes that divides space and concept ("res extensa" and "res cogitans") and then reunites them in qualitative evaluation and in judgment about structural characteristics.
Bypassing Taylorism was constantly one of the goals of Adriano Olivetti, who believed that the scientific organization of labor was an absolutely necessary achievement[18], but at the same time believed that the results brought about by standardization in terms of the workers' psychic state were negative, and that the worker was thus deprived of any awareness of the overall process in which he constituted no more than a segment. This search for a way for the company to overcome Taylorism is documented — not only in the writings of Adriano Olivetti — in texts published by Edizioni di Comunità which proposed solutions to the problem: from *La condizione operaia* by Simone Weil translated by Franco Fortini and published in 1952, to *Dove va*

16. See G. Martinotti, "L'informatica domestica," in Aa.Vv., *Tecnologie domani*
17. K. Marx, *Lineamenti fondamentali della critica dell'economia politica ("Grundrisse")*, "Frammento sulle macchine" (Florence: La Nuova Italia, 1978), pp. 402, 403.
18. *L'organizzazione scientifica del lavoro* by F.W. Taylor was published in Italy by Edizioni di Comunità in 1952, which followed with other books on corporate organization, from *Studio dei movimenti e dei tempi* by R.M. Barnes (1955) to *Il potere dei dirigenti* by P.F. Drucker, and *Fondamenti di alta direzione* by R.C. Davis (all in 1958).

Electronics has changed the way we work and produce. Automation, by transforming Taylorism, also transforms the very concept of standards, upon which classical ergonomics is based.
From left to right: the Robogate system at the Rivalta (Turin) Fiat factory, the Smart robot at the Comau factory (Turin), automated assembly lines at the Scarmagno (Turin) Olivetti factory.



il lavoro umano? by G. Friedmann, published in 1955. Friedmann sustains that, since "the encouragement of blind parcelled work implies, for society, that the worker must give up any form of satisfaction as a producer of goods," it is necessary to "accentuate the tie of interest between the worker and the company-collectivity and, beyond that, with industry and society."[19]

One of the points on which the reforming policy of Adriano Olivetti hinged was the idea of an unusual "social exchange" : the inevitable "process of enervation produced in the workers by Taylorism" in the production process had to be counterbalanced, on the institutional level, by an inverse process which would "operate through reappropriation and control over the economic development induced by the better organization of production," and would offer "the substitution of control over one's labor with co-management of development."[20]

Debate and controversy over this project were overcome, first by the arrival of new conflicts and later by the elimination of traditional Taylorism due to the advent of automation.[21] What remained was ergonomics in its two variant forms: the American form (human factors engineering) which was devoted to increasing efficiency and productivity, and the European form, more sensitive (or so it claimed) to the workers' needs, health, and welfare. Indeed, nowadays, with robotization, traditional ergonomics is to some degree a reality; if the (quantitative and structural) ergonomics of human labor is intended to optimize the relationship between man and his tools or machines with the Tayloristic context of parcelization and standardization, then the only perfect ergonomics must be "robot ergonomics", i.e., the process that creates the sophisticated technological relationship between a machine used for automated production and the material being processed; an extremely simple relationship, completely proceduralized, absolutely predictable though at the same time reasonably flexible (a robot is capable of adapting its operations to a number of different tasks).

This is ergonomics in action — because the quantitative measurements, which are always uncertain when applied to men, finally become absolute when applied to robots; men are all different one from another in terms of dimensions and characteristics, and anthropometric standards are merely statistical generalizations, while the dimensions of robots and their specifications are rigorously established in advance; men may change their procedures from time to time, insert small variations or perform unforeseen actions, while the robot maintains even its flexibility in the context of Tayloristic parcelization and standardization. And so ergonomics becomes an exact science.

Men and women however continue to carry on an intense network of exchanges with objects, tools, and machines in the processes of work and everyday living. And the grammar that design culture has inherited from the language of Descartes is constantly shown to be inadequate — the pure measurability of the "res extensa," a "quality" that

was a correlative of the methodic and conceptual subjectivity of the "res cogitans." Nowadays other characteristics — that were previously considered secondary — clamor for expression and space. Among these characteristics are those of perceptions — light, color, sound, microclimate...[22] But then there are the characteristics of relations, which are inherent in the logical and emotional relationship between man and his objects. A new subject-user emerges as the reference of new ergonomics — it is no longer the methodic subject of Descartes (within the context of which Taylorism had been conceivable), but a man rich in physical, logical, symbolic, emotional needs. The new ergonomics of relations which is developing for this subject grows from a starting point of anthropometric ergonomics — which sets its ineradicable limitations and yet remains the framework, as far as function and performance are concerned, within which the ergonomics of relations operates; but to go one step beyond, to define the coordinates of work in the electronic panorama dominated by automation.

Toward a post-ergonomic office?

Should we look forward to the absolute end of Taylorism and the successful creation of a post-ergonomic office, as some theorists predict?[23] The organizational models that are proposed nowadays for office work — which in the future should constitute the overwhelming of share of work in general — are numerous and diverse.[24] Let us examine only a few of them.

Today the strictly Tayloristic model, which organized office labor as a series of manual activities to be parceled up and rationalized through the formation of specialized groups (typing pool, xeroxing pool, switchboard pool, etcetera) has become less credible and accepted. The radical consequences of this model were examined in 1974

19. G. Friedman, *Dove va il lavoro umano?* (Milan: Edizioni di Comunità, 1955), pp. 308, 328.

20. G. Berta, *Le idee al potere*, p. 85

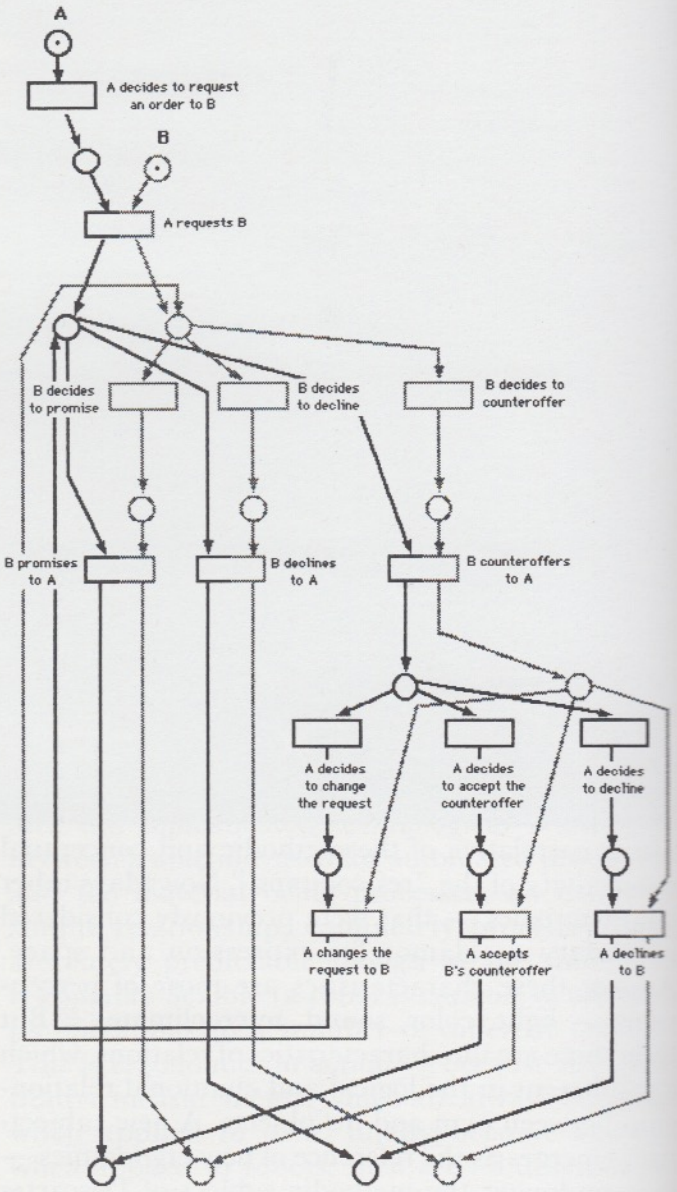
21. On this subject, aside from the works cited, by Adriano Olivetti, see F. Ferrarotti, "Il taylorismo: fine di un'ortodossia," in *Comunità* 54, anno *XI*, November 1957, now in *Sindacato industria società*, and G. Berta, *Le idee al potere*. On the debate over neo-capitalism, see R. Alquati, "Composizione organica del capitale e forza-lavoro alla Olivetti," in *Quaderni Rossi* 2, June 1962, and 3, June 1963, now in R. Alquati, *Sulla Fiat e altri scritti*, (Milan: Feltrinelli, 1975); B. Trentin, "Le dottrine neocapitalistiche e l'ideologia delle forze dominanti nella politica economica italiana" (1962), in *Da sfruttati a produttori* (Bari: De Donato, 1967); R. Panzieri, "Relazione sul neocapitalismo" (1961), in *La ripresa del marxismo-leninismo in Italia*, ed. D. Lanzardo (Milan: Sapere, 1972); Aa.Vv., *La crisi della società italiana e gli orientamenti delle nuove generazioni* (Rome: Editori Riuniti-Istituto Gramsci, 1978).

22. For information on "design primario," see A. Branzi, *La casa calda* (Milan: Idea Books, 1984); G. Lentati, "Prospettive del 'design primario' nell'ufficio postergonomico," in *Ufficiostile* 8-9, August-September 1984; C. Trini Castelli, *Il Lingotto primario. Progetti di design primario alla Domus Academy* (Milan: Arcadia, 1985).

23. See, as an extreme example, an essay by Adam Schaff "Occupazione e lavoro," in *La rivoluzione microelettronica* (Milan: Mondadori, 1982), which holds the utopistic belief the expansion of automation in services and industrial manufacturing will bring about the end of labor.

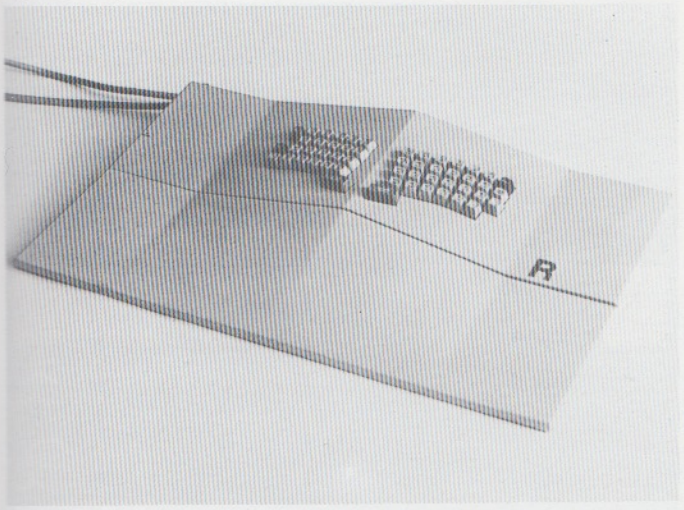
24. See P. Manacorda, *Lavoro e intelligenza nell'età microelettronica* (Milan: Feltrinelli, 1984), pp. 69 ff.

New metodologies, such as communicative approaches, have been proposed in order to analyze the new forms of organization that have developed with office automation.
One of these methodologies uses mathematical models called "Petri nets."
The Gamerù model, shown below, illustrates the conversation between two actors, A and B, when A asks B to fulfill an order, thus making explicit the rules that govern the conversation, rules which also govern organization.



in a well-known essay by Harry Braverman, who described the parceling up of work taken to its logical conclusion — the opening and closing of drawers pool, the scissors pool, etc.[25]
The new models depict the office chiefly as a setting for information management, or as a place *where people talk to each other*. Therefore, description techniques typical of communications are employed.
The communications approach proposed by Fernando C. Flores, for instance, consider the office (or more in general, an organization) as a network of conversations aimed at action,[26] carrying out a pragmatic analysis of the language and utilizing, among other things, the taxonomy of linguistic acts proposed by the Oxford philosopher John Searle. Flores suggests identifying within the linguistic universe of the office assertive, directive, commissive, declarative, and expressive phrases. In this context, office management is the optimization of the network of commitments requested (with directive phrases) or accepted (with commissive phrases). "A technological system for the office should therefore be capable of registering various needs and promises in appropriate archives, and thereafter find them through a simple inquiry device constituted by a terminal and telephone."[27]
Recently a group of researchers at the Istituto di Cibernetica dell'Università di Milano developed an analytical methodology for offices, aimed at resolving problems of office automation, named *Gameru* (Games Rules). Here the communications approach avails itself of qualitative mathematical models, that is, of a specific class for organizational analysis of the "Petri networks": these (they take their name from Carl Adam Petri, a German physicist working at the GMD in Bonn) allow the graphic description of communications processes through circles, referred to as *places*, rectangles, referred to as *transitions*, and *arrows* that connect places with transitions, transitions with places. The circles denote the states of the system thus described, and the presence therein of a *token* (a point) allows us to establish the conditions that lead to the event denoted (by a transition).[28]
"Petri networks" allow one to leave aside time, since they do not require a single scale upon which all events considered must be based; they also permit the creation of models for sequential events, as well as alternative or competitive events.[29]
Above and beyond the variety of the theoretical approaches, one fact seems evident — in office work strict sequentiality of operations is over and done with.
According to several persuasive theoretical hypotheses,[30] we are not moving toward the end of Taylorism, but toward its contradictory obsolescence. The reorganization process of labor is not linear but *cyclical* and *extensive* — a phase of extensive model-construction and standardization of tasks, during which Taylorism remains evident, is followed by a phase during which those standardized tasks are inserted into machinery, and therefore men need only carry out those tasks which could not be standardized; then, the cycle starts over in an asyntotic process that relegates Taylorism to increasingly narrow areas of human labor, which is instead increasingly organized into non-

A research prototype for an ergonomic keyboard designed according to an integral electronic concept, freed from any residual heritage of the mechanical era.
The arrangement of the keys is determined only by the comfort of the two hands, while wrists and forearms find support on the surface before the keys.



linear, flexible processes that operate on the model of networks.
What does remain of Taylorism, and is indeed accentuated according to the theories cited above, is the separation between conception and execution of the process which, despite all the flexibility acquired "downstream," is destined to see the decision-making centers — "upstream" — reduced inexorably in number. Indeed, "downstream" there may be a homogeneous style imposed on the process; the introduction of information technologies, in fact, is not limited to the arrival of new machinery but involves — much more decisively — the introduction of programs, procedures, and style in behavior, of relationships among the social elements involved, of organization of labor.

Other Experiences in "Interface Design"

The interface of the future — that which will quite simply allow us to enter into communication with machines — is the voice. As early as 1983 the designer Rodolfo Bonetto wondered, "What should we say about the developments and mutations of machinery that will certainly take place with the utilization of voice synthetizers and voice analyzers? One has the sensation that this technology has the power to turn the relationship between man and machine on its head or at least to reform it in its entirety. Machine/objects, which previously could not communicate save through tactile and visual channels, will in the future be able to speak and to understand our language. The consequences of this new possibility might be enormous in ergonomic and morphological terms, i.e.: from the integration and disappearance of the machine/object to a possible consequential new emphasis on the 'artistic' form, a return to new solutions to the question of 'decoration.'"[31]
Research and experimentation is pushing toward the perfection of the "voice interface." Talking machines are capable of reproducing the human voice phoneme by phoneme. One need only type a phrase on a keyboard and these devices repeat it, with their clear and slightly metallic voices. Of course, the work involved in creating a machine that can "understand" the human voice, that can distinguish orders given verbally or that can take dictation, is proving to be far more complex.
While anxious to work with the innovations that the future holds in store, designers of interface elements continue to deal chiefly with keys, buttons, knobs, and leds.
Alphanumeric keyboards, especially those (as we have seen) designed for writing, are the elements of the interface between man and machine which boast the most complete and refined body of ergonomic experience, developed over decades of experimentation and use. Nevertheless, in this field as well significant transformations may yet take place — for example, the possible adoption of new keyboard typologies, with the keys arranged in two separate groups (one per hand) on two different surfaces; instead of forcing the wrists to rotate unnaturally outward (as traditional typewriters do) the new ergonomically designed keyboard will offer great support for the wrists and the forearm. When will it become possible, however, to overcome habit? What company will run the tremendous risk of offering the market a keyboard that — although it is more convenient and faster — flies in the face of the users who have trained and become expert on traditional keyboards for over a century?
What has already changed in the relationship between the user and the machine is the immediacy

25. See H. Braverman, *Lavoro e capitale monopolistico* (Turin: Einaudi, 1978).

26. See F. Flores, J. Ludlow, "Doing and Speaking in the Office," in *DSS: Issues and Challenges*, ed. Fick and Sprague (New York: Pergamon Press, 1981.
Flores, with T. Winograd, has recently proposed a method for analyzing office systems and information technology based on the notion of structural coupling, borrowed from the theory of autopoiesis — see H. Maturana and F. Varela, *Autopoiesi e cognizione* (Venice: Marsilio, 1985); F. Flores and T. Winograd, *Understanding Computers and Cognition* (Norwood, NJ: Ablex, 1985).

27. P. Manacorda, *Lavoro e intelligenza*, p. 73.

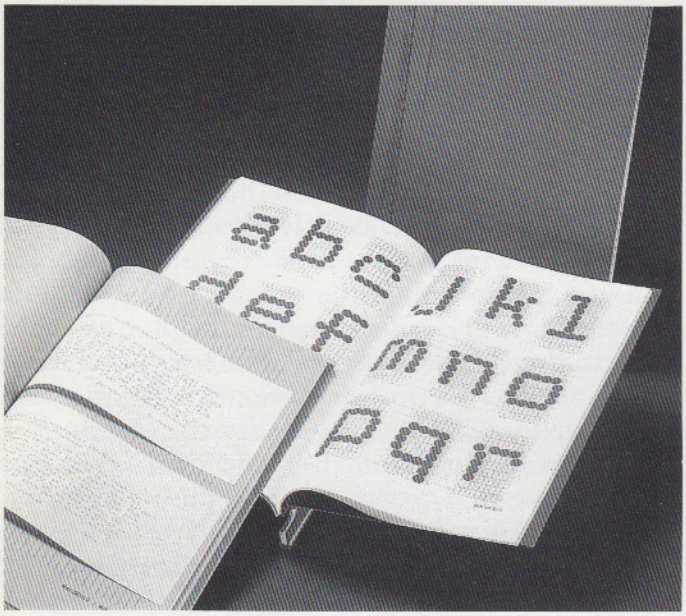
28. See F. De Cindio, G. De Michelis, L. Pomello, C. Simone *Gamerù: un linguaggio per il disegno dei processi nelle organizzazioni* (Milan: Istituto di Cibernetica dell'Università, 1985); F. De Cindio, G. De Michelis, C. Simone, *Gamerù: A Language for the Analysis and Design of Human Communication Pragmatics within Organizational Systems*, 7th European Workshop on Petri Nets, Oxford, June 1986.

29. See F. De Cindio, G. De Michelis, C. Simone, "Organizzazione come sistema: quali relazioni, quali modelli," in *Studi organizzativi* 3-4, 1984.

30. See M. Turchetto, "L'organizzazione del lavoro nella dinamica attuale del modo di produzione capitalistico," in Aa.Vv., *Lavoro, scienza, potere* (Milan: Feltrinelli, 1981); M. Turchetto, "Le grandi trasformazioni del capitalismo," in Aa.Vv., *Alla ricerca della produzione perduta* (Bari, Dedalo, 1982); P. Manacorda, *Lavoro e intelligenza*.

31. R. Bonetto, "Il rapporto designer-industria," talk delivered at the symposium "L'oggetto abitato. L'industrial design nella prospettiva degli anni '80," held by the Centro Studi e Ricerche Busnelli (Milan: Museo Nazionale della Scienza e della Tecnica, 12 May 1983); now in *Caleidoscopio*.

The letters of the alphabet as interface between man and machine. The ease and pleasure with which one reads improve the relationship with the user.
Left, the Olivetti dot matrix font designed by King and Miranda in 1972.
Right, several images that document the development of Olivetti writing systems (from a panel of the exhibition Design Process).



— we have not yet attained direct voice control, but a series of tools and systems (from the mouse and the joystick to the magnetic tablet and touch screen) reduce to a minimum the necessity of using codes to communicate with the machine. Now we enter more directly into contact through the use of software that is already programmed to act as a simplifying filter between the "naiveté" of the user and the complexity of the machine.
The "Macintosh case" provides a perfect example of this; the small computer produced by Apple presented itself to the user as an immediately accessible tool, with its procedures illustrated by simple drawings that appeared on the screen — while the mouse permitted the substitution of initials and coded procedures with simple hand movements that pushed the cursor across the screen; a little cartoon computer smiled when operations were performed correctly or displayed its unhappiness when an operation was botched; a small wristwatch advised the user to be patient while an operation was underway; and a trashbasket stood ready to gather data that was no longer useful, and so on. Here the design itself shifted from hard to soft, and became the design of graphic means of direct communication between the machine and the user. This is a field that is destined to grow with extreme rapidity — every interactive machine (from automatic tellers all the way to new appliances) will be able in the future to have a graphic screen for immediate dialogue with the user. The touch screen has even, in part, unified the input (tactile) and output (visual) apparatus — the screen, for certain operations indicated by video, substitutes the keyboard; the pressure of a finger on the point indicated is sufficient to obtain the operation desired.
The screen is, at any rate, along with printing terminals, an essential element of interface — between the operator and his results. Clarity of letters and words — a primary need of the user — almost always means that letters, numbers, and symbols are translated into *points* which can be easily reproduced on video screens, displays, printers; Perry King in 1972 designed the Olivetti dot-matrix font for OCR applications, later adopted by the ECMA (European Computer Manufacturers' Association). Clarity of communication also means the possiblity of communicating in one's own language with the computer, even when that means using non-Latin alphabets. Olivetti has equipped its typewriters and other systems with Cyrillic, Arabic, Greek, and Japanese (Katakana) alphabets but also with Korean, Hindi, Singhalese, Burmese, Nepalese, Thai, and Cree characters, designed at Ivrea by Arturo Rolfo.[32]
In office machines, "interface ergonomics" is imposed — more than by an intention to improve the conditions of human labor — by the necessity to organize office work and by the desire to increase productivity and efficiency. Other elements of the interface between man and machine — given the multifarious nature of the latter — cannot be grouped under these headings and are designed according to other criteria. They are: the driver's seat, an eminently public interface, which allow man to control his car while travelling, and the group of interfaces, all domestic and private, represented by the controls of household objects, commonly grouped under the class of appliances.

Intermediate between "public" machines used for work or transportation and the "domestic" machines (labor and time saving), "brown" appliances (time-consuming) serve as technological interfaces between man and the world.
Below, the TS 502 radio set, designed in the Sixties by Marco Zanuso and Richard Sapper for Brionvega.

Home machinery

In the household environment, we encounter a range of machines and tools that — though they are (normally) used at home — are classed into two groups: "brown" appliances (time-consuming) and "white" appliances (labor and time saving).[33] The former, those that interconnect the house with the world, are in reality intermediaries between "public" machines and the machines that can properly be called "private" or domestic; on the one hand they are increasingly extensions of "public" machines, while a parallel process leads — in the workplace as well — to the substitution of human movement by the cybernetic flow of information; on the other hand we see them leaving the walls of the house and becoming urban appliances (let us think of the little tape-player-headset combos called Walkman or the giant compact stereos carried around the cities of the United States by blacks and Puerto Ricans).

Also within our houses, however, radios, television sets, tape recorders, video recorders, record players, loudspeakers all display, emphasize, and glorify the technological power exhibited by consoles teeming with buttons, meters, leds, switches, remote control units — but above all luminous displays and indicators. Long gone are the days when radios and television sets were huge pieces of furniture that tried to seem reassuring in order to win a place in the living room; and long gone are the days of formal polish of the masterly solutions offered in the 1960s by Marco Zanuso and Richard Sapper for Brionvega (the TS 502 radio receiver; the Algol 11 and Black ST 201 television sets). As early as 1977 Rodolfo Bonetto designed a car radio for Voxson called, significantly, Mostro ("Monster"). The name, which poked a little fun at itself, referred more to the performance promised than the esthetic choices made — in truth, quite well balanced and successful. But a decade has passed since then, and today there seems to be no end to the domestic technological monsters (especially from Japan) that populate our homes.

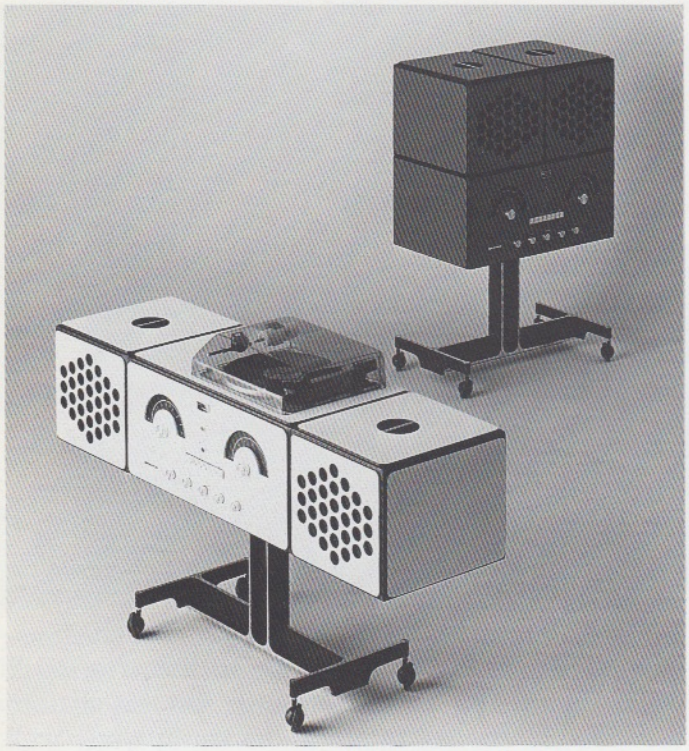
For the future, the direction of development for "brown" appliances, which now include the home computer, seems to be toward an increase in interactivity; we are moving toward the creation of the *Home Interactive System* (HIS). Televideo and Videotel allow access to channels with a continual flow of information requested from home with the push of a button, forwarded via telephone cable, and consumed via the television set. Also already available is IVIS (Interactive Video Information System), a videodisc system produced by Digital that allows a complex "dialogue" between the user and a computer equipped with a laser videodisc reader. IVIS is not only able to respond with images, texts, and graphs to the questions about a given topic, but it is also capable of offering — using the images of the video disc — a personalized instruction program, supplying the user with information according to the speed at which he (by answering the computer's questions) demonstrates that he can learn.

At MIT in Cambridge, Massachusetts, Nicolas Negroponte, in his laboratory, Mediolab, continues experimenting on new domestic media —

32. See *Design Process Olivetti 1908-1983*, pp. 226-27.

33. See N.J. Freedman, "La casa elettronica: resterà sempre 'casa del futuro'?," in Aa.Vv., *Tecnologie e sviluppo urbano*, Atti della Prima Conferenza internazionale del Progetto Milano, 15-16 June 1984 (Milan: Angeli, 1985).

The RR 126 stereo radio/recordplayer designed by Achille and Pier Giacomo Castiglioni for Brionvega (1965).



more newspapers with continuous information flow, with news pre-sorted for each house according to the interests of the user; but also interactive video books that tell stories determined by the user's intervention in changing the plot.

Machines with off-line operation, autonomous within the home, are being joined by growing varieties of on-line equipment, connected with external communications networks — not only the traditional television and telephone, but terminals (audio, video, and printing) with which it is possible to dip into entertainment and games networks, but also to perform banking transactions, go shopping, access data banks, interactive education services, and so on.

With "white" (time-saving) appliances we enter into the true heart of the private sector, of day to day living. The extreme, final interface in the relationship between man and machine is within the four walls of the home: here that relationship takes place daily, here use of machinery and the activities of living coincide every day.

In reality, rather than the relationship between man and machine it is still necessary — despite the changes that have taken place — to talk about the relationship between woman and machine; because the ripe fruit of technology that are "white" appliances are designed by men for women. Refrigerators, washing machines, dishwashers, and the whole vast range of small and tiny machines for the house constitute a teeming

Arision, a proposal for comprehensive interface between users and their home. Designed by Makio Hasuike for Ariston-Merloni, Arision is a programmer of functions, an answering machine, and an alarm management system.

array of technological presences — ranging from the absolutely essential (how could we live without refrigerators?) to the domestic gadget.

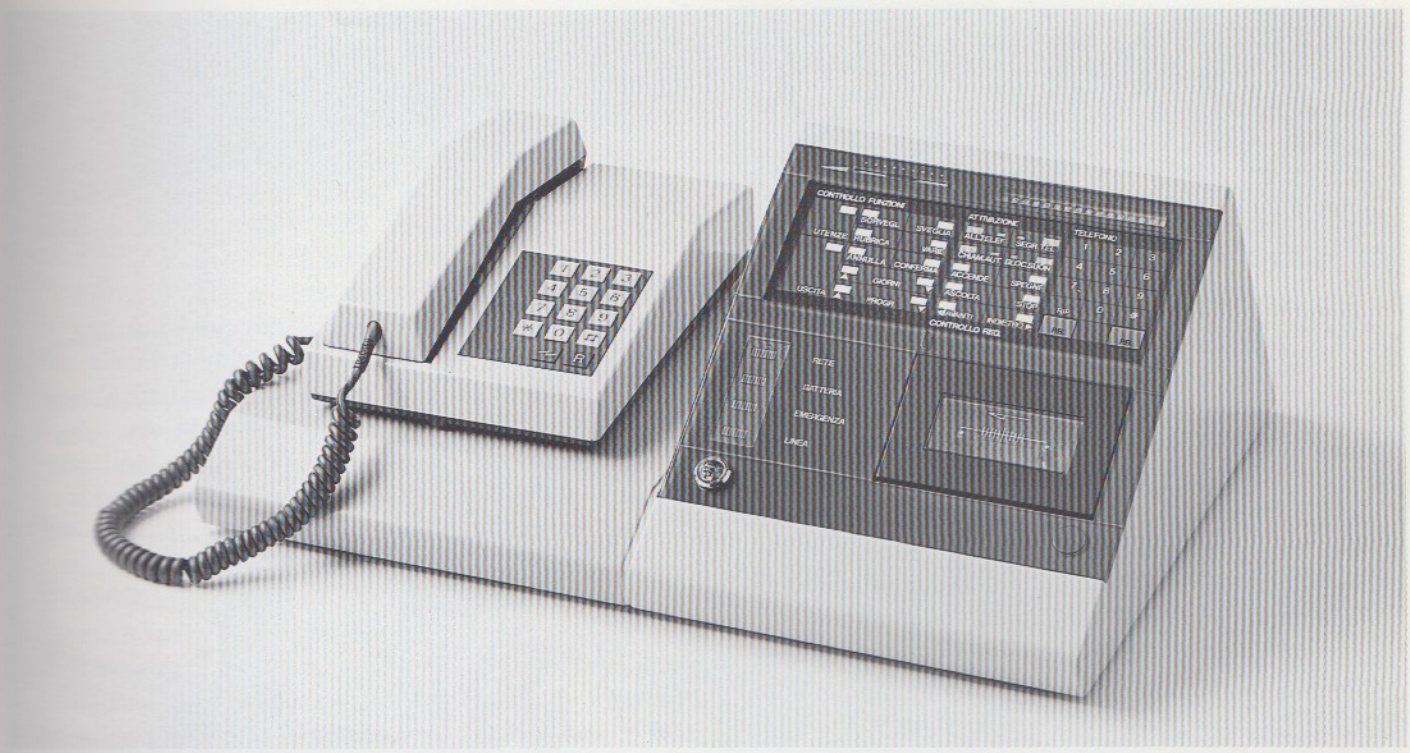
The ways in which they communicate with the user vary as well; there are "calm" machines that send out totally reassuring messages for the climate of home and family, built for complete safety and reliability, without the slightest concession to decorative playfulness; but there have been (and still are) more aggressive products: tiny gadget appliances that stake more on their technological features (very lightweight technology, but served up with a great deal of emphasis) than on the usefulness of their operation, mostly superfluous but at times gratifying.

A more complicated set of messages emanates from appliances (more than one generation of washing machines, for instance) that have tried to unite the reassuring and functional presence of machines capable of providing extremely efficient service (the cleaning of clothing) to the promise of technological extras — this is how washing machines were created that promised a complex range of functions, that offered different washing "programs" to be selected through a console crowded with buttons, dials, knobs, switches, and timers; for the most part, it meant little more than the addition of gratuitous complications to simple operations — the programs offered only non-essential variants. The result — the user ignored the knobs and buttons, tucked the instruction book away and forgot about it at the bottom of some drawer and adapted to her needs a console that was destined more to stun (mostly husbands) upon purchase than serve during use.

These years of crisis and restructuring in the appliance industry have not witnessed any organized commitment or specific attention directed toward aspects of communication. In Italy the Rex-Zanussi group, during its period of expansion (in 1958, to be exact), created an office (Unità di disegno industriale — the Industrial Design Unit) under the direction of the architect Gino Valle that introduced some significant solutions, such as the size coordination of the various elements of kitchen furniture; after 1975 the new image program of the Zanussi group coordinated by Andries van Onck — although its freedom of movement was hindered by the restructuring that had unified Rex, Zanussi, Becchi, Castor, and Zoppas appliances — succeeded in offering intelligent brand and market diversification chiefly through instrument panel design.

The console of a washing machine designed by Makio Hasuike for Ariston-Merloni.

Below, Arision, a proposal for comprehensive interface between users and their home. Designed by Makio Hasuike for Ariston-Merloni, Arision is a programmer of functions, an answering machine, and an alarm management system.



These panels, van Onck explains, communicate the machine's possibilities even before it is turned on, but they also communicate its "cultural" and technological levels, the market at which it is aimed, and its potential membership in a larger family of kitchen furnishings; then, when the user has moved into the operative phase, the domestic interface must provide all necessary information about its operation. "One of the tasks of a well designed instrument panel must be to reduce complexity," the designer says, "by putting communications chaos into order." Technological developments and marketing logic in fact tend to make even household machinery increasingly complicated, with a resulting danger that the overabundance of necessary information may make the instrument panel difficult to decipher.

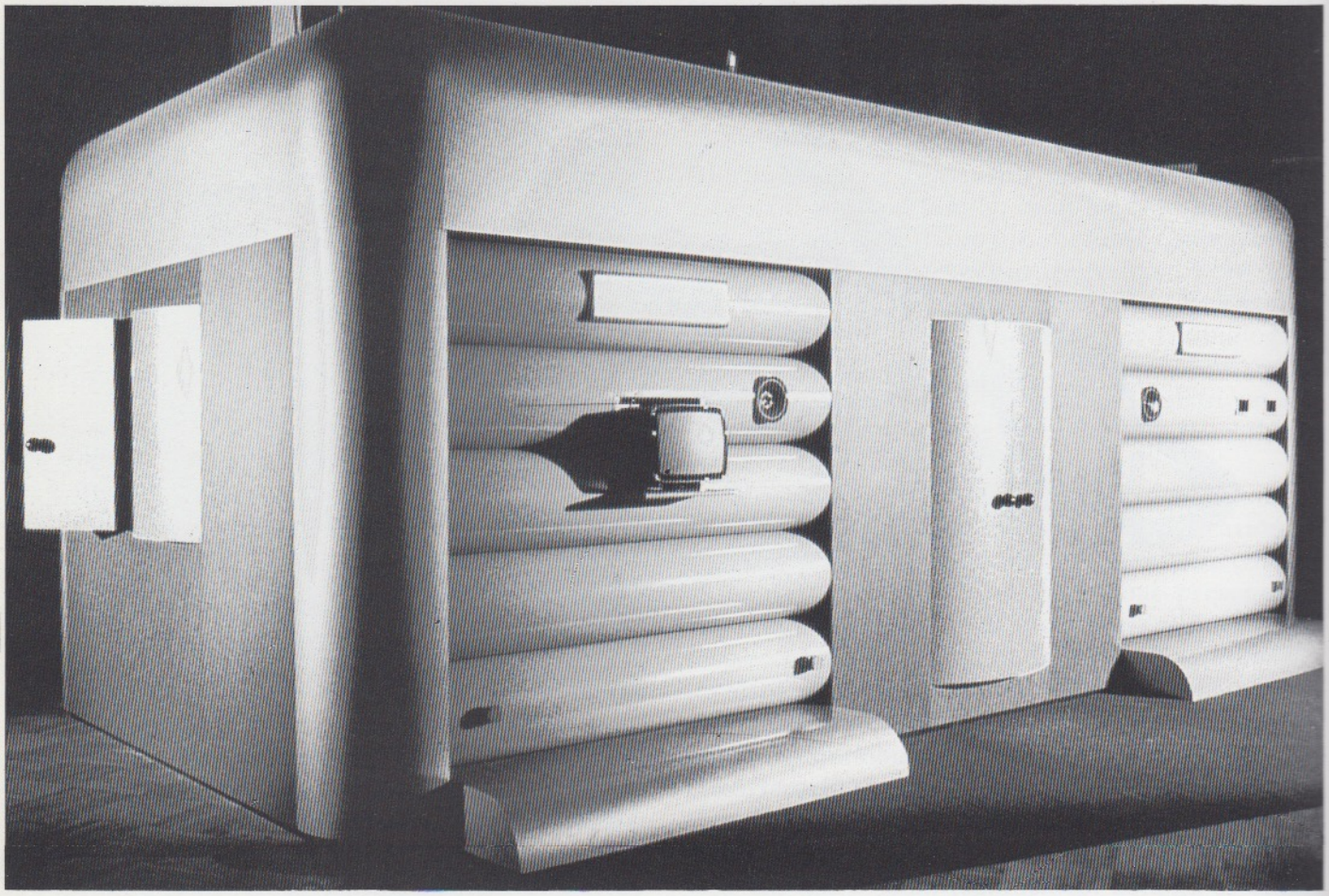
At this point the designer intervenes; van Onck stressed clarity of communication, even in those cases where he wanted to emphasize the technological richness (but not redundance) of the equipment. In his instrument panels, van Onck created information hierarchies, poles of attention, overlapping levels of control. He also paid special attention to color and to the playful effects that can be attained: "Esthetic factors are not merely an extra with respect to functional factors, nor is there any conflict between esthetics and functionality. Esthetics, when it is not a gratuitous plaything, is itself a function, in that it facilitates the correct use of the machine's controls."

Now there also exists a superappliance for household use, a central control brain for all domestic machinery. Arision, the electronic environment control system made by Ariston, is a "black box" that operates precisely as an interface between users and their habitat. It is not *an* appliance, but it is capable of programming, activating, controlling all of the appliances in a house; guided by a home computer, it watches over the safety of electric and gas appliances of all sorts, turns on the answering machine and the burglar alarm, and at the same time can oversee the preparation of a nice grilled cheese sandwich.

This is now. What about the future? Queries, forecasts, utopias having to do with the home of tomorrow are especially intriguing in that they have to do with the most intimate and private aspect of the foreseeable future. In the past few years "metaphysical" and disturbing houses have been proposed as have "telematic" houses[34], but there have been hypotheses and experiments of a far different variety as well — the *Self-Cleaning House* (SCH), for example, is not characterized by pervasive video images and communications equipment — extremely "masculine" elements — but rather by a tendency toward the elimination of housework. The SCH is one of the proposals

34. See *Le case della Triennale. Otto progetti di ambienti domestici contemporanei*, ed. F. Raggi and F. Trabucco, catalogue of the show at the Triennale di Milano (Milan: Electa, 1983); *La casa telematica*, a leaflet for the installation by G. Bettetini with A. Grasso and U. La Pietra, done at the 61st Fiera Internazionale di Milano, 14-23 April 1983.

The "Vacation Home": a technological cabin that with its colored plastic beams contains the most sophisticated equipment that can serve contemporary man. Designed by Michele De Lucchi, it was exhibited at the Milan show Le Case della Triennale in 1983.



analyzed by several recent American studies developed in the area of feminism and specifically concerned with the future of the interface between women and machines within the household context:[35] the SCH was designed, patented, built (and inhabited) by France Gabe, a sixty-plus-year-old artist and inventor who lives in the Oregon woods; a woman who always hated housework, Gabe invented and perfected over a period of several years a redesigned living unit, from walls to windows, from appliances to furniture, that would be capable of self-cleaning. There was no futuristic formal ideal behind Gabe's design approach; on the contrary she attempted to create objects and furniture that would be as close as possible to those that can be found in an ordinary house of an average American family; the walls and windows of the Gabe Self-Cleaning House are airtight, however, and two feet from the floor are vents that, via remote control, emit jets of high-temperature dry steam that dissolve grease and flush dirt and dust onto the floor, which is sluiced at the same time by a powerful spray of hot water, and then eliminated by an outlet duct set at a corner of the floor. The clothes closet is equipped with a steam-operated system that washes and irons the clothing that is hung in the closet, and in the kitchen the cupboards for plates and pots become — when the controls are switched on — a perfect dishwasher. There is nothing magic about this approach to technology — Gabe has removed any emotional aura from the consoles of her machines, which were rationally designed in function of their efficiency in the self-cleaning cycle.

The American researchers who presented the SCH — with a slight polemic challenge toward the ecological movement — reject a model of life that, in the name of harmony with nature, restores the family to its place around the hearth and women to housework. The relationship with technology, they say, is decisive — it should not be rejected, feared, or depicted as evil, but adopted and employed intelligently in the home as well, with an eye to saving time and energy (both natural and human) so as to widen the role options for the women and men that live there.[36]

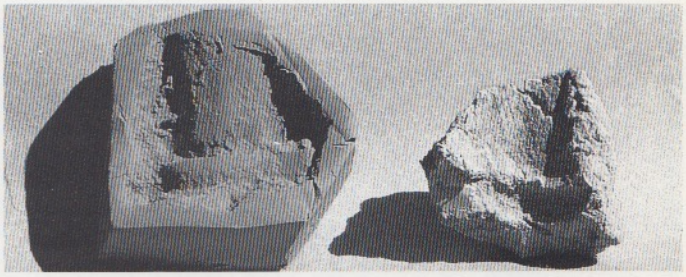
35. See Zimmerman, *The Technological Woman: Interfacing With Tomorrow* (New York: Praeger, 1983); Joan Rothschild, *Machina Ex Dea. Feminist Perspectives On Technology* (New York: Pergamon Press, 1983).

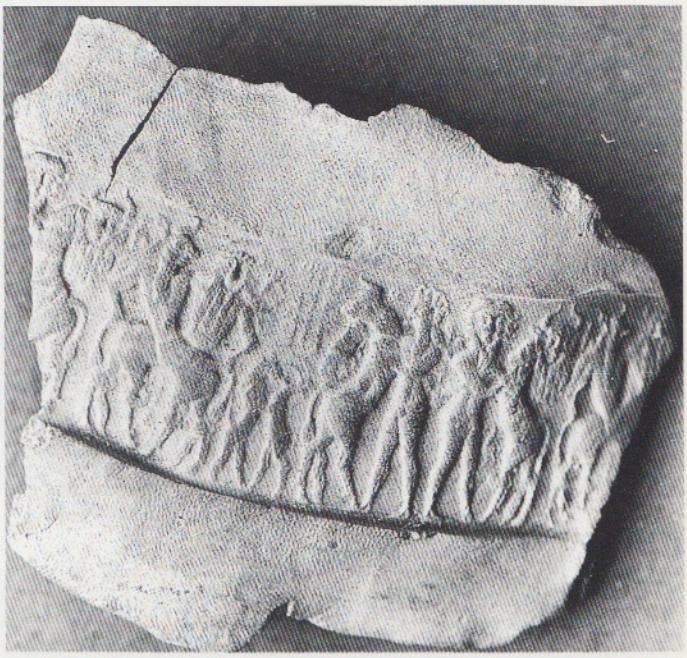
36. See P. Piva, "Le macchine che ci servono non le penseranno gli uomini," and "La casa dei sogni," in *l'Indice* 5, June 1985.

The Origins of Ancient Administration

Piera Ferioli, Enrica Fiandra

Clay sealing attached to a cylindrical peg, unearthed in Arslantepe (Turkey).
On the left, the mould ST, bearing an impression of coiled woolen cord that held a door in place.
Below, clay sealing on a pot from Kish (Paris, The Louvre).
Before the cylindric seal of the "Minister for Commerce" Ur-Emush of Lagash (2450 BC) was rolled over the clay sealing, the sealing was kneaded so it could adhere better to the sealed object.





Archeological evidence that ancient civilizations possessed economic organizations — with records-keeping, control systems, and inventories — is provided by remarkable objects that have been dubbed "clay sealings." Clay sealings were apparently shapeless nuclei made of clay, by now often reduced to fragments, that have a front (bearing the imprint of a seal) and a back (bearing the imprint of a portion of the object that was sealed).

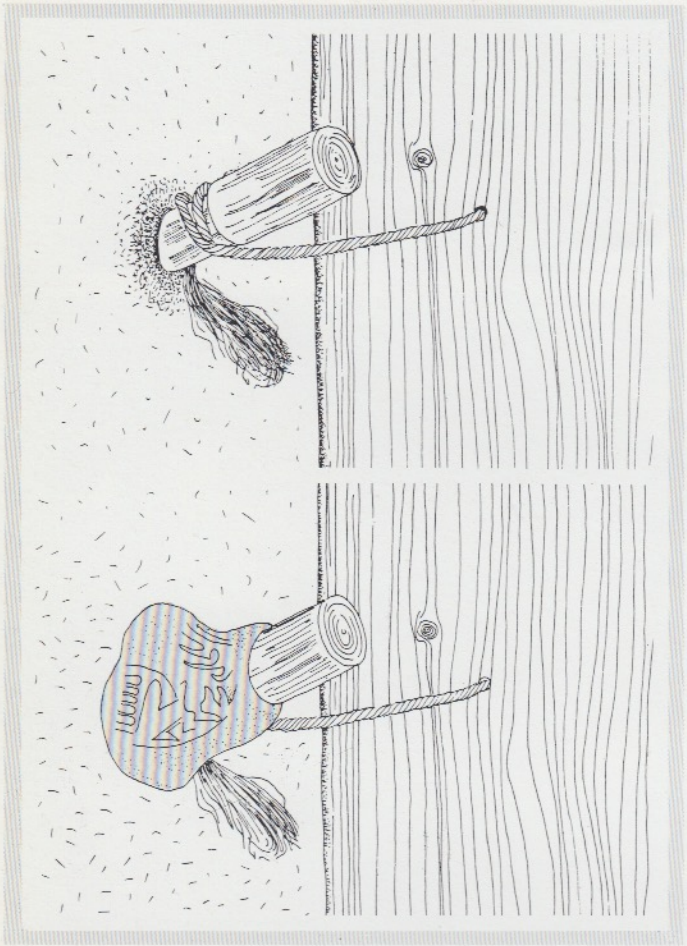
Before use, the clay sealing was only a shapeless nucleus. This nucleus of clay constitutes the first known preparation of an administrative tool. The act of placing this clay nucleus upon an object intended for monitoring, transformed it into a clay sealing. This is the first step in the use of clay for administrative purposes, and constitutes an official act that initiates a process of administrative control. When a seal is applied, the clay sealing acquires various values and meanings. First of all, it then testifies to a relationship between the act of closing and the person qua *function. It indicates the presence of the possessor of the seal or of his proxy (thus acquiring a value of personal testimony with juridical validity). It indicates the existence of a significant act in juridical and administrative terms, and this act per se either constitutes or assists in constituting an alteration in a given juridical and administrative situation. At the same time, it indicates the existence of administrative operations: withdrawals, deposits, statements of quantity and quality, and so on. Last of all, it is the antecedent of an analogous administrative act. When the clay sealing is in place, prior to its removal, it signals a period of closure of the storage house, of a container, and so on, and it also signals a cessation of operations. In this phase, a clay sealing represents a cognitive and chronological device, produced after the transfer of goods of all sorts. The sealing permits periodic readings — that is to say, determinations of the amount and sort of goods being managed, throughout the time. The clay sealing therefore constitutes a primary tool of knowledge-gathering and -storing with juridical value, inasmuch as its basic recording function is compounded with a function of justifying the operations to which it bears material witness. Its authenticity is guaranteed by the imprint of the seal.*

When a clay sealing is removed, it no longer serves to ensure a storage house or container, but it continues to bear witness to its closure. It thus establishes a document that proves that the storage house was safely closed between one operation and the next, and provides evidence of a quantitative transfer that was correct in procedural terms.

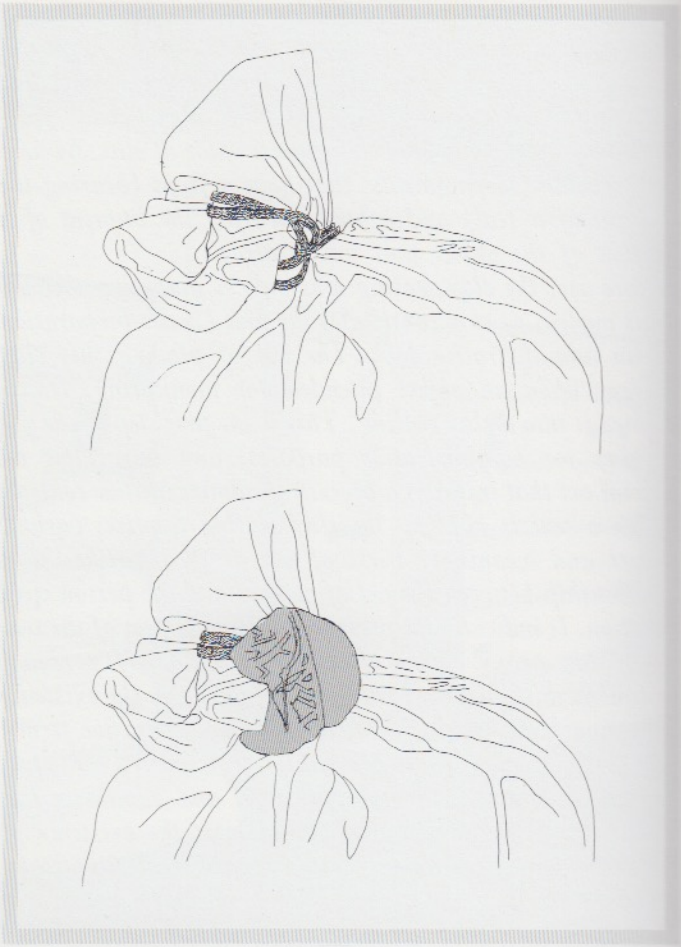
The clay sealing, when removed, is then preserved either in the same place in which it was used and/or (for a longer period of time) in a central archives. Here it forms part of a complex system of documents, and it may also serve as a chronological reference. The criteria of collection respect the single "document" inasmuch as it is a component of an archive series in which it is inserted by date and topic, and whence it can be summoned up at any moment. The theory employed in modern computerized systems of archiving is already applied here. Clearly, clay sealings are indicators of the existence of centralized administrations in ancient communities that were gradually urbanizing.

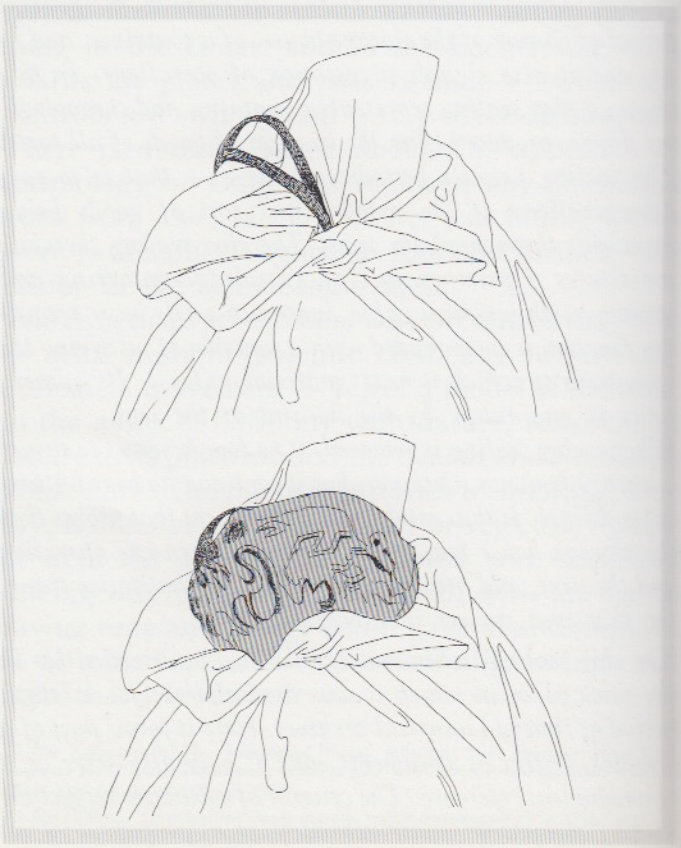
It is standard practice to consider the birth of "cities" as being contemporary with the invention of writing, toward the end of the fourth millennium. As Denise Schmandt-Besserat has shown, however, writing should not be thought of as an instantaneous occurrence, as a leap forward in human development. Writing has a very long gestation period that spans the millennia that preceded the fourth millennium. As early as the middle of the ninth millennium, an archaic system of records-keeping employed plastic symbols in clay in all ways similar to the symbols scribes used later in the first tablets. These tokens were capable of indicating simultaneously the amount and sort of goods in question. Thus we might say that the need to memorize economic data for exact control in management of goods was responsible for prompting the creation of conventional elements that underlie the development of writing. This is the context within which the clay sealing developed with its juridical and administrative value — the clay sealing always requires a numerical indicator that in some

Reconstruction of the shutting of a door. The rope holding the door was wrapped around a peg, without knots, in order to facilitate the opening and closing operations, which took place several times daily. The clay sealing, set on the peg and coiled rope, guaranteed that the door remained shut. After removal, it was stored in the archives to "document" the operation.



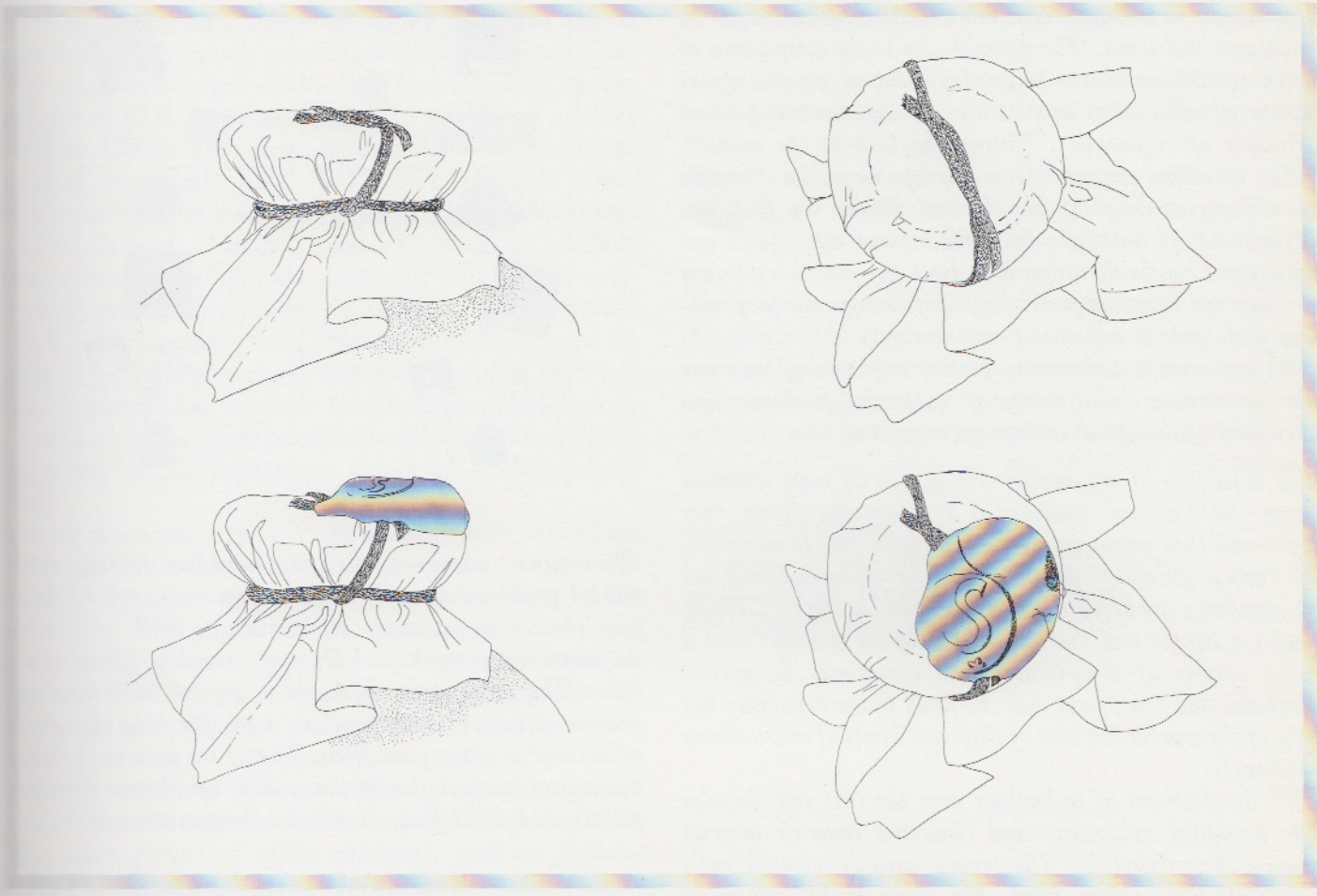
Reconstruction of the closing of a sack. In ancient times sacks, along with pots, were the most common containers.
They were closed in two ways: either a clay sealing was set outside the sack at the end of the rope, or else a clay sealing, inside the mouth of the bag, held tips of the rope.





way indicates the number of items involved and above all the numerical operation performed. Together with the clay sealing itself, they constitute the first records of economic transactions — which could be recorded and which provide reliable proof of those transactions — that could be called up at any point during the business management.
The clay sealing thus constituted a great help in verifying, with greater reliability, the process of urbanization that seems to have spread out over time, beginning in much earlier times than is even today thought. It also allows us to detect the evolution of social and administrative systems in all their nuances and modifications, inasmuch as it allows one to establish the level of organizational maturity, even without the evidence of writing.
As far as the preliminary process of urbanization is concerned, it must not be imagined as a sudden or revolutionary change, but as a gradual development of the management of goods on the part of the community, within the context of which, finished graphic expression should be considered nothing more than a step in the ancient process of development of bureaucratic control.
Recently at Arslantepe in Anatolia a palace has been found dating from the end of the fourth millennium with storehouses that testify to a sophisticated organization of controls. In these storehouses, containers were uncovered that

Reconstruction of the closing of a pot.
The mouth of the pot was covered with leather or cloth, depending on the contents, and then bound with unknotted ribbon or rope.
The clay sealing partially covered the rope tips in order to guarantee the closing.



were still closed by clay sealings. We should presume that this maturity and ease of administrative operation, apparent in every detail, must be the result of thousands of years of experience. A commercial settlement dating from the fifth millennium in Değirmentepe, not far from Arslantepe, with a system of management in all ways similar, seems to offer trustworthy confirmation. The clay sealings from Değirmentepe and Arslantepe have permitted great steps forward in the search for the origins of administration, both because of the age of the finds, the site in which they were rediscovered, and the wealth of information uncovered. Both sites represent a link joining the Mesopotamian area and the Mediterranean area, with a peculiar cultural autonomy tied to the powerful economic interests created by the presence in the neighborhood of metal mines. These finds are of enormous importance to studies on the presumed Mesopotamian superiority and the very origins of Western civilization. This system — which proves to be extremely complex, since it involved the responsibility of numerous persons — required organized space for storage, marshalling offices, archives, open spaces — such as courtyards and open squares — for moving and stationing animals used in transport, and so on.
One can see an interesting transposition of complex management functions into corresponding architectural and urban solutions that are equally complex. Urban layouts, and architectural and distributive systems are created that adhere closely to the management needs of the administrative organisms, which tend to centralize both functions and the physical structures where these functions are performed. Naturally the ideal solutions coincide with a reduction of motion required, being equal the amount of goods moved, in compliance with definite economic rules.
At times we come upon apparently different solutions to the same problem because there are other factors that condition the architectural arrangement, such as topographic variations, but this does not alter the fact that there is a constant effort to attain peak functionality at minimum cost.
The principle of rational correspondence of functions and architectural solutions allows us better to understand and interpret what we have discovered in surviving structural building materials. Often they may seem to be mysterious merely because the interpretive key — the function for which they were designed, produced, and modified over the course of time in order better to serve changing organizational needs — is lacking.

P. Ferioli, archeologist, and E. Fiandra, architect and archeologist, work for Ministero dei Beni Culturali e Ambientali; their works have been published in Italy and abroad.

Ergonomics at the Interface between Man and Computer

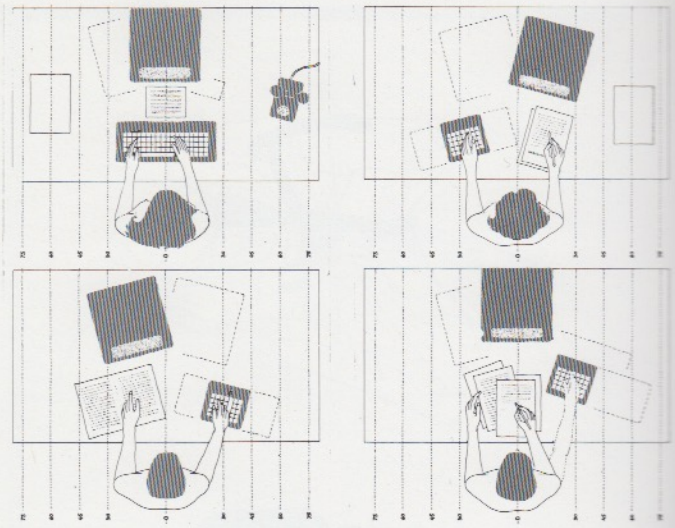
Etienne Grandjean

Ergonomics is the study of man's reactions and behavior in relation to his work. The general aim is the adaptation of work conditions to the physiological and psychological nature of man, and this results in the most important principle of ergonomics, "fitting the task to the man."
What is called ergonomics in Europe is called "human factors engineering" in the United States. In fact, the definitions of both are so similar that no significant differences can be distinguished. Both are interdisciplinary — they are based on physiology, psychology, anthropometry, and various aspects of engineering.
Both ergonomics and human factors engineering have one aim in common — the design of equipment, facilities, and surroundings adapted to human capacities.

The objectives of ergonomics are as old as man. Human beings have always endeavored to adapt the things they make and their environments to their own use. In our time, the "things we make" are increasingly complicated, and our surroundings are becoming more and more artificial. It is no longer a simple tool that must be adapted to man; now a large variety of complicated and sometimes dangerous machines and equipment must be fitted to the capacities not only of the worker but also of different kinds of end-users or consumers.
This development of technology over the last few decades has prompted systematic and concerted research activity toward these objectives. The general area of scientific activity with its various facets has come to be known as ergonomics, a science which came into existence shortly after World War Two.

The Industrial Age, which began in the nineteenth century, increased the physical power of mankind. Machines enhanced or replaced human muscle. The physical strain of human labor was greatly reduced.
The Information Age has had similar effects on mental work — information technology will enhance or replace mankind's intellectual powers and capabilities. With the information age, communications hardware and techniques will become vastly more complex and an increasingly critical element of the office. Fiberoptics will connect computer networks and other communications hardware. These technologies are likely to continue to deluge offices at an accelerating rate. There will be fewer centrally located shared pieces of equipment and more individual work stations, which can already be seen nowadays in the massive spread of personal computers. Most likely, the percentage of workers with specialized bodies of knowledge will increase, and a smaller percentage of clerical and support workers will be required.
It is unlikely that ergonomics will become unnecessary in the Information Age office. In general, experience shows that as productivity increases, human labor is intensified.

The relationship between operators and the tools they work with, in images from the volume "Ergonomics at Olivetti".



The strain on sensory organs and mental functions, environmental problems as well as forced postures, are likely to pose challenges to future ergonomics as well.
As mentioned previously, VDUs are invading offices of all types. They are entering a world where machines have not been used before. The result is a considerable change in offices and working conditions. To call the present change a metamorphosis, similar to that which we observe in caterpillars and butterflies, is not an exaggeration.

At the traditional office desk, an employee performs a great variety of physical and mental activities and has a great deal of space for various body postures and movements — he can look for documents, take notes, file correspondence, use the telephone, read a paper, exchange information with colleagues, type for a while — and he will leave the desk repeatedly during the course of his working day.
A desk that is too low or too high, an inappropriate chair, insufficient lighting conditions, or other ergonomic shortfalls are unlikely to cause great annoyance or physical discomfort.
The great range of activities prevents adverse effects from long-lasting invarying physical or mental strains.

The situation is, however, entirely different for an operator working with a VDU for several hours without interruption or perhaps for a whole day. Such a VDU operator is tied to a man-machine system. His movements are restricted, his attention is concentrated on the screen and his hands are linked to the keyboard. These operators are more vulnerable to ergonomic shortcomings and are more susceptible to constrained postures, to poor photometric display characteristics and to inadequate lighting conditions. This is the reason why the computerized office calls for ergonomics; consequently the VDU workstation has become the launch vehicle for ergonomics in the office world.

As long as engineers and other highly motivated experts operated VDU, nobody complained about negative effects. The situation changed drastically, however, with the expansion of VDUs to workplaces where traditional working methods had formerly been applied. Now there were increasing complaints from VDU operators about visual strain and physical discomfort in the neck and shoulder area and in the back. This has provoked a range of reactions caused by the belief that the complaints were greatly exaggerated and mainly a pretext for social or political claims, while others considered the reactions a health hazard requiring immediate measures to protect operators from injury. Ergonomics as a science stands between the two poles — its duty is to analyze the situation objectively and deduce guidelines for the appropriate design of VDU workstations.

Several ergonomists in different countries have carried out field studies in order to analyze the complaints, to study the working conditions and to look for possible causes of impairments. The results can be summarized as follows: about one third of the operators working many hours per day with VDUs complained about severe physical discomfort in the neck, shoulder, and arm area. A similar percentage of operators also experienced eyestrain, which is generally considered to be a symptom of visual fatigue. A few studies also revealed that not only VDU operators but also other groups of office employees, such as fulltime typists or accounting machine operators, complained about similar physical troubles.

A more extensive analysis of the results obtained from VDU operators disclosed some clear relationships: a) the more time the operators spend looking at the screen, the more likely it is that the operators will experience symptoms of fatigue; b) the incidence of eye complaints increases at work stations with poor lighting conditions or with VDUs of low photometric quality; c) the incidence of physical complaints and of medical findings increases at work stations with inadequate furniture dimensions.

All these recent studies on VDU operators as well as on photometric characteristics of terminals have led to valuable recommendations which are addressed to the manufacturers of VDUs and to the management of companies responsible for the design of offices and for the use of appropriate furniture.

In the last few years, ergonomics has become increasingly popular. Many end-users are nowadays sensitive to physical discomfort and are less prepared to accept uncomfortable working conditions. As a result of this development, the philosophy and knowledge of ergonomics are brought into various organizations such as employee federations, unions, and governmental agencies.

Since the end-user of machines and equipment is sensitive to the ergonomic quality of a products, ergonomics is becoming a strong selling point. Management and chief buyers of companies are, to some extent, also involved in this trend, but they are of course more interested in the efficiency of the product.

They are not independent from the general attitudes of the end-user, nor are they independent from unions, standards, legislative regulations. They certainly try to optimize the balance between efficiency and other effects of equipment. These tendencies are evident in many fields and especially in the office world. It is safe to conclude that the importance of ergonomics will increase in the near future and that ergonomics will be taken increasingly into consideration by designers and manufacturers of products as well as by the management responsible for the design of workstations.

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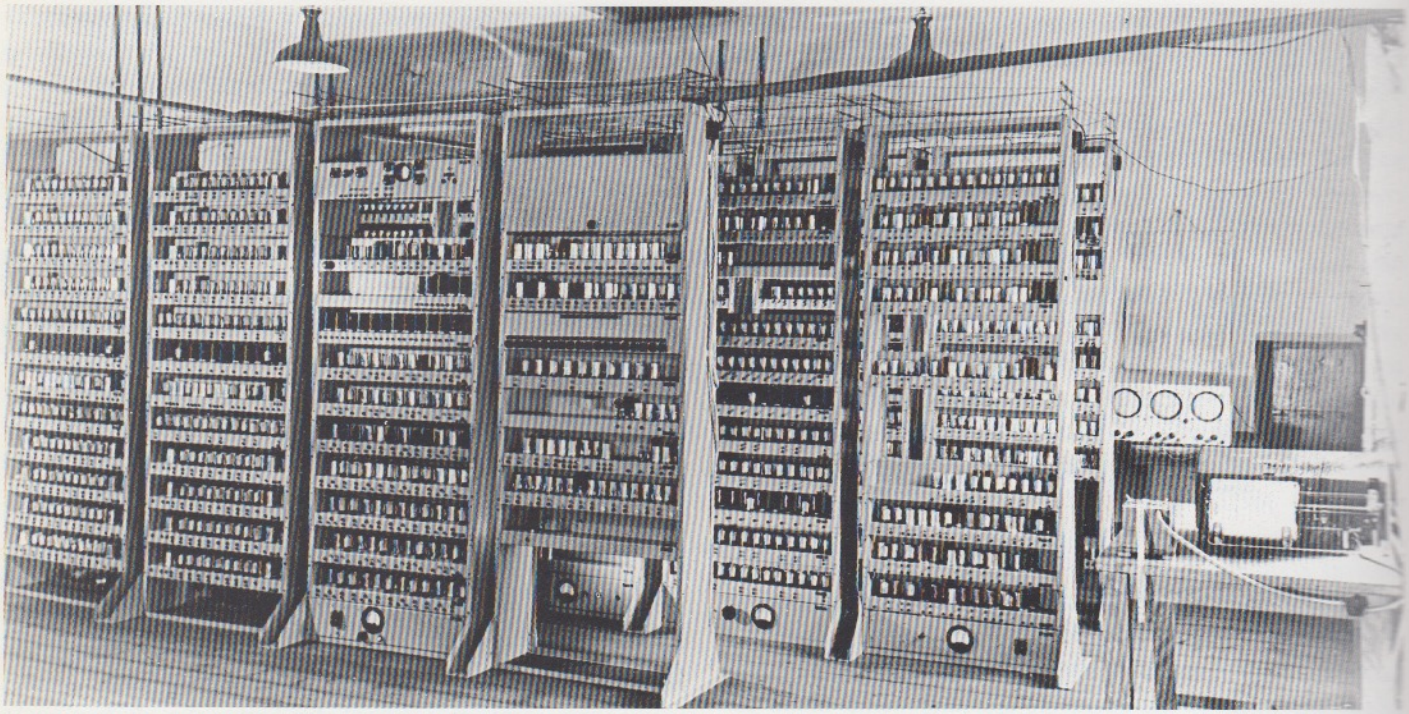
The Man-Computer Interface – Past and Future

Hermann Hauser

The first computers did not even consider the problem of successful interface between machine and user. Considerable improvement was achieved with Edsac, in which Maurice Wilkes introduced the first program housed within the computer. The program took the form of a mercury delay line.



Humans distinguish themselves from other species by the quality of the interface with their surroundings. Man invented tools to shape things according to his will. He discovered fire to cook food and to modify the environment, and he made rein harnesses to control animals.

There are endless examples of such interfaces, some of which appear in this book.

All these are examples of improvements to the interface problems between man and his environment. However, all these examples are very specific. Tools, reins, steering wheels, etc. have each a very limited and specific purpose. This is where the computer differs. Computers are used in so many different ways that a good generic solution to the man-computer interface problem is difficult to imagine. How can we serve such diverse computer users as the accountant, the scientist, the artist, the office worker all in the same way? It seems hopeless, and yet a lot of progress has been made since computers were first invented some 40 years ago.

The age of bits

The first "computer" the ENIAC, was built in 1944 in the United States. It had the world's worst user interface. The program had to be put into the computer by setting binary switches. Each switch represented just a single bit of information. A bit is the smallest unit of information held in a computer signifying a "0" or a "1" depending on the switch's position.

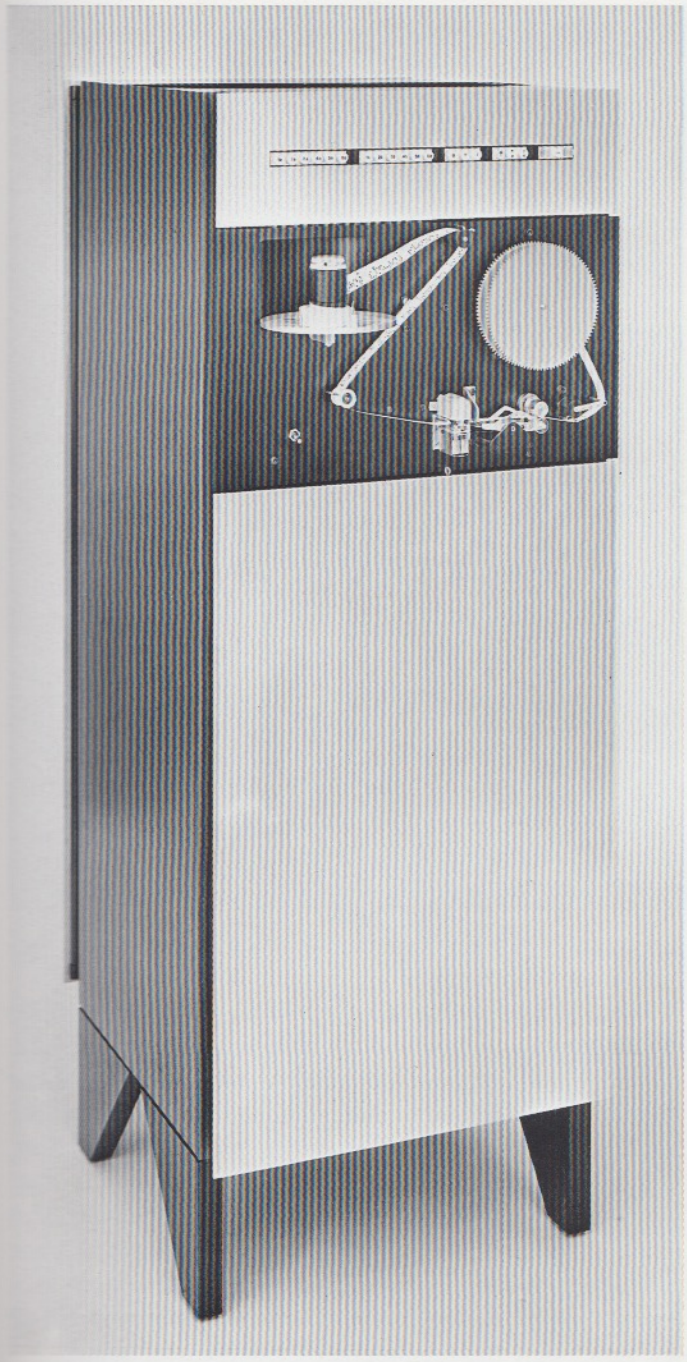
Prof. Maurice Wilkes in Cambridge, England brought about the first big interface improvement. He built the world's first stored program computer, the EDSAC; the critical new device was the mercury delay line. Instead of setting thousands of switches by hand, a job that took days, the program could now wide reside the computer in a much more dynamic form as pressure waves in a mercury pipe. This made program entry and modification much faster and easier.

Alan Turing, another Cambridge computer scientist used a CRT display as an output device. The information on the display, however, consisted of dots rather than characters, and signified the binary patterns which represented the numbers. To make the display even more difficult to read for the non expert, the binary patterns appeared backwards. Even the most dedicated "hacker" of today would find such a user interface totally unacceptable, and it is obvious that in those early days there were only very few, very dedicated experts who could use computers. The interface was completely dictated by the computer hardware, and no concessions at all were made to the convenience of the user.

Bit patterns are the "machine language" of computers, their natural way of representing numbers and symbols. These sequences of "0" and "1," however are far removed from a human language, like English which is our natural way of representing numbers and symbols.

But things soon improved. Machine language was replaced by high-level computer languages like Fortran and Lisp, which made some concessions towards a more human way of interfacing with the computer. Switches and bit patterns on the screen were replaced by papertape, punched cards and printers as the main input-output devices. Computers themselves became more powerful, so much so that it became possible to share one computer among many users.

In Olivetti's Elea computer, the interface that conveys input and output data was made up of a band of perforated paper.

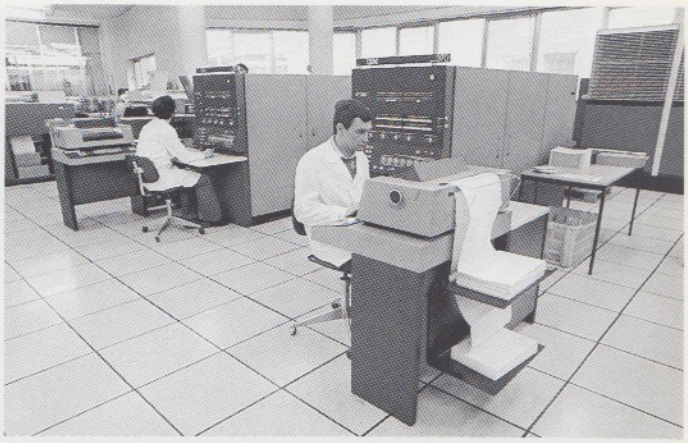


The waiting game

Dividing the computer power of one CPU among many users or time-sharing, dramatically increased the number of people who could access a computer. This, together with the proliferation of high-level computer language, allowed many more users to have access to these new machines and the demand on these central mainframes increased rapidly. The era of time-sharing was, and still is, characterized by large computer installations with hundreds of users, and long job queues.

In order to get some work done, the user had to submit a job to the computer. This job entered the job queue along with all the jobs that were submitted by other users. Users there-

An old example of mainframe for administrative uses - an IBM A24 installed in the Riunione Adriatica di Sicurtà.



fore spent a lot of their time waiting for their job to run, and then waiting for their output to make it through the print queue.

The situation was slightly improved with the arrival of Visual Display Units (VDU) and user terminals. Now the output could appear on the user's individual screen rather than on the shared printer and therefore skip the printer queue bottleneck.

The next development involved on-line systems where each user at his personal terminal appears to have the computer all to himself. The job is typed in and submitted from his keyboard and the output appears on his VDU. As the computing power of mainframes has increased, the individual user can normally get reasonable turnaround times for small to medium sized jobs.

However, although the user interface of mainframe computers has greatly improved over the decades it has in no way matched the massive progress in the computing power of these machines.

User friendliness

In the late seventies the personal computer appeared and in the course of a decade changed our ideas about the man-machine interface dramatically and forever.

Although these machines, like the Apple computer in the USA and the Acorn Computer in Great Britain, were much less powerful than their big brothers the mainframes and minicomputers, they had one big advantage: they were more user friendly.

They dedicated all of their limited power to one user only, and they soon became much easier to use. Although the user still input data and programs via the keyboard and received output on the VDU screen or printer, the command language became simpler, approximating natural language. Novel input/output devices were developed such as mice, light-pens, graphics tablets, touch screens, plotters and loudspeakers, all of which greatly improved the user-friendliness for specific applications.

The public rewarded that dedication to the end user. When

In the second half of the Seventies, the advent of personal computers radically changed the panorama of man to computer interface. The Acorn, manufactured in connection with the British Broadcasting Company, has had a considerable role in the spread of information technology in Great Britain.

the BBC asked Acorn to produce a computer to complement their TV series "The Computer Program" they expected sales of 12,000 units. Acorn last year had shipped over 500,000 units.

A new market segment was born and soon larger companies entered the field, in particular IBM, the giant among computer companies. IBM managed to set an operating system standard called MS-DOS which defined a simple user interface. Olivetti, also, decided to enter this market segment and is now second only to IBM in the number of MS-DOS PC's shipped every month.

During this time all the various work in computer science was still being done on time share systems. One of the few exceptions was the research team at Xero Park in Palo Alto. They argued as follows: "Powerful personal computers will be cheap in 5 years' time. So cheap that each office worker can have one. Therefore let us deem these computers cheap now, and see what people can do with a mini on a desk."

This approach was spectacularly successful. The idea of a powerful computer that serves just a single user produced an interface that was far superior to anything users had experienced before.

The desk top metaphor was born at Xero Park. This was a breakthrough in interface design. The display of the computer looked and behaved like a desk top. There are icons representing paper documents, filling cabinets and even rubbish bins.

A mouse is used to activate these icons. For example if the mouse pointer is moved over the filing cabinet and activated, the filing cabinet opens and displays its documents. These documents can be marked and refiled or scrapped via activation of the appropriate icons, or sent through the out tray, another icon, to somebody else.

The reason why this desk top interface is so successful is that we will have a very good model of what people do in the office. As long as the computer behaves like our own model of the office we can make the computer perform all the tasks that we perform in a conventional office.

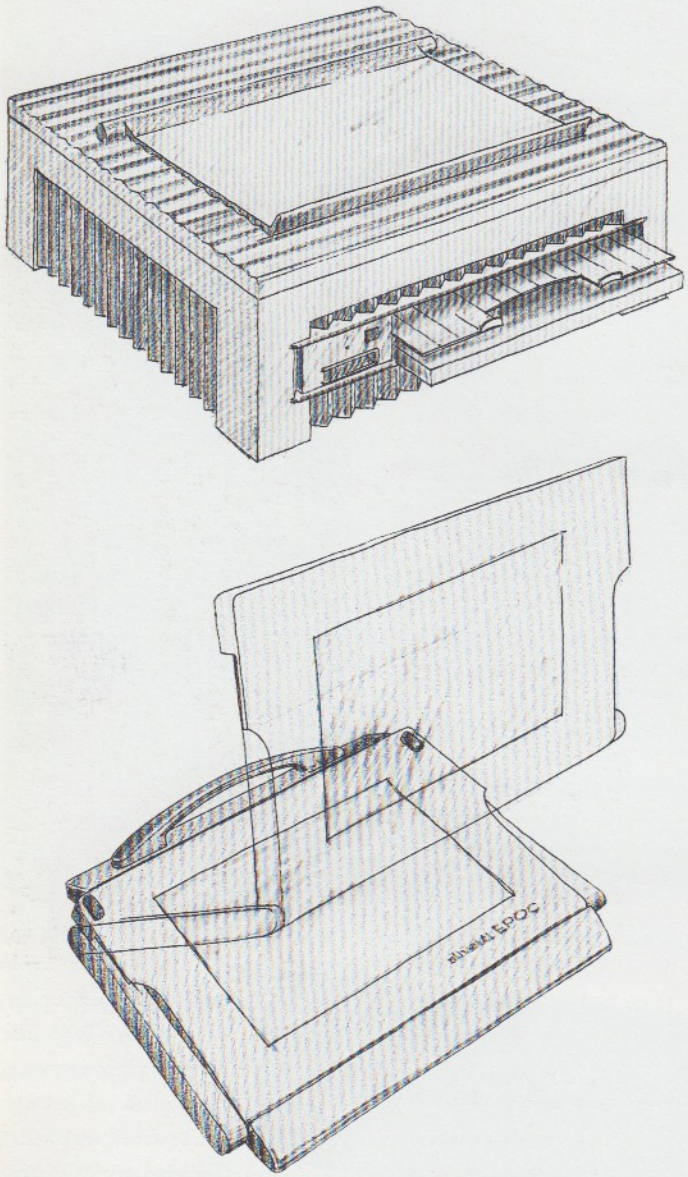
As personal computers became more powerful the quality of the user interface increased also in the input output devices. Screens have increased resolution and more color. Printers, especially laser printers, produce quality formerly only associated with published material.

Although not widely used yet, we have taught computers how to speak reasonably well, albeit with a machine accent. Progress is also being made with the field of voice recognition. But this is a much more difficult problem than voice synthesis.

Today it is possible to recognise approx. 5,000 words if spoken in isolation. The next step will be continuous speech recognition, but it is clear that we need to develop better

M24, the most common Olivetti work station, works both in a network and on-line.

A sketch by King and Miranda for Epoc, a computer being developed that integrates an optical scanner, a printer, a flat screen, and a telephone - all in a single machine.



programs at the syntax and semantic level of speech recognition before this is possible. We need to make the computer "understand" what it hears. Hearing without understanding does not seem to be possible.
Speech is important, because it is the human output channel with the highest band width. We can speak faster than we can write. The input channel with the highest band width is of course the eye, and that is the reason why displays are so important.

Role reversal

In the past, computer scientist have worked very hard to change their way of working to fit the computer.
Today many people are preoccupied with the question: How do I design the computer interface in such a way that it is easy for humans to use?
It is difficult to predict what will happen next in this very fast moving story of man and computer. Is it speech that will bring about a great improvement in the man-machine interface, or will 3-D displays or even holography have the greatest impact?
My personal opinion is that it is not progress in a single communication channel between man and computer that will be most important. I think that the key is the combination of all these channels balanced carefully to suit particular applications.
In Direzione Olivetti Ricerca we are presently working on a new computer concept called EPOC for Experimental Personal Office Computer. As can be seen in Fig. 7, the EPOC integrates a scanner, printer, flat panel display, and telephone all into one unit. The scanner allows the easy input of paper documents into the computer.
The personal printer provides local output of documents as well as facsimile. The flat panel display is covered by a transparent tablet which provides "electronic paper" since we can write on it as well as use it as a display. The telephone and loudspeaker provides an integral voice interface and links the user to other computers anywhere in the world.
The real challenge now is to make the best use of all these new hardware features and provide the same degree of integration in the software. Object oriented languages and artificial intelligence will point the way into the future.
Having contributed to the design of a number of computers I feel that tremendous progress has been made in the quality of the man-computer interface. It is becoming more human with each new computer generation. As an optimist in these matters I hope to contribute to a new computer within my life-time who will be proud of its designers.

Hermann Hauser, Physicist, Co-founder of Acorn Computers, is Vice President for Direzione Olivetti Ricerca.

The Interface between Man and Automobile

Giorgetto Giugiaro

In the Medusa prototype, a four-door "berlinetta" constructed by Giugiaro in 1979-80, all of the controls can be operated without taking one's hands off the steering wheel.

I find the definition of the driver's seat as an interface between man and automobile to be quite interesting. Nevertheless I think it is more correct to focus the role of interface not so much on the driver's seat as an area but on the steering wheel, the gearshift, switches, pedals, and instrument panel — all of which represent the operative interfaces necessary to control and interact with the automobile. The development of design and technology has differed considerably in each of these interfaces and I shall try to analyze the changes and the future in this area — beginning from the state of the art that I encountered when I began to design automobiles.

An initial observation — at the end of the Fifites, the level of finishings and the quantity of accessories and electrical servo controls was far lower than it is today because the interfaces between man and automobile were limited to what was strictly necessary, while gadgets — more or less superfluous — had not yet been introduced.

The array of pedals was the same as today — three pedals in a row, the same quadrangular shape for brake and clutch, a rectangular shape for the accelerator.

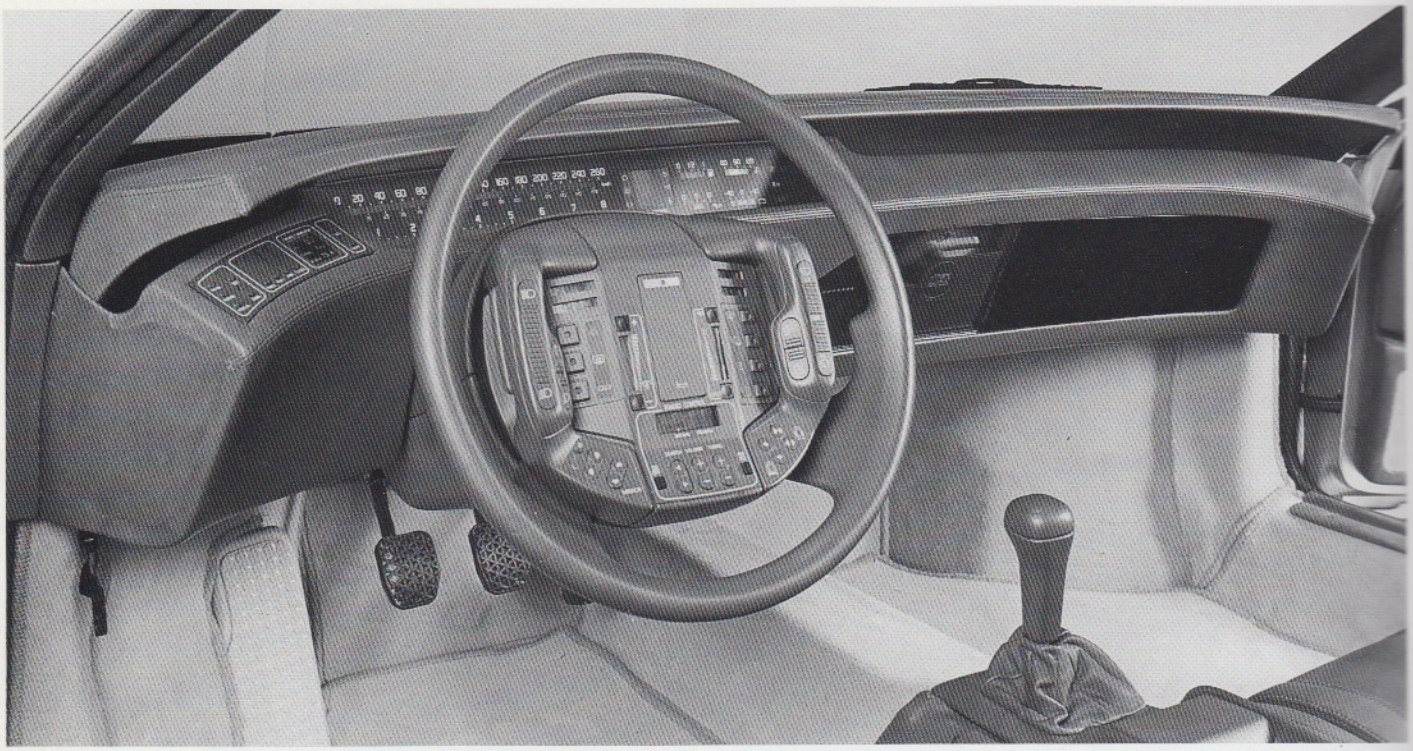
The steering wheel had on the whole a greater diameter than today's steering wheels because there was no power steering — except in luxury cars, and so to reduce the effort necessary car manufacturers increased the diameter. The horn was mounted in the center of the steering wheels or on the spokes.

The gear shift was almost always a "column shift," that is, coaxial with the steering column, which allowed a front bench seat which could accomodate three persons. Floor shifts were found only in small economy cars and sports cars.

Light switches, turn indicators, heating, and windshield wipers were split up between coaxial steering column levers and switches set in the center of the dashboard. In most cars these controls were not identified with specific graphic symbols, and there were no lights or indicators showing their operation. The driver therefore had to carefully study the instruction book in order to understand the various functions of a number of identical switches. They were certainly not much to look at in terms of functionality, but in the Fifties, the important technical problem was to make cars reliable — and certainly no one was talking about ergonomics.

The instrument panel was spartan and analog: speedometer, odometer, light indicator, alternator light, and oil pressure. The RPM counter was found only in a few luxury sedans and sports cars. The clock was a high-level optional.

The steering wheel of the Maya prototype, constructed by Giugiaro in 1984, houses within it a stationary disk that incorporates the controls of all the vehicle's functions. The steering wheel thus becomes a total operating center of the vehicle and the dashboard, which is thus freed of controls, takes on a less technical appearance and begins to resemble a drawing room.



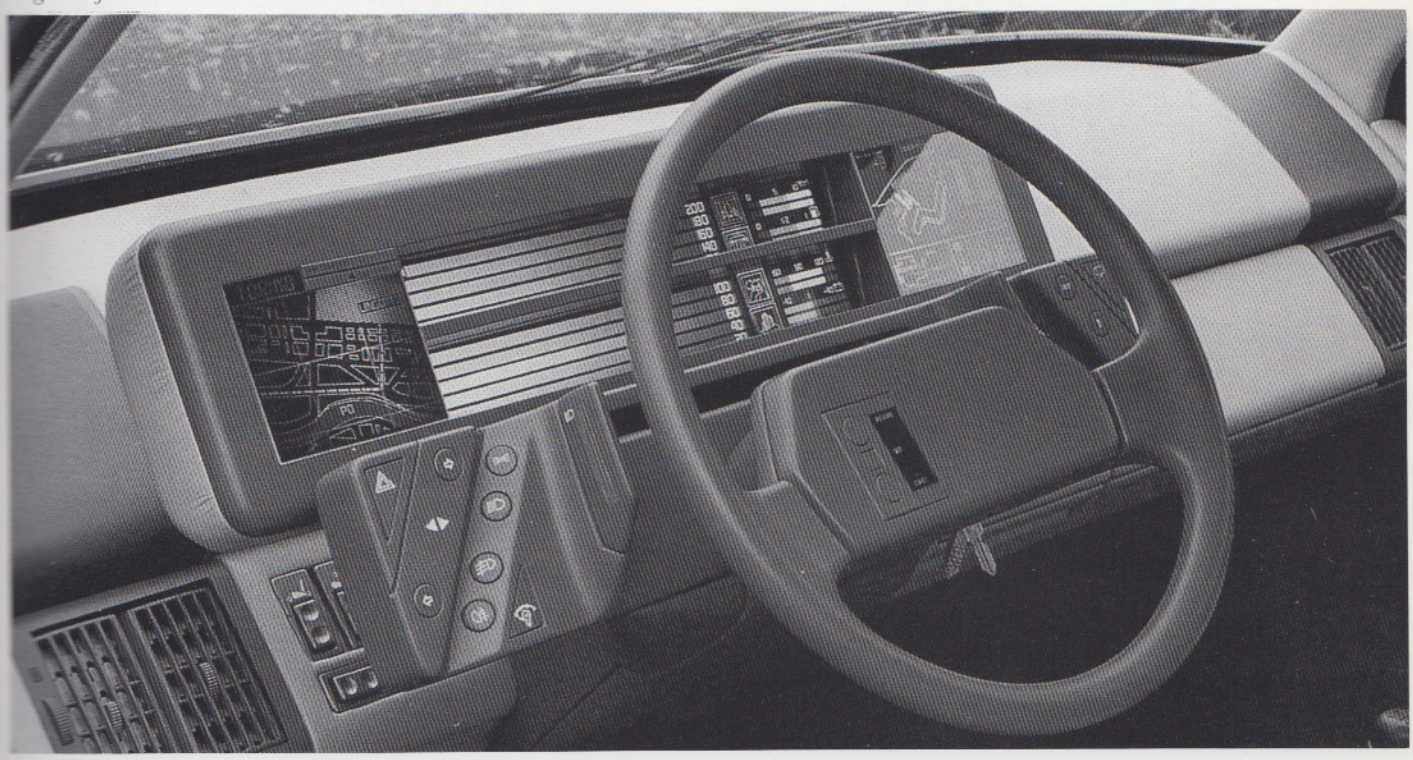
These were the starting point of the development that we will discuss; it is however necessary to point out a basic premise:
— there is regulatory development that is imposed on automobile manufacturers by legislation and which results in immediate modification across the market;
— there is subjective development generated by manufacturers' Research Centers or by market research. In theory, this development could be much more rapid than it is, but this rarely happens because innovation often means cost increases.
Therefore interesting developments in the areas of safety or comfort have been introduced much more slowly than technology would have allowed for purely economic reasons. This observation is not intended as the lament of a victimized innovator, because I am perfectly aware that the speed of innovation is reduced by cost considerations that are fundamental both for industry (the aim of which is to earn profits) and for the market, which correctly requests the most economic vehicles possible — nevertheless I feel that sometimes a little courage wouldn't hurt.
Now let us look at the principal changes undergone by the individual man/automobile interfaces, the role played by regulations, and the influence of designers and marketing people.

Gearshift

By regulation, the gearshift was removed from the steering column and moved to the central tunnel, because if there was a head-on collision, it constituted a dangerous projecting element.

The designer's intervention proved to be relatively modest — variants in the leather finishing, and ergonomic research into the best knob shapes. These shapes were however always rejected by marketing because they were not believed to please the public.
In terms of functionality in the past three or four years there has been a repositioning of gears — reverse, which in most cars was "under" fourth gear, has moved alongside first gear (or even in the same position as first gear but with a button/lever that selects reverse). This is far more practical because in parking maneuvers the previous positioning of gears obliged the driver to strain his arm and often miss the gear desired.
From a technical point of view, today it is possible to have a gearshift where the selection of the relationship is not carried out by moving a lever but simply by pushing a button. This is an interesting solution that nevertheless would encounter resistence among most drivers who are accustomed to gripping a lever and would feel rather lost facing a button console such as can be found in elevators.
For a designer this would mean that the shift would be located on the dashboard, which would free the central tunnel and allow better use of the available space by passengers. It would thus be possible to design extremely snug interiors like in central-engine sports cars and incorporate large drawers for objects, stereo systems, accessory controls. Or else it would be possible to return to the sedan with a front bench seat which allows six-passenger cars (three to a seat); a solution that was used widely by many manufacturers until the column shift was outlawed.

The driver seat of the Together, a research vehicle for space wagons constructed in 1984. The dashboard houses a map computer with magnetic files.



Steering wheel

The improvement in steering systems and the presence of power steering even in mid-level automobiles have accustomed us to smaller and smaller steering wheels, which have proven extremely useful in parking maneuvers because of the reduction in arm movement.

The horn is mounted on a lever coaxial with the steering column so that it can be operated by moving just a finger instead of the entire hand. In ergonomic terms, this is a reasonable solution. Nevertheless I prefer the horn in the center of the steering wheel, because I feel that this is a more instinctive positioning, especially in case of danger.

The two design tendencies that I have tried to introduce are, first, an increase in the diameter of the rim itself so that it can be gripped better and thus improve safety; second, I designed two bulges where the thumbs would go, since when we drive we do not grip the wheel as if we were holding a tennis racket but leave the thumbs open, thus providing adequate support.

Controls

This is the interface between man and automobile that has undergone the most radical development permiting a series of new layouts that differ considerably one from another. Standardization has resulted in the introduction of standard graphic emblems for the various controls. Each manufacturer has maintained its own characteristics of identification, but most function controls nowadays are immediately recognizable. This standardization may seem unimportant, but it constitutes a genuine step forward since it means that any driver can take the wheel of any car and be able to drive it immediately with full confidence.

Most switches nowadays are equipped with internal illumination and visualization on the instrument panel, two other seemingly unimportant developments to which we are now accustomed.

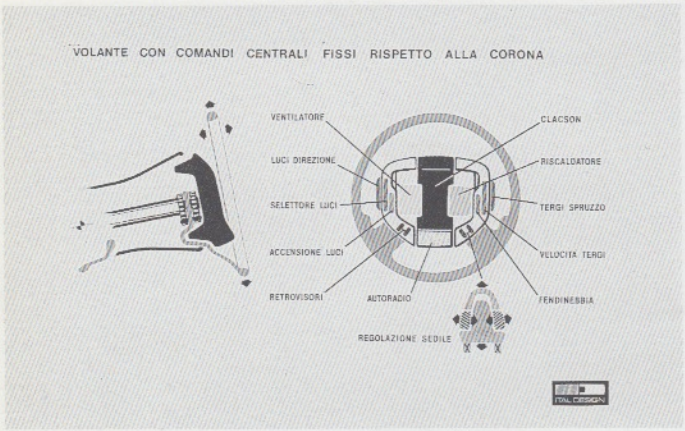
An important phenomenon is that of the massive introduction of electric servo controls and gadgets. This trend, generated above all by commercial needs of a few manufacturers that wanted to differentiate their products in a mature market by increasing the performances available, is now common to all manufacturers. And so, in the general frenzy to add continually and never reduce, we have super-accessorized vehicles that weigh and cost more. The consumer (who was supposedly being offered advantages) sometimes wonders if he is disadvantaged with respect to the period when controls were limited to those truly necessary.

Thus nowadays we see thermal rear windshields, electric windows, rear defoggers, centralized locking (standard even on economy cars), extremely sophisticated climate control systems, headlight washer/wipers, beam height adjustment, electric gastank cover opening...

This careening increase of functions has forced designers to revise the positioning of controls — putting them all on the dashboard meant creating only confusion.

The current trends are three: (a) concentration of all the principal functions (lights, turn indicators, horn, windshield wipers) on the steering column levers and positioning of the other controls on the dashboard; (b) positioning of all controls on two satellites set on either side of the steering column; (c) compromise between the first two solutions — principal controls on the column levers, second-

The lay-out of the centralized controls incorporated in the steering wheel.

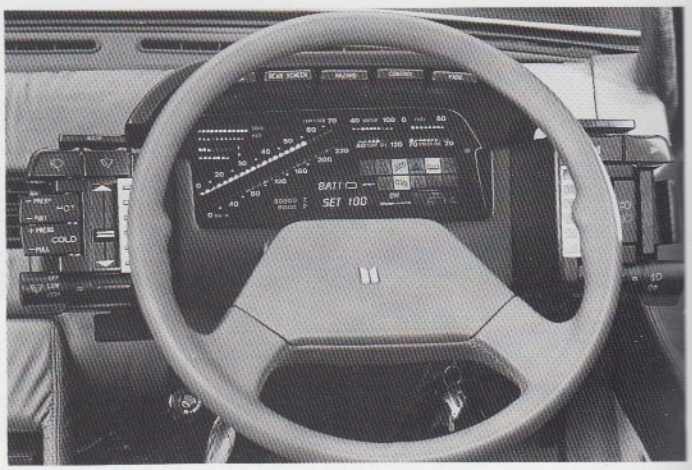


ary controls on the satellites.
The satellite constitutes a considerable design revolution — on the one hand the instrument panel becomes more important, on the other hand the dashboard is stripped of all technical content, and becomes merely furnishing. Hence large trays for various objects, or else extremely sunken dashboards, that were impossible before as they would have made the secondary controls unreachable.
I personally feel that satellites are valid only if they are ergonomically perfect. This is pretty difficult because compromise between small and large hands, long and short fingers leads to hybrid solutions that often prove less functional than the traditional levers.
The ideal solution would be to have the possiblity of regulating the distance between the steering wheel and the satellite so as to put the controls at the fingertips of any driver. Technically, simple, though — slightly more expensive than a fixed satellite, but it would be the only solution that would make the satellite truly ergonomic.

Steering wheel that incorporates controls

This is a solution designed for an experimental prototype called Medusa that I have been pushing for five years.
The initial observation is quite simple — if the philosophy of the satellite is that of allowing the operation of a control by lifting a single finger from the steering wheel instead of the entire hand, then why not make the center of the steering wheel a single satellite that incorporates all the controls? This idea was at the origin of the steering wheel of the Medusa (1980), then developed into the wheel of the Orca (1982), and attained perfection in the Marlin and Maya (1984).
The Maya represents a synthesis of my experimentation in this area — the center of the wheel houses all the principal controls, secondary controls, climate control, electric regulation of the seats, and the stereo system. In this way, the steering wheel becomes a true operative center and not only a system for regulating direction.
In technical terms, this innovation poses the problem of designing a number of cables that must run parallel to the steering column and be able — at least in part — to rotate.

The steering wheel and control console of the prototype Piazza Isuzu (1979) in two versions — with digital instrumentation (above) and analog instrumentation (below). Giugiaro prefers analog instrumentation because less time is required to read it.



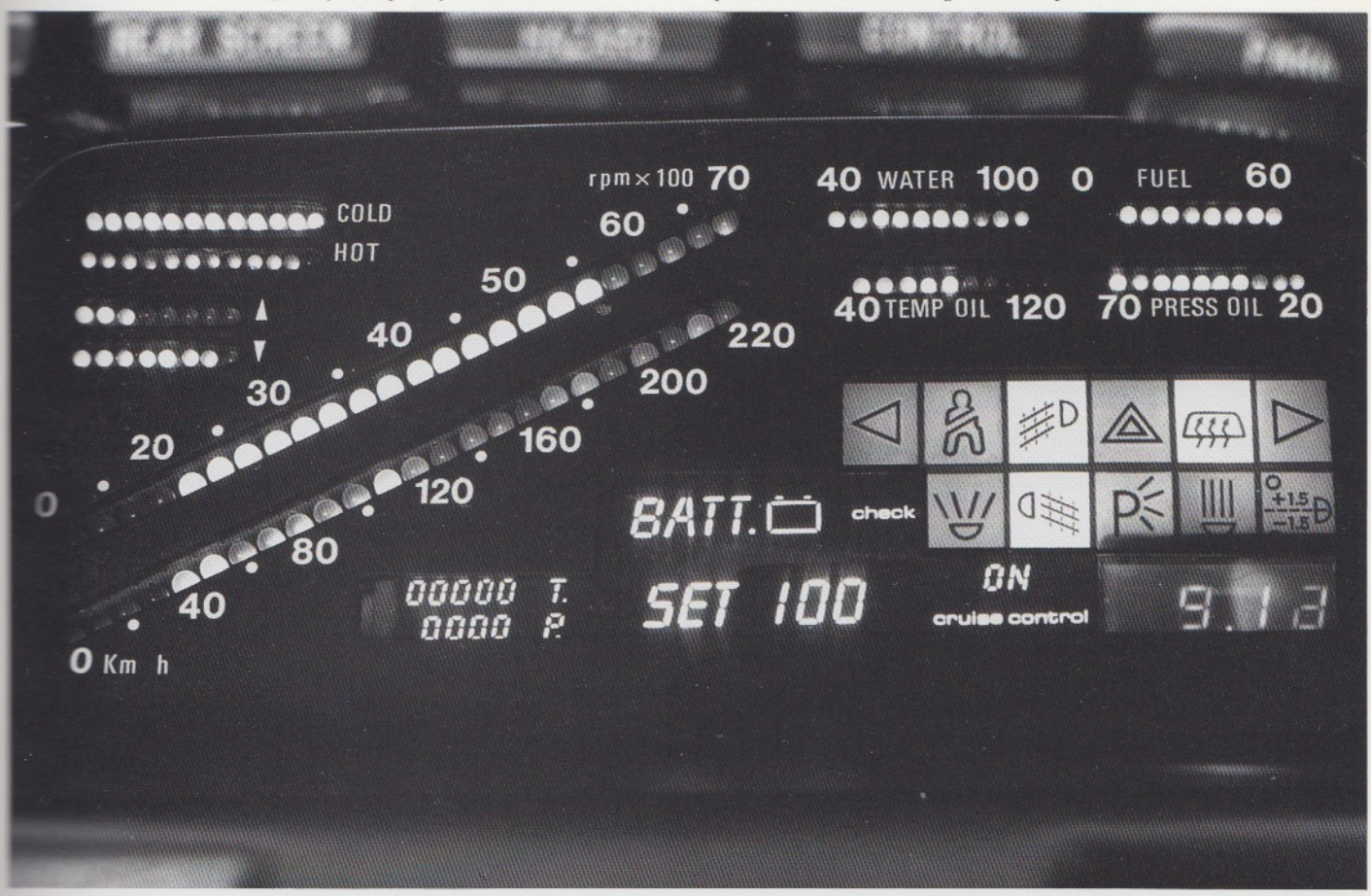
To solve this problem, we have patented a system that utilizes an ultrasonic transmitter housed in the steering wheel and a receiver behind the dashboard.
I am deeply convinced of the worth of this solution, and so I improve upon it each time I design a prototype. No manufacturer has yet decided to produce it, but I hope this will happen soon. Furthermore, I am comforted by the positive opinions of many of the journalists who have driven these prototypes.
From a design standpoint, an integrated steering wheel/controls group frees the entire dashboard, making it only a piece of furnishing and making the interior of the vehicle less technical and more parlor-like. This is not to belittle the technical aspects of the car — the Maya is a high-performance two-seater coupé in which I have concentrated the interface in the steering wheel and left the rest of the vehicle freer and less claustrophobic than other sports cars.

A joystick in place of a steering wheel

The joystick-style steering wheel that I developed for the Incas (1986), is not meant as a gadget but is as a contribution to research into a radically new layout of a driver's post. Recent marketing studies done in Japan (which led Mazda to present a prototype icorporating this solution at the Salon of Tokyo 1985) revealed that the generation of young people who grew up with videogames, upon reaching driving age, generally prefers driving with a joystick.

Analog instrumentation designed by Giugiaro for the Piazza.

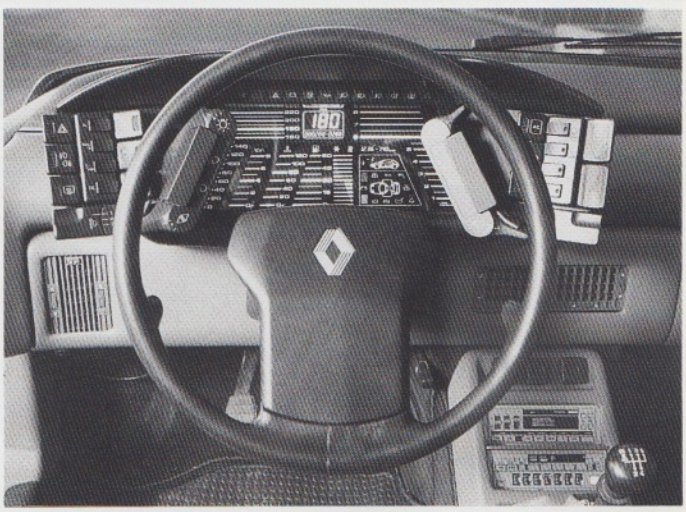
Below, the steering wheel of the Gabbiano, a four-seater coupé prototype with gull-wing doors, constructed by Giugiaro in 1982-1983.
Here the controls are consolidated into two satellites and can be operated without removing the hands from the wheel.



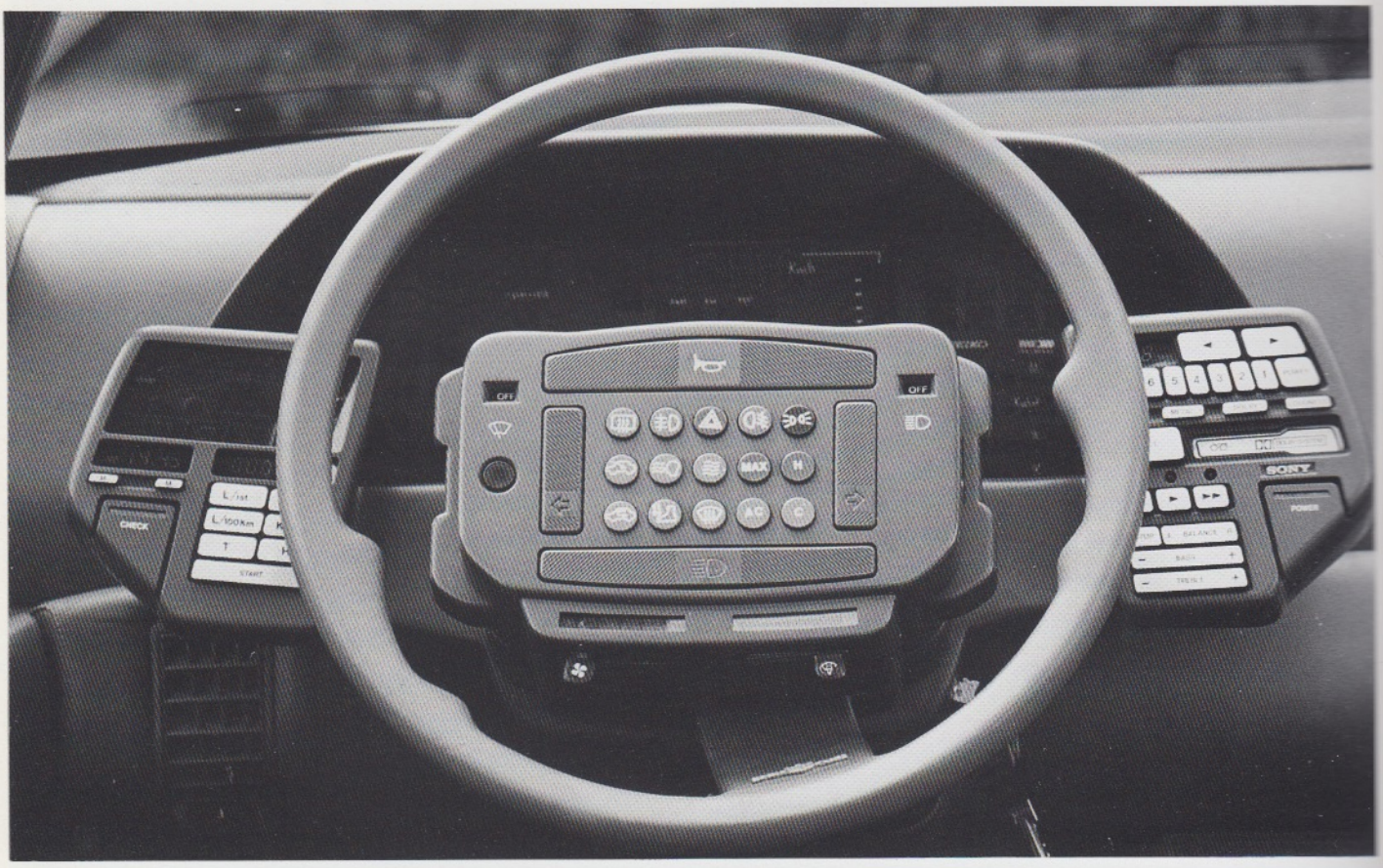
The joystick of the Incas requires a steering angle of only 90° per side; the right-hand grip incorporates the controls for the gear shift, heater, air conditioner, and windshield wipers; the left-hand grip controls lights, turn signals, stereo system, and cruise control. The horn can be operated on either side; the selector of the automatic shift was achieved with a button panel which has a key for each position (P, N, D, 1, 2).
How long will it be before we see mass-produced cars with joysticks? This is a question to put to an oracle, not a designer. The designer's job is to offer feasible and ergonomically valid solutions for this new frontier of driving.

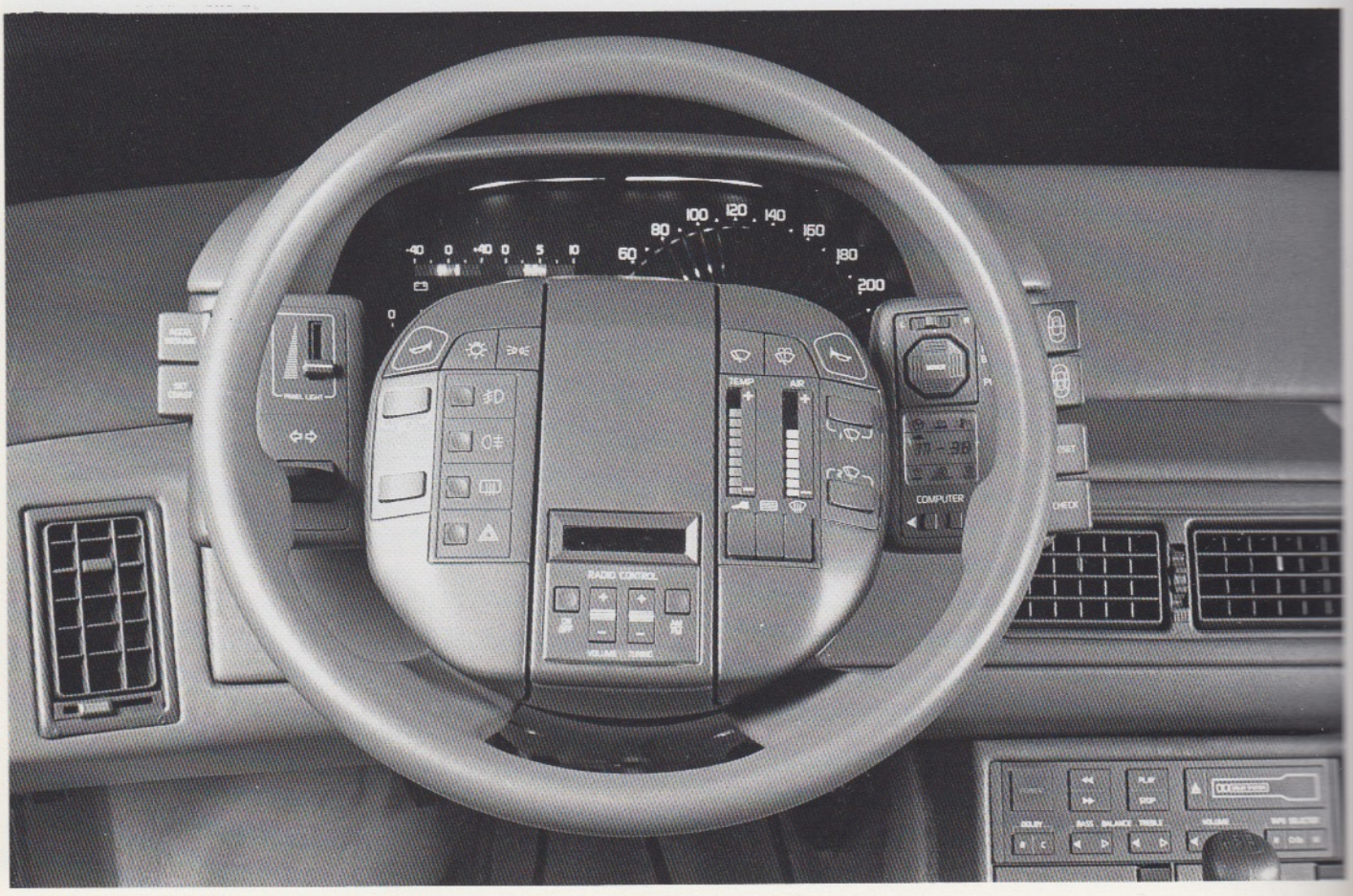
Instrumentation

This interface has undergone an interesting change — the dials have gone from round to square and then back to round or else oval. The only real structural development has been in the area of visualization: analog or digital.
I personally believe that the most valid method is analog — after using the vehicle for a while, it is enough to take a just look at the position of the needle in order to read the speed or RPMs of the car. Digital instruments instead require a slightly longer comprehension time — it is no longer sufficient to glance, it is necessary to read a number. It may not seem important, but these are seconds of distraction from driving that can prove fatal, and so it is necessary to look for solutions that are as immediate as the analog dial. On the most recent Ital Design research prototypes, I developed a combination of different colored leds which offer immediate legibility and in functional terms represent a compromise between analog and digital. The most sophisticated solution is in the Marlin : an array of led segments are arranged in a semicircle. Each segment represents a velocity (with a marker every ten kilometers) while the leds light up progressively changing color to indicate the number of RPMs. In practical terms, this means that at a single glance it is possible to receive two different pieces of

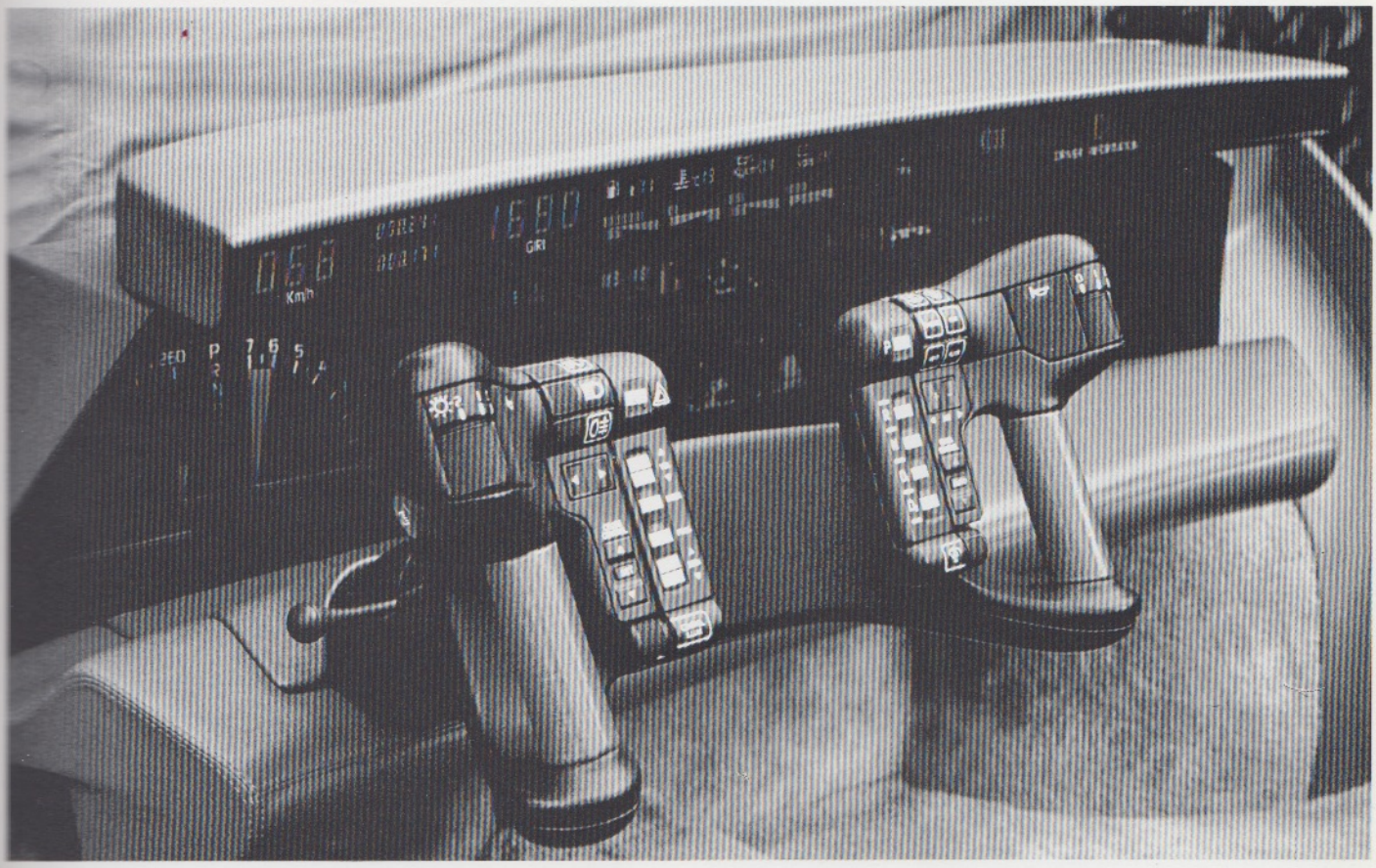


In the Incas prototype, a radically new layout is proposed for the interface between man and machine - the steering wheel is a joystick like that of airplanes. The right-hand grip incorporates the controls for the gear shift, heater, air conditioner, and windshield wipers; the left-hand grip controls lights, turn signals, stereo system, and cruise control.





Steering wheels with incorporated controls for the prototypes Orca (1980-1982) and Marlin (1983-1984).
In order to avoid the need of running cables through the steering column, Giugiaro has patented an ultrasonic transmission system.



information — speed and RPM. Digital and electronic instruments will progressively replace analog instruments, and this represents a considerable creative enrichment for the designer because it allows massive use of color (previously impossible) as well as an approach to shapes and dimensions that is substantially different.
Research in Japan is tending toward the use of tiny television screens that link up with the on-board computer and permit the selection of some very sophisticated graphs developed and programmed by the manufacturer. In theory, this allows anyone who has a slight familiarity with computer graphics to create their preferred visualization, a sort of "personalized dashboard."

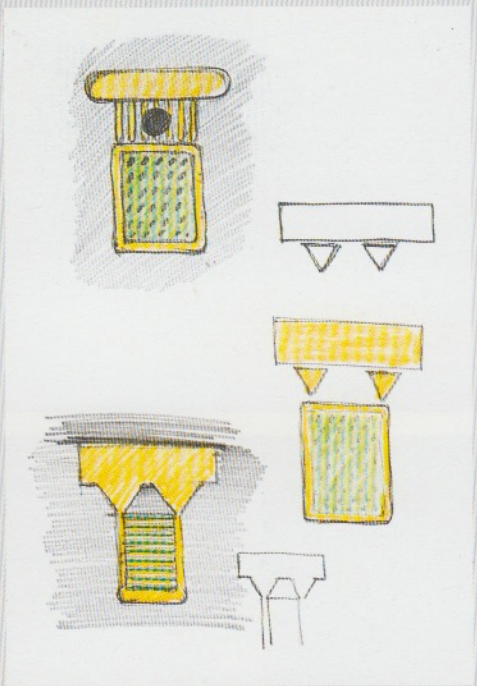
At the same time, I wonder whether the driver will soon tire of this sea of information, which may also distract him from the serious business of driving. A program to put in the memory would be an on-screen analog speedometer and a red zone that would blink if something malfunctioned — then all that would be necessary would be to push a button in order to see the defect, the origin, and possible solutions. This, more than telematic instrumentation, seems to be intelligent instrumentation.

Front brake lights

A new interface between man/automobile and the outside world. In practice, one mounts some colored lights on the front of the car which light up when one brakes.
In this way a pedestrian can tell if the machine that is approaching has begun to brake or not, and in the same way, in a line of cars, a driver can tell the intentions of the car behind him instead of just trying to guess them. This would be a very inexpensive interface that would provide a considerable degree of safety — I hope that this becomes a required element soon, because it would be useful for everyone. Everywhere.

Giorgetto Giugiaro is a designer and the president and founder of Ital Design, Moncalieri, Turin.
Interview by Luca Ciferri.

First sketches by King and Miranda in their search for forms for the new Olivetti keyboards. Already we can see the functional discomposition between the information zone and the target zone of the keys.



"Designing the new Olivetti control keyboards: for us it meant giving color and form to the sensitive portion of the machine, the part that allows access, that permits one to enter into communication with the machine." King and Miranda prepared themselves to carry out the project for Olivetti by conceiving the keyboard as an "interface" between man and machine. The sensitive zone in which the exchange of signals between the operator and his instrument takes place, in what Santiago Miranda calls "the little loincloth of the electronic machine."[1]

Separation of functions

In every key, two functional elements can be distinguished:
— an active element, that communicates from the machine toward the user, through a visual stimulus that sends a message regarding the machine's availability for a given operation; this is the information zone.
— then, a passive element, which permits communication by the user toward the machine, through a tactile stimulus which accompanies the operation selected; this is the target zone.
The information zone and the target zone normally coincide in the key, a sensitive three-dimensional object that communicates (with a letter, a number, a symbol, a legend, a color...) the performance for which it is available, and at the same time, after receiving adequate pressure exerted by a finger, is capable of setting in motion and completing the available function indicated.
King and Miranda's decision for the new Olivetti control keyboards was to maintain in the design the functional division: the target zone separate from the information zone.
In traditional keys, the finger that struck the target zone hid information. This is perfectly acceptable for a professional keyboard, utilized by a specialized operator who quickly memorizes the position of the keys and connects them to their respective functions — the specialized operator (the most common case is that of the office typist) does not even look at the information written on the keyboard, which is already internalized as part of the professional preparation.
The dissemination of electronics and its tendency to become an everyday tool available to ordinary "naive" operators necessitates the complete visibility of the information zone. Therefore the key proposed by King and Miranda bears on its upper portion (corresponding to the eye) elements for visual identification (legends, symbols, leds ...) of the task which it indicates is available; on its lower portion (corresponding to the hand) there is a sensitive zone, capable, when touched, of carrying out the task indicated. Consistent arrangement of functions and the appropriate use of forms and colors make it possible to link the information zone immediately to its target, and to identify the target with ease.
The possibility of making functional separation operative becomes a concrete reality through the use of electronic technology, which permits the miniaturization of the key so that it becomes a tiny button (like in some of the new keyboards of microcalculators or telephones) or even tranforms itself from a three-dimensional object to a small sensitive surface on a touch panel.

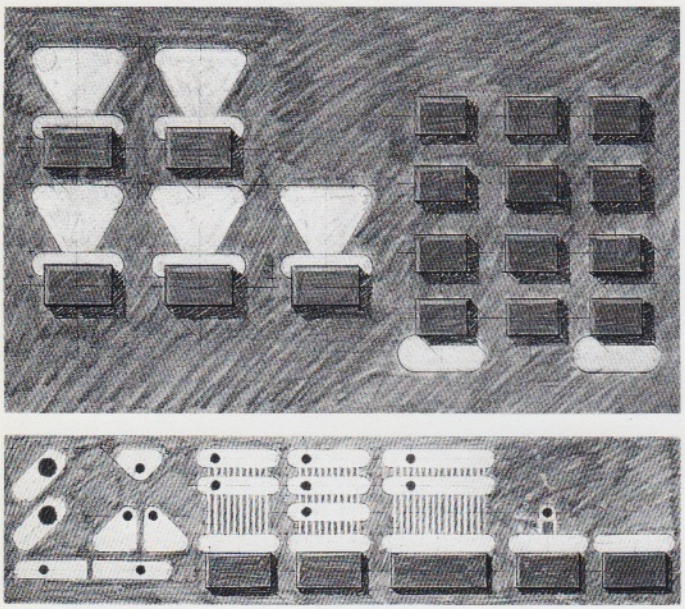
Sketch of the keyboard for the TLM 320 telecopier.

Open configurations

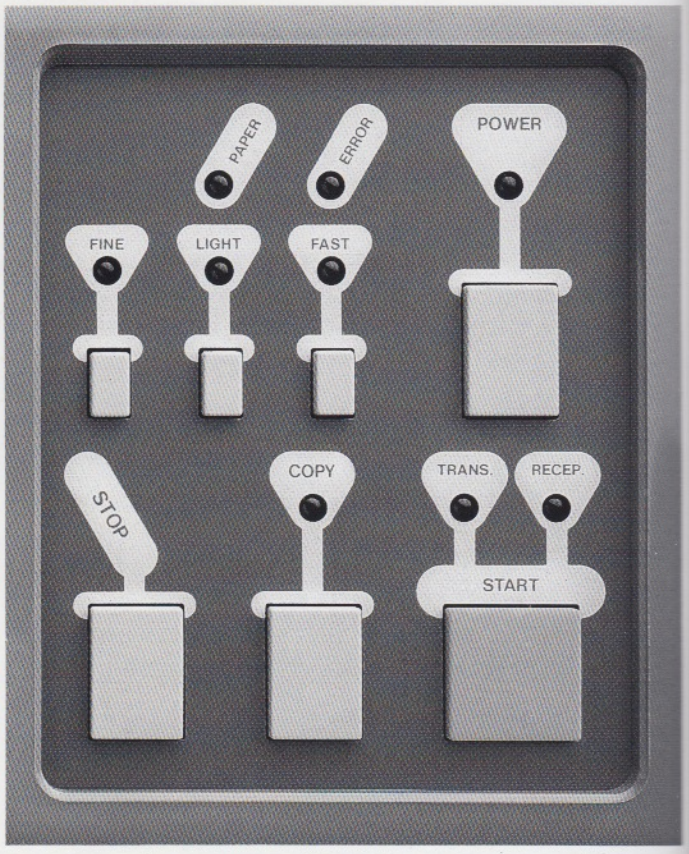
It was the great period of Western industrialization that led to the diffusion of keys, pushbuttons, levers, and switches as "keys" to guide the mechanical movement of machinery; the climate was that depicted by Fritz Lang in the film

1. See *Design Process Olivetti 1908-1983*, pp. 348-51; "Olivetti Consoles," in *Space Design* 3, March 1983; S. Miranda, "Storia di un progetto"; "At Last - the Sensuous Keyboard," in *Design* 412, April 1983; D. Sudjic, "Friendly Feelings," in *The Times*, 30 June 1983; "Ertastete Tastaturen: taktile Informationschriften," in *Form* 101, I, 1983; "Nuove consoles per le macchine Olivetti," (Milan 1983); introductory text of the Olivetti Standard Consoles project at the Compasso d'Oro 1983. "Appunti sull'interfaccia," the text of a seminar held by P.A. King and S. Miranda at the Domus Academy in Milan (Milan 1985); G. Barbacetto, "Tastiere per operatore ingenuo," in *Modo* 78, April 1985.

First studies of the subsidiary keyboard for the TLM 332 telecopier and, below, for the principal keyboard.



The rubber membrane keyboard for the TLM 320. The shapes, their arrangement, and the colors create the hierarchic recomposition of information.



Metropolis. The machine, a huge heavy magical assembly of gears in motion, was controlled by a man through his manipulation of bridge-objects: the lever that started or stopped the gears, the pushbutton that set into operation a mechanism that opened or closed electronic circuits, the key that transferred onto the little hammers of a typewriter the applied force of human fingers. The machine era inaugurated the preeminence of mechanics (among various technologies) and physics (among the sciences). With the diffusion of electronic innovation, however, the scenario altered considerably, and the smoky setting of *Metropolis* gave way to grey and ascetic landscapes in which red lights blink and the diffusion of force is replaced by the management of information.

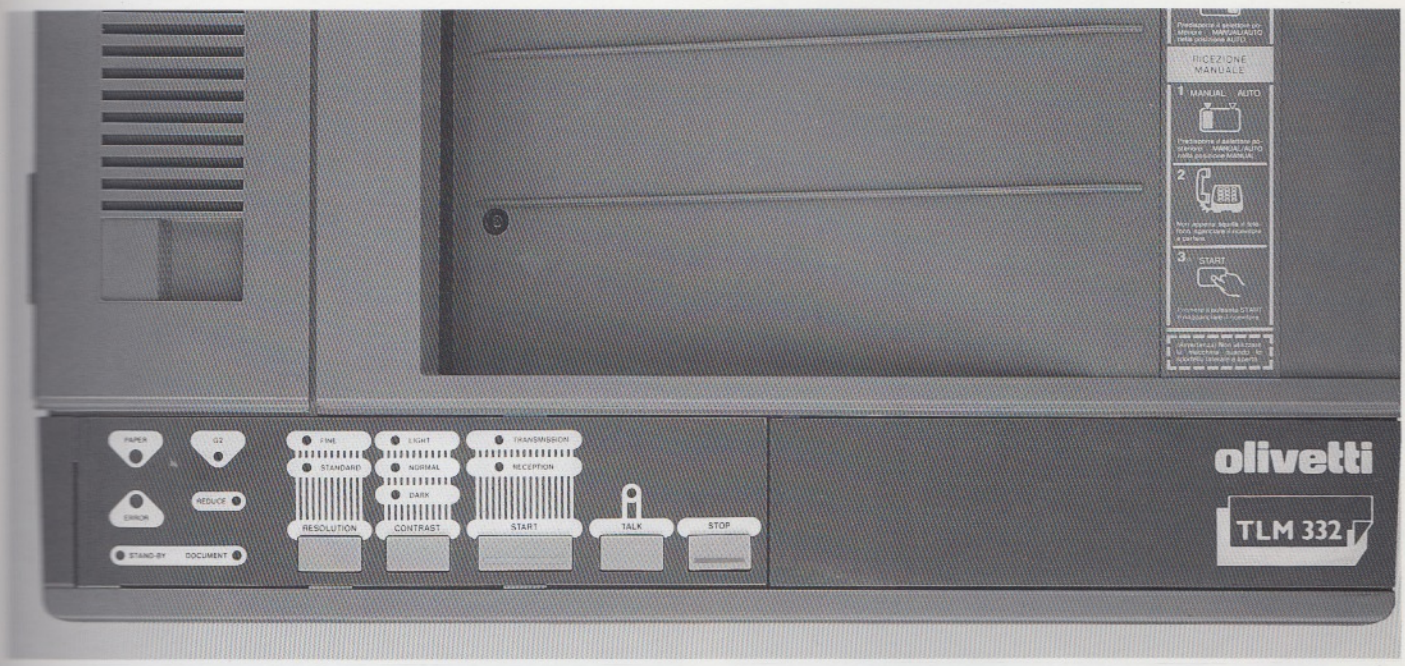
The key also becomes lighter — it no longer has to support the pressure needed to move physically mechanisms and little hammers, all it needs to do is deliver an impulse to a microelectronic circuit. The three-dimensional key-object shrinks or even disappears, replaced by sensitive panels that open circuits and activate machinery at the touch of a finger. It is in this context that King and Miranda reached their decision to propose for the new keyboards neither the old three-dimensional key-object — conceptually obsolete due to the progress of electronic innovation — nor the simple translation into two dimensions of the outlined key-space. We have already had an opportunity to observe how the first electric typewriters maintained many of the characteristics typical of their forerunners, the manual typewriters. The same inevitable inertia has also weighed down the passage to electronic keyboards. In thinking about the future, we can do no more than use and process, at first, elements that derive from our experience of the past — even the soldiers of the Merciless Ming who fought Flash Gordon had, amidst their spaceships, a vaguely ancient Roman look.

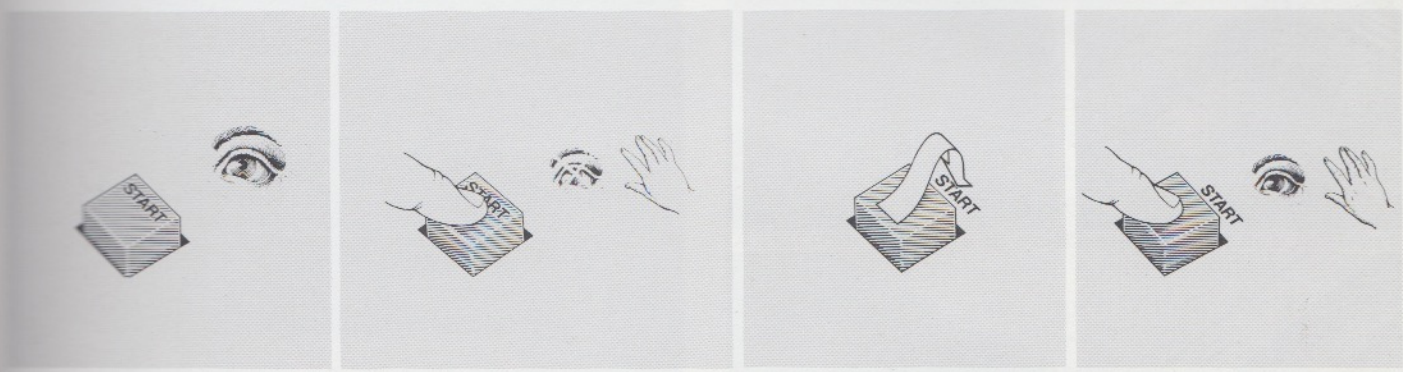
And so, many new keyboards have been designed as simple translations into a new formal language (two dimensional, flat) of the old design canons of traditional (three-dimensional) keyboards: outlining closed key-spaces — rectangular, square, or circular — on the surface of the keyboard-panel. It is something like taking a picture from above of the keyboard of a mechanical adding machine and then superimposing the photograph onto the space-keyboard of a new electronic calculator.

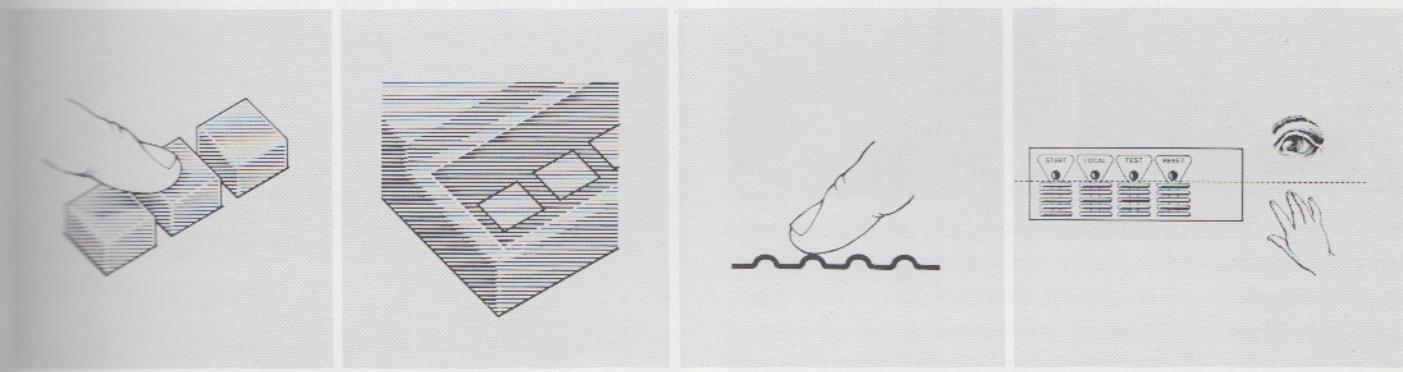
Avoiding this "linguistic counterfeit," King and Miranda sought a new syntax that would be appropriate to the new morphology. They replaced the habits of a design accustomed to dealing with volumes and sculpting shapes with, in this case, a "soft" design that could renovate the relationship with the machine, no longer in mechanical terms, but in terms of information. The logic of power, typical of keys designed to be pushed (final result of the development of the mechanical lever that, maneuvered with force, was capable of setting a machine into action) was replaced by the logic of utilizing the functional question/answer

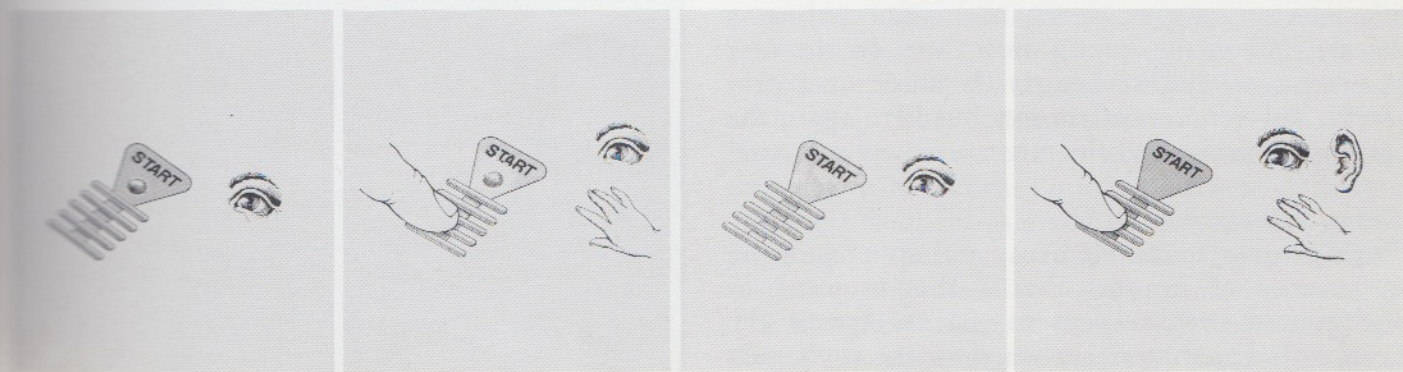
The console of the TLM 332 telecopier.

Below, the process of sensory decomposition: the finger on the key hides the view of the information zone; information is therefore removed from the tactile surface, into an information zone separate from the target zone; the sensory recomposition (including use of acoustic feedback) takes place in the new typology of a functional whole: the information zone and the target zone.



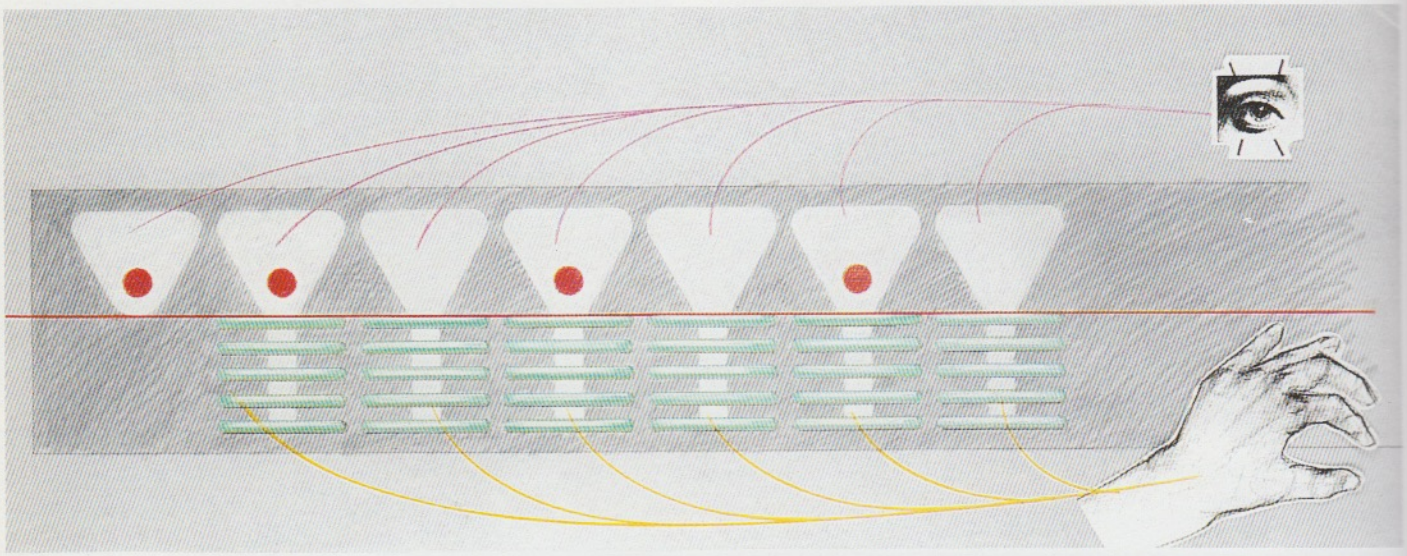


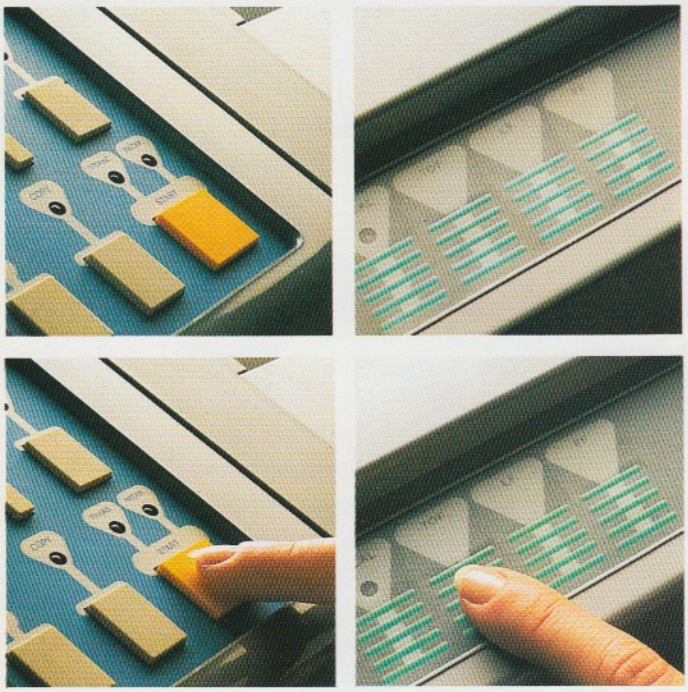


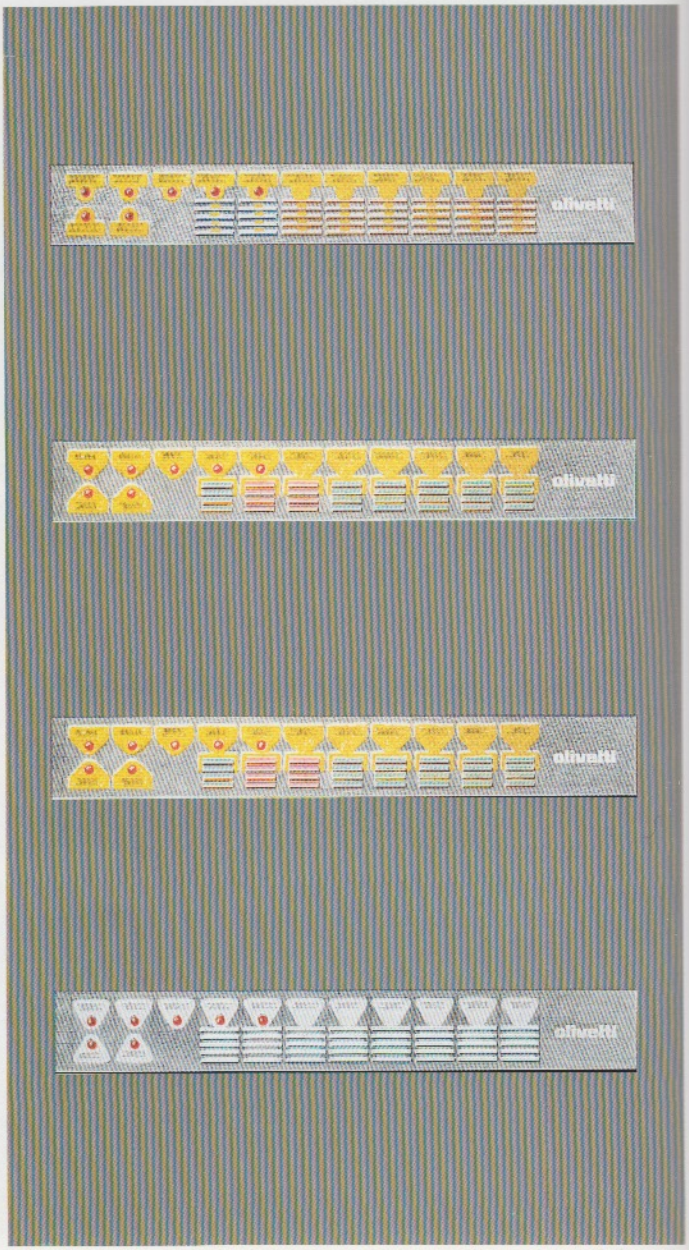


The distinction between information zone and target zone prevents the visual stimulation (from machine to operator) and tactile stimulation (from operator to machine) from overlapping, both in the case of three-dimensional keyboards and in the case of sensitive keyboards.

Below right, studies for definition of the shape and color of the keys.





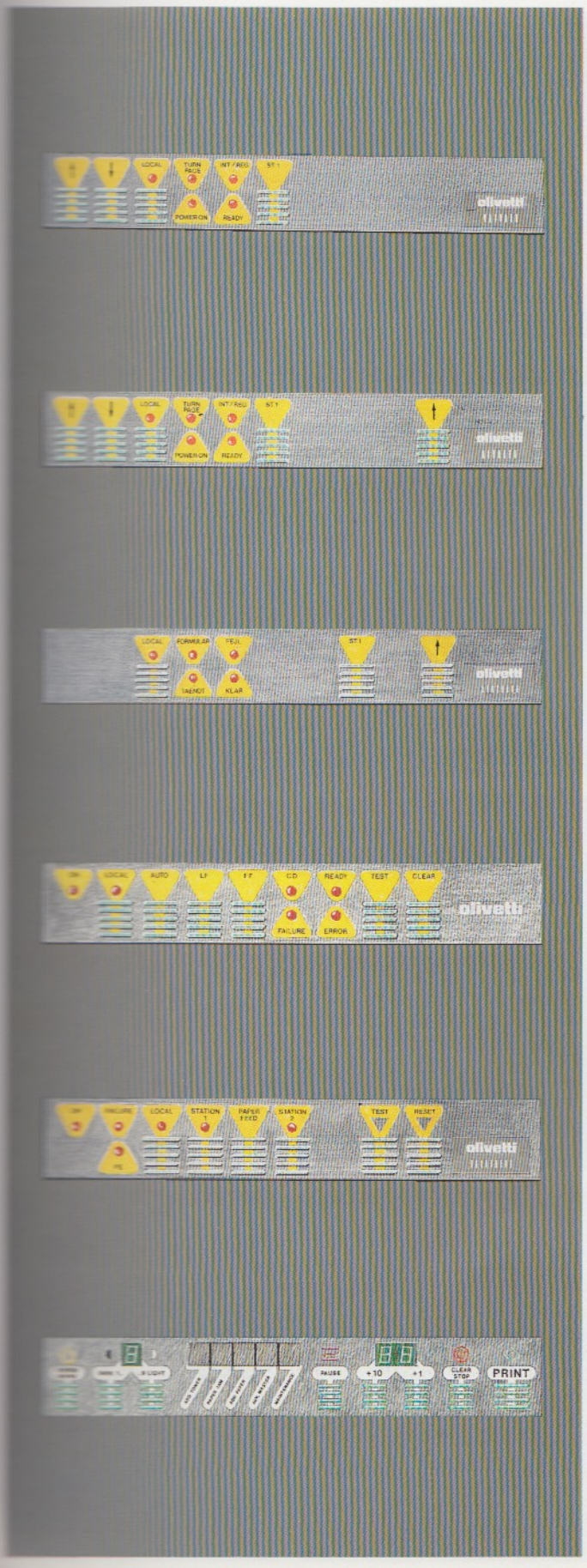


binomial. The functional separation of the key into an information zone and a target zone thus springs into existence — in touch keyboards — as open configurations, without perimeters. The target zone consists of an assembly of little horizontal elements or spheres, touchable, connected by a colored tab to the information zone. In the new three-dimensional keyboards the traditional projecting key remains of course, but here again the information zone and the target zone are separate.

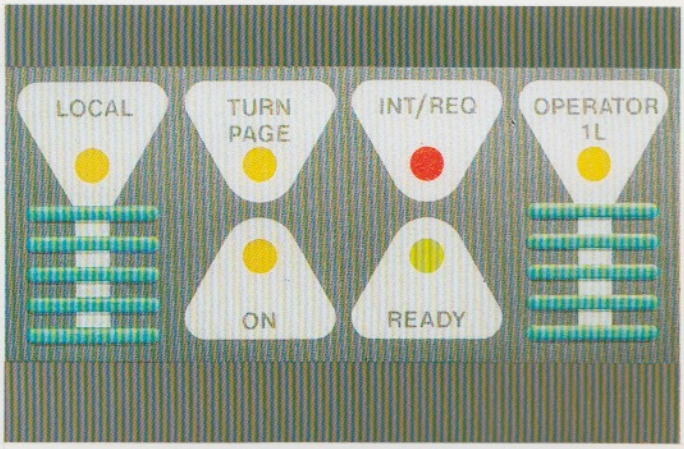
Sensory recomposition

The little horizontal elements and spheres of the target zone are in relief, that is, they project 0.25 millimeters with respect to the surface of the keyboard. The material selected for the keyboards

Console layouts for five different printing machines and a photocopier. The size of the console zone is the same for all of the printers shown here, while the number and arrangement of the functions housed in the same space change.



An example of an Olivetti printing console. Information and target are united in functional wholes. In some cases an information zone does not correspond to a target zone.

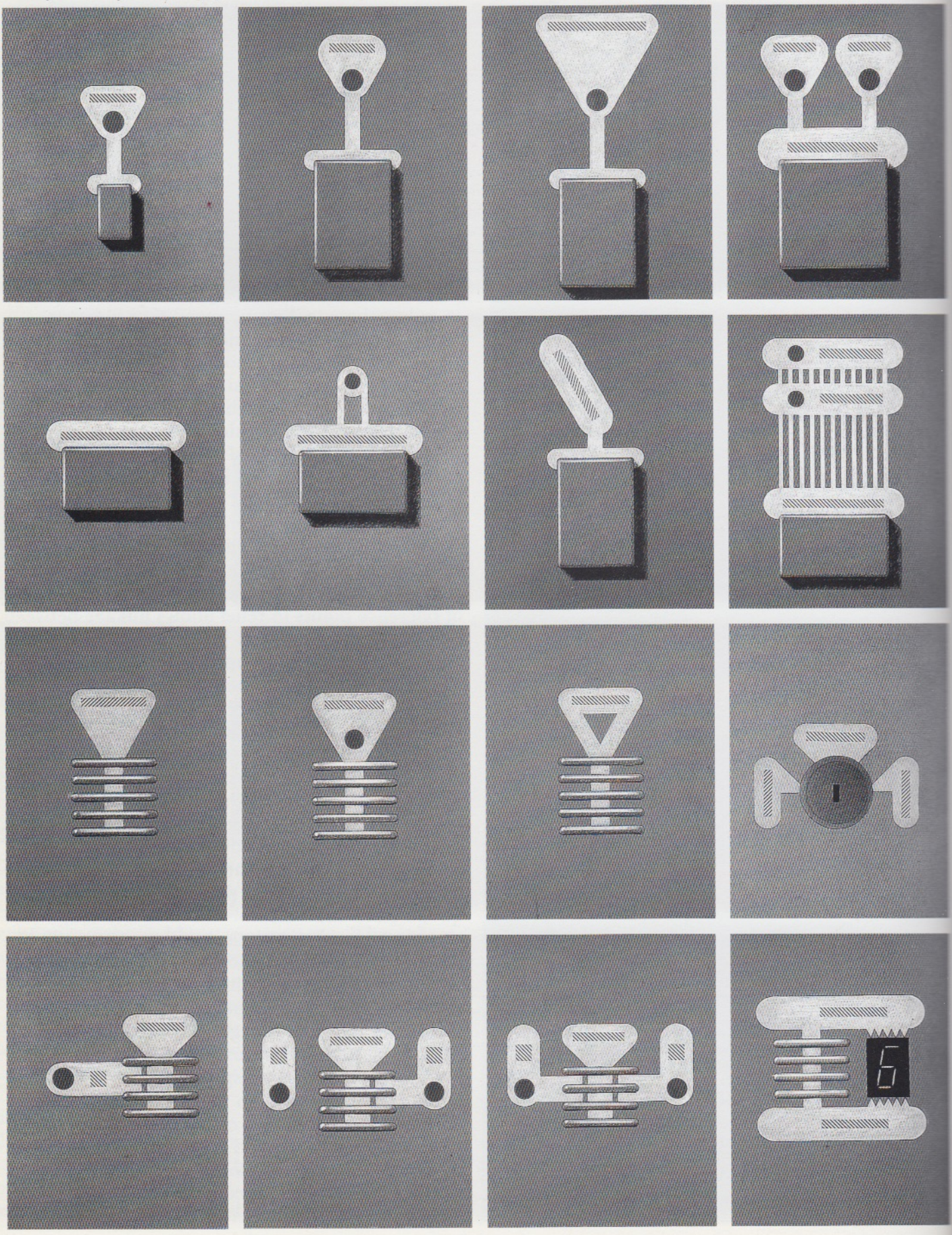


is polycarbonate Lexan, more durable than soft rubber which hardens and loses its elasticity with prolonged use; the method of production selected was direct hot pressing, simpler and more effective than other methods, such as silk screening with a deposit, for instance (which produces the relief by means of accumulation of plastic material on a flat surface). Here instead it is the surface of the keyboard itself that, after hot pressing, is moulded to form the colored elements in relief.

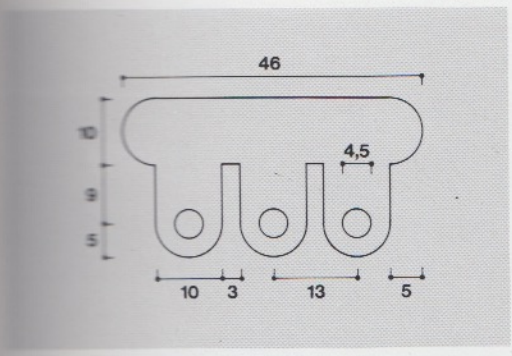
The configurations in relief recall the principle of Braille script, so that the target zone can also be identified by touch. In the Braille system a pattern of reference points in relief allows linkage between reader and text through tactile stimulation generated by the support upon which the text was "written" in relief. In the new Olivetti keyboards the process of using the key also sets into operation (in response to the functional discomposition that prevents at any moment overlapping of the two — visual and tactile — links) a complex process of sensory recomposition: the eye sees the information zone, from this zone it is immediately conducted to the corresponding target zone in relief, where sight operates as an invitation to touch; the tactile operation (slight pressure of the finger requests from the machine the task desired, while touching provides at the same time, thanks to the structure in relief, the tactile satisfaction that also serves as an initial feedback, a confirmation and reassurance that the operator indeed has completed the action that began with the initial visual stimulus). The configurations in relief (little horizontal elements and spheres) provide in tactile terms both identification and feedback. A further and final feedback is given by a slight downward yielding of the keyboard, and/or by an acoustic response generated by an electronic beeper.

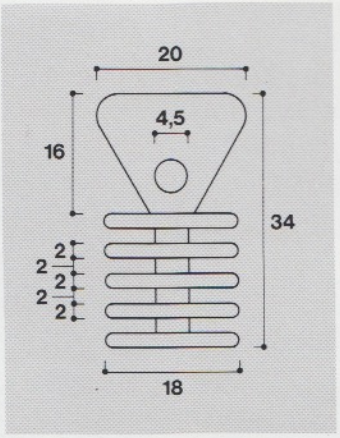
The designers' chief objective was to ensure complete and easy comprehension of the procedure of

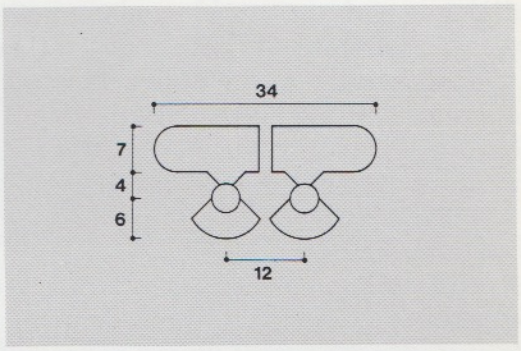
Studies for various types of three-dimensional, sensitive, simple- and double-function keys, with displays and leds, etc.

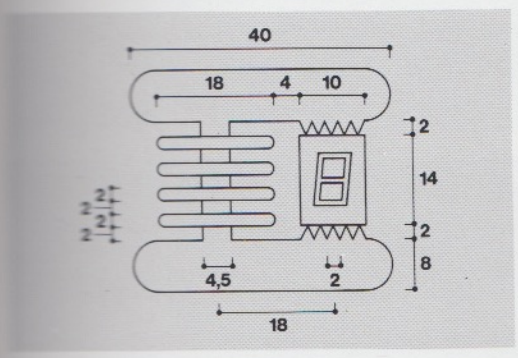


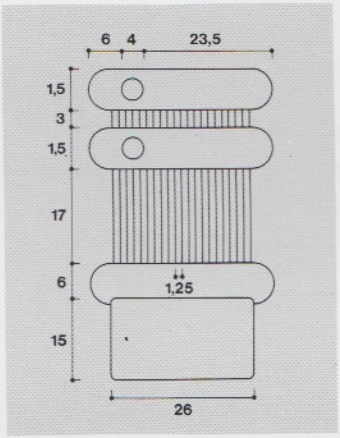
Drawings of the constituent elements of the keyboards. Just like in an alphabet of new characters, despite the smallness, each element is designed in great detail.

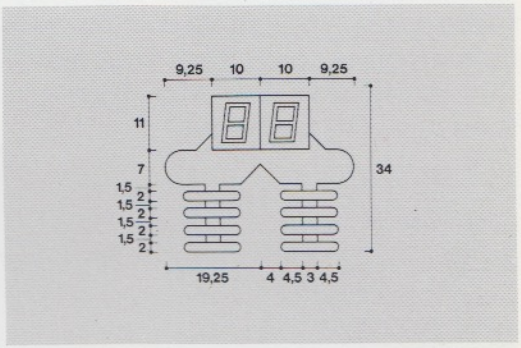


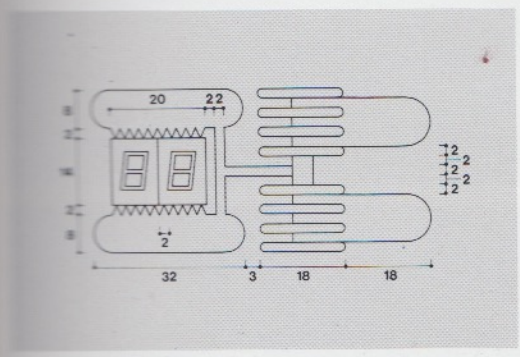


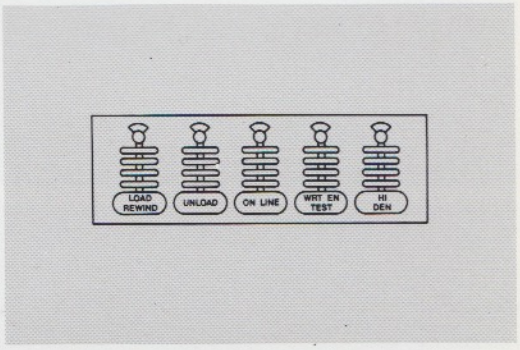


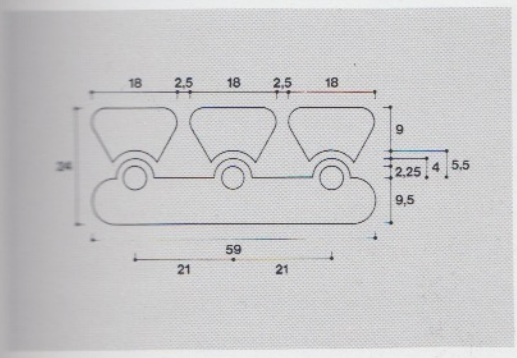


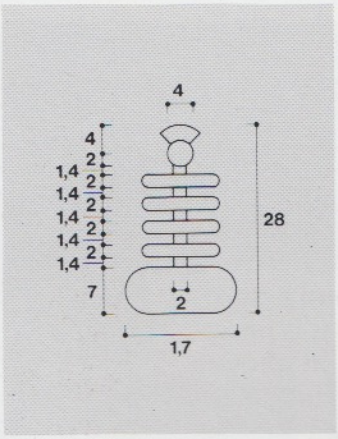


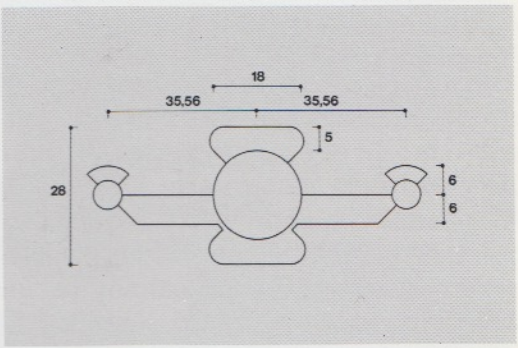


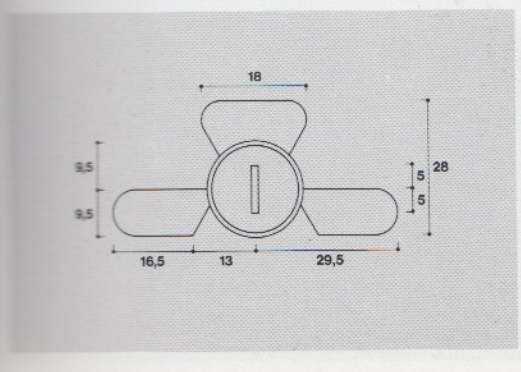


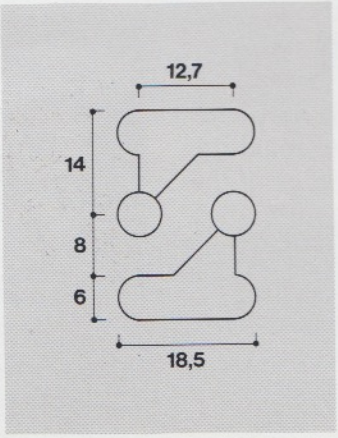


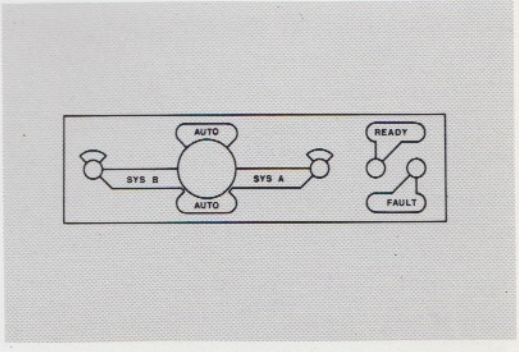












dialogue with the machine, along with the sensory pleasure of physical contact with it. "Satisfying the eye and hand,"[2] as the designers wrote, "makes an operator's work easier." Satisfying the eye and hand as subjective correspondence to functionality in the relationship with the machine-object.

The new grammar

An information zone and a target zone together constitute a functional whole, delineated by special forms and consistent colors. The graphic shapes which gather, link, and connect information and target themselves become message and symbol — they are words in a visual grammar that has utilized archetypal signs.

The forms and colors selected are able to:

— communicate messages about the messages to be communicated through the keyboard; they are therefore signals of signals, and must possess extreme communicative and expositive clarity;

— provide reassurance (logical, but also emotional) to the user as he approaches the keyboard.

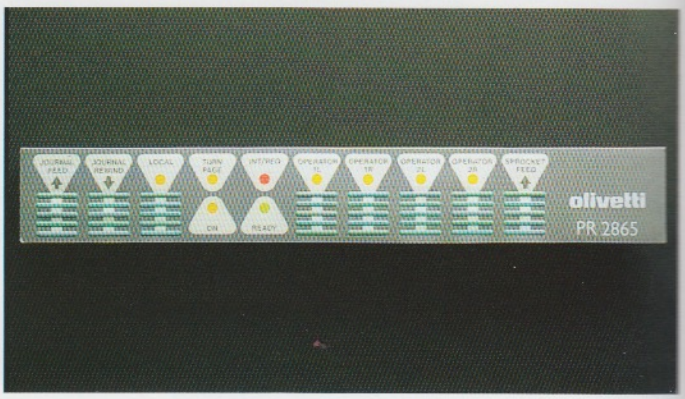
The information zone communicates to the user a possible task the machine can perform (for instance: *start*/I can go ahead with the production of a photocopy; *reset*/I can cancel the previous order) or else the machine's state (for instance: *on*/operating; *off*/non-operative; *stand by*/waiting).

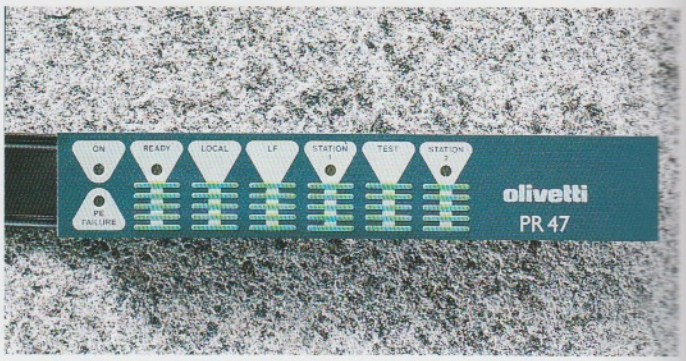
This information is communicated through a legend, or a symbol, or a led, or an alphanumeric display, or through a combination of two or more of these elements.

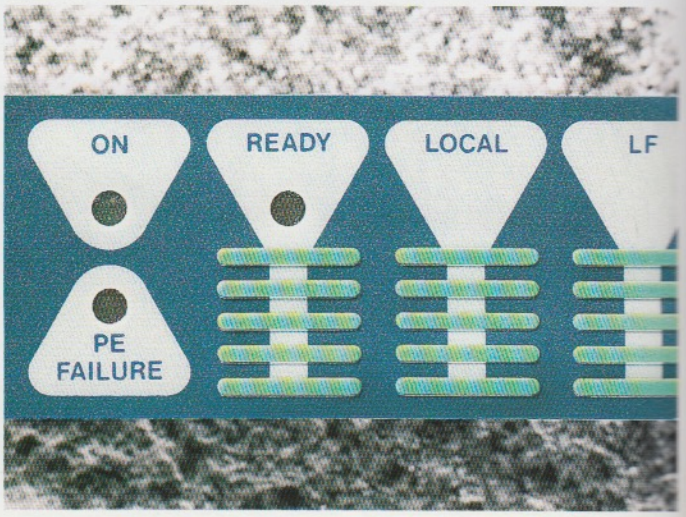
The legends that appear in the information zone of the new Olivetti keyboards are always set in a Haas Helvetica medium capital typeface, with a minimum letter height of 2 millimeters and a maximum height of 4 millimeters. Only when it is necessary to insert particularly long words or phrases that cannot be abbreviated (which sometimes happens with the machines manufactured in France, where English legends cannot be used) is Haas Helvetica medium condensed sometimes used.

The leds are luminous signals meant to communicate or emphasize a piece of information. By themselves, they communicate a state of the machine (such as: *stand by*/waiting; *paper jam*/blockage of the copying paper); when linked to a target zone, they indicate a response to an operation of the user (for instance, the starting up of the machine). The leds' shape, size, and color vary, according to the various signaling needs and the international rules

In the image at the top, three keyboards: for the PR 47 printer, for the TLM 340 telecopier, and for an Olivetti cash dispenser. Below, the keyboards of the PR 2865 and PR 47 printers, and a detail of the latter.

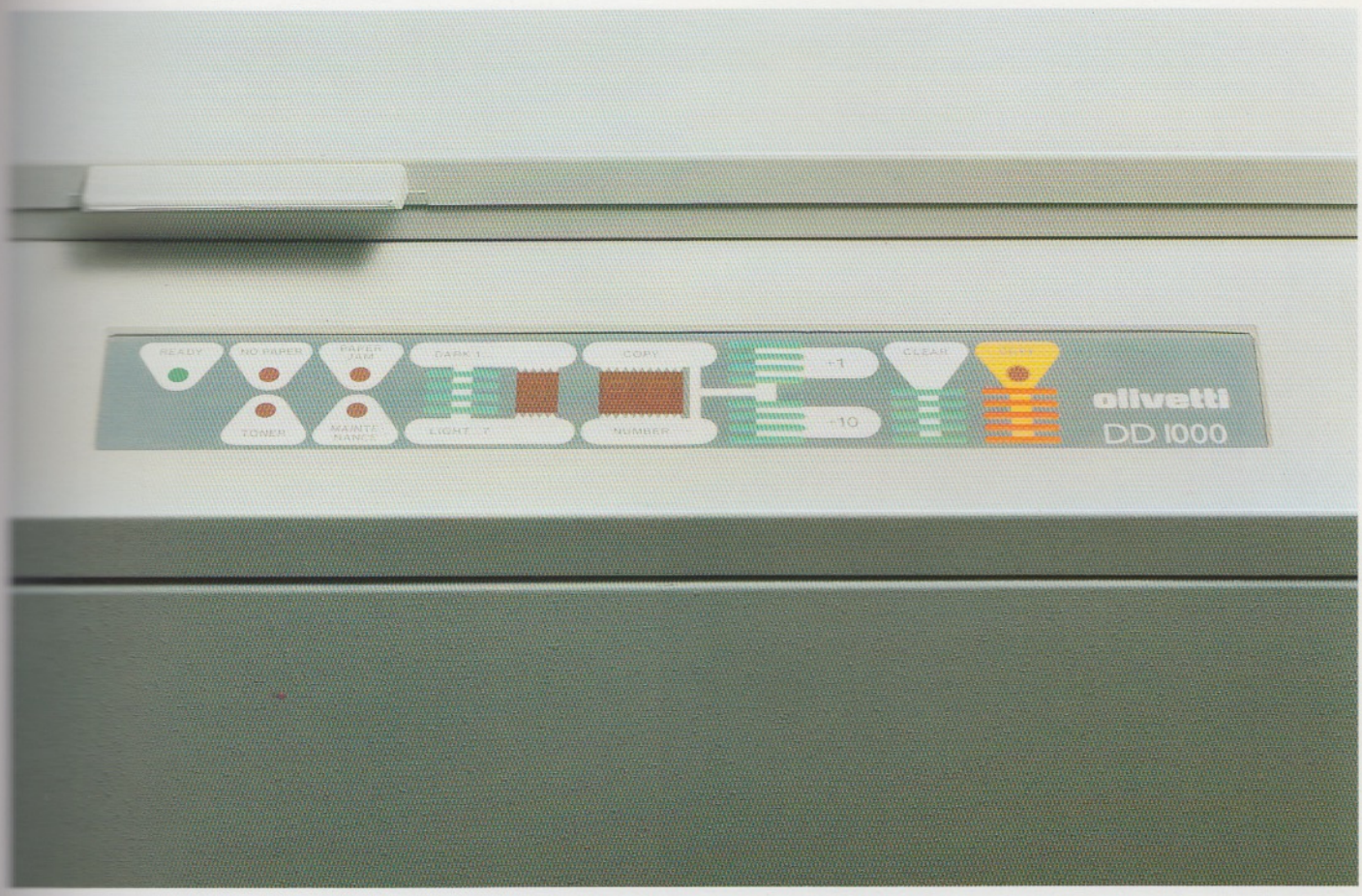


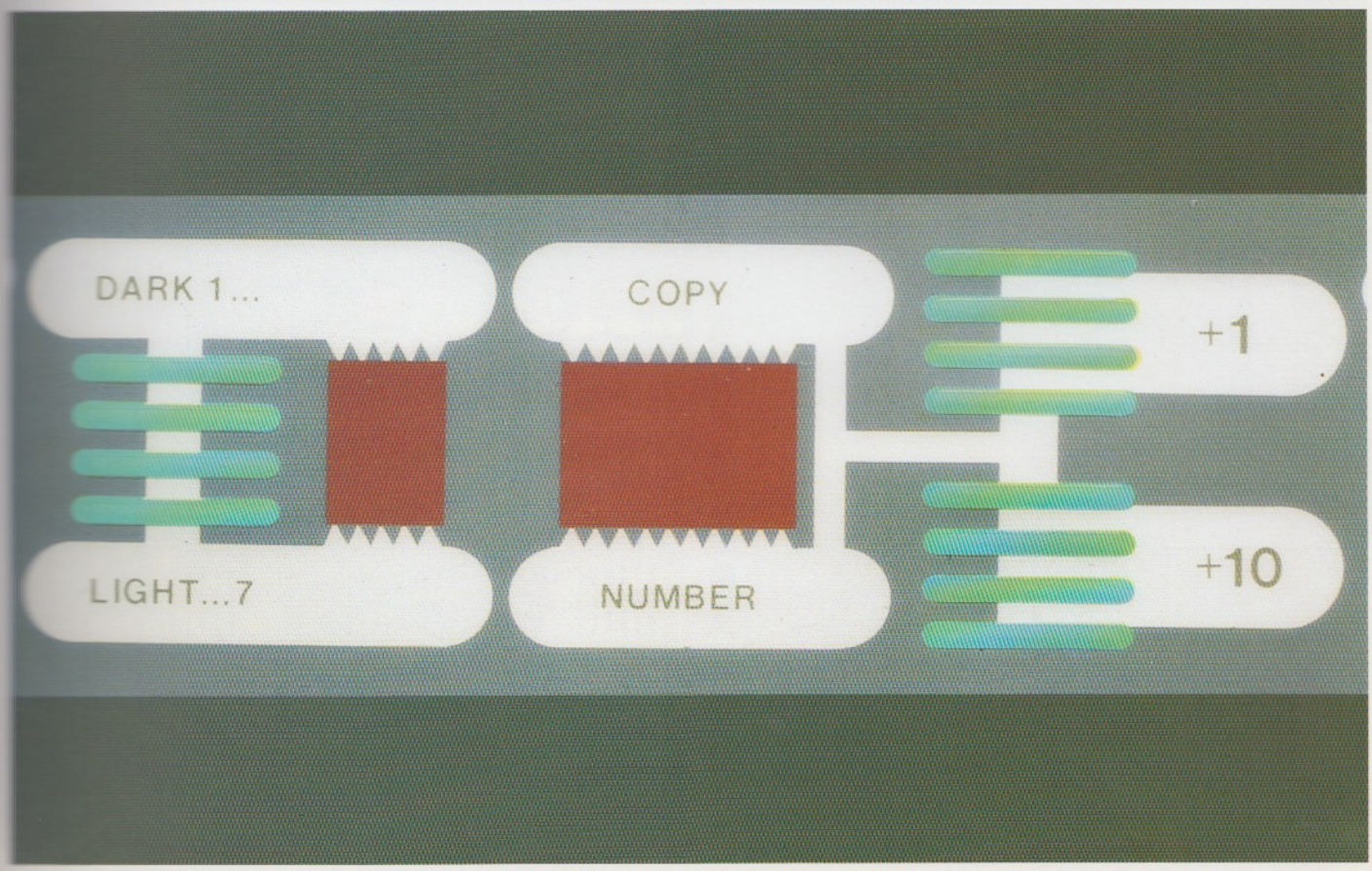




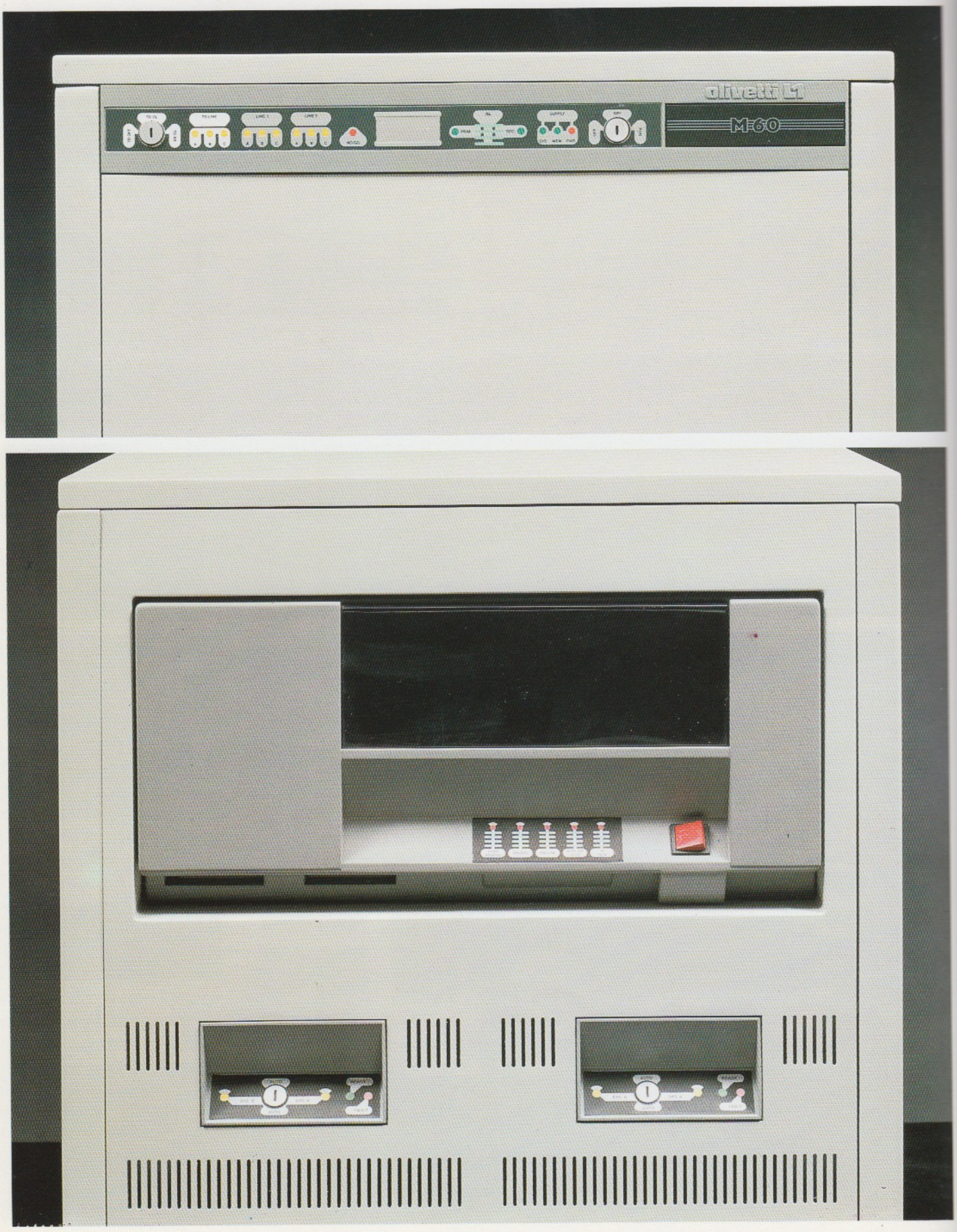
2. S. Miranda, "Storia di un progetto".

The keyboard of the DD 1000 laser photocopier/printer. Below, the information island formed by a "sequential" key to increase or diminish the brightness, and by two quantity keys (one for units and one for tens of units) which allow the user to set the number of copies desired.



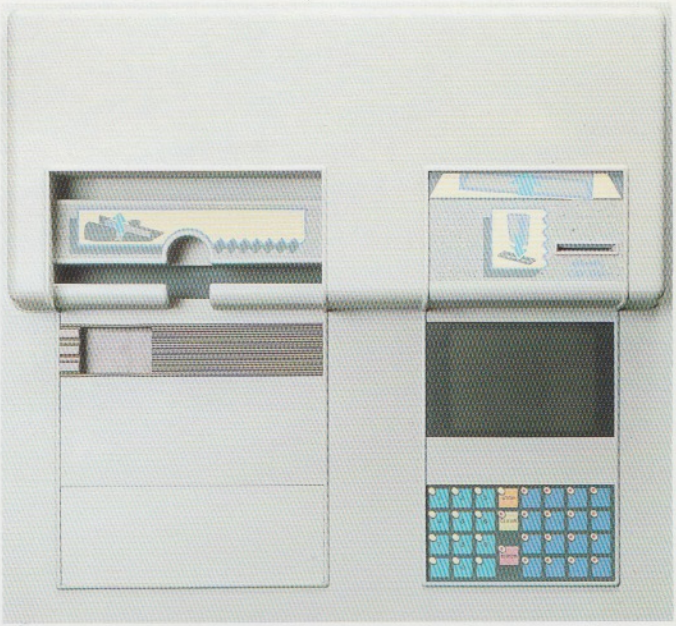


The M60 concentrator and the SB2 ribbon unit.



A preliminary study for the development of the M60 keyboard.

The CAT 330 cash dispenser.
Below, a detail of the numerical and function keyboard, which each Bank can personalize.



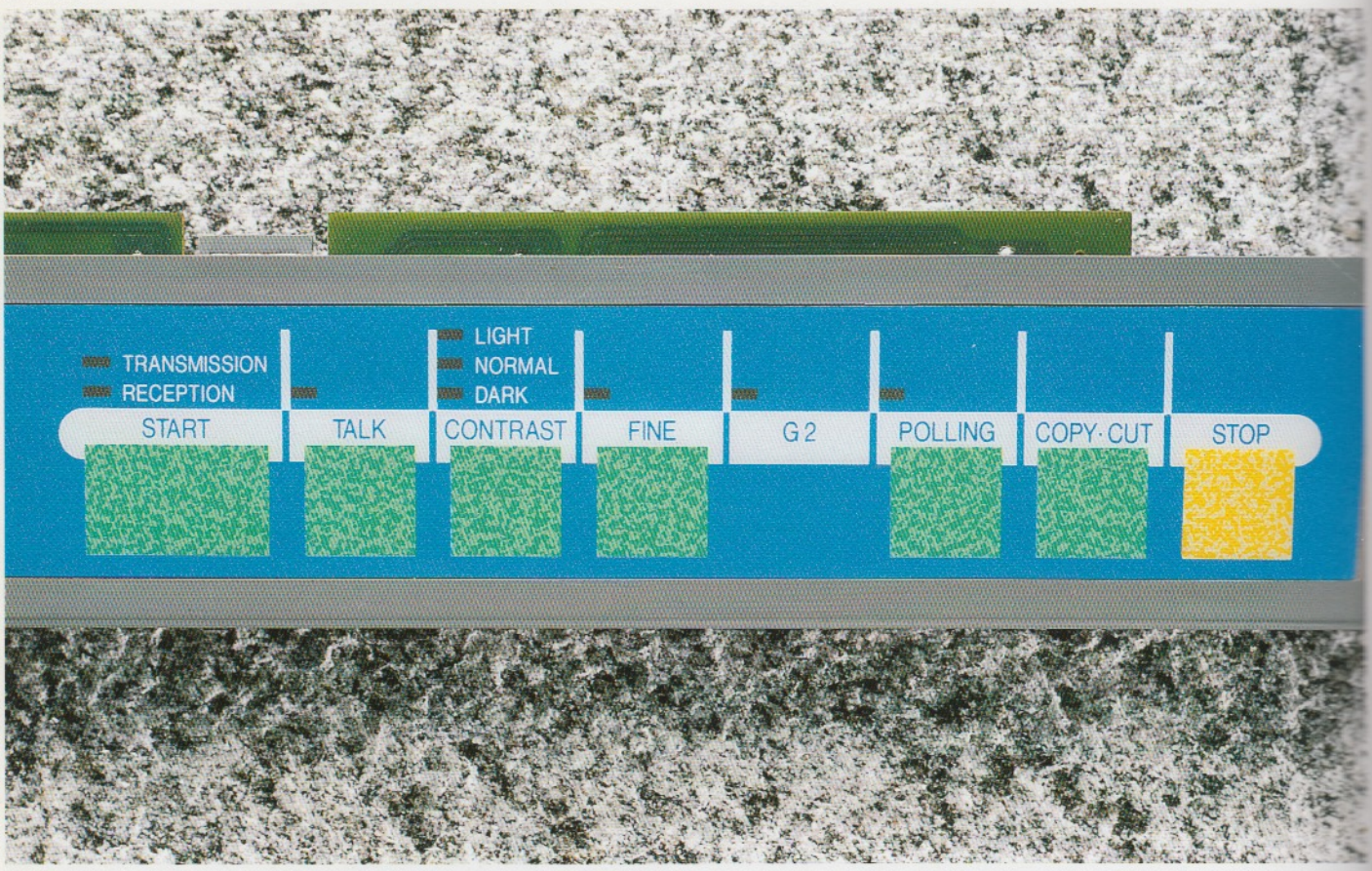
that must be complied with. Complex legends or symbols have in some cases been made luminous, placing a large led (up to 7 x 9 mm) under the polycarbonate membrane of the keyboard, at a point where the shape or legend desired has been printed and rendered transparent.

The new syntax

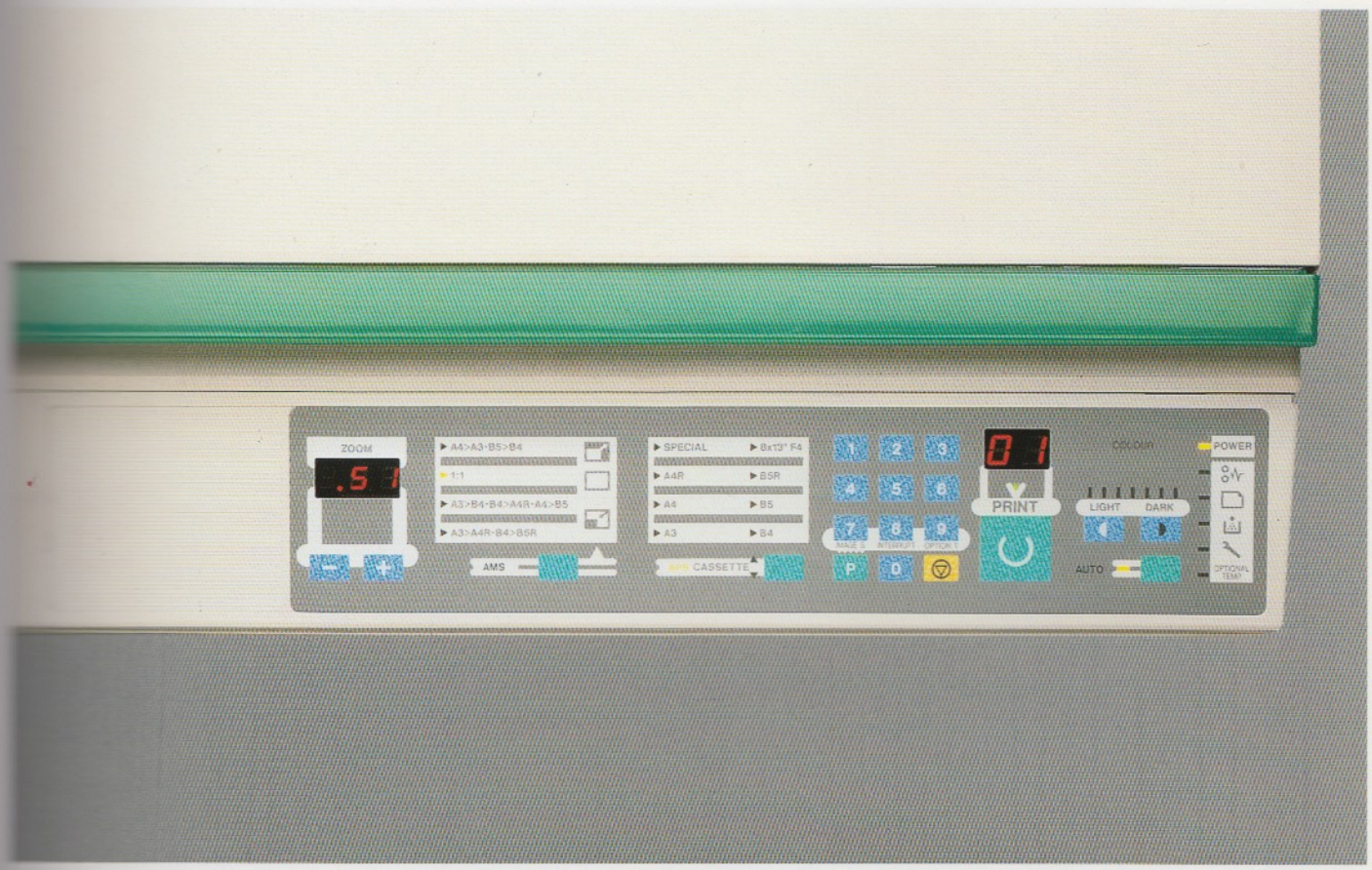
King and Miranda intended the logic of the user, not the logic of technology, to be the guiding star in the design of the new Olivetti keyboards: they were not meant simply to express the technological arcana buried in the depths of the machine rising to the surface, nor were they meant as a mere manifestation of the necessity for circuits and microprocessors to poke their heads into the outer world in order to be operative and governable. The designers did therefore take into account first of all the electronics hidden beneath the membrane of the keyboard, its development in "steps" of 50 mills each (thousandths of an inch); but they then constructed (in part through the far greater flexibility of electronics when compared with the rigidity imposed in the past by mechanical components) an informational syntax with which to order the elements of which the keyboard is composed. Each group of functional wholes (information zone plus target zone), organized by spatial vicinity and operational affinity, forms an information island. Each different control keyboard was designed as a complex system structured in information islands, which harmonize with each other in terms of shape and function. The position of a single functional whole in the information island, and of an informa-

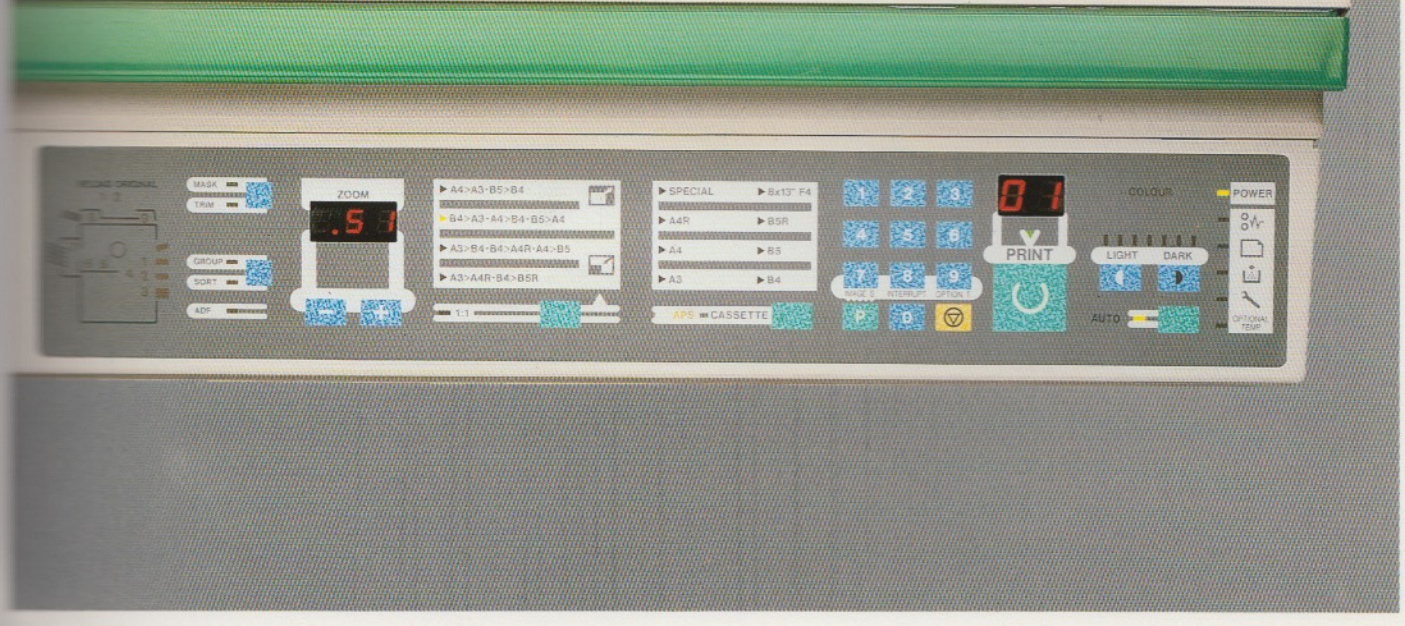
tion island with respect to the entire keyboard system, is aimed at attaining several results:
— immediately clarify the overall meaning of the messages to be communicated;
— make clear the nature of the individual items of information and the degree of importance that

The TLM 340 telecopier and, above, a detail of the function zone of its console.

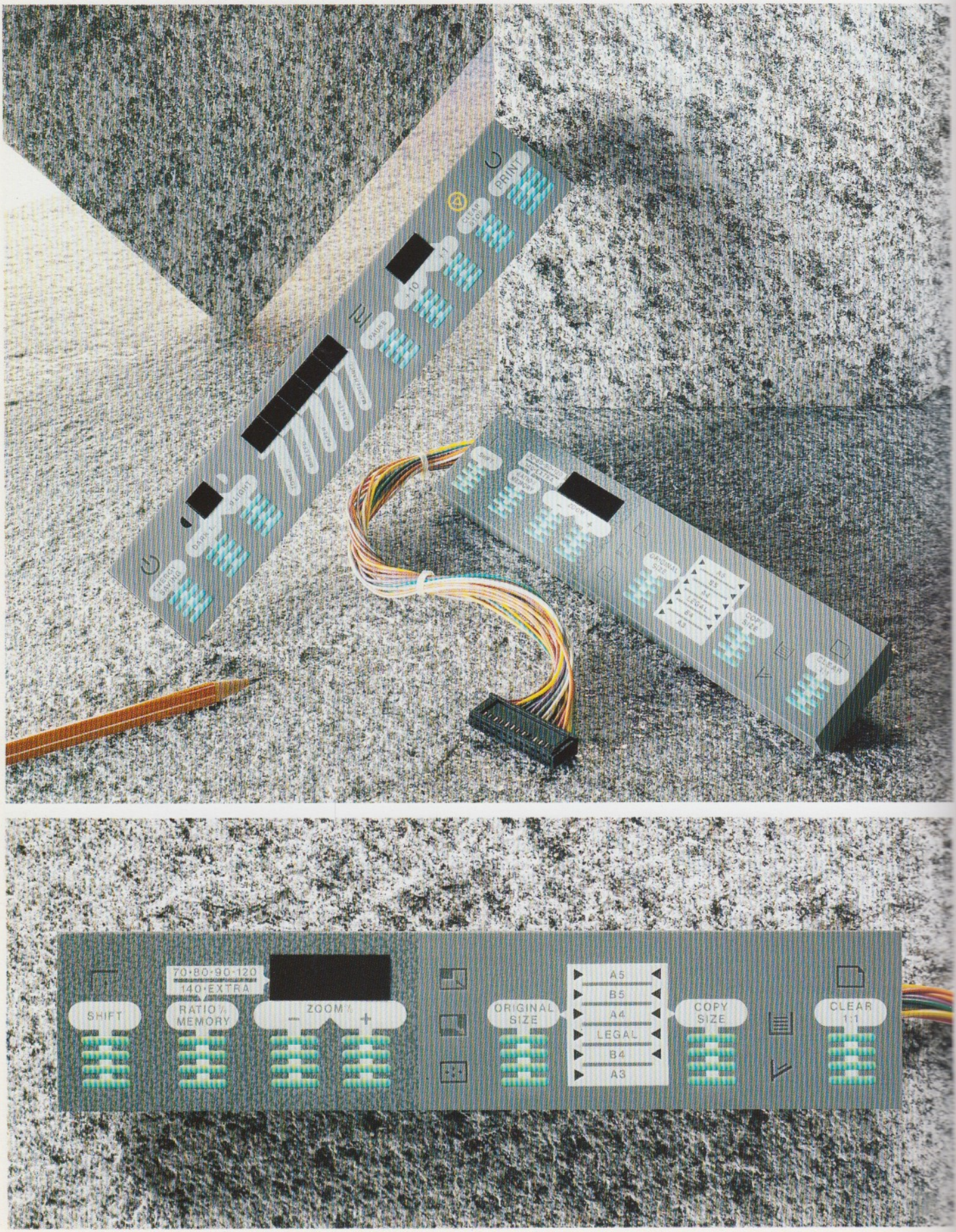


The keyboards of two photocopiers: the Copia 7040 and, below, the Copia 7150.

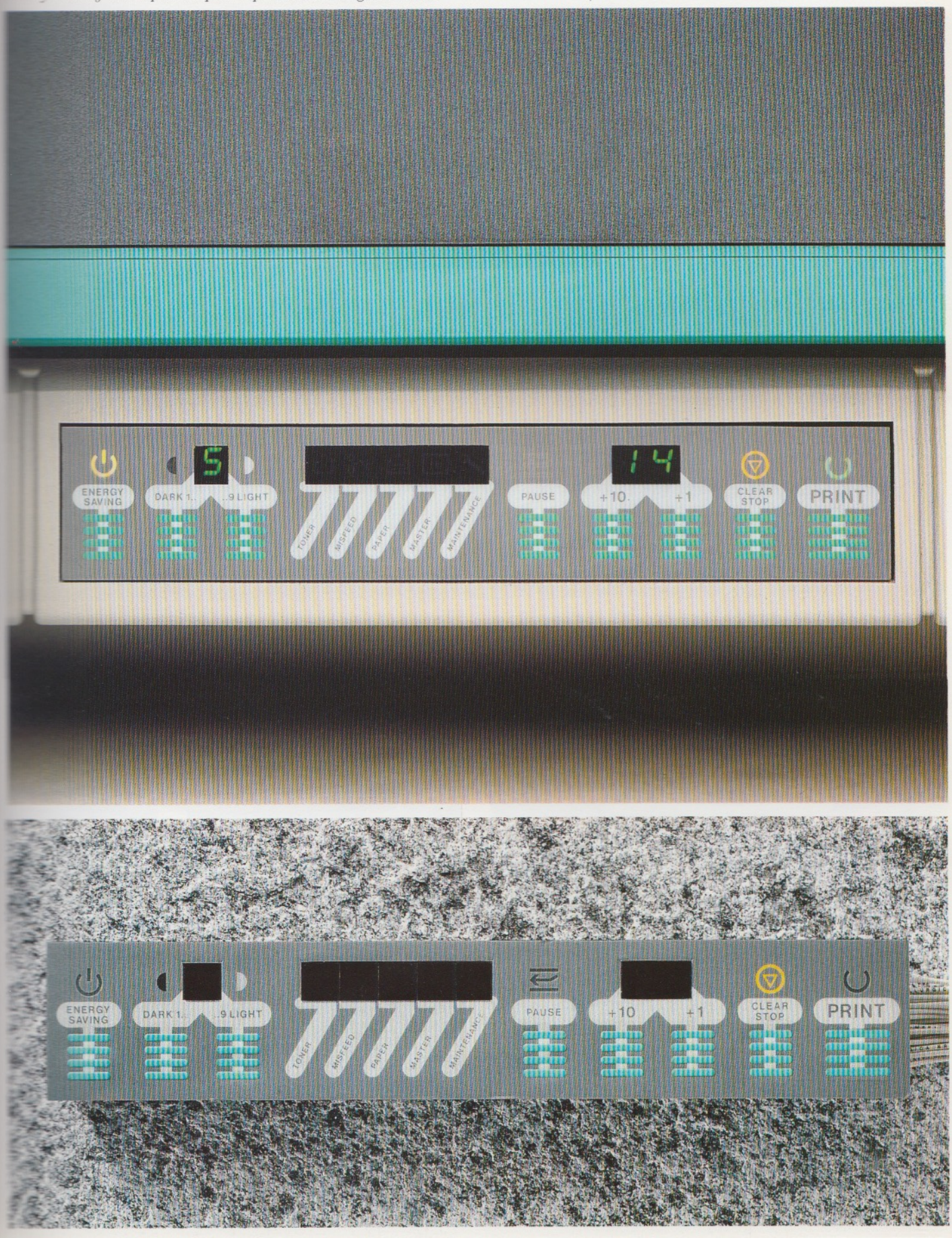




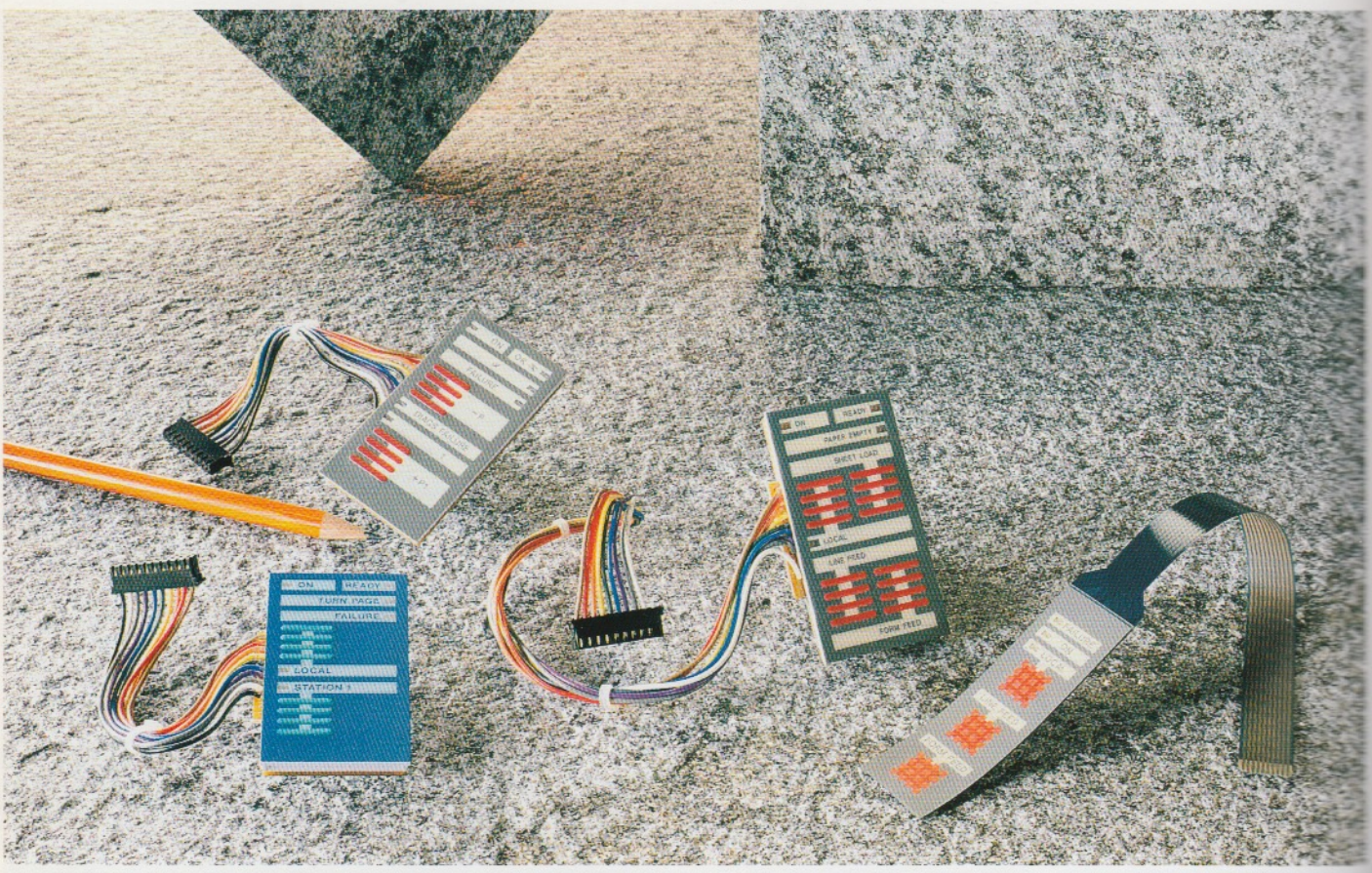
The principal keyboard and the subsidiary keyboard of the Copia 1150 photocopier.
Below, the subsidiary keyboard.

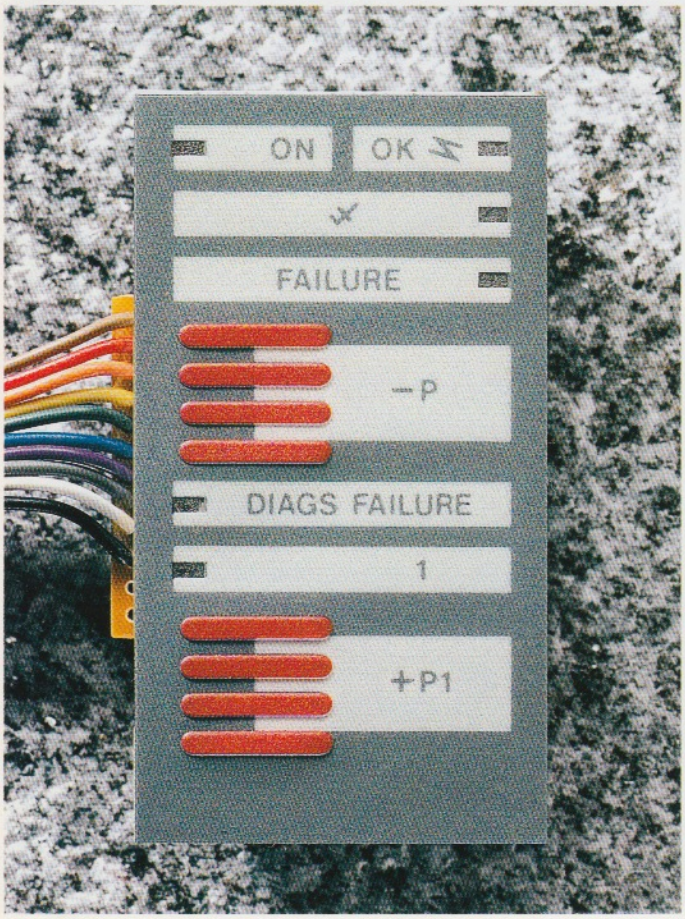


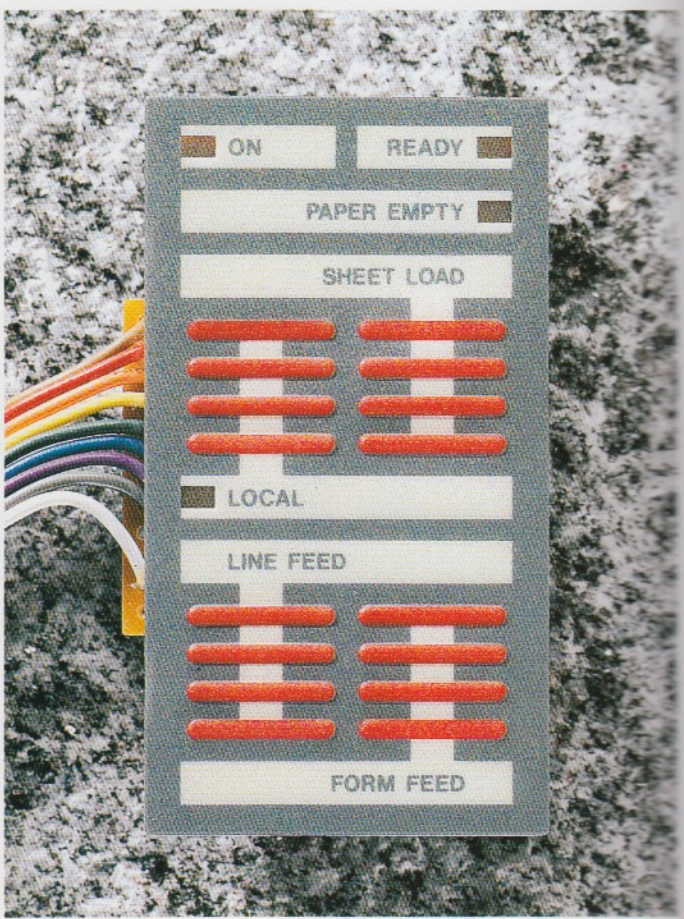
The keyboard of the Copia 900 photocopier and the diagnostic zone.



In the latest generation of printers the size of the keyboards has shrunk yet further, thus stimulating new research into materials with which to construct them, and into the methods for manufacturing relief and tactile feedback.







they should take on in the eyes of the operator;
— emphasize points of functional similarity or divergence existing between contiguous information zones;
— communicate priorities and hierarchies so as to suggest possible sequential orders that the operator should follow in the procedures of utilization;
— underline clearly any necessary actions or prohibitions.

The information islands are organized internally and in relation to each other by taking into account (aside from the residual structural electromechanical limitations) also the ergonomic considerations and logical and emotional requirements of the potential user. The designers paid special attention to attaining — within the diversity and extreme variety of the applications to which their design must adapt — harmonic configurations that respect optical alignments and formal equilibrium in relation to the many visual element within and without the keyboard.

"We call it leopard-skin harmony," King and Miranda say. "The leopard is marked by totally irregular spots, without the slightest pre-established symmetry, and yet it provides a final effect of complete order. We would like this to be true of our keyboards as well, composed as they are of many elements that may be combined in a wide variety of ways among themselves, but that always tend to make up, in the end, an overall harmony. Another example we like to give, which may be more pertinent, is that of a typeset page put together by a good typesetter in a well designed typeface — there is nothing more wildly varied than an alphabet, every letter is different and every sentence assembles them in an inevitably different fashion; and yet the resulting page — if it is well set — is always regular and homogeneous, because the variety and richness of the single elements in the end form part of an harmonic homogeneity, an equilibrium.

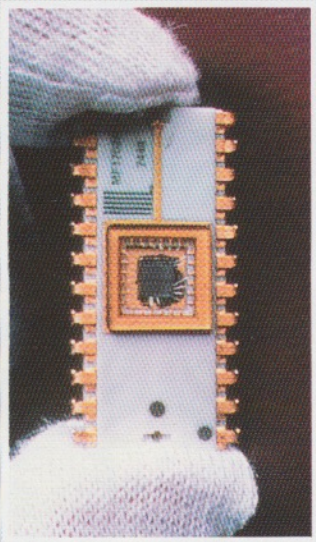
The color

The range of colors proposed was selected, on one hand, with an eye to the international regulations that call for certain levels of reflectivity and luminosity for office equipment that do not cause eye fatigue in the operators, and that conventionally ascribe certain meanings to certain colors and, on the other hand, attempting to meet the needs of the operator for emotional satisfaction in his relationship with the machine. Therefore: they said no to a world in black and white, but they also said no to a bombardment of colors which translates into an increase in psychic fatigue.

Color also must meet specific visual requirements, and must comply with strict rules on usage that ensure that the messages can be read. And so the difference between the colors in two neighboring areas of a keyboard must always be at least three Munsell points: if for example the background grey is five Munsell points, the color of the information zone must be two or eight Munsell points, while the legend contained within the information zone may again be just five Munsell points.

Color differentiates from the rest of the keyboard special functional wholes or entire information islands, if they should need to be diversified because they are more important or functionally different; the background color of the information zone that is to be emphasized, for instance, should be lighter than the other information zones, so as to make the writing stand out more sharply.

A microprocessor. In a few square millimeters it is possible to house almost 300,000 memory positions — the equivalent of approximately twenty-five typewritten pages.

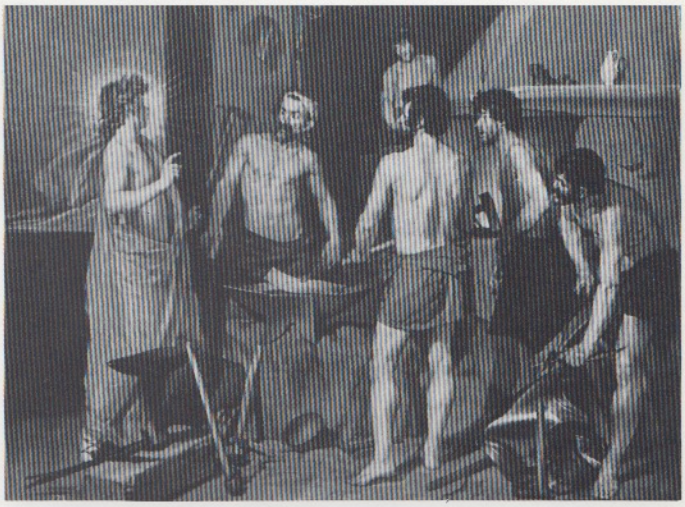


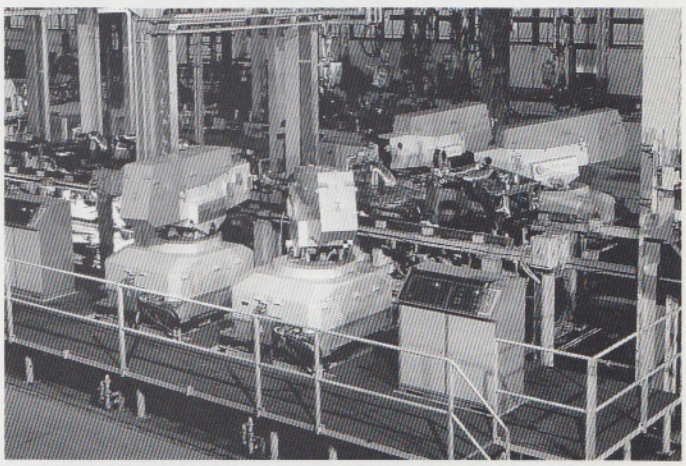
In creating the new Olivetti keyboards, King and Miranda attempted to simplify the interactive relationship between man and machine. In order to achieve this goal it was not only necessary to create well designed assemblies of keys, with clear, easy-to-use indications whose design took into account all ergonomic requirements and the physical and logical needs of the user; nor was it enough to invent shapes, create colors, organize the composition, and select the texture of the materials in order to satisfy the user in psychic and emotional terms. Another step had to be taken to facilitate the relationship between man and technology by means of design; if we are to understand that step fully it will be necessary to examine carefully the existing relationship between design and technology.

Microelectronics innovation

In 1973 the creation of the microchip paved the way for the obsolescence of the object. Mechanics — which with its autonomous, bulky, "heavy" presence had always determined the interior of machinery, so that objects were created with an inevitable three-dimensional physicality — began to give way to tiny flakes of silicon. Machines could become smaller and smaller, while their shape — no longer greatly influenced by mechanical interiors — began to fall to the discretion of the designer, who was asked to "invent" a shell of physicality in which to wrap objects.
Gillo Dorfles expressed the new relationship that was emerging between the "container" and the "contents" in these words: "We often speak of form and function without realizing that — for many products that just yesterday had to respect these imperatives — today a form does not even exist! To provide some simple examples — if we think of the infinite range of elements based on microchips, on minuscule flakes of silicon no larger than a fingernail, capable of recording, starting engines, processing and so on... capable of controlling entire automated mechanisms, laboratories, factories... or think of the infinite range of hi-fi equipment: tape recorders, amplifiers, radios, microphones, videocassette recorders, etc. — by now reduced to tiny black boxes that contain only a few chips on which mysterious circuits are printed. What is the form of these objects? The form either no longer exists or else it is invented of whole cloth without the slightest relationship to whatever it "covers" or hides, just so that the user can have a simulacrum of the container which is in reality devoid of contents

Diego Velázquez, "Vulcan's Forge", The Prado, Madrid.
Below, a robot-operated production area at the Turin Fiat factory. The workplace, once typified by smoke and fire, has now become hygienic and automated. The very presence of man and the need for menial labor has diminished.

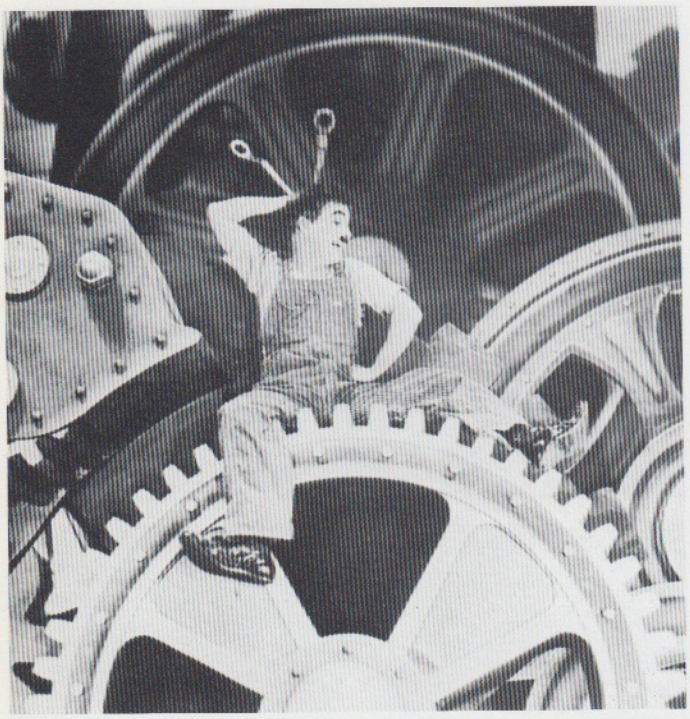




that correspond morphologically."[1]
In the decade between 1973 and 1983 great transformations occurred on a worldwide level, both in the area of technological options and in the area of the organization of labor, while the effects of microelectronic innovation began to become noticeable in the field of culture but especially in the area of lifestyle. The decade culminated — in 1983 — with a lively debate en masse on the culture of information technology, stimulated by *Time* magazine, which in December of 1982 named the personal computer Man of the Year.
In Italy too electronic restructuring took place. To cite just one example, the most advanced available — between 1978 and 1980 the Digitron and Robogate systems were introduced at Fiat.
In 1980 sixteen thousand factory workers were fired by the Turin automobile manufacturer, and the old Lingotto factory — now empty — has been renovated for use as a center for cultural events.

1. G. Dorfles, "Dieci anni tra due convegni," talk delivered at the symposium "L'oggetto abitato. L'industrial design nella prospettiva degli anni '80," held by the Centro Studi e Ricerche Busnelli (Milan: Museo Nazionale della Scienza e della Tecnica, 12 May 1983); now in *Caleidoscopio* 29.

Charlie Chaplin, in "Modern Times", a 1935 film. The caricature of a little man on the assembly line, crushed between cogs and gears, has become a symbol of the human condition in factory work.



The cultural and structural transformations that have been introduced by microelectronic innovation have brought to the forefront a utopia of industrial civilization: liberation from work.

The transformations that followed one upon another in the entire industrial fabric of society generated a mass awareness that the way in which people work and live is changing, while sociological theories and general analyses proliferated on technological innovation and social mutations that — adopting the new term coined by the American sociologist Daniel Bell — are referred to as part of the passage to post-industrial society.

One begins to detect in mass culture, but also from sophisticated theorists, hints of millennialism reminiscent of the attitudes rampant at the dawn of the Industrial Revolution. Two hundred years ago there were those who hailed the advent of machinery as the definitive liberation of mankind, while others preached the destruction of machinery in order to free man from a new slavery. Microelectronic innovation acts just as powerfully on society's imagination, provoking alternately catastrophic despair and paradisiacal exaltation. Will the future be determined by the total tyranny of centralized information technology, destined to crush humanity? Or, on the contrary, are we moving toward a decisive change in man's history, a change that will turn the tables on the relationship between work and leisure time, a change that will bring about the most radical of all utopias — the end of all work?

The millennial forebodings can usually be discarded with a bit of common sense — the destiny of mankind faced with the massive introduction of microelectronic technology is neither oppression nor liberation, common sense tells us, but dependent upon the decisions of those who use the progress of information technology.

Design too is closely interwoven with innovation, and its destiny is linked to the destiny of new technologies. How? The history of industrial design is a history of the relationship — often synergistic, at times conflicting — between manufacturing and design culture. This relationship is now destined to change because the features of manufacturing itself are changing radically. The theorists of post-industrial society describe it as a system that will be based chiefly — not on the manufacturing of goods, which will be handled by the CAD-CAM complex (computer aided design and computer aided manufacturing) — but on the circulation of information and on the manufacturing of services. Some have gone so far as to depict the future as a time in which the manufacturing of physical goods will cease, or even work itself will cease to exist.

As early as 1983 Renzo Zorzi took the time to recap the salient aspects of the ongoing information revolution[2]: a drastic reduction in factory labor, a continual increase in office workers, a growth in the education sector, the leisure sector, and a general development of the service industry. "The factory will become a box," Zorzi said, "a simple equipped container, itself a piece of equipment, devoid of human life, automated, perhaps in the future controlled and directed from a distance." And, along with the factory, "no longer inhuman because it is no longer inhabited," we can bid

farewell also "to one of the bridgeheads of design for factory labor: that of machine ergonomics," which, once it is autonomous of man and freed of workers, can be designed in a completely different fashion, without having to keep in mind safety requirements and the need for managability.
If the factory empties out, the office will fill up beyond our wildest expectations. "Office work has become more and more the general form of work. White collar work is work."
The near future will consist of a landscape of keyboards, printers, and videoterminals that will soon become thin slabs on which data can be read. Immediately afterward, some have ventured, the future will become the recomposition of the living and the work sphere, with the work place inserted into the space of the home itself, each distant in spatial terms, but, in terms of information, extremely close to all the other points of that great communications network, that unending flow of information which will become the work of tomorrow.
Perhaps we shall return, Zorzi speculates, to "a past that human society once knew, which in ancient times had already found a linguistic expression — home and workshop." After the radical split between work time and leisure time, fundamental to modern experience, "after a voyage that crossed the threshold of space between the stars, in the never-abandoned dream of reaching, inhabiting, linking the galaxies, is it possible that the computer will carry us back — that it can carry us back — to the peaceful garden of our home?"
The question, the curiosity about a nearby and possible future, remains unanswered. Next to it, Zorzi sets another open question: "On the path towards home can the word design rediscover its meaning?"

The question of technology

This is what is shocking about new information technology: microelectronic technology has proven capable of allowing machinery to absorb some part of intellectual labor.[3]
Already, classical machinery presented itself precisely as the capacity to transform matter through the application of energy (first muscle power, then heat, or electric, or chemical energy...); and part of the necessary information management was already incorporated into machinery — the models of work procedures and their insertion into the "scientific organization" of labor typical of Taylorism was exactly this. The radical new development, however, that is entering the stage of history is that new machines are capable of bringing about the automation of some non-material processes, and that already a model has been constructed for the entire process of information management and transferred to machines. How can design culture react to this technological shock? It is still too early to say, but already we can see the signs of an alignment along the lines of two positions — antithetical but related — of the uncritical acceptance of all that is technological, on one hand, and the equally uncritical rejection of the same.
Nor is it sufficient to consider technology simply as a human activity, a device, a neutral medium in his hands. That may have been true, perhaps, in a world in which man was exploring and organizing the Earth, but it becomes naive to think this in the era of full-fledged technology.
Certainly — men built the ancient bridge that has linked the two banks of the Rhine for centuries, men built the electric power station that exploits the Rhine's waters; but the two constructions used as examples by Heidegger,[4] equally the result of man's labor, do not have the same meaning — in the first case the river welcomes and contains the technological creation which, while it offers itself to man as a way of overcoming an obstacle, lets that obstacle "be" exactly what it was, a river crossing a broad plain; on the other hand, the hydroelectric power station incorporates the Rhine into its construction, and reduces it to an employable object, a simple source of hydroelectric power.
The real question then is not the (moral or political) question of the use of the technological *instrumentum*, but the question of the essence of technology, that is, the recognition of the new qualities of our entirely artificial world where nature has become an available "fund" and technology is no longer the result of human effort, but the horizon within which human effort exists.[5]
Therefore, once the concept of technology as a tool of man becomes naive, the common sense approach of considering technology as a "neutral box" whose destiny depends on who uses it is no longer sufficient. We come a little closer to understanding the paths of technology if we consider

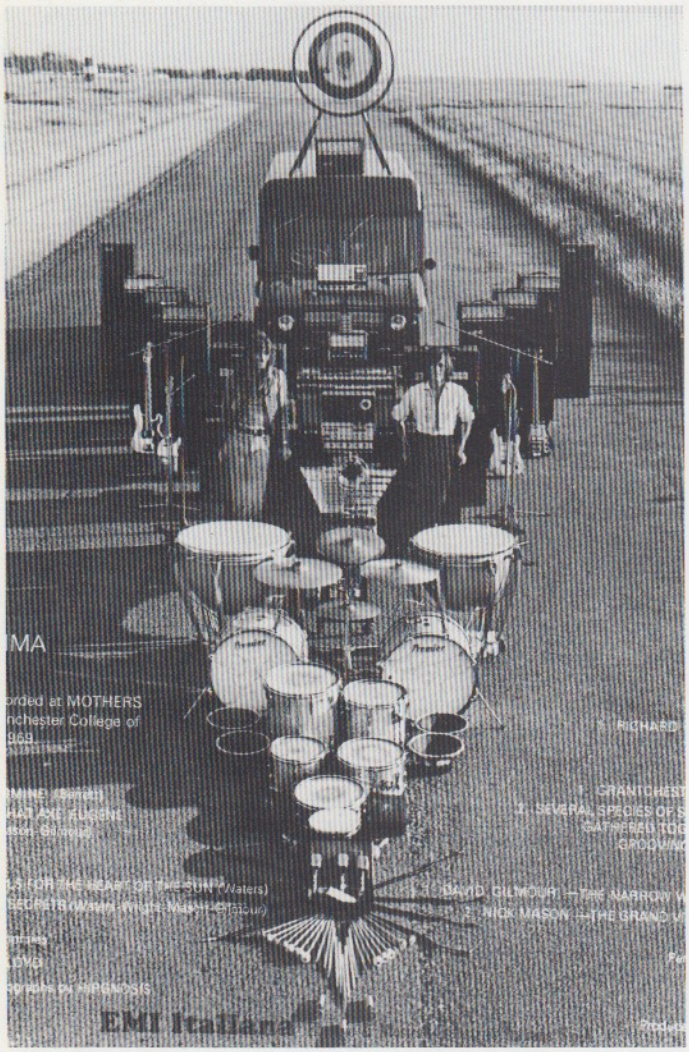
2. R. Zorzi, "Il nuovo paesaggio industriale".

3. See P. Manacorda, *Lavoro e intelligenza*, pp. 21 ff.

4. See M. Heidegger, "La questione della tecnica," in *Saggi e discorsi* (Milan: Mursia, 1976), pp. 11, 12.

5. Aside from the "Questione della tecnica," mentioned previously, see M. Heidegger, "L'epoca dell'immagine del mondo," in *Sentieri interrotti* (Florence: La Nuova Italia, 1968). On the same topic, see also A. Sordini, "Immagini della tecnica tra prassi e destino," in Aa.Vv., *Innovazione e società. I risvolti socio-politici del processo innovativo* (Milan: Angeli, 1985), pp. 126 ff.

Two versions of technological objects — the panoply of bombs in an airplane for guerrilla warfare at the Paris Airshow, and Pink Floyd's panoply of musical instruments, as they appear on the back cover of one of their albums ("Ummagumma", 1965).

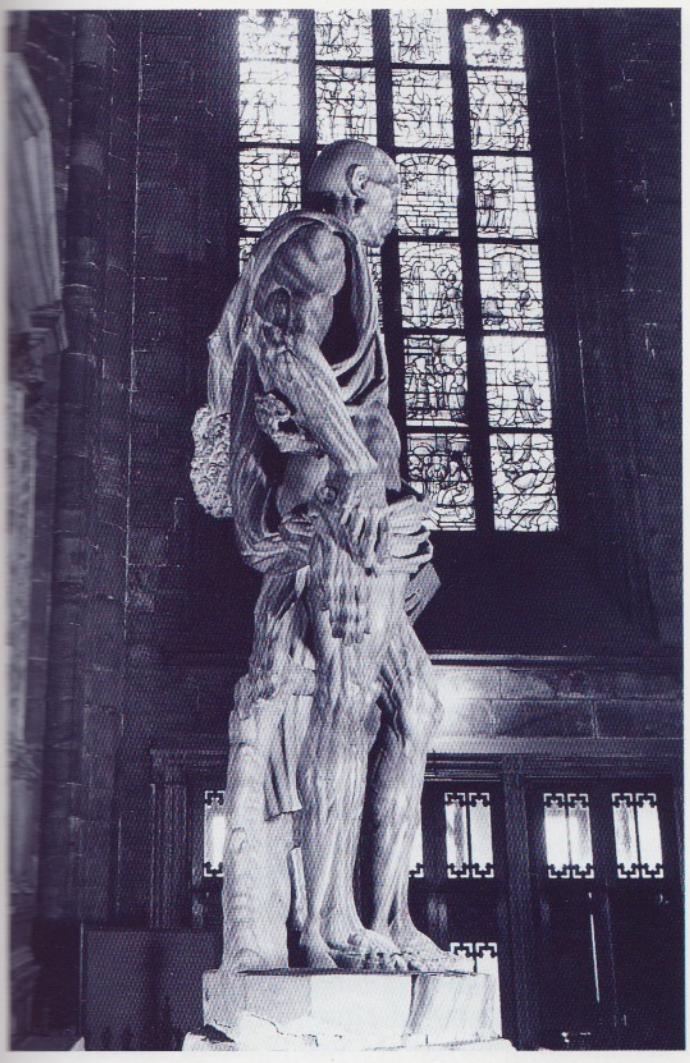


who produces it, or how it is produced, and for whom; or "how it is selected, placed in a context, adapted to specific objectives. The user of microelectronics, whether a Digiton factory worker, an office typist, or a family in front of the television, is less capable than anyone else to choose how to use it and for what."[6] Like in the old world of the manufacture of objects, in the new scenarios of information technology the key to strategic choices lies not in the segment of circulation and use, but prior to that stage, in the area where manufacturing and information management are controlled. The designer is placed in the delicate intersection which links production planning and the mass "consumption" of goods and information. The "arbitrary choice" of "inventing" physical aspects for objects which physically are increasingly obsolete is transformed into the responsibility to design the relationship between man and his objects. This is what design is beginning to become — the interface between man and technology.

The microscopic silicon chips that, along with a few increasingly miniaturized components, constitute the shapeless interior of machines, will always need, in order to be manipulated, an outer "skin," a coating that in some manner objectifies the evanescent physicality of the objects. That will be (in the autonomous choices of the designer, increasingly free of material and mechanical constrictions) the concrete filter that will allow man and the object to communicate, and it will also become immediately the filter of the abstract relationship between man and technology.

Here then is the answer to the question which opened this reflection — what else must the designer do besides satisfying the ergonomic, logical, physical, and emotional requirements of the user? He must design the visibility of technology, he must design the messages of the relationship with technology — a concrete relationship, which takes place with respect to the specific technological object being offered, and at the same time an abstract relationship, with respect to technology in general. Design is destined to incorporate the

Architecture as a display of its structures and layouts. Technology is interpreted as the immediate form of design. "St. Bartholomew Flayed Alive", marble statue by Marco d'Agrate, 1562, left nave of the Milan Duomo. Right, the Centre Georges Pompidou, or Beaubourg, Paris, designed by Richard Rogers and Renzo Piano.



quality of the relationship with technology, the cultural contents of the relationship between men and technology. And this is true today for machines, "technological objects," but it is also true (although to a differing degree) for objects in general (even those that might not seem technological) because they can all be utilized as communicative signs in this artificial world of ours — this world of technology.

A rapid excursion into recent events in Italian design may be useful in reconstructing the way in which design faced the question of technology.

Design and manufacturing

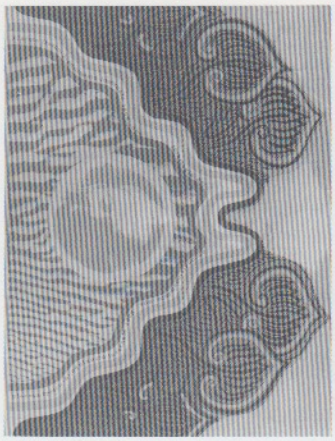
By definition "industrial design" is inseparable from manufacturing, the series: in short, technology. Industrial design, born alongside of large-scale industry, created with the development of mass production, has a relationship with technology which is part of the fabric of its reasoning process, indeed, industrial design *is* design in the era of technology.

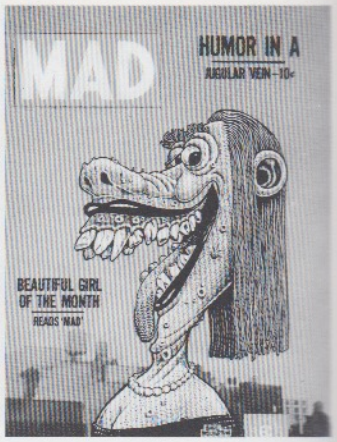
By no means does this signify the desirability of design's being reduced to technology (as has happened also in the area of architecture): the shortcuts of high tech — which moved toward what almost proved to be total identification of technological forms and architecture (or industrial design) — wind up reducing design to its technological aspects and reducing construction to the simple exposure of structures or even of the various support systems. In this way, the problems of design forms are not resolved but merely eliminated; or to be more accurate, formal choices are hidden, and are palmed off surreptitiously as the direct expression of the structural choices.

Far beyond this particular tendency that has been observed in the last few decades, the entire matter of relations between design and industrial manufacturing has taken on very particular connotations in Italy, and for at least two reasons. First off, because of the underdeveloped and erratic nature of the

6. P. Manacorda, *Lavoro e intelligenza*, p. 17.

The cover of "Pianeta Fresco", a magazine created by Ettore Sottsass jr in the Sixties, alongside the cover of an American comic book from the previous decade. Pop and mass media enter design culture.





industry in which Italian design was born and took its first steps. As early as the 1920s and 1930s, the dawning school of Italian industrial design — created from a rib of what were called the "applied arts" — was marked by the paradoxical quality of being substantially "design without industry."[7] And even when it did "explode" in the 1950s, that happened, as Gregotti pointed out, because of the odd ability to "cover with a brilliant esthetic solution the vacuums of an industry plagued by remarkably erratic consumption, which is basically underdeveloped in technological and organizational terms, often jury-rigged in terms of methodology. That Italian design is slowly and painfully moving away from this condition is an unquestionable and historically necessary fact."[8]

The second reason for the peculiarities of the "caso italiano" lies in the proportions of use made of design by the various industrial sectors — one might say that "large-scale industry has almost never considered the problem; that mid-range industry has established intermittent relations with the world of design; and that small-scale industry — which often verges on economic and productive structures more typical of craftsmanship — has been, with the exceptions and calibrations which we shall discuss, the only naturally fertile soil for Italian designers."[9] If we consider Italian industry from the 1930s until today, we can safely say that only in the 1970s did anything change in this situation, with a greater participation of large-scale industry. Otherwise, Olivetti — which has always paid careful attention to culture and design — remains an atypical case in Italian history.

Without a doubt, in Adriano Olivetti there existed a complete ideology, that of classical modernity — the term classical indicating a degree of faith, in that period referred to as humanistic faith — in the redemption that a positive attitude toward culture between the two wars supposedly provided;[10] yet the fact remains that this ideology — inadequate, "humanistic," and naive though it may have been — was the best that Italy had to offer in those years, since a fully developed industrial culture was lacking. From the design standpoint as well there was no scarcity of results. In more general terms — Olivetti aside — if one considers the overall design landscape in Italy, one must recognize that while industry was structurally and culturally underdeveloped, its halting development did nothing to hinder the rapid development of high-quality design. On the contrary: "The international success of Italian design is linked (though this may seem to contradict the experience of other, more industrialized nations) to the experimental and pioneering nature of Italian industry, were design was often relegated to a secondary and improvisational role, or at times even elevated and awarded the task of making products individual and recognizable."[11]

In Italy, unlike in other countries, invention of forms and design carved out an independent area for innovation. "This design without industry prompted a questioning of functionality and rationality, while in more advanced nations this questioning was hindered or confused by industry, which offered the illusion or hope of total acceptance of the needs and requirements of design in the areas of innovation, reform, and so on."[12]

Nowadays, many of those original imbalances have been resolved. It would seem nevertheless that many long-lived debates over the link and bonds between design and manufacture are further from resolution than ever before. This at a time when new qualities — emerging from the transformations provoked by microelectronics and the evolving status of design as interface between man and technology — make it necessary and urgent to find successful solutions to that conflict.

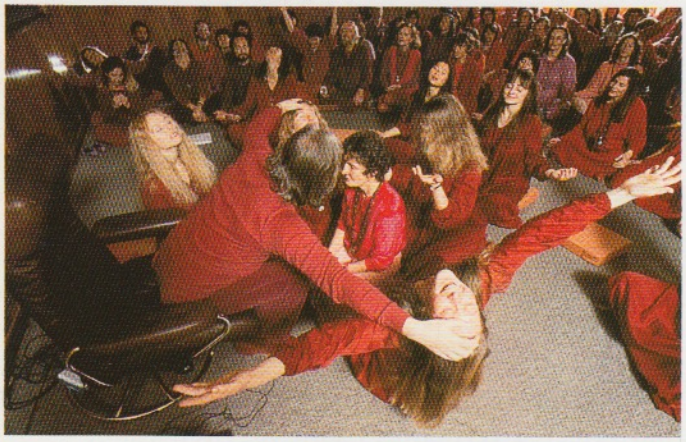
"Radical" architecture

Beginning in the late Sixties, the most innovative and paradoxical developments in urban and regional planning were produced by what in Italy has come to be called "radical architecture."[13] The result was the creation of enigmas, visions, and apparitions in which one could glimpse — like a watermark in heavy paper — the contradictions of social existence. Design culture was shaken by urgent calls for change, by unrest in the body politic — shot through in those years by radical cultural transformations, profound signals of change in a society just making its debut among

the seven industrialized nations of the world.
Most of what is today called "new Italian design" has roots deep in the "radical" experiments of groups such as Archizoom, Superstudio, and Ufo; these groups later made an attempt at coordination on a national level, between 1974 and 1976, under the name Global Tools.[14]
The "radical" architecture of Berlin and Frankfurt in the Twenties — although marked by an ideology that has been branded "antiurban utopia"[15] — was a force that planned, constructed, and actually changed the face of the city.
The radicals of the Sixties and Seventies, on the other hand, chose to take up the weapons of criticism: they designed architectures of architecture, constructed theories, planned a meta-language, a hyper-architecture that proclaimed — after lengthy discussion strewn with inventions, ideas, and experimentation — the death of architecture. Intriguing and provocative, the "radical" movement produced — side by side — theory and art (if by "art" we mean fragments of design aimed at linguistic stimulation rather than use; "art" that, like its traditional counterpart, wound up not in the city, but in museums, catalogues, and the galleries around the world).
The "radicals" succeeded in disrupting the well-oiled machinery of Italian architecture and design with tiny grains of the sand of invention, insanity, in a revolt against a way of reasoning that gave no heed to the new plurality of procedures, needs, behavior, and conflicts; they succeeded in sowing confusion in architecture and design with their criticism of the statutes, methods, and ceremonies of those disciplines, and in shredding the veil of Maya which seemed to separate them from the processes of production and social multiplication.
The "radical" counter-design that first appeared in the huge exhibition "Italy: The New Domestic Landscape" held in 1972 at New York's Museum of Modern Art gleefully ranged from design criticism to political and social criticism.
The later developers of these intuitions took it upon themselves to demonstrate that "radical" criticism — captive to the myth of "otherness"[17] — had a clouded vision of technology (was unable to meet its terrible gaze) and chose to deploy its forces elsewhere in an attempt to postpone the inevitable problem of a direct confrontation with technology.
The "radicals" were perfectly in tune with the rebellious culture of the Sixties and Seventies. Like many of the cultural and social movements of those years (often expressed in Marxist terms, even though for purely formal reasons) the radicals were swept by views linked to Marcuse, which rejected Culture, Production, and Labor, in the name of a proclamation of Utopia for creativity, triggered by a belief in the importance of circulation over manufacturing.
The program of Global Tools — the "first experimental laboratory for mass creativity" — was to coordinate and to create contacts between all those who, in different areas, were working for the "Liberation of Man from Culture." A non-school that rejected technology and specialization, while theorizing a Happy Ignorance opposed to Science, a spontaneous creative primitivism that counterbalanced the deadly repetition of industrial culture.
In the Seventies, Riccardo Dalisi carried on an intense teaching activity in the Traiano section of Naples, experimenting group teaching approaches with the ghetto kids that were aimed at stimulating collective creativity. The results included the construction of artifacts that Dalisi's theories classified as "poor technology," spontaneous objects and settings, produced in conditions that approximated zero-level technology. This activity greatly influenced "radical design" (going well beyond the intentions and the cultural and political motivations of Dalisi himself) due to the aura of "vitalistic" fascination and a-cultural primitivism that emanated from these objects of "poor technology," perceived by the "radicals" as artifacts of an uncontaminated infancy, an intact and immediate state of nature, uncorrupted by the predominance of Culture and Industry. In the final analysis, the ideological use made of these important experiments sounded on the one hand as a yearning after innocence lost and a reversal of refined intellec-

7. See P. Fossati, *Design in Italia*, p. 29.
8. V. Gregotti, "Marcello Nizzoli".
9. P. Fossati, *Design in Italia*, p. 11.
10. Ibid., p. 37.
11. V. Gregotti, *Orientamenti nuovi nell'architettura italiana* (Milan: Electa, 1970), p. 104.
12. P. Fossati, *Design in Italia*, p. 29.
13. See P. Navone and B. Orlandoni, *Architettura "radicale"* (Milan: Documenti di *Casabella*, 1974).
14. See Aa.Vv., *Global tools* with contributions by Archizoom, R. Buti, R. Dalisi, U. La Pietra, A. Mendini, G. Pesce, E. Sottsass jr and others (Milan: June 1974), and Aa.Vv., *Global tools* 1, (Milan 1975).
15. See M. Tafuri, *Progetto e utopia. Architettura e sviluppo capitalistico* (Bari: Laterza, 1973).
16. See E. Ambasz, ed., *Italy: The New Domestic Landscape. Achievements and Problems of Italian Design* (with essays by G.C. Argan, L. Benevolo, G. Celant, R. Cominotti, M. Fagiolo dell'Arco, V. Gregotti, I. Insolera, A. Mendini, F. Menna, P. Portoghesi, M. Tafuri (New York/Florence: The Museum of Modern Art/Centro Di, 1972).
17. On the fascination with the myth of "otherness" in our recent culture, see F. Rella, *Il mito dell'altro. Lacan, Deleuze, Foucault* (Milan: Feltrinelli, 1978); F. Rella, *Il silenzio e le parole. Il pensiero nel tempo della crisi* (Milan: Feltrinelli, 1981).

In the Seventies, in many Western countries, there was a flood of new ideas (often drawn from the Orient) for the depoliticizing of collective life.
Above, the community of Shree Rajneesh in Oregon.
Below, an image from Sottsass' book, "Il pianeta come festival".
Here, the depoliticizing of design forms part of a renewed utopistic thrust, but above all forms a wealth of remarkable inventions.



tualism, a negative calligraphy, and on the other hand as a fragment of a sort of ideology of poverty. Twenty years previous Pier Paolo Pasolini wrote with extreme clarity:

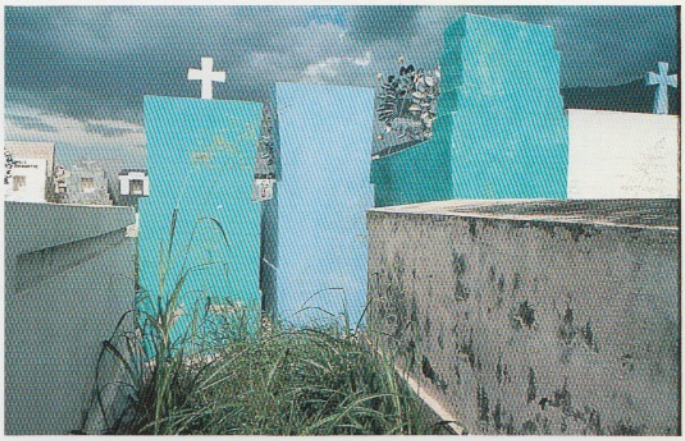
attracted by a proletarian life
[...] it is the cheerfulness of it
that is religion to me,
not its thousand-year struggle:
its nature, not its conscience [...]

In 1972 Ettore Sottsass jr. formulated his proposal for a vast utopia, "The Planet as Festival": a marvelous architectural dream that called for the conversion of an entire area of the planet, the subequatorial belt, into a space set aside for continual partying in a society freed from work. Here too, Sottsass' splendid approach to the imaginary fits into an ideological context that annuls its critical valences within a pacific and playful view of the world, in which all contradictions are eliminated. The project of the "radicals" was meant as a bellwether (based on the intellectuals' announcement of the death of architecture as a product of the bourgeois world) of a new world with a widespread spontaneous and vigorous non-culture, or, as Alessandro Mendini was to write in those years, "direct planning by the masses."

The "banal" turning point

A crucial theoretical step in understanding the development of the "radicals" involves "banal design," which revolved around the exhibit "The Banal Object" at the Biennale of Venice.[18] Crucial because it was "critical" — a point of transition from the generous and productive utopias of the Sixties and Seventies to the reality of the Eighties. Theorizing the "banal" meant a complete recognition not only of the demise of architecture as a cultivated and academic intellectual project, but also the failure of "radical" anti-architecture as critical, spontaneous, mass design. Reality burst in on utopia, wearing the mask of banality — the everyday, it was said, is neither cultivated nor radical, neither refined nor proletarian, not intellectual but not kitsch either; it is an immense, endless, and rather homely middle-class *koiné*: mediocre, though not in a negative sense because, just as Alberto Savinio wrote in his Nuova Enciclopedia, life is vast, and "vastness is mediocre." Faced with the triumph of the quantitative — which at any rate defied the hints and regulations of intellectuals and cultivated architecture — there was no alternative but to resign oneself to examining, surveying, and cataloguing reality and — the chief form of activity — to redesign. "We must say goodbye to design as a new development — the new no longer exists, and all is restyling and redesign," Mendini wrote. There is no more planning, one can only underline what has already been planned, dig out objects from the storage room of history, juxtapose them in jest. Ironically. Perhaps with a note of sadness. "Goodbye to intellectual design — the revolution consists of banality in imagination. Goodbye to design in general — design is conquered by life."[19] A definitive farewell to "radical" architecture (a phase that had already ended in the mid-Seventies), but above all it was a reflection upon the role left to

The brightly colored tombstones of a cemetery in Haiti. These are signs of life, tiny unique pieces of architecture built by the surviving friends.
Below, the chaise-longue designed by Charles Eames for his friend the director Billy Wilder. Conceived as one of a kind, it was manufactured only years later by Herman Miller.



intellectuals within design culture — "radical" architecture (even though it had theorized a sort of "dissolution" of the designer in mass social collectivity) in reality maintained, while turning the terms of it all upside down, a perfect substantial continuity with what was most Enlightenment-oriented in traditional architecture and in the Modern Movement, assigning a de facto role to the intellectual as stimulator, creator of the coordinates of design; the latter being "rational," the former being utopian and "anti-architectural." With the arrival of "banality," the "radical" area abandoned any optimism about design (or anti-design). The (inevitable) disappointment which came hard on the heels of faith put in a non-existent protagonist (the proletariat that was supposed to carry out widespread self-design) prompted a shift from an ideological activism and optimistism to an opposite — but equally ideological — acceptance of passivity and contemplation of reality.

Against the destiny — this time also "cynical and treacherous" — which disappointed the builders of utopias, the only defense was to cut out a small space as contemplators of real events. This was how the New International of the everyday came into existence, with its acceptance of the "banal" landscape of reality inhabited by the masses — which followed the discovery that this reality corresponded neither to the correctness in design of the Modern Movement nor to the populist intellectualism of the "radicals," but rather a vast panorama of furniture, appliances, living spaces, objects for everyday use upon all of which the designer — who had nothing new to design ("the new does not exist") — set little marks, messages of his semantic intervention, erudite tokens stamped at the foot of the pages of an enormous catalogue of "bad" taste.

There was no "revolutionary" thrust, no taste for paradox, in the theoreticians of the "banal" (unlike the designers of Neo-Kitsch, some ten years previous). There was only an unhurried exposition of a reality upon which the designer insisted on marking his separate and intellectual existence with the imprinting of a Midas' touch that turned objects of "bad" taste into sumptuous collector's pieces.

With Memphis, a few years later, a step was taken toward the positive role of the designer, but with a method aimed at total non-ideology: "Memphis — after forsaking the myth of progress and a potential program of cultural regeneration capable of changing the world according to a rational design, and after forsaking as well the utopias of the Sixties and Seventies — was the first step towards the reconstruction of an open and flexible design culture that paid close attention to history, aware of consumerism as a search for social identity and of the object as a sign through which communication is achieved."[20] It was a rejection not only of Functionalism but of all the traditions of the avant-gardes — Cubism, Bauhaus, Suprematism, Futurism, De Stijl, "movements that were philosophically bound to the idea of an objective reality or 'truth' and that asserted a heroic and reformistic morality that sought alibis or evasions of a spiritual, mental, logical, and ideological variety."[21]

Thus, Sottsass had instead announced the rupture provoked by Memphis in opting for sensory hedonism: "Now we can finally move with a light step, the worst is over. We can even sit down without excessive danger and we can let snakes slither over us — even if they are poisonous — and obscure

18. See B. Radice, ed., *Elogio del banale* with essays and contributions by A. Mendini, B. Radice, F. Raggi, C. Trini Castelli (Milan: Studio Forma/Alchymia, 1980).

19. A. Mendini, "Editoriale," in *Domus* 620, September 1981; now in A. Mendini, *Progetto infelice* (Milan: Ricerche Design Editrice, 1983).

20. B. Radice, *Memphis. Ricerche, esperienze, risultati, fallimenti e successi del nuovo design* (Milan: Electa, 1984), p. 141.

21. Ibid., p. 142.

spiders, and we can avoid even the mosquitoes, we can feel perfectly free to eat crocodile meat; and that doesn't mean that we have to skip hot chocolate or crêpes-suzettes au Grand Marnier. We can do — almost — anything, because, dear friends, we are old expert sailors accustomed to great wide oceans. The fact is that the fear has passed — and I am referring to the fear of having to represent or not represent something or someone, whether élites or derelicts, whether traditions or mere boorishness. The fear that emanates from the past and the much more aggressive fear that emanates from the future — the fear is over."[22]

By uttering these words, Sottsass performed a liberating act, almost Nietzschean in nature: he set himself beyond rules and morals, beyond the traditions (of the past) and the revolutions (of the future). It was the act of the intellectual who finally abandons the necessity to be something, the obligatory solidarities, the programmed schools, the burden of always having to answer for his choices before the court of History (of Design, of Class, etc.), the chore of always having to play a flute for someone else. Today this act is repeated in the area of consumerism and in the name of pleasure. When language is no longer adequate to describe changes, we must welcome changes in language, the rupture of codes, the "genetic hybrids that have yet to stabilize," even if these changes are the product of a general Babelic confusion and resemble — more than anything else — a bad case of aphasia. And yet the act of Sottsass cannot be repeated, it cannot tolerate imitators. It designates a market, but a market of pure signs — real, made up of real objects, just as the act of liberation was real and true. And therefore, not repeatable. It is impossible to create a new school, a new style, a new bazaar. The composite and multiform area of research and experimentation which can claim credit for having succeeded in the past twenty years in provoking, innovating, rejuvenating the scene of international design, defines its current point of arrival as "New Italian Design." It is here that the results and theoretical contradictions ripened over the rich and many-faceted progress of the last two decades extend themselves.

French ideology

Jean-François Lyotard put the term post-modern (borrowed from American sociology) in philosophical language to connote the present condition, as a category capable of "giving a name" to a situation which is not otherwise connotable, fragmented after the vertical collapse of the overarching ideological systems that allowed the world to be analyzed, the "Great Narrations": (Enlightenment, German Idealism, Marxism...).

For Lyotard (just as for Deleuze, whose thought neighbored Lyotard's closely) reality has no depth, it is a film, a flat plate that cannot be organized, even in cognitive terms. "Nothing comes from nothing, nothing is the effect of a cause."[23] On this surface, there are varying intensities — Lyotard's idea of libidinal economics is that one should "construct bodies that are sufficiently anonymous and conductive to avoid blocking its effects"[24] since these effects are stopped by the opacity of any body (theoretical, organizational, political) that attempts to channel, organize, understand. Only the most absolute "desire for impotence" can guarantee a free flow of the "weak" circulation of reality.

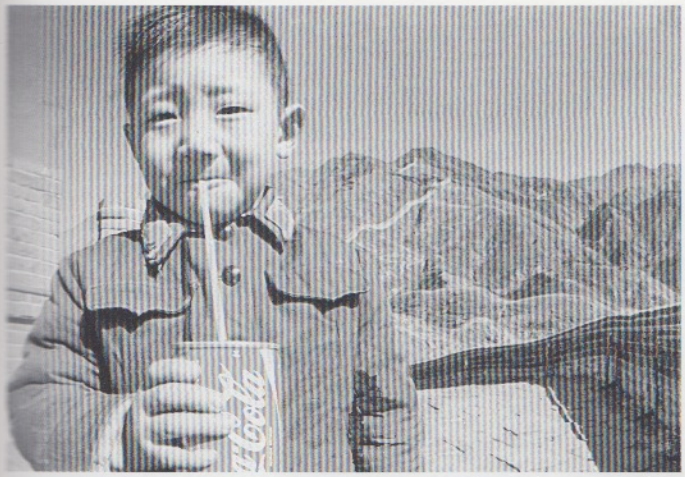
Now, this flat landscape is determined by the absence of a "center" and by the "awareness of the loss of meaning" : these are the characteristics that define the post-modern condition[25], typified by the end of centralized manufacturing, in turn replaced by infinite and indifferent circularity of signs. The world is an enormous playground of simulation, the field of mimetic or symbolic interaction of communication.

The paradigm of communication[26] — previously delineated by Walter Benjamin in his *Thesis on the Philosophy of History*, used by Jurgen Habermas as an "integration" of the paradigm of production[27] — acquires richness and radicality (setting itself in open contradiction to Marx's thought) in the considerations of Jean Baudrillard[28], who announced the end of the distinction between signifier and signified: what is signified disappears while the chain of signifiers remain, in the unending series of references and signs which is the world. Fashion, the styling of bodies and objects, is the "lightest" of all signs, with respect to economics, politics, morality, science — all "heavy" signs; and this is precisely the reason why fashion is the finished form of economics, the cycle in which the linearity of merchandise is abolished.[29]

This is the theoretic setting in which "New Italian Design" has developed.

"The great mass markets — to which classic design always referred — have disappeared; standardization, which corresponded to the process of transformation of behavior and different traditions into stable and universal models, was based on a single and enormous homogeneous international

What object in the world could be more famous and common than the Coke can? Below, a familiar photograph by J. Andanson. Right, "Le dejeuner en fourrure", by Meret Oppenheim, Museum of Modern Art, New York. Here the item is unique, its cultural quality is high. A refined solution for "lunch in fur."



market. Design was thus committed to the creation of objects destined to be acceptable to everybody, without really satisfying anyone." This is how Andrea Branzi[30] describes the present situation. "The advent of the current post-industrial society is characterized by the simultaneous presence of numerous markets that correspond to different cultural groups." This calls for a shift to manufacturing that is "no longer based on great semantic reductions which were supplied by classical design, but — on the contrary — a new and violent acculturation of the product."

Thus we register the historic watershed constituted by the end of the mass market. The "happy years" of the economic boom, with assembly lines that produced huge numbers of automobiles, television sets, appliances, and other objects for everyday use, are only a distant memory now; the optimism about unending economic growth and development has faded, no longer do we dream of the affluent society that the Edizioni di Comunità introduced into the Italian debate over neocapitalism, with the publications of John Kenneth Galbraith's well-known book, *The Affluent Society*.[31] Today, consumption is limited, select, and the market is segmented and diversified.

But it is precisely from this point that the "New Italian Design" — having reached the market after a long voyage through experimentation, exhibits, and magazines — demonstrates the irrelevance of industry to design culture, the decline of interest in design for mass production; not so much because design wishes to oppose industry, but rather because of a belief that the expressive innovation necessary to design must be generated outside of the area of industry, in a "manufacturing liberated from the problems of mass production, with a strong element of experimentation and research": the margins of renovation, if contained within "the context only of the industrial experience, are increasingly limited to recycling of productive stylemes which have already been amply confirmed." And thus we have the strategic proposal that results — the new craftsmanship. "Selling a few prototypes with high cultural quality" rather than chasing after large-scale industrial design, that is to say, rather than "selling many prototypes with a middling level of cultural value."[32] This seems to be the choice made by the "New Italian Design"; a choice that mirrors in some way the reality of manufacturing, which relegates to small and mid-sized productive entities — capable of profound "cultural" commitment — several sectors with a high image content (furnishings, fashion...) and aimed at the high end of the market.

Interactive design

The de facto existence of two different areas, of two ways of operating within the context of design, was pointed out by Renzo Zorzi in his contribution to a conference held in 1983[33]: on one hand it is possible to note "a way of operating which, in the final analysis, still maintains many of the features of

22. E.Sottsass jr., in *Memphis. The New International Style*, ed. Barbara Radice (Milan: Electa, 1981).

23. F. Lyotard, *Economie libidinale* (Paris: Minuit, 1974), p. 297.

24. Ibid., p. 207.

25. See F. Lyotard, *La condizione postmoderna* (Milan: Feltrinelli, 1981).

26. See G. Màrkus, "Produzione e comunicazione: quale paradigma per il materialismo storico?," in *Stili marxisti. Il marxismo dopo le grandi narrazioni: crisi e ipotesi di ricostruzione* (Milan: Franco Angeli, 1981).

27. See, di J. Habermas, *Lavoro e interazione* (Milan: Feltrinelli, 1975); *Conoscenza e interesse* (Bari: Laterza, 1970); *Per la ricostruzione del materialismo storico* (Milan: Etas, 1979).

28. See J. Baudrillard, *Lo specchio della produzione* (Milan: Multhipla, 1979); *Lo scambio simbolico e la morte* (Milan: Feltrinelli, 1979); *Il sistema degli oggetti* (Milan: Bompiani, 1972); *Le strategie fatali* (Milan: Feltrinelli, 1984).

29. J. Baudrillard, *Lo scambio simbolico*, p. 99.

30. A. Branzi, *La casa calda*, p. 142.

31. *The Affluent Society*, by J.K. Galbraith, was published in 1959 by Edizioni di Comunità with the Italian title *Economia e benessere*.

32. A. Branzi, *Casa calda*, p. 141.

33. R. Zorzi, "Il nuovo paesaggio industriale".

Mao Tse-tung, as seen by Andy Warhol, 1972, or the artist as "engineer."
"Sentiero per qui" by Mario Merz at the Milan Triennale, 1986, or the artist as "craftsman."

high-level craftsmanship for limited series production, where at any rate the problems of form prevail over everything else and have less need to give way to the conditioning which can be decisive, and at any rate always constitutes a constriction, of complex mechanisms, which may be said to be the 'priority' element of design"; on the other hand there continues to exist a "method of design typical of objects or instruments in which it is impossible to forget even for a moment or put in a secondary role the attributes of mass production, and all that this implies in terms of materials and finish, together with the need to reduce variations to zero." This second area has always required "the simplification or abandonment of formal sophistication; the mechanization and, now, automation of the entire manufacturing cycle, and — on the other hand — the integration of the design unit so that form and mechanism, functional ergonomics and 'cultural' values all fit in and form part of the more technological elements; the final evaluation must be all-inclusive, indivisible, and cannot fail to take into account an evaluation of performance versus economy versus ease of use versus form (and I shall skip everything that goes along with that, such as the competition, market characteristics, speed of innovation, residual habits, persistence of an image, etc.)."

Two areas therefore — one that can be called "craftsmanlike," where it is possible for the designer to unleash his creativity and inventivity, and another that we can call "ultra-industrial," where there is extremely limited room for formal innovation. An artistic area as against an engineering area? This is, with some simplifications and sketchy innacuracies, the way things stand.

Much has been said and written on the relationship between industrial design and craftsmanship, but we now know that this is not a "pair of opposites, tertium non datur"[34] if it is true, as Giovanni Klaus Koenig recalls, that a symbol-object of industrial design such as the Barcelona Easy Chair was designed by Ludwig Mies van der Rohe for a total production of twelve for the German pavilion at Barcelona in 1929; and that the Chaise-longue designed by Charles Eames was practically a one-of-a-kind item made for Eames' friend Billy Wilder, the director. Only much later did the mass production of these items take place, by Knoll for the Barcelona and by Hermann Miller for the Chaise-longue.

On the other hand, it is again Koenig that tells us

that "the Italian company that designs and manufactures extremely sophisticated radar equipment for missiles, utilizing incredible inventions which are still top secret, has long had a staff, alongside its electronic engineers, of artists who come out of art schools (for the most part illustrators and cartoonists). Their specific job is to draw what are practically objects out of science fiction, deriving them from those that they see in production."[35]

Perhaps it is conceivable that innovation will succeed in blurring this distinction as well — on the one hand even simple objects, which could fit into the "craftsmanlike" area tend to take on a greater level of technological sophistication; and on the other hand even technologically complex systems depend less and less on the laws of mechanics and more and more on the laws of electronics, and this tends to reduce the limitations imposed by them upon design and increase the ease with which they can be "moulded" by design. Electronics, unlike mechanics, is on the whole "formless"; but it waits to take form, in order to enter the realm of the usable. The designer's task is to "inform" electronics, transporting it from the world of possibilities to that of reality.

The new developments of technology, while requiring great concentration of production — necessary for the achievement of sufficent economy of scale — then transform their rigidity into a new type of flexibility: automated FMS (flexible manufacturing systems), for instance, that can be adopted only at the price of enormous productive concentration, are capable of performing a range of operations that are far richer than what could be done in the traditional assembly lines. As a result it will become possible to obtain products that can be manufactured with a greater number of variants, versions, different colors. And this is not in opposition to, but through the system of mass production.

The concentration and the internationalization of industry do not rule out, of course, the survival and even expansion of "neo-craftsmanlike" segments in the world economy; but if we entrust to new design the strategic choice of concentrating on these segments, abandoning the most advanced and integrated sectors and taking for granted the equation — mass production equals low or medium cultural quality — it means that design culture is surrendering before the challenge presented by technological innovations on the local and world level and is accepting a retreat into the "hot house" on the part of an elite super-craftsmanlike over-council.

"New Italian Design" seems to have accepted (and theorized) this surrender, thus demonstrating its extreme coherence with the cultural presuppositions upon which it has developed its thought — the anti-industrial rejection typical of "radical architecture," a cultural heritage that originated in Frankfurt, nourished on the myth of "otherness" and its development ("post-modern") in the area of "French ideology" — along with a dash of Italian "weak thought."[36]

The result of the cocktail is a persistent anti-industrial suspicion which manifests itself in the denial of the innovative value of the manufacturing process and presents itself today alongside a new, consumeristic fetishism, a hedonistic "grande bouffe" of merchandise (amidst a period of new levels of poverty...) after a long and ascetic fast.[37]

This is the point of arrival of a voyage rich in inventions and renewal, and without which today the design landscape would certainly be desolate, although it was successfully contained within the narrow limits of an anti-industrial ideology that undermined at its very roots the very possibilities of development of design. These areas do not open up even when technology is used and glorified, but only as a pretext for a new estheticism, as the inspiring muse for gadgets at the level of the cybernetics market, as a *primum motor immobile* capable of producing Neo-Merchandise, that is, design of invention and artificial ecstasy — "feeling of the artifice."[38]

On the other hand, in the past years, designers working in Italy have demonstrated enormous abilities for innovation — in expressive terms as well — of design, without necessarily slipping into the opposite ideological traps of anti-industrial

34. G.K. Koenig, "Tertium Non Datur," in *Design Furniture from Italy. Production Techniques & Modernity*, catalogue of the exhibition "Möbel aus Italien" (Stuttgart Design Center, March-April 1983).

35. Ibid.

36. Subordination to the fashions of the moment also provokes curious incidents that border on the comic: thus it happened that the philosopher Hans-Georg Gadamer, a solid post-Heideggerian proponent of hermeneutics, is presented, certainly to his own displeasure, as "one of the first to theorize what much later Jean-François Lyotard was to describe as a 'post-modern condition'": and as "the father of the so-called 'weak thought'" (see "Hans-George Gadamer: storie parallele," in *Domus* 670, March 1986).

37. Barbara Radice, for instance, wrote: Memphis "is not only a cultural event, it is an erotic event, a consumer-oriented erotic rite'" that produces "objects destined to a total and immediate consumptions, objects that are like intense apparitions, magic anathema, concentrates of existential libido." And, in a footnote, appears the theoretical source of these ideological applications, the Baudrillard of *Stratégies fatales*: "The sole radical and modern solution: to increase the power of what is new, original, unexpected, and brilliant in merchandise, that is, the formal indifference to usefulness and value, the preeminence given to circulation without reserves. (...) Vulgar merchandise generates nothing but the world of manufacturing – and God only knows what a melancholy world that is – elevated to the level of absolute merchandise, it produces seductive efects." (B. Radice, *Memphis... design*, p. 186-187).

38. See D. Santachiara, ed., *La neomerce. Il design dell'invenzione e dell'estasi artificiale*, catalogue of the show at the Triennale of Milan, February-March 1985 (Milan: Electa, 1985).

suspicion or a-critical glorification of the manufacturing process; indeed, testing de facto new forms of integration between "workshop creation" and mass production.

From the reality of manufacturing today there comes a radical challenge: to face, relying on the entire cultural and traditional background, the new quality of technology, the essence of the artificial world. From this confrontation there may spring a form of design that will face the problem of becoming the interface between man and his objects — technological and non-technological.

This is the area in which King and Miranda operate, in a continuing confrontation with industry and mass production, not from a subordinate position but in order to set in action all of the critical gains won by design culture in its encounters with the new realities imposed by technology.

Now that the certainty of functionalism has vanished, they recall, there are designers who have looked for new solutions along the roads of "technical surplus" (the trend toward High-Tech) or "decorative surplus" (the trends that can be linked to Post-Modernism). "We are sure that neither shortcuts, nor ultratechnology, nor hyperdecoration, are what is needed. We must face this crisis — which we are all passing through — by trying to go forward."

King and Miranda call their concept of planning and design "Interactive Design." At times, in the past, designers have been compared to sculptors — the hands gave a harmonious and functional form to objects first encountered (at least, when working with some type of machine) as a formless mass of gears of mechanisms; at any rate (whatever object was being designed) the relationship between designer and material was a monodirectional relationship, which moreover resulted in a product that was as static as a statue.

Today, in the world of mass telecommunications and electronic innovation, each object (not just machines, but the most common and everyday products) is perceived and treated as an interactive object, as a communicative message — it expresses signals (cultural, functional, status, market signals) and stimulates responses (functional responses but also emotional responses) from those who use or even look at the object.

The relationship between the designer and the object, then, has changed. Today design is not merely the reconciliation of formal and functional requirements, but it is also a consideration of the entire area of communication between man and his objects. "Interactive design is the development and treatment of linguistic and design models that permit interactivity — potential or real — with all of the objects in our world."

King and Miranda believe that what is important today is that which goes *beyond* functionality — functionality has already been established, it is a threshold below which it is no longer possible to descend. "It is above this threshold that today the decisive battles are being fought, in the logical and emotional setting that makes of the object a usable message, a site of relations, of interactivity."

We can glimpse a future in which objects will be considered immediately (in conceptual terms) signs in a chain of references and (in operative terms) systems within a greater complexity. "Design is therefore becoming a planning process within an enormous immaterial communications network." This is the setting within which the full possibility of using design as a language is developing: "for planning objects made so as to offer themselves for use but also, prior to use, objects telling us something about the world and about life."

The night sky
Light
A Camuno rock carving (Rock 50 at Naquane Capo di Ponte, Brescia)
Fire in a cave (from B.C. *by Johnny Hart)*

Ra, lamp designed by King and Miranda for Arteluce Flos
Tor, lamp designed by King and Miranda for Arteluce Flos
Central nave of Westminster Abbey, London
Cable, an office furnishing system. Designed by King and Miranda for Marcatré

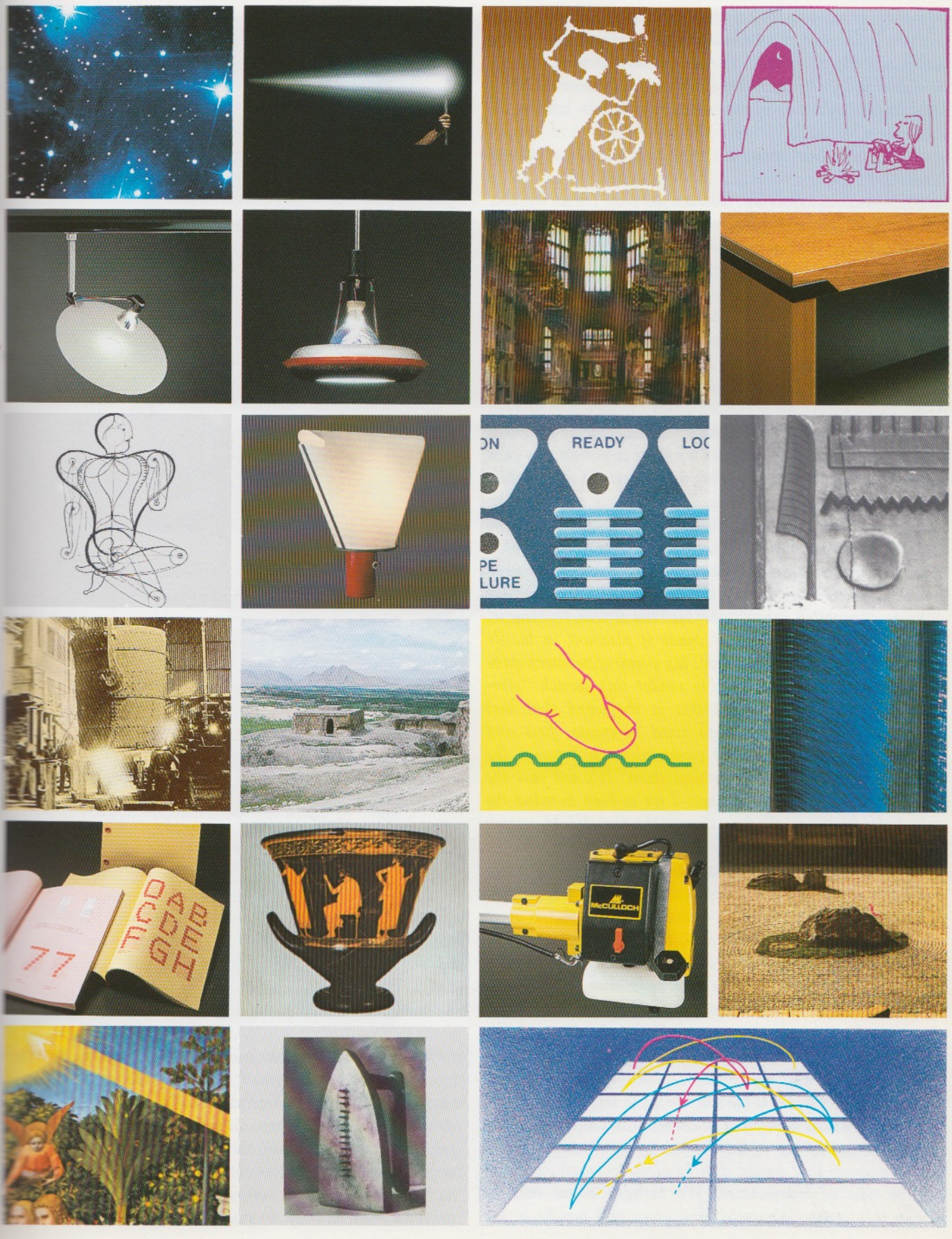
Oskar Schlemmer, "Homo Figur T", (1919-1920)
The reinvention of the abat-jour. Dolly, table lamp designed by King and Miranda for Arteluce Flos
Olivetti keyboard, designed by King and Miranda
Detail of part of the temple of Deir el Medina, Egyptian Museum, Turin

Industrial crucible (Breda, Milan)
Takht-i-rustam, Buddhist stupa carved from rock at Samangan, Afghanistan
The tactile effect in Olivetti keyboards by King and Miranda
Diffuse communication in the office of the future, designed by King and Miranda. Marcatré showroom, Rome

Dot matrix font designed for Olivetti by King and Miranda
Crater with red figures, 470 B.C. (National Museum, Athens)
Brush cutter, designed by King and Miranda for McCulloch
Zen garden at Ryoanju, Kyoto

Detail, Fra Angelico, "Annunciation" (Prado, Madrid)
Man Ray, "Cadeau", 1921
The drawing in the last two panels suggests just a few of the possible references

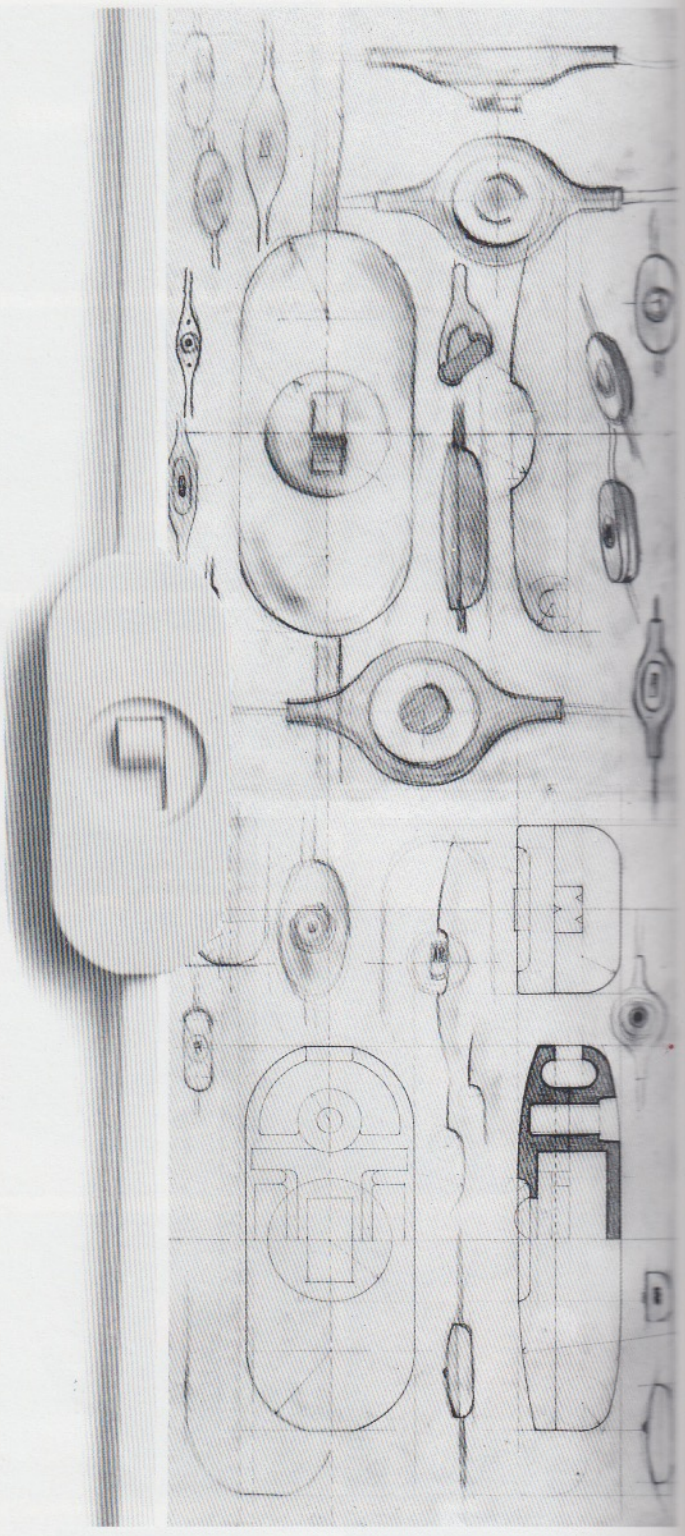
Design is called upon to give form and visibility to engineering in an infinite chain of sign references.
King and Miranda mean by "Interactive Design" an approach to design that considers each object as an emitter of structural and cultural signals and a stimulator of functional and emotional responses. In the full possibility of design as a language, objects — even before they are used — speak and communicate.



Jam and Bread

Achille Castiglioni

The switch designed by Achille Castiglioni for VLM in 1968, and several preparatory sketches.
It is one of Castiglioni's favorite pieces of design: anonymous, designed for mass production, pleasant to behold and touch, silent.



My work is always done with a view to manufacturing. I like to think that the things that I plan will be mass-produced. My profession is not that of creating one-of-a-kind objects, otherwise I would have become an artist. I consider myself to be a craftsman who works within the boundaries of industry.
And it is industrial manufacturing that stimulates formal innovation. I often think, in this connection, of an image created by Italo Calvino. He wrote that creativity and imagination are like jam — nice, sweet, but no good without bread. In the same sense it is necessary for technology to sustain creativity, otherwise, in the long run, jam by itself creates nausea.

One of the objects that is dearest to me, among the many that I have designed, is the VLM switch, first produced in 1968. It is a small object that you may even have in your home, anonymous, not possessed of the prestige that belongs to "designer" objects. Nevertheless it is an object produced in enormous quantities, selected by those who buy it — not because it is by a name designer, but because it is a simple, easy going object pleasant to hold in one's hand.
My brother and I designed it with precise reference to the hand that holds it, seeks contact, operates the switch that is located at the center of a circular hollow. These are operations that often take place in the dark, and so we took care to make the switch easy to operate even without seeing it, and — at the same time — made it pleasant in tactile terms, with its curving lines. This piece of research produced formal results such as to render this switch "simpatico." Simpatico. Perhaps this is the word that best describes what I have always tried to create, first and foremost — that is, ease of communication between the objects I design and whoever uses them. It's not just the feel, it's not just the appearance. I try to keep in mind the sound, for instance. And so this is the first VLM switch that makes a pleasant noise when turned on or off.
This is an important detail, and one which I have tried to maintain in my lighting equipment. And so the Ipotenusa lamp, produced by Flos, has a switch with a tactile snap and an especially pleasant noise. These are characteristics — small but fairly essential — that add to the special qualities of Ipotenusa — the extremely slim support rod, the shade that functions as an optical filter, the base which does not take up much space, especially because it stands far from the zone of illumination.
To give some idea of my relations with those who commission projects from me, it may be useful to tell the story of a little incident that took place in the early Sixties. An advertising and marketing agency asked my brother and me to design a spoon that would then be given to purchasers of a certain type of mayonnaise. We thought about how to design this spoon. We could have given it a handle in the form of a little woman or — what? — a cat, and the client would have been delighted. Instead we created a useful object that did not exist merely for its own sake. We designed a plastic spoon with a form that corresponded perfectly to the inside of the mayonnaise jar, so as to get mayonnaise out of even the neck and bottom of the jar. The handle was flat, but a hollow gave a support to the thumb so as to make it easy to grasp an object that normally is

Mayonnaise spoon designed by Pier Giacomo and Achille Castiglioni for Kraft in 1962.
The client, a marketing and advertising agency, asked for a gadget, a spoon to be given away during a promotional campaign. The project was a small and intelligent object, rich in original approaches.

fairly slippery.
My studio does not produce routine objects, every product I work on contains a bit of passion, some interest in the thing itself, and even a dash of humor and irony. Every time, I try to find a solution that is innovative but not gratuitous. In the set of glasses by Ovio, I introduced an external bumper ring made of elastomer; in the plates and bowls I designed for Danese, there is a border around each item that allows one to hold them securely in one's hand; in the Alessi oil and vinegar bottles I designed a hinged coverlet equipped with two counterweights — like two little ears — which make the cover open or close by simply tilting the container. At times they seem like playful toys, and in a sense they are, but at the same time they are useful and captivating.

Technical things fascinate me; I have always been interested in radios, ever since 1939, when I was still a student, and my brothers Livio and PierGiacomo with Luigi Caccia Dominioni, designed a five-tube Phonola radio. It resembled a telephone more than a radio — it was the first radio receiver with a plastic shell that made no attempt to copy the previous furniture-radios made of wood, but instead was trying to invent new shapes for an object that had now changed with new technology.
My design is certainly not intended to reject or disguise technology, but neither does it use technology as a merely formal and gratuitous element. The presence of technology certainly has some effect on the final outcome of the object and tends to condition its form.
There is also a "poor" technology, such as the technology underlying the shoe-cover that I placed in the house of Hoey, redesigned for the exhibition Il Progetto Domestico for the 1986 Milan Triennale. It is an object that I have noticed on sale in Swiss department stores for more than ten years, and yet it is quite remarkable — a single piece of felt shaped as if it were a hat, to create a great big soft slipper without a stitch.

I have been in houses where the symmetrical two-part protective case of the Parentesi lamp hung on the wall as if it were a limited-edition piece of art. It is true that in designing it I drew some inspiration from certain artforms of the Seventies, but pressed plastic packaging should still just be tossed out, after it has performed its task. What I was interested in, when I designed it, was to create an object that would correspond to the lamp and allow it to be transported efficiently. With respect to the container, my design approach was to achieve an esthetic form without introducing any gratuitous or superfluous elements.
And the Parentesi (inspired by a sketch by Pio Manzù) is made of a very few, simple elements that are all "intelligent"; a metallic cord, a floor weight, a sliding profiled tube, a totally flexible lamp.
I believe that it is important for a designer to attempt, in selecting a form, to create a communicative relationship with the observer that tends to prompt his interpretative capacities — a relationship of simple reciprocal curiosity.

From an interview with the author, January 1986.

My Work as a Craftsman with Industry

Richard Sapper

For the most part my relationship with industry has been positive. I have almost always had the good luck to meet people whose interest in design was culturally oriented, who did not consider design a mere sales tool. For that matter, I am not certain that design is a tool that can build sales; if anything, it may help a product to sell longer than another less good product.

And so, when I work for a manufacturer, I make no promises about doubling sales volume, but I simply try to offer a cultural contribution or qualification. This is a basic ingredient for any profession — if I were a baker, I would try to make rolls that were not only good but also handsome, and indeed there are many bakers that make extremely handsome rolls. In any human profession, to some degree, beauty is necessarily involved.

In the modern world that we face, instead, everything is counted in number, evaluated with what Americans refer to as the "check list." You draw up a list of topics and then you count the numbers — how many topics does this have, how many does that have... In a world of numbers like this it is not possible to evaluate quality. Quality cannot be quantified. And so it is lost.

By nature, instead, man is interested in quality, and it may happen that one comes across this interest in the world of mass production. Especially in Italy, where there are not only manufacturers who like to make handsome products. There are even manufacturers who like to have handsome factories.

Italy has the best looking factories in the world, containing the most beautiful machinery in the world — even if they may not be necessary, or they may not work, or things happen like what I once saw in a factory in Prato. This factory had the most beautiful textiles machinery in the world, and the interior of the factory was truly a jewel. Out back, however, they were dumping poisons and dyes into the river, because the river was not considered to be part of the factory and so it was not important... It is not even necessary to say that this is a terrible mistake. But, aside from these cases, the fact remains that in industrial design, in the will of industrialists, there is a desire to create beautiful objects, there is the pleasure of possessing beautiful objects. Every once in a while it really happens — you meet a manufacturer who tells a designer to create anything he wants, in order to have something that is truly beautiful. Afterwards, when it has been produced, he tries to sell it. I believe that this is the correct procedure.

In almost every case, I am not the one that first establishes a relationship with industry. The manufacturer calls me on the phone and makes a request. In general, I say yes when they offer an interesting job and when I have the time to do it. My office does not have a very large staff — in practice I do all the work myself and, objectively speaking, I have a very limited work capacity. We all know about design studios in the United States that have a staff of forty, fifty, even a hundred, but I do not have a very clear idea of what all those people do. When I asked for information, they replied that, out of a hundred, probably eighty or so do packaging... But packaging is something different from design. In reality, these eighty people are doing something else, different from design, even if it is related.

Of course, a person capable of doing product design can also do packaging, or graphics, or market research, or even public relations, if he likes... But this is the typically American idea of horizontal expansion. I personally tend toward the opposite idea — I like to do only and exclusively what I am interested in: designing products. And designing new products is necessarily a type of work that must be done on one's own. Here in Italy design studios tend to be much smaller than those in the United States, but on the whole they are still larger than mine (obviously, these studios do much of their work in architecture and in other related fields). For years, I worked with Zanuso in one of these organizations, a small one, but not exactly tiny. At a certain point however, I decided that the thing that I was interested in more than anything else was design. I decided that if I was going to design, I would never direct other persons, because I have learned that in this narrow field of design, anything you do in person is a way of learning new things. If I had others doing my work, I would lose opportunities to improve it.

I have reached the point where I carefully check all the models that I have others construct. On the whole, I don't use models much — I tend to do three-dimensional sketches. But even the few models I use are made by my modeler, with whom I have worked for twenty years, and I am constantly looking over his shoulder to see what he is doing, and telling him: "round off this sharp piece." And while he is rounding it off, the transformation of the shape of the thing helps me to discover something superior to what I had originally conceived.

I believe that — at least in this specific area — neo-craftsmanship is an illusion. Certainly, the field of industry is vast, and it is possible to spend your life working as a designer and never leave the bounds of craftsmanship, because there are lots of design objects that might seem to be industrial products at first glance — furniture, for instance — but that are handcrafted. ... But we cannot talk about "craftsman" design of extremely complex products such as automobiles, airplanes, computers. The design of a computer may seem like child's play (a computer is just a box filled with various components, many of which preassembled), but the implications in terms of capital and industrial power are too large to be able to talk about craftsmanship.

When any one of the decisions that are made about the shape of an object represents a billion, or five hundred million lire, any comparison of this work with craftsmanship is hopelessly mistaken. I may be alone, as a craftsman, in designing something, but then it is always my job to convince five hundred persons to produce something in exactly that fashion, and then I will still have to persuade fifty or a hundred persons (engineers, specialists in manufacturing, robotics, materials chemistry, testing) who all work on the thing that I made and develop it together with me.
It is only later, after a year or two or three from the original model which I developed as a craftsman, that the industrial product emerges. And this industrial product may be fairly similar to my initial idea, but then again it might be completely different from what I conceived at the beginning of the process. My work as a craftsman, in short, is never anything more than a first step. The rest is necessarily a product of teamwork. In my professional practice, this teamwork does not take place inside my studio but in the larger context of the companies that have to produce these things. There is a precise reason for this — only companies can make decisions, only they can choose how to develop a mould, how they want to manufacture something. Working with them is an objective necessity. Of course, as I indicated earlier, this is true of objects that can really be called industrial — automobiles, television sets, all machines that are mass produced with a complex process and the use of large amounts of capital. This can be true as well, if you like, of an office chair, but almost never of an ordinary chair.

In the field of furnishing, I have designed lamps, which are almost always crafted products — the Tizio, for instance, has been on the market for almost fifteen years, and only now are they starting to think about robot manufacturing for it.
With the Tizio as well, however, I designed a low-cost item for automated manufacturing. When I presented the prototype I even brought along an estimate for the material that was required in making the lamp...; if there had been faith in mass production back then and a decision in favor of making the necessary investment, the Tizio could have been quite inexpensive. Certainly, from a commercial point of view, I cannot be a hundred percent sure — no one can guarantee that the Tizio would have sold. But the design I prepared was for an industrial product, a mass-produced lamp.

For those who are interested in designing working tools (and this is the field in which I am most interested) the evident sore point, the most important area, is the point where man touches machine and works with the machine —

The setting proposed by Sapper at the exhibition "Il progetto domestico", at the 1986 Milan Triennale. It shows what can be developed today from the tradition of dens.

the handle of a hammer, for instance.
It is a very interesting, vast field. Man has always had an interface with his tools, whether they are weapons or utensils. Basically the only thing that has changed in modern times is that tools have become more complicated than they once were — complicated up to a certain point, though, becase if I think of a violin as a machine for producing music, the interface between this tool and man is far from simple, it is already quite complicated.
Three or four years ago, in a film for IBM about these problems, I compared the keyboard of a piano with the keyboard of a computer. There was a scene of a person working on the keys of a computer and then, to indicate the difference, a pianist playing the piano. The idea was to show the range of cultural action that can take place in the interface between man and machine in the two cases of an extremely primitive "machine" such as the piano and a very sophisticated machine such as a computer.

I basically believe that the objective a designer should never lose sight of is that of creating as human a relationship as is possible between man and tool, whether or not the tool is a machine. In the case of machine keyboards, for instance, contact should be in some way stimulating, should respond to the person. I am afraid, however, that this is not true at all nowadays.
Nowadays, a keyboard is totally abstract. The keyboards that we are accustomed to using were developed from American typewriters, because the Americans were the first to think about the ergonomics and functionality of keyboards. The first typewriters were made in such a way that the keyboard was as inconvenient as possible, because

The Sapper-designed kettle with a two-tone melodic whistle, for Alessi.

if the typist had been able to write too fast, the little hammers would have jammed. This situation — with the weight of tradition behind it — still exists today, and apparently no one is thinking of changing it. It seems that no one is capable or wants to modify the situation.

When American ergonomists came onto the scene — in America they are called human factors engineers — they began to do some studies and to say: "This keyboard is ridiculous, we've got to change things." In fact, they changed the keyboards. But on the basis of what criteria? They lined up fifty typists working on different keyboards, and told them to type. Whoever worked fastest and made the fewest errors had the best keyboard — the criterion was efficiency.

This is the American concept of keyboard design, and this concept remains the model for all our keyboards. Then, when the Europeans discovered ergonomics, they thought of other things: muscle cramps, physiological ways of improving the keyboards... For instance, they said that it was necessary to lower the keyboard, to bring it closer to the table, so that the operator could sit in a more correct position.

A great number of things has been done, all good, but without touching the heart of the problem, which is cultural, not merely physiological. How can we give a soul to a keyboard?

If I pick up a nice hammer, it gives me pleasure. It is not enough for the hammer to be well balanced. I want it to be truly well designed. I cannot see the balance, but I can see the beauty, something that attracts me. I wish to work with this hammer because it pleases me. This is the type of appeal that our tools no longer have. Keyboards do not have it, neither do monitors.

And so it is necessary to change everything. But it is far easier to say it than to do it. It may be that in a couple of years, we will no longer have keyboards because voice communication will have replaced them. I don't believe it, though, nor do I hope for it.

I do not hope for it because it would be something intolerable — even if we leave aside the question of privacy (if you are writing, you don't want everyone to know what you are writing), there would be another fundamental problem. If everyone talked to their machines, who would understand anything anymore?

From an interview with the author, January 1986.

Manufacturing after the Great Ideals

Sergio Gandini

There is a generation of Italian manufacturers that started working in the Fifties and Sixties with a specific intention — to introduce into the area of consumer products choices that were also valid from a cultural point of view. We wanted to offer more than just merchandise. We wanted to offer quality, and allow the consumer to make further choices within that context of quality.
Good choices — for us, that meant supplying objects that had a correct relationship between product and use, between product and image; objects capable of providing, in the area of the habitat, a correct overall communication with the user. And so we developed a special interest in design. Our utopia was that of mass-producing objects that were rich in material and cultural qualities. Mass production — meant that these qualities could be reproduced in great quantities and sold at advantageous prices, so as to spread new qualities of living and furnishing.

It was a utopia. We discovered that consumption follows its own complex and variable rules. It does not always reward what we consider to be the most culturally valid qualities. The final consumers, furthermore, play only a small role with his autonomous choices in determining the success of a product; between industry and a consumer there are countless filters that make most decisions — architects, interior decorators, commercial middlemen, and so on.
And so our expectations of developing "mass acculturation" in the field of furnishing proved illusory. Deep down, the space in which one can move is extremely small, and is limited to a group of opinion leaders for mass decisions. So the question remains whether we succeeded in raising the cultural level at least of that small group. This hope too proved to be a utopia. Quality does not necessarily win on the market, because decisions are influenced by other factors — the circulation of a product image which creates a trend, greater profit margins, and so on...
The market is saturated by an excessive number of products. It has become necessary to develop batches of new products each season. Not better products — new products. By now, the market demands this. There are products that last for a long time because their qualities continue to be valid and because they are correctly supported by intelligent commercial and marketing choices. This is right, just as it is right that less valid products last for shorter periods of time. But what I cannot accept, and what happens with increasing frequency, is that valid products are abandoned and are replaced by others that are not better, just newer.
Consumerism has legitimized the new for the sake of the new. It has become impossible to offer a series of tested, valid products in quantities that will truly allow one to reduce costs. We have been forced to put parentheses around the utopia of a habitat landscape made up of intelligent and culturally valid objects.
Reality proved more complex than we expected. High-quality objects do not necessarily prompt mass enthusiasm because mass taste and mass culture are different from our intellectual proposals.
Within the context of this new situation, however, I think it is necessary to continue manufacturing high-quality objects.

In the meantime, from the Fifties and Sixties until today, consumers have also changed. The new challenge for a manufacturer is this — how can we operate, in these new conditions, without simplifying or falling into illusions, succeed in introducing into society not merely merchandise but cultural qualities? There are no ready replies. Still, this is the only direction of research that interests me.
Today Italian products are successful around the world, but I do not think that we should be excessively euphoric — what we call "Made in Italy" is an export line in which quality is often sacrificed and forgotten for quantity's sake, and where in order to increase sales products of all sorts are made into "designer products," without an eye to the real level of quality that these products can promise and deliver. These trends are very dangerous, because short-term success may lead, in the long run, to the drying out of the line. It is therefore necessary to extend our commitment in two directions — commercially, in order to consolidate our foreign sales networks, but above all culturally, to maintain and improve the level of quality of products marked "Made in Italy."

In the last few years, in response to the disappearance of the utopias we described above, some have proposed new utopias, such as that of neo-craftsmanship as a field of experimentation in which objects with high cultural content can be produced — in series and mass-produced, though mass-production is inevitably considered a source of low cultural quality.
In reality, neo-craftsmanship has often done no more than generate new forms of academia and elitism. But a more radical and simpler criticism can be levelled — that is not design. I consider design to be the planning of a series of products, of products that can be manufactured in potentially large quantities and at potentially low costs. Otherwise, we have exercises — very worthwhile exercises — in high-level craftsmanship, or even art. But not design.

It is true that experiments have been done in this area, and successfully so. The positive aspect comes from the fact that they have generated discussion — but this does not authorize one to pass them off as the new design culture.
It has been said that in the future everyone will be able to program and request their own personalized products, that factories will be able to produce automobiles each one different from the last, and that purchasers will be able to

select the color, finishings, design, the curves of the doors, and so on.
This may become technically possible, but we must be cautious about this new utopia. Consumers, terrified by the enormous number of options available, will wind up choosing the most standard and reassuring products. Instead of chasing after these dreams, it would be much better to offer a narrower range of choices — that had all been checked and selected, with a greater level of quality.
The demagogic supply of infinite options should be counterbalanced by a supply that may be more limited in quantity but higher in quality. Which remains the fundamental role of industry — designers and manufacturers.

From an interview with the author, December 1985.
Sergio Gandini is a manufacturer who has been working for over twenty years in lighting (Flos, Arteluce).