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## **Contents**

### **Editorial**

**Environment, Design and Man** V. N. Adarkar

### **An Emerging Profession—**

**Industrial Design** S. N. Ramachandran

**A City: A Machine? An Organism!** Dilip Chitre

### **Diploma projects**

### **Classroom projects**

### **Faculty projects**

### **Design Survey / Letter-box**

### **People and events**

The industrial designer is a much misunderstood man about whom there are several popular misconceptions. There are many otherwise well-informed people who regard the industrial designer as a kind of make-up man for products that have been already engineered. There are others who regard him as a stylist who changes the outward appearance of a product by some visual gimmicks intended to make the same product look new and different every year. In short he is regarded as a man whose main job is merely to add glamour to products. At present, his role is not taken more seriously than this.

If the above conceptions of the industrial designer were true, indeed it would be a very thin foundation to build a profession upon. It would also mean that it is difficult for the industrial designer to survive on par with the technocrats and the marketing men he is supposed to work for.

Again the industry could not afford to use the services of an industrial designer if his work did not lead to economy in production through his understanding of suitable materials, processes, techniques and the total marketing context. When misconceptions about the industrial designer exist, there also exists prejudice about his efficacy and role. Since the industrial designer is misunderstood, it is only logical that the discipline of industrial design should be the cinderella among not only executive hierarchies in the industry but also among design disciplines themselves.

To make the role of the industrial designer understood better not only by the leaders of the industry but also by the community in the largest sense, we have to take a close look at the Indian situation today. The recent role played by India in the liberation of Bangla Desh has heightened achievement-consciousness in a nation which had so far been depressed. In the wake of this historic event, Indians proved to themselves that they could defy bullying by the super powers. In the process, they learnt how to stand-up, internationally, and stick to their own principles. The same, one hopes, would be reflected in all activities in India in the next few years. Here is the

context in which the designer's role could be best understood.

India is striving today to become an industrial power. We already have a base—both in terms of manpower and resources—to cherish such an ambition. What is needed is vital management skills and professional expertise which will translate the technological ambitions of our society into reality.

Man has always had to assimilate and integrate objects into his culture to maintain its continuity. His culture must also be such as would continuously create new objects and qualitatively better environment. The designer does not merely produce a good design: a good design delivers a higher standard of living.

Our industries at present rely too heavily on engineers in shaping of their products. However, engineers seldom take a human view of the technological environment of modern society. There is a crying need today to humanise our technological environment. Since the designer takes an anthropocentric view of all man-made objects, he is specially oriented to create technological designs with a human bias. The engineer's approach to a design problem contrasts radically with the industrial designer's view of the same problem. Whereas, in designing a technical object, the engineer makes a structural analysis of the product, the industrial designer makes a formal analysis of the product. Again, the designer's conception of form is married to economic and anthropometric considerations. Discarding the jargon, one may say that the designer is as much concerned about the user of the object as the object itself. The engineer is usually concerned only about the object. This leads to certain anomalies: engineer-designed products often create frictions between the object and the user. Basic concern is to harmonize the relationship between man, the user and the products that he creates and uses.

The industrial designer thus looks at the product in the shape of the needs it serves. These needs lie deep within human nature as well as the total social and cultural environment of man. If we regard the product as a

system consisting of many elements' the configuration of these elements may be called the structure of the product. The structure of the product shows its elements and their inter-relations. While the engineer analyses merely the structural complexities of a product, an industrial designer is trained to understand its functional complexities. Therefore, when an industrial designer thinks of a product, he is thinking of all the operations the product is able to perform and he is equally aware of the human environment of these operations.

This, precisely, is the missing link in the processes of production in Indian industry today. We have competent technologists, we have the requisite materials and methods, we have skilled technicians and managers, we have all the know-how that goes into the product-mix, the only element that is missing is the vital element of industrial design know-how.

All those who forget the importance of industrial design also forget that it is the industrial designer who links the product with its user.

We at the Industrial Design Centre are aware of the enormous task of asserting the industrial designer's role in emerging India. If recognition to the industrial designer is delayed, we would be delaying recognition to the vital human aspect of the technological revolution. Sometime in early 1973, the Industrial Design Centre proposes to convene a national Seminar on the role of industrial design in emerging India. At this Seminar, we hope to bring into a single focus all the related interdisciplinary problems confronting those who want India to step positively into the technological age.

S. Nadkarni

## Environment, Design and Man

V. N. Adarkar

With one of the stablest ever Governments installed at the Centre, India can plan for the future more confidently than any other time since independence. The present need of the nation is a need for change and yet it does not by itself make decision-making easier.

Apart from the host of internal problems India faces today, the most serious problem we face is the problem of coping with the emerging world culture in the era of an ebullient technology. Within a few decades, futurologists predict the emergence of post-industrial societies in the world. Japan, the United States, Sweden, West Germany and Canada are likely to forge ahead of the rest of the world in evolving highly technologised patterns of culture. Most of Europe, including the Soviet Union, is likely to develop into advanced technological societies. Even China is expected to reach the middle-industrial status while India, along with many other Asian, African and Latin American nations will still be an 'industrialising' nation by the year 2000 A. D. according to futurologists.

### Cultural response

It is too easy these days to take economic and technological development for granted provided certain steps are taken. But the required steps can be taken only if an entire society is consciously prepared to take them. For a totalitarian regime, it is possible to achieve certain economic and technological goals predictably within a short period. For a democratic society, the task is much more difficult since it involves the participation of the majority of the people and it must be voluntary and enlightened participation. Thus, for India, the basic task is to create the kind of cultural infra-structure which will ensure the proper response to technology and pave the way for enlightened participation in national reconstruction. With only twenty-four per cent of the population having a claim to literacy and with eighty-two per cent of the population living in 567,900 villages, preparing Indian society for technological transformation is a formidable task.

What makes this task most complicated is the diversity of languages and local cultures in India, obscurantist attitudes, regional chauvinism, and ignorance of the emerging world. But the most dangerous factor in the way of planned cultural, social and economic development is likely to be an imitative attitude towards already technologised societies, which widely prevails among the Indian elite. In the West, social scientists are gloomily observing a man overtaken by his own technological achievements. Western man is beginning to feel insecure in the midst of all his glittering technological progress. Alienation has become an everyday term in every cultural and social context. A kind of global mass-civilization is swiftly demolishing cultural identities. In the words of Claude Levi-Strauss, the eminent anthropologist, "Native cultures are disintegrating faster than radio-active bodies."

All this is relevant to India where there are diverse native cultures, where the cultural tradition has yet to evolve the proper attitude and response to modern science and technology.

### India's advantage

Western experience of the social and cultural impact of technology can help India to plan for change in a more enlightened, even if less spectacular, way. Economic growth is possible minus the hazards of cultural imbalances, alienation from the traditional physical environment and erratic responses to change. After all, India's plans for industrialisation and technologisation will have to be in the context of a rural and predominantly agricultural society. At present, there is no meaningful interaction between metropolitan and industrialised India and rural, agriculturist India. In a way, this is the same kind of gap that exists between India and the Western world. It is, basically, a cultural gap, a gap between two value-systems, a gap in communication. If we can bridge this gap, we can confidently take our place in the emerging world.

However, bridging the gap is difficult not only because the cultural

ethos of the rural Indian masses is so different from the ethos of technologising societies but also because the decision-making elite in India has not been able to pay sufficient attention to rural India. Consequently, we read reports of Swedish or American volunteers achieving valuable inter-cultural exchange in rural India while urban Indians, who receive fabulous aid from foreign foundations, are seldom heard of a hundred miles beyond city limits. The cultural disparities thus created are potentially more dangerous for the integrity of the Indian polity than economic inequities which are more obvious. It is true that the Indian village today is being drawn into a larger and more complex chain of economic interdependencies; but it is also true that the rural Indian is not sufficiently aware of the network of cultural interdependencies which should be the concomitant of such wide economic relationships with the outside world.

### A virgin territory

Rural India is still a virgin territory. Marketing organisations and the communication industry are now beginning to realise that the mass media of communication do not sufficiently reach the rural consumer. These are the people who are quick to reach wherever purchasing power lies and it is definitely going to increase in rural India. The nation is thus culturally divided between the urban and the rural. National newspapers, periodicals and magazines find it difficult to reach rural Indians. Even the regional press and periodicals do not reach them adequately. Yet, the Indian villager is going to make a rapid transition from his traditional objects of utility and luxury to more modern consumer products, durables and some semi-luxury articles. At present, there is no organised marketing research on the rural Indian. His profiles is only a guess to the urban industrialist. Creative artists, musicians, writers are equally removed from rural India and the same can be said about academic men. In fact, at all levels, there have to be meaningful cultural inter-relationships

between urban India and rural India. Since urban India is more conscious of its economic and cultural inter-dependencies with the rest of the world, for some time it has to act as a conveyor belt between rural India and the rest of the world.

But a major movement towards a modern future must begin within rural India itself. It should not merely adapt to outside changes imposed from about but should intelligently and confidently evolve its own response to technology, retaining its own cultural identity.

### Product designers' problems

In the ICSID Seminar organised by UNESCO in 1964, a resolution was passed on "Design for Living". It described Industrial Design as "a creative activity whose aim is to determine the formal qualities of objects produced by industry. Formal qualities include the external features but are principally those structural and functional relationships ... converting a system into a coherent unity both from the point of view of the producer and the user." The resolution further gave the following, comprehensive definition of Industrial Design: "Industrial Design extends to embrace all aspects of human environment which are conditioned by industrial production."

It is worth recalling that anything from a mug to an aircraft is an industrial design. But it is even more important to remember that every aspect of man-made environment is an industrial designer's problem and that the physical environment we design profoundly shapes our cultural life and our patterns of individual and social behaviour. As such, industrial design is a cultural design discipline tuned, on the one hand, to scientific knowledge and technical know-how, and on the other hand, to the living conditions, cultural traditions, social life, social goals, and economic and technological aspirations of the milieu within which it operates. It may have to make its compromise with the techniques of economic optimisation, but it has to place cultural and aesthetic constraints on the

techniques of optimisation if it plays its vital cultural role intelligently.

Planning to place India in the emerging world with its sweeping mass-civilization, industrial designers must widen the definition of their own role in shaping a total cultural environment. And to do this with due regard to the needs of rural Indian is a task involving a most diverse inter-disciplinary group exchanging information and ideas with the industrial designer, the designer of our environment in the future.

It is an unfortunate paradox that there is not yet a single institution in India which is devoted to the study of environmental designing on such a wide scale and in the necessary inter-disciplinary perspective. Some beginnings have been made but the industrial designer still works in relative isolation from other relevant disciplines and is denied the vital feedback on patterns of local culture in rural India.

Western experience with strident technologisation without regard to its total cultural consequences tells us how the decisions of technocrats, economic experts, giant industrial and commercial organizations and even the Governments have been made sometimes without regard to their consequences on the total physical and cultural environment of man. The most important factor in planning is the man for whose well-being the plans are ostensibly made. Yet, man is the most neglected factor. The dominant economic technique for evaluating alternative strategies has been the technique of optimisation. But cultural values and their associated variables are often left out of the neat calculations of planners whether they are State planners or experts employed by private enterprise. The "best" solutions to design problems are still those which optimize. Thus the atmosphere and waters are polluted, monstrous structures are erected in the metropolises, vulgar creature-comforts take the place of culturally more vital and wholesome environments.

### Responsible planning

The need for responsible planning in designing the total environment of

man should thus be obvious. The two patent dangers described above are rampant scientism and economicism. Western societies have had to pay a heavy price for not having planned an environment for "the whole man". In India, the mood may be different at the moment.

Rapid economic developments have to be made and industrialisation and technological development are unquestionable necessities. Yet, it is possible that a passionate but narrow view of the whole process of social development may be adopted. We may thus vulgarise our surroundings and we may even profoundly affect human behaviour by taking short-cuts to a designed environment. The social and cultural consequences of such short-cuts will be apparent only when they have locked the Indian man within irreversible processes of dehumanisation and robotization. While opting for man-made machines we must be careful not to produce machine-made man.

In Western societies, a mathematical model of human behaviour lurks beneath all applications of the technique of optimization. In India, where the average man today is illiterate, deprived of human dignity and subjected to both man-made and natural forces beyond his comprehension and control, it is easy for experts to make instant assumptions about his nature and his way of life and to offer him a ready-made value-system and pattern of living. The designer who often acts in the interest of his commercial or Governmental clients has seldom the urge to exercise his expertise, armed with inter-disciplinary feedback of the sort described above.

Indian designers will soon be called upon to focus their attention on rural India. They will have to plan modern products and physical environments for Indian villagers. They will be involved in planning villages and new townships, consumer goods and durables, the interiors of houses, and a host of other things touching the life of every man from walking to sleep. In fact, if we take a broad view of design, it would include many more things beside visual and plastic design. The whole cultural activity of

man is designing. Thus, industrial designing is designing for an industrial culture, technological designing is designing for technological man. But in this predominantly rural and agricultural society of ours, even technology will have to be applied in unique ways suited to India's native cultural genius, and its urgent social needs. All our efforts of development will have to be on a scientific basis. But this includes both the natural and the social sciences. Our basic concern with 'the whole man' should focus our attention equally also on folk art, folk music, traditions, customs, habits, handicrafts and aesthetic attitudes; religion and the need for a this-worldly orientation without destroying man's inner need for religion; and a comprehensive study of the evolving social, cultural and economic inter-dependencies of the Indian village and the outside world. It may be true that the world will eventually become a single village. But at present, the Indian village is a world by itself and it has not found out what tremendous changes are taking place in the outside world. Within a few decades, unless we establish inter-cultural communication, the outside world will become incomprehensible to the rural Indian and vice versa. One way of achieving such inter-cultural insights is through designed products and designed environments. For designed products are a kind of silent language: they reflect the form of life of the society which uses them. Just as a new language, created out of words picked at random from various languages, neither makes sense nor takes roots, a few products designed in imitation of foreign products do not make sense within our culture. We have to apply universal, scientific principles in unique local conditions.

### Need for organization

There is thus the need for an institution which will not only study the design of various alternative physical and cultural environments for tomorrow's India, but also much more. It will have to be a multi-disciplinary institute with facilities for field work, experiments as

well as theoretical study. It may require talent of diverse types and scholars from various disciplines working in close collaboration with technologists and designers. It should be able to undertake the study of living conditions in India and the life-styles of the people of India. It must have its own expert futurologists sensitively studying trends and developments and outlining alternative futures. At first, such an idea seems impracticable and too ambitious. However, judging by developments in other countries, it is not so. Planning for the future is no more regarded as an intellectual parlour - game. But today the dimensions in which the future is planned for are too limited. Environmental design is a subject which concerns scientists, intellectuals, experts and people of all kinds. For the environment is something which we inevitably share with the rest of the community.

## An Emerging Profession— Industrial Design

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'Does your company plan to grow?' The first answer that comes to mind frequently is 'Of course'. This naturally encourages the next question 'How do you plan the things? — How do you plan to grow?', which is usually answered in a much less specific tone.

Certainly new products are synonymous to growth. It must never be forgotten that with the expectations of the community and the ever-changing tastes and functions, there is a need for continuous evaluation of the existing products and innovating and developing new ones to earn a higher rate of return and, therefore, a stimulant to the profit picture.

New products may just appear, but most of the time they have to be planned for. Companies should think almost continuously about new products. The customers may outline new requirements, employees may offer new suggestions, outsiders may propose new ideas, but regardless of how new products come about there are specific steps which are required to be undertaken quite elaborately to make the idea a success. It should be realised that new products, or modification to the existing ones, should be based on prior assessment of the needs and tastes of the consumer which include functional, aesthetic, time and exchange values offered through the product for the price he pays. Fitness of the product for the purpose is the key.

Any product or service is a part of some system that is used either by industry or by the common man to meet some particular needs. An examination of the consumption system will indicate what types of product in what shape, size, capacity, colour etc will be useful for satisfying the needs and wants. Thus the manufacturer should think not only in terms of his particular role in relation to other manufacturers but also in terms of its suitability in the consumption system. The general 'Production-oriented Approach' to marketing goods and services should not become chronic and ignore the basic issues involved—Why a customer buys? Thus the product policy in any organization should be one of producing

goods and services which can satisfy fundamental needs and for the changing needs of the community.

Man expresses himself in the things he makes—it does not matter whether it is an axe, bow and arrow, a clock or a space capsule. It is a way in which he chooses to do so which makes the sediment reflect the human touch. This sediment called 'culture' is not only founded on things made by him but also on the way of living and the way of thinking by which the individual comes in communication with others. Thus the early part of the 20th century started the concept of industrial design as one of the most important stepping stones in synthesising art with industrial activity to help create better products.

In the early stages industrial design pretended to raise consumption by merely adding 'Selling Points' to products. Industrial design proved to be successful and it told people that selling points were added for making the products attractive for the individuals. Thus the industrial designers became 'Stylists' which means that refraining from really substantial improvement of the product by adding 'Real Value', they tried at least to 'Let it look like being substantially improved, untraditional, new and thus surprising'. But the increasing trend towards mass production and market competition changed the role of the industrial designer from a mere stylist into a discipline extensively used in product design and development—a dynamic philosophy which takes into account aspects, such as, social, cultural and economic values and systems, psychological, emotional and anthropological aspects and aesthetics over and above the pure technical and technological aspects of a product.

The task of developing a new product includes :

**Exploration** —A search for product ideas to meet the companies' objectives.

**Screening** —Analysis to determine which ideas are pertinent and which could be given careful thought.

**Specification**—The explanation for the idea through creative analysis regarding product features etc.

**Development**—Transforming the idea on paper into a being which is producable and demonstrable.

**Testing** —Commercial requirements and communication.

These steps are not mistraced but are practical business functions of any organization which would like to keep on reviewing the development of new products.

A new product seldom emerges full-fledged from research alone; it seldom continues through engineering or production. Product design and development is a result of a group activity and as such, there are normally so many contributions to be made in the process of development. There will be, accordingly, a great number of contributors sharing the total responsibility for thinking and for synthesising a great number of factors in an absolutely convincing manner and to agree upon a system of reaching the aim of such synthesis. For reasons that every representative of a discipline cannot possibly know more than his own professional field and that factors from one's own field always have the habit of being of greater importance than those carried out by others, there is a need for synthesising the ideas of others to make the output of such a group activity more than the sheer mathematical sum of the individual outputs put together. Thus, integrating the ideas from different disciplines and providing creative ideas form the core—nucleus of any exercise of industrial design.

Thus industrial design is the practice of analysing, creating and developing products through group activity. Its goal is to achieve forms which are assured of acceptance and a desire to process, which can be manufactured at a price permitting wide distribution and reasonable profits to serve man better than his predecessors.

The practice in India with regard to introduction of a new product or modification and development of existing ones has been mainly one of import substitution or of producing something out of sheer imagination of an artist or a technician. Product development until now has been haphazard and depended on the intuition of their elders and opportunism. It is seldom realised that the product should be based on prior assessment of the needs and tastes of the consumer. This is due to the common feeling that there is no problem for marketing any product—marketing means to many 'mere selling'. For sheer reasons of beauty or ease of production or perhaps of no reasons at all, goods are made every day which are difficult to hold, hard to understand or impossible to repair. You may need a six months, course to learn how to fold an ironing board ! What could be called 'Production-oriented Firms' are the worst culprits as might be surmised. The relation of machine to man and man to environment is still ill-explored.

Manufacturers produce what they could and push the result on to public to buy. They look inward at their production capacity. Fortunately, only recently industry has begun to change giving place to innovation and fresh thinking to develop products to satisfy needs which are beneath the surface consciousness of people. Industrial design seeks to give products these qualities beyond merely being technical.

Industrial design as a profession is yet to find its roots in Indian industry. This highly potential and futuristic profession in an economic environment undergoing changes has both challenges and opportunities. For this the role of an industrial designer should be clearly understood by management who seek employing the professional. For this an industrial designer should not be mistaken as an engineering designer with a very high level of engineering competence, or to merely a coordinator to put together the ideas of others. An industrial designer should be viewed as a 'Creator' who synthesises technology with human needs and emotions reflected through form, shape, size, colour etc. of products. He should be involved in all aspects of product planning within an

organization and should not be called in at the end merely to make things 'Look Pretty'. Advantage should be taken of the opportunity, experience and fresh outlook he offers. The lot, therefore, falls on those pioneering organizations who have seen the need for this discipline to make use of the incumbent in a positive manner. The lot also falls on the newly qualified professionals in the field to get accepted and bring about a high degree of professionalism.

## A City : A Machine ? An Organism !

Dilip Chitre

At the Fifth General Assembly and Congress of the International Council of Societies of Industrial Design held at Ottawa/Montreal, Canada in 1967, there were three distinguished non-designers to address a gathering of designers from thirty-two countries from all over the world. It was significant that the speakers included an eminent anthropologist and social biologist, a distinguished psychiatrist and a reputed mathematician and philosopher of science. The three speakers – Dr. Ashley Montague, Dr. Daniel Cappon and Dr. Jacob Bronowski – spoke on inter-related themes all centred on Man. The theme of the congress itself was described as *Man to Man*.

The significance of this seminar lies in its attempt to relate designing activity to a new scientific humanism enriched by an inter-disciplinary dialogue between designers and human scientists.

This is only as it should be. During the first Machine Age, thinking in design was dominated by a romantic scientism based on a mechanistic model of man and society. Even today, when some human societies are already in the post-Industrial or neo-Technological Age, there is a strong habitual tendency to use the technique of optimisation in solving problems of designing. There is nothing wrong with the technique of optimisation as such. But its application is limited. Underlying the use of this technique is a utilitarian philosophy as well as a robot model of man. Together these two reduce the view of individual and social behaviour to a crude economicism. The assumption made is that every human activity, whether individual or social, is governed by the economic principle of reaching any goal at the smallest cost.

This economicist view of man is shared equally by both socialist and capitalist states which also commonly share an industrial mass-society. The nature of industrial mass-society is itself like an assembly line in which there is highly diversified division of labour and complex chains of inter-dependency. This is precisely what lies at the root of modern

urbanism. A city, according to this system of organisation, is a machine to live in. The organisation of a city is seen as an organisation of several human activities directed towards very few basic goals, primarily and predominantly economic.

There is another view possible of man and human society. It is a radical view both scientific and humanistic in the widest sense. This view would derive the concept of a city from a concept of total human culture and creativity and not merely human economic activity. From this point of view, the slow and erratic-seeming development over the centuries of a city like Benares is preferable to the instantaneous creation of a Brasilia or a Chandigarh. Purely from the point of view of designing philosophy, a brilliant young designer like Christopher Alexander raises the same issue in his highly provocative paper, *A City Is Not A Tree* which won one of the 1965 Kaufman International Design Awards. Alexander has propounded what might be described as a new concept of 'open system designing' and his paper, *From A Set of Forces to a Form*, articulates his ideas further.<sup>1</sup>

From one's own point of view, the problem has been stated in its wide cultural perspective in the publication, *Design for Living: Role of Cultural Environment with Special Reference to its Impact on Man*, by V. N. Adarkar et al<sup>2</sup>. When this particular paper was published it created wide critical interest both in India and in the outside world. Several correspondents, in their communications to the group of authors, strongly criticised its view as 'impracticable'. One of the correspondents made a very significant critical observation : according to him, every designing activity has to minimise and fix variables and this particular study mentioned so many constraints on designing as would make any design solution difficult, or perhaps even impossible, to arrive at. The real rub lay in the fact that the authors of the paper were precisely criticising scientism, economicism and the rampant use of over-simplified techniques of optimisation. The

authors of this paper were mainly concerned with the problems of evolving a technological and scientific response to problems faced by Indian society in particular. The authors believed that the development of various technologies within any given society is basically a matter of its highly individual cultural response to existing challenges.

By implication, this paper even raised doubts about the obsession with urbanism and technologisation on the part of some Indian planners. In a society consisting of several cultural groups divided not only by language and tradition but also by various stages of civilisation simultaneously present among the peoples of a single nation-state, a society which had not on the whole – made a systematic transition from an open, natural environment to a man-made environment, to ignore the variety of constraints and variables in designing activity would be to endorse an engineered cultural change in a very naive manner.

As co-author of this paper, but now writing in one's own individual capacity, one would like to deal with certain implications of its total approach to environment.

One believes that this particular paper stresses that like the human organism itself, society and culture are open and *living systems*. As such, their own growth is always *naturally* multi-polar and spontaneous. If a culture were merely utilitarian, then it would inevitably lead to a completely mechanised or robotised mass-society. However, in its natural life every culture constantly undergoes the processes of diversification and re-rationalisation. That is to say, a society creates culture by continuously diversifying its activities, by continuously articulating its value system and, at the same time rationalising the impact of every new extension of human knowledge, expression and skill. This view has been considerably influenced by the work of the eminent biologist and philosopher of science, Ludwig Von Bertalanffy<sup>8</sup>.

Bertalanffy's contribution to the development of general systems

theory is well-known. The most exciting insight provided by him seems to be the concept of forms of life as systems.

A system is a complex of interacting components any of which may be material or non-material. Bertalanffy lists the features of systems as follows :

"Among systems features are multivariable interaction, maintenance of wholes in the counteraction of component parts, multi-level organization into systems of ever higher order, differentiation, centralization, progressive mechanization, steering and trigger causality, regulation, evolution towards higher organization, teleology and goal-directedness in various forms and ways, etc. The fact that such features – omnipresent in the biological, behavioural and social fields object of empirical observation both in everyday life and scientific research – are not covered by traditional physicalist concepts, has often led to their being considered as of a meta-physical nature or vitalistic provenience, or even to deny their existence and anathematize their investigation – in contradiction to common sense and to actual practice in the biosocial realms." (*Robots, Minds and Men* pp. 69-70). Bertalanffy then proceeds to pin the blame for this on the Western Scientific habit of still relying on 'Newtonian simplification of one-way causality' and 'two-variable problems' which have no relevance to essential problems of 'life, mind and society.'

It may be mentioned in passing here that 20th century designers and design philosophers, such as, Le Corbusier share the scientism and the mechanistic metaphysics criticised here. This is how (to use Alexander's terminology) 'artificial cities' are created.

Bertalanffy's concept of open systems is too complex to be stated in a short form. He states that their basic characteristic is that "they are maintained in a continuous exchange of components" (*ibid*, p. 73). The next feature of such systems is their 'equifinality', i. e. the fact that they reach the same final state or "goal"

from different initial conditions or in different ways. The third aspect of open and living systems stated by Bertalanffy is their apparent disobedience of the second law of thermodynamics which states that physical events tend towards the most probable states or towards maximum entropy and progressive destruction of differentiation and order. Open systems, such as, living systems are maintained in a state of fantastic improbability, in spite of several irreversible processes continually going on' (*ibid.*, p. 76). This phenomenon of increasing order and decreasing entropy has been discussed by Bertalanffy in detail in the context of physics and biology. Since the present writer cannot claim more than a layman's grasp of the scientific concepts covered in the detailed discussion, he prefers to remain silent. However, one would like to suggest that Bertalanffy's concepts are tools which have a much wider application and they seem to open the possibility of a rational understanding of not only life-systems but also of social and cultural systems as well as all aspects of human activity of which the measure, man, has hitherto appeared to be uncertain and irrational.

It is interesting to cut to Christopher Alexander's *From A Set of Forces to A Form* from Bertalanffy's concept of open, living systems. Alexander has raised the following question:

"Given a set of Forces, WITH NO RESTRICTION ON THEIR VARIETY, how can we generate a form which is stable with respect to all of them?" (*The Man Made Object*, p. 101).

Alexander has earlier shown the limitations of both 'analog methods and 'numerical methods' and he suggests the use of 'relational methods' characterised by 'two key ideas'. The first key idea is, in his own words, "We try to determine, as abstractly as possible, the physical relation which each individual tendency is seeking." The second idea is, "We try to combine these individual abstract relational implications, by fusions, to generate the form" (*ibid* p. 101). In his paper, *A City Is Not A Tree* (Design, February 1966, pp. 46-55), Alexander proposes

the terms 'tree' and 'semi-lattice' to describe 'artificial' and 'natural' cities. On close thought, it appears that his 'semi-lattice' and his 'relational methods' are concepts which bear a family resemblance to the concepts of open systems. All these ideas seem to be the part of a big upheaval which has interdisciplinary ramifications (the very idea of interdisciplinary exchanges is related to the development of general systems).

It is the beginning of an exciting revolution in design philosophy and the emerging discipline of environmental designing, with its serious concern with ecology on the one hand and social and behavioural processes on the other as its chief witness.

One is not familiar with the above disciplines beyond a point. One's own analytical concern has been with the 'irrational' structures of poetry and the fine arts and with culture and society. One has been concerned with the phenomenon of human communication inter-personal and social, and with the mass media. In other words, one has been dealing mainly with activities which are fascinating and complex, where there is an interplay of too many variables and where the 'noise level' is rather high !

Yet, this in itself provides, hopefully, a new approach to the problems of environmental design. With such a background, one comes to a city.

When one thinks of a city one thinks first of the number of people that it comprises. A city has always been, and will always be, a crowd. It is a spontaneous crowd and not a planned mass of people like an army or workers in a factory or the personnel in an organization. As political entities, legally, each individual in the city-crowd may be the equal of every other. Culturally, he may belong to a sub-group or group in a highly diverse cluster of population. Socially, status and privilege-wise, each may belong to a different level.

Economically, he may belong to any of three or four main income groups. Vocationally or professionally, he may fall into any of the many specialised or semi-skilled or unskilled categories. By education, by tradition, by other

cultural criteria the people in a city are very diverse. Even each single individual belongs to different groups according to different criteria.

When we consider the various types of inter-personal, intra-social and inter-social activities in a city, we again come across extreme diversity. Religious places, such as, temples, mosques, churches may bring together people who are otherwise different from one another. Communal institutions or events may bring together otherwise diverse types. Language may unite or divide people likewise. Secular institutions like schools, colleges, offices and factories also bring together diverse human elements. All these interact within the physical space of a city which is a place of maximum interaction between otherwise, at least sometimes, rationally disparate elements. Their togetherness, their co-operation, their frictions, their conflicts, their common goals as well as their cross-purposes are the very essence of modern secular social dynamics. This dynamics itself is an open system since such a diverse society is maintained "in a state of fantastic improbability, in spite of several irreversible processes going on." Among others, the Marxists would of course conceptually refute this by making a 'two-variable problem' type of analysis and offering a dialectical explanation of social optimisation of historical and economic forces. Similarly, orthodox capitalistic 'economicists' would also oversimplify the problem and produce a view similar to Marxist scientism.

City planning, thus cannot be done on an 'ideological' basis whether the ideology is aesthetic, economic or political.

At best, the planners should try to provide a necessary infra-structure to enable existing social, cultural and economic forces to articulate themselves. However, the moment the planner shows an excessive bias in favour of any one constraint, he would be overstepping his limit and interfering with natural and spontaneous social processes.

A city cannot be based on an abstract model of its citizen simply because its

real citizens are diverse types.

Nor can a city be based on an utopian dream of what the society should be.

A city continuously becomes what it is, yet amazingly retains its basic identity, by virtue of its human contents.

To take a really open view of it, what an exploding city needs is not an artificial extension but an extension of communication and transport facilities. New channels, new connections, new outlets into the surrounding regions and more links with them go on naturally extending a city. Railroads, highways, waterways, telephone, telegraph and radio links - these are the components of the extending nervous system a developing city requires. A city is limited by space, but speedier transport and communication compensate for the spatial limitations. In the past, before the first Industrial Revolution, great rivers, trade routes, fertile plains and sea ports provided seats for natural cities.

Today a railroad or a highway in India is like a river. It brings close what physical space separates. It allows the spontaneous regulation of the inflow and outflow of population from existing cities, villages and towns according to the existing social and economic forces. It promotes dynamic cultural change and exchange. It extends the national network of inter-dependencies and reinforces the total fabric of society.

This is not the way Mohammad Tughlak looked at it when he sought to create an artificial Tughlakabad.

This is not exactly what Lucio Costa had in mind when Brasilia was created. This is not why Chandigarh was created.

But then, this is how all the great natural cities of the world grew. A city is not an engineered emptiness waiting to be populated. It is a spontaneous area for highly active, social, economic and cultural interests to articulate their needs progressively.

Gyorgy Kebes, Studio Vista,  
London 1966.

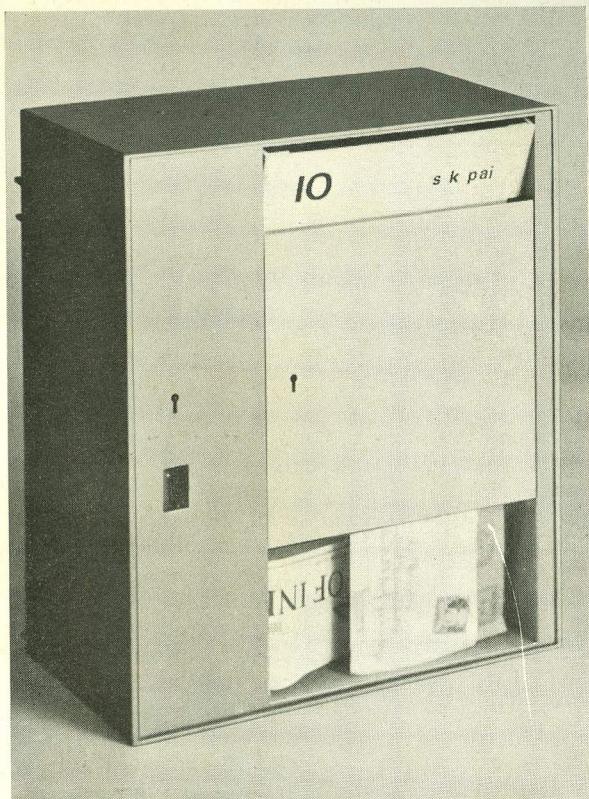
2. Design for Living-Role of Cultural Environment with Special Reference to Its Impact on Man:  
Working Paper for India Study Group, International Enquiries, Cultural Relations for the Future; Industrial Design Centre, I. I. T. Bombay; March 1971.
3. Robots, Men and Minds:  
Psychology in the Modern World by Ludwig Von Bertalanffy; George Braziller, New York 1967.

## Diploma projects

In the fifteen-month course offered at the Centre, the last three months are exclusively devoted to the diploma projects. The problem for a diploma project normally consists of designing a product or system of products. The students choose the problems in consultation with the faculty members. Each student is expected to work on the project on his own under the guidance of the concerned faculty members. This helps the students gain experience in planning and executing a complete design project. It also provides an opportunity for the student to try and utilize scientific methods of planning like PERT and CPM. The responsibility of completing a design project within a stipulated time is important since all the students join the industries immediately after finishing their diploma projects.

The problems taken by the first batch of students at the Centre cover a wide range of subjects from a ticket dispenser to a shearing machine. It may be seen that all the problems are based on real needs of people in their daily life. The efforts put in solving these problems reflect a commitment on the part of the designers to change the environment, adding better values to the existing quality of life and standard of living. Many people react to these problems of daily life. But then they fail to communicate their reactions. Added to this lack of feedback from actual product users, there is yet another difficulty. The decision-making authorities controlling these products or designed environments are completely unaware of the users' needs and problems most of the time. Here is a situation for a third party to study and

propose a better way of doing and using things. This third party is perhaps none other than educational and research institutions. The diploma projects become useful tools in this light. Absence of obligation to a particular manufacturer gives freedom in defining the problem in the correct perspective as well as in solving the problems in a systematic manner. However, all the problems are solved within the constraints of industrial production and consumer economy. Some of the diploma projects are illustrated in the next few pages. We earnestly hope that publication of these may help to evoke design awareness amongst the public as well as the industry.



966/D/2

#### **Milk and mail storage systems for multistoreyed buildings**

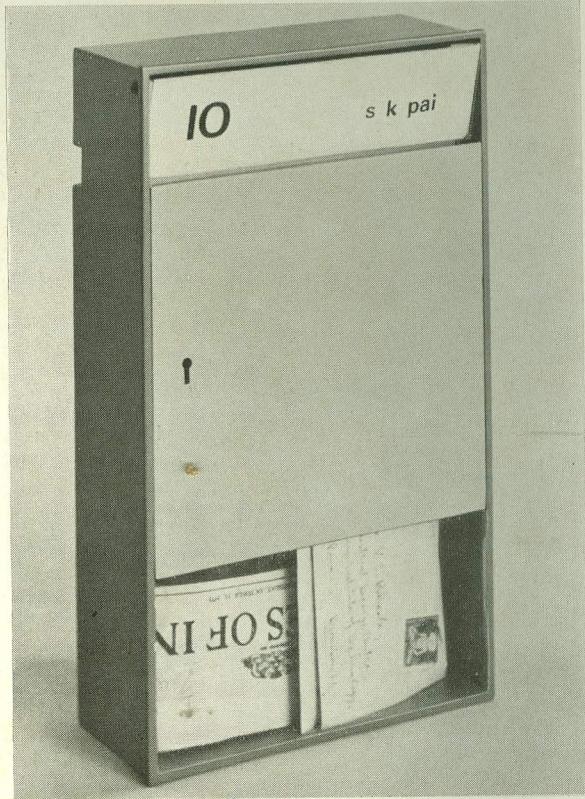
Multi-storeyed buildings have become a regular feature of big cities whether they are desirable or not. Distribution of milk and mail becomes a tedious job in these buildings. It takes considerable amount of time and effort for the persons concerned with delivery, and this further results in delay in the distribution of milk, newspaper and mail, since the same person is required to cover a number of buildings. Because of these factors, the need to have a central storage system for each building assumes greater importance at present.

It is found that no such system is existing in Bombay now, and as such information regarding the optimum storage requirements of a family for milk and mail was collected. The study and analysis of the present milk distribution system, types of buildings and social attachments of different income groups led to a set of problem constraints.

The major constraints turned out to be:

1. It is required to store varying sizes of mail articles and the newspapers.
2. Each unit should be capable of storing 4 milk bottles at a time.
3. The storage unit should be at a convenient height for easy operation.
4. It should have a secure locking arrangement.
5. There should be provision for inserting name and address of the tenant on each unit.
6. Letters should be visible from outside.
7. It should be possible to instal the system in the existing buildings as well as in the new buildings.
8. The system should be an integral part of the building.

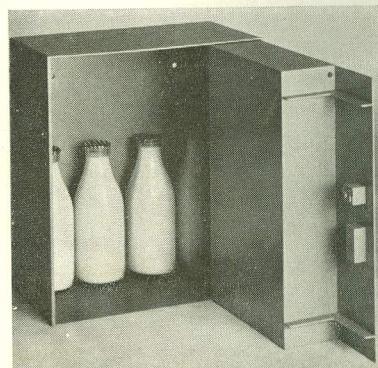
With these major constraints a storage system was designed consisting of



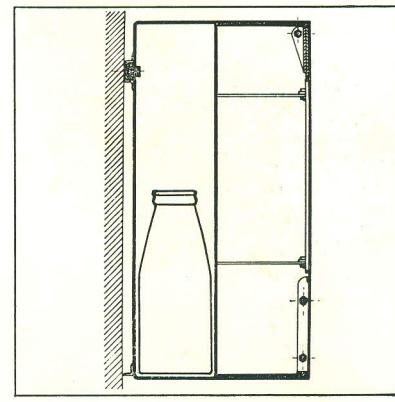
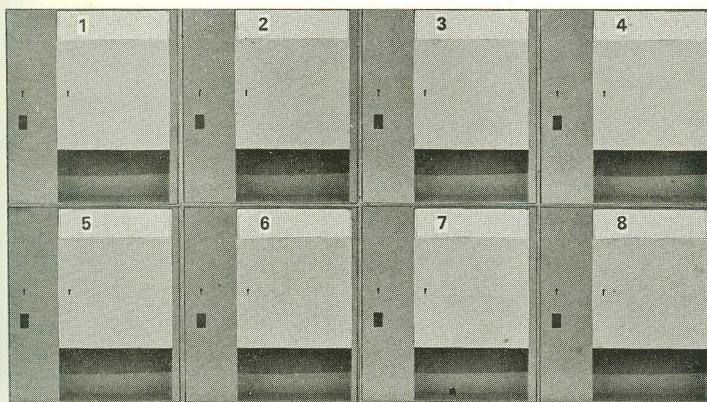
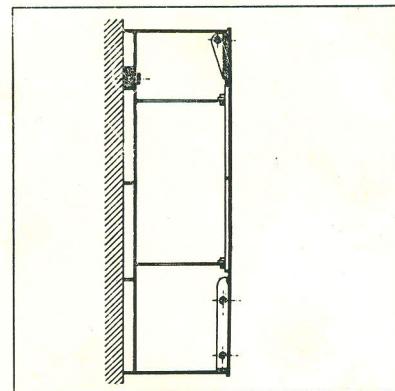
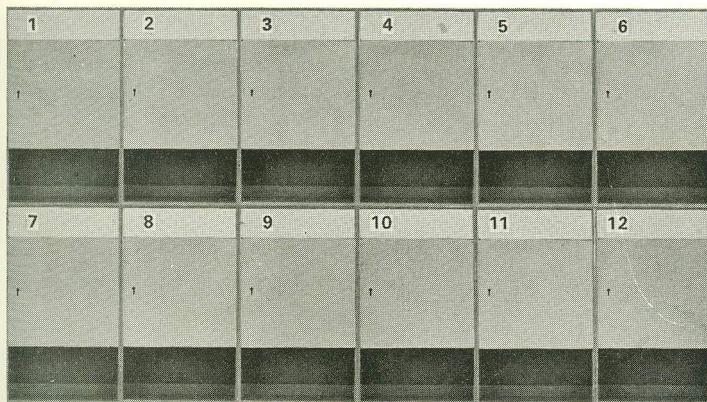
966/c/2

identical units which can be mounted together on an aluminium extruded section. The milk storage unit fabricated out of sheet metal can take 4 bottles of milk. The mail box which can be locked separately acts as the door of the milk storage unit. The mail box is made of injection-moulded high impact polystyrene.

Milk man will operate the milk storage unit with a master-key and the tenants will have individual keys. The milk



966/D/1



981/F/5

man will not have access to the mail unit. The name and address of the tenant can be inserted in the mail box.

An alternative system consisting of only mail boxes has also been developed. This system can be used where there is no need for milk storage units.

Design :  
P. Achutha Rao

Guides :  
S. Nadkarni  
U. A. Athavanakar

Top left : Storage system for mail

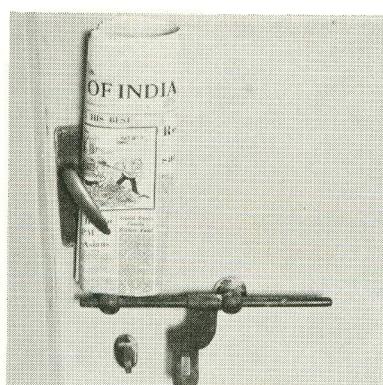
Top right : Cross-section of mail storage unit

Middle left : Storage system for milk and mail.

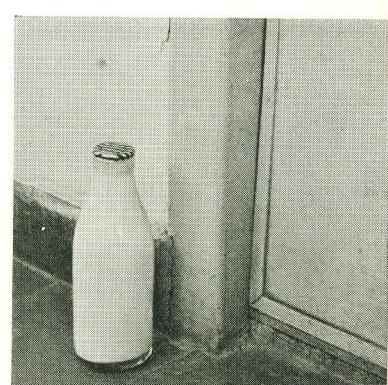
Middle right : Cross-section of milk-cum-mail storage unit.



956/C/1

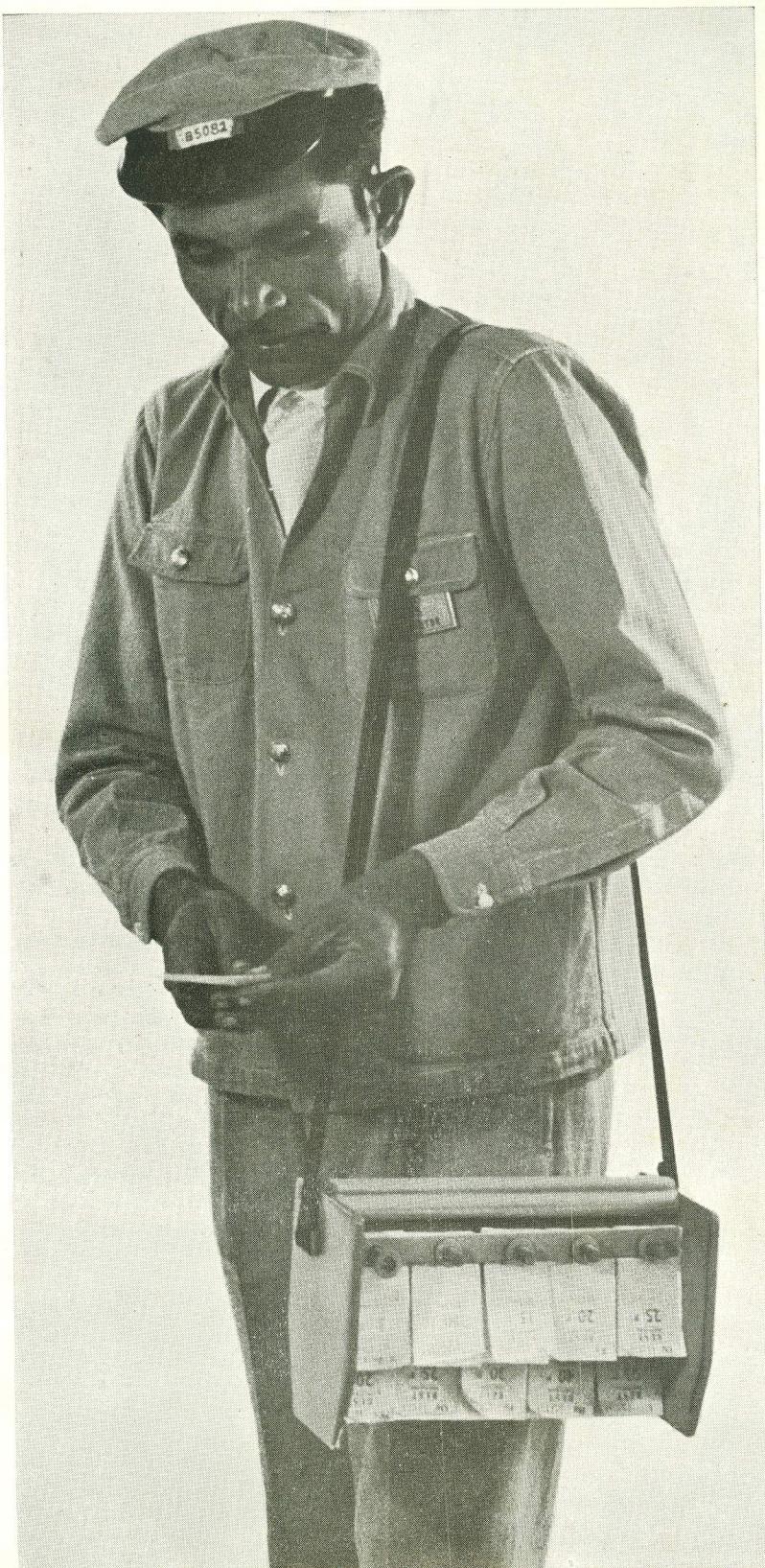


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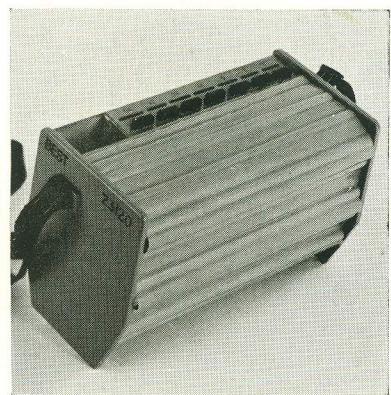
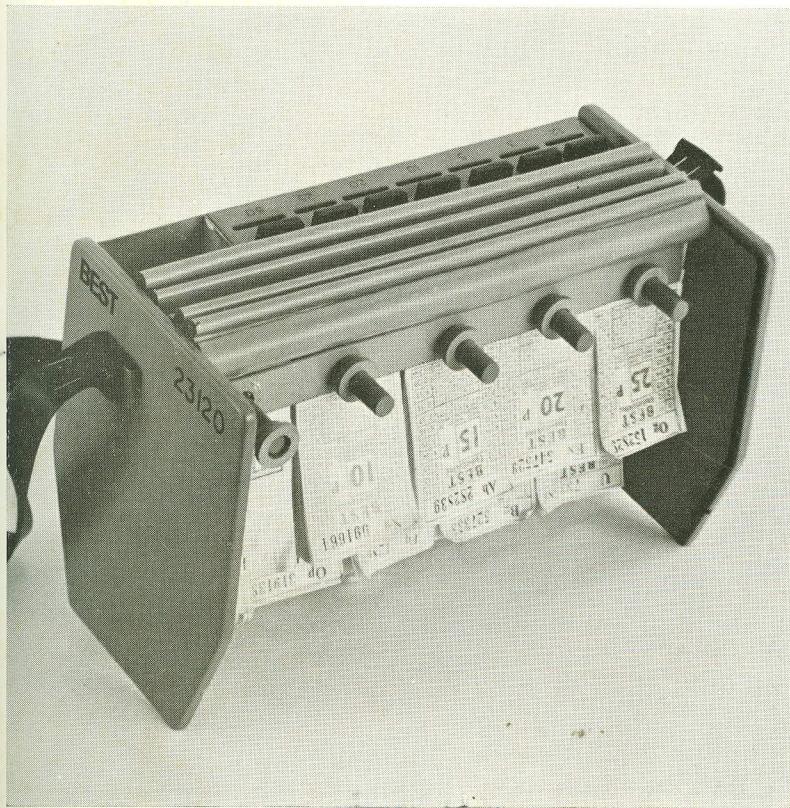
981/F/5-

### Ticket dispenser



951/c/1

Small problems and small products are often ignored in spite of the fact that most of the people use these products almost every day. Detailed attention to the problems of such products can go a long way in making the environments pleasant and comfortable. One such product is a ticket dispenser used in the city buses. Any one travelling by these buses is aware of the occasional tearing of the passengers' clothes due to the present sharp-edged ticket dispenser and of the irritating noise it makes. And there is the conductor who has to handle it for eight hours a day. It is neither convenient for him to operate nor to carry. These problems were studied in details. One revealing factor was the fairly large size of the tickets which is not functional. It could be reduced to half of the present size. But the organisation concerned has a printed stock of tickets which will last for the next few years. Thus keeping to the same ticket-size becomes a major constraint. The bulk of the dispenser unit could not be reduced due to this factor. The new unit is made of injection-moulded high-density polythene. The main advantages of using polythene are its light weight and unbreakability. The risk of accidentally hurting passengers and tearing off their clothes have been overcome both by the choice of material and by certain features of the design. The use of polythene also reduces the cost. A coin dispenser is integrated with the ticket dispenser. Coins of each denomination come out when the corresponding button is pressed. However, the conductor, after collecting the change, will have to insert the coins in their respective slots whenever he is free to do so. With this arrangement, the time taken for the money transaction while issuing a ticket, is minimised. The overall operation becomes easier since ticket-dispensing and money exchange manipulations are performed by using the same unit. (It was found by questioning many conductors that they prefer to keep the currency notes in their pockets at present.) In the existing design,



968/E

968/C/2

changing of the ticket blocks is another problem which consumes a lot of time due to the wing-nuts provided at the top of each bunch of tickets to hold them together. Polythene caps have been used in the new design to facilitate quicker removal and insertion of the ticket blocks as required. The analysis also revealed that the cover need not be opened and closed every time a ticket is issued. This led to the inclusion of a plastic cover which can be closed whenever necessary and

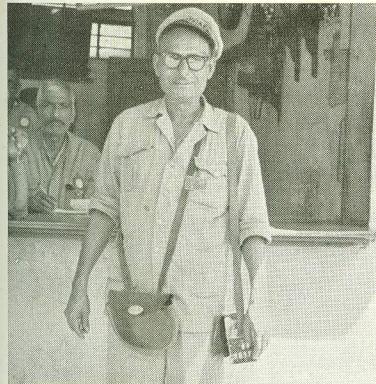
kept folded otherwise. As a whole, the main features of the redesigned unit as compared to the present ticket dispenser are:

1. Reduction of weight to one-third of the existing unit.
2. Introduction of a collapsible plastic cover which need not be closed and opened every time a ticket is to be issued.
3. Use of a toothed plate over the ticket for easy and uniform tearing of tickets.

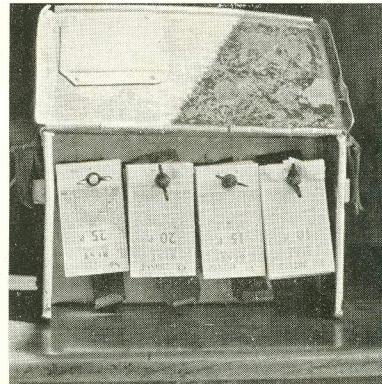
4. Creation of different levels for different rows of tickets to facilitate quick and easy location of tickets.
5. Adjustable belt.
6. Improved details and product appearance for a better image of the concerned transport organisation.

Design : V. Ramasubban

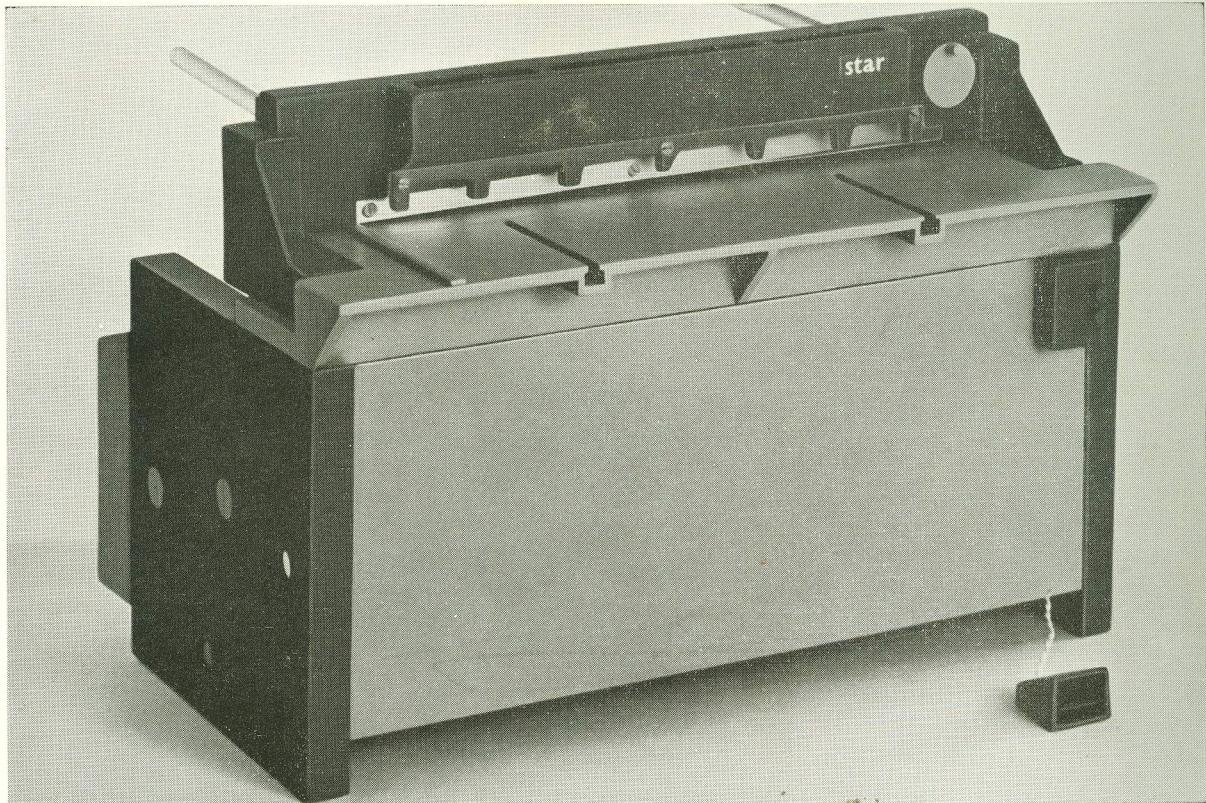
Guide : A. G. Rao



831/C/6



831/D/15



1206/B/4

### Shearing machine

Heavy engineering products lag behind consumer products in design development. But the export market and internal competition demand a great degree of sophistication in these products as well. In fact, the need for the consideration of man-machine relationships in products like machine tools seem to be urgent. A considerable degree of collaboration between the manufacturer and the designer is necessary in designing

these products as they have complex mechanisms and require heavy investments.

The redesigning of a shearing machine was one of the projects undertaken. The photographs below illustrate the ignorance of space economy as well as the human problems in the design of the machines at present. The salient features of the redesigned unit are listed below :

The length-adjusting gauge which is

at the back can be operated from the front itself with a screw-pinion mechanism.

Leg-operated electromagnetic switch which can be moved sideways is introduced.

A transparent guard made of perspex is provided for visibility and safety.

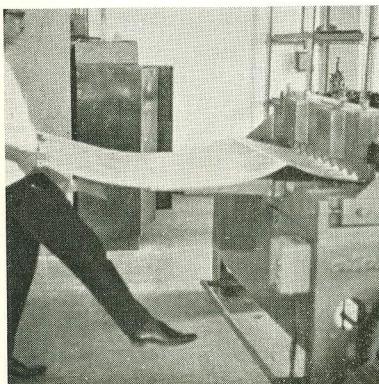
The arrangement at the back of the machine allows easy and safe collection of cut metal pieces.

A graduated guide for cutting the sheet at right angles is provided. The overall compactness achieved results in saving of floor space in addition to increased safety.

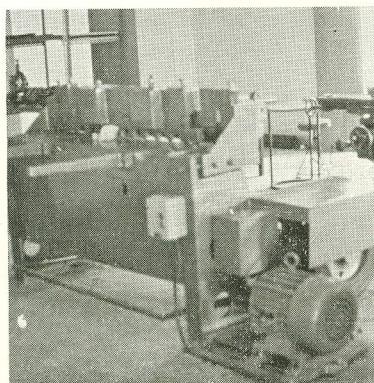
Suitable formal integration and colour combinations impart a simple, clean form to the machine.

Design : S. S. Kshirsagar

Guide : A. G. Rao



835/A/4



835/B/6

## Electrical cooking range

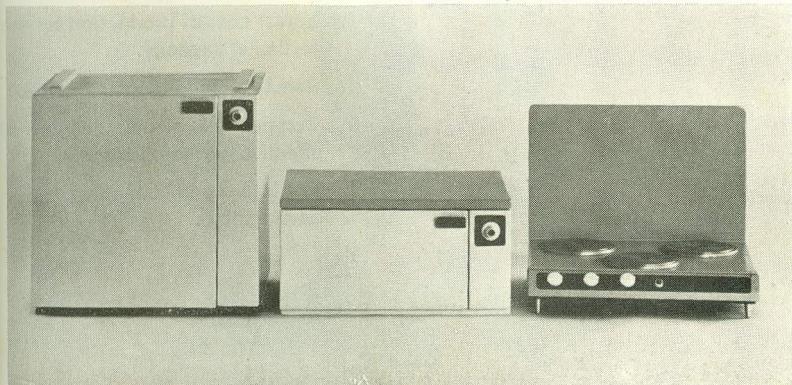
A number of Indian companies manufacture cooking ranges at present, but detailed studies of consumer convenience are seldom conducted. Electrical cooking ranges available in the market normally consist of hot plates, a grill and an oven, making the total unit rather costly for a middle class consumer.

Consumer requirements were minutely analysed. This led to the design of a system where units like hot plates, an oven or a grill will be marketed separately and can be bought by the customer as and when he needs. This system is also advantageous to the manufacturer in that he can produce each of the units in varying quantities according to their demand. Other features of the cooking range include:

1. Use of aluminium for hot plates to avoid rusting.
2. Provision of a back plate behind the hot plates to protect the wall behind.
3. Addition of a glass door for the oven for observation and protection from heat when the door is opened.
4. Provision of a rim on the hot plate to protect the control knobs from spillage of oil, water and the like.
5. Introduction of separate fuses for each unit.
6. Optimised relationships between the elements and the corresponding control knobs.
7. Clean appearance.

969/A/2

Design : S. K. Dastoor  
Guide : M. Chattpadhyay



969/B/1

## Domestic fire extinguisher

In Bombay, sometime back twentyfive young housewives were victims of household fire hazards within three days. Further enquiries in similar incidents revealed that one Municipal Hospital in Bombay registered 635 burn injury cases out of which 95% took place in homes in 1966.

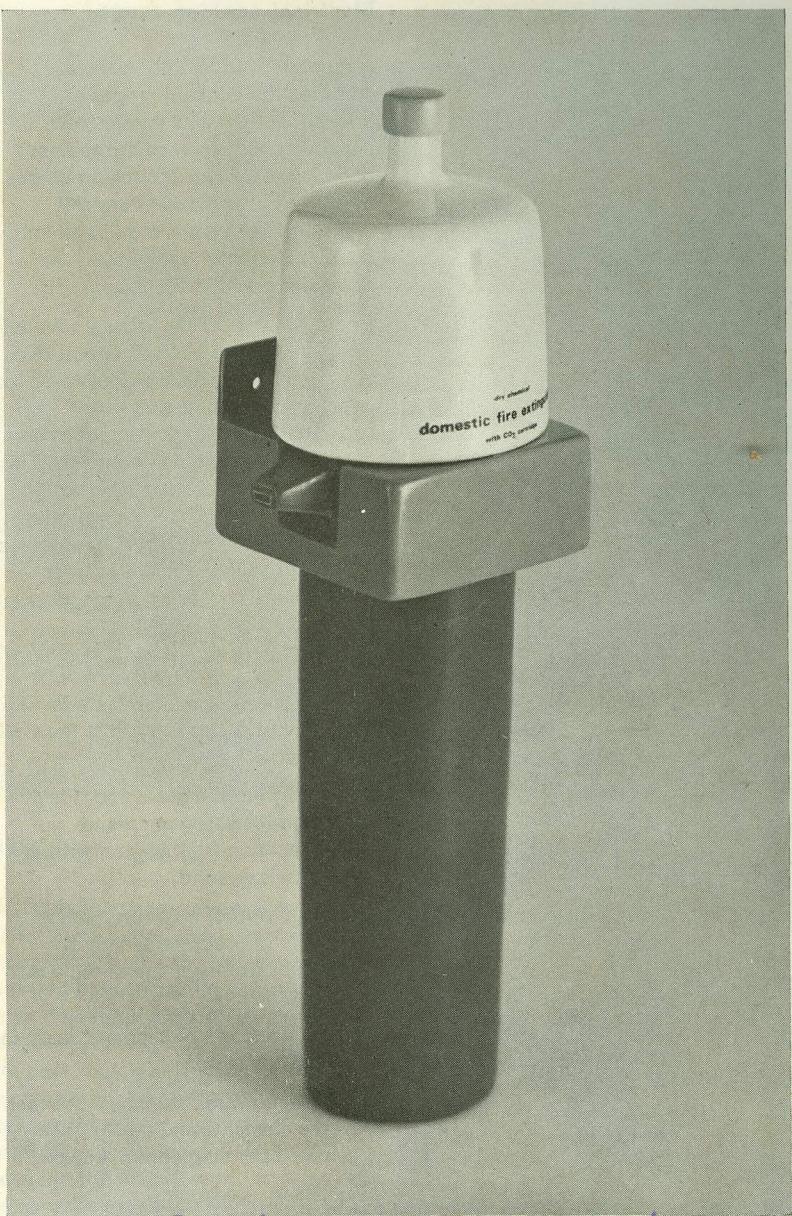
Yet, precautionary measures are seldom taken. This is because of two reasons. Firstly, the people cannot conceive of meeting with accidents themselves. Everybody would like to think that somebody else would be the victim. The second reason is that no suitable fire extinguishing equipment is available in the market at a reasonable price.

With this background an attempt was made in the beginning to design a unit which could be utilised by the victim of the fire hazard himself (or herself). But it was not possible to arrive at a satisfactory solution within the limited time in the absence of any research data on the behaviour of people in such distressed conditions. So the solution was resticted to the conventional way of using the fire extinguisher. The unit designed consists of 3 major injection-moulded parts of polycarbonate. The upper part containing CO<sub>2</sub> cartridge and the lower part containing dry chemical are separated by a central partition. The unit can be set into operation by pressing the knob at the top. The main features of the unit are. :

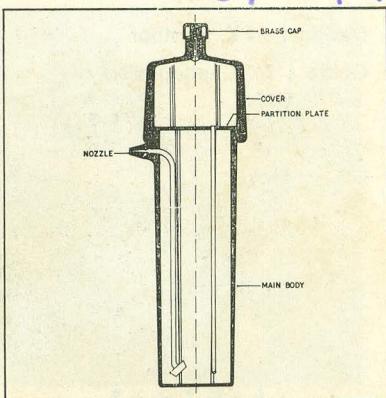
1. Greater fire quelling capacity for the same volume.
2. Effective on all types of fire.
3. Light in weight.
4. Lower cost of production for the particular capacity.
5. Remains charged till it is used.
6. Compact and visually simple with effective communication.
7. Fits into the household environment.

Design : S. B. Akki

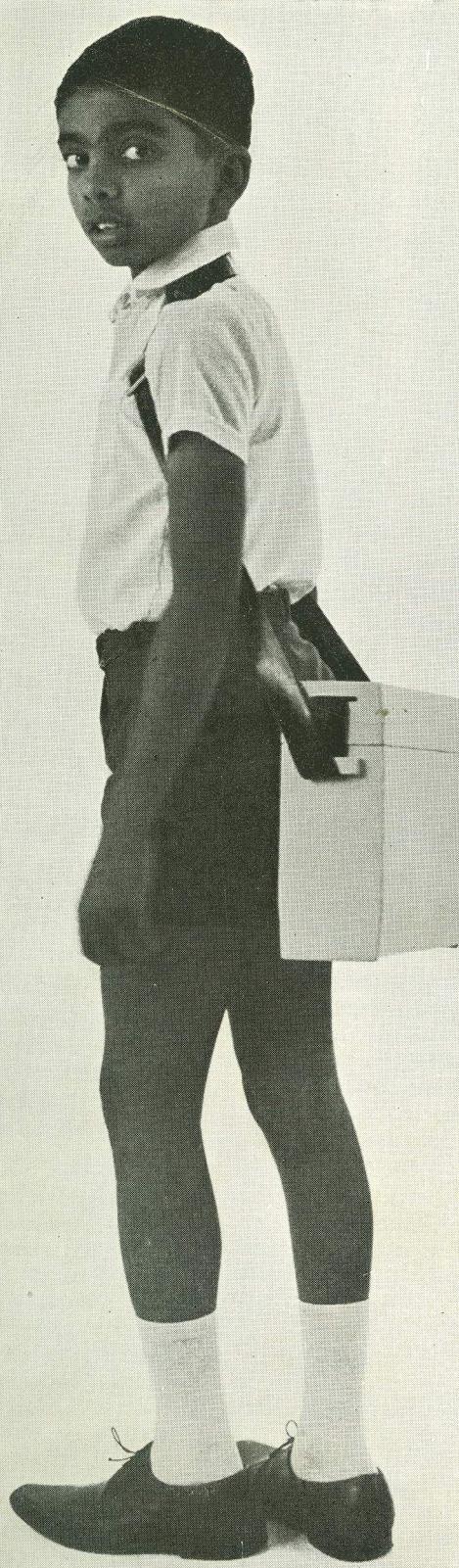
Guide : A. G. Rao



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961/6/4

### School bag

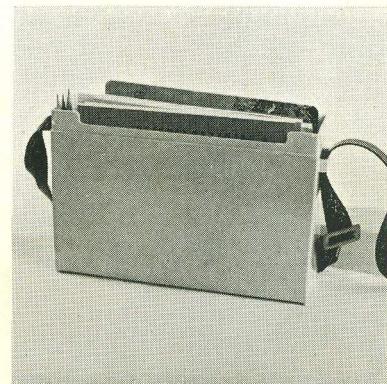
Educational systems are rapidly changing. Children are required to carry large number of text books and copy books to school under the present educational system. A school bag is an essential item of life for the school-going child. A close study of the bags available in the market points to the fact that none of these bags meet the requirements of the school children. Most of the bags are not only heavy for them to carry but also expensive. The lighter bags, specially of canvas cloth, are not capable of protecting the books during rain, and also get torn within a short time.

Designing of the school bag was undertaken with this background. The bag proposed is a light-weight container made of high density polythene or P. V. C. The capacity of the bag was determined after studying the requirements of various students in different schools.

The student can carry the bag on his back by means of an adjustable belt and this leaves both his hands free. The lid gets self-locked while carrying the bag. A separate container is provided for keeping the pencils, erasers, pens, etc. The name of the student can be written in the space provided on the lid. The colour suggested is bright yellow, with red and blue as the alternative colours.

Design : V. L. Bakhale

Guide : A. G. Rao



981 | A | 1



9661 B11

#### Classroom Projects

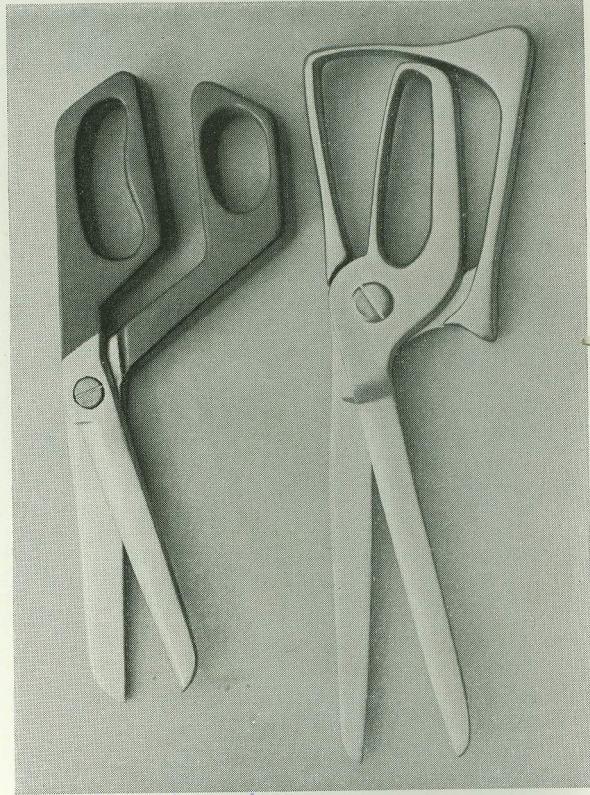
Application of principles of ergonomics is vital in the design of hand-operated tools like knives and scissors. The knowledge of the physiology and anthropometry of the human palm influences the design of these products to a great extent. It is necessary and useful to make a number of initial studies in this respect since no anthropometric data is available on Indian subjects. These basic studies have potential application in several similar problems thus leading to rational design solutions. With this objective, three hand-operated products were chosen as product design problems.

#### Knives

The shapes chosen for the knives are mainly based on the safety and convenience of the operator. Provision is made for the storage and quick removal of extra blades. The process of fixing and removing of the cutting blade is simplified. High density polythene and bakelite are chosen for the body material. The cost of either knife would be less than the cost of the conventional knife made of metal casting.

Design : K. K. Trivedi  
K. L. Munshi  
V. K. Rao

Guide : M. Chattopadhyay



9681 B12

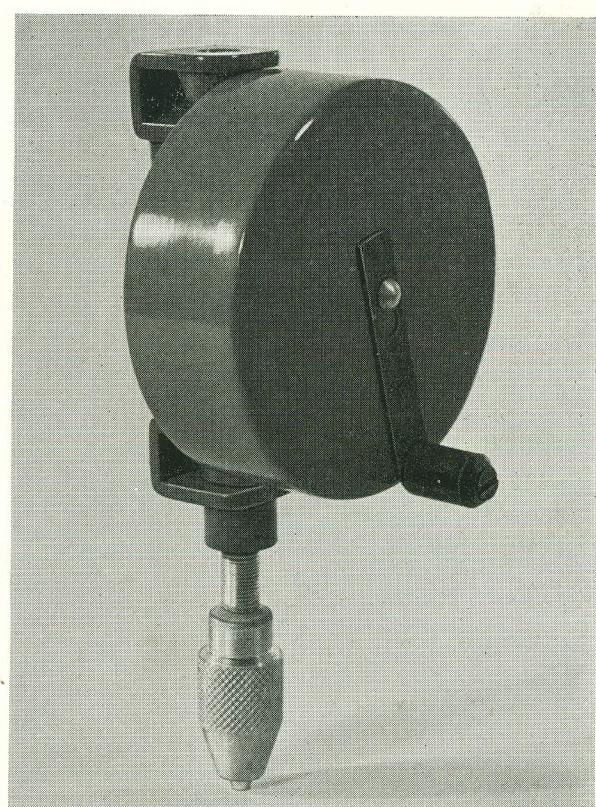
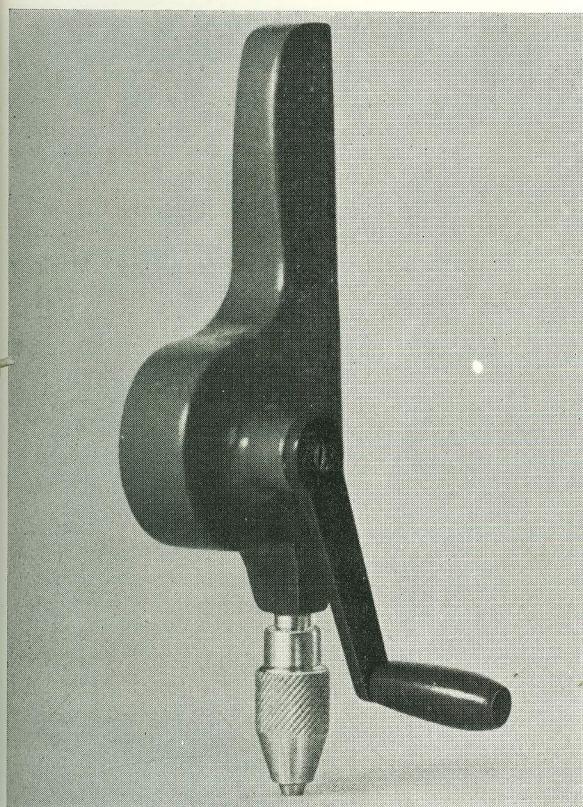
#### Scissors

Two distinct requirements were found in this case, one for household use and the other for professional use. Consequently two different solutions were produced.

The scissors designed for household use consists of a plastic handle with a metal insert. It is light in weight. The contours have been chosen for comfortable operation of the scissors.

The other scissors meant for professional use is of forged steel. The analysis indicated that professional users like tailors usually rest the lower part of the scissors on the table while cutting. In the new design one part of the scissors is made stationary so that the person using it need not lift it from the table surface. The leaf springs at the joint facilitate easy operation of the scissors.

Design : S. Srinivasan  
S. R. Menon  
Guide : A. G. Rao



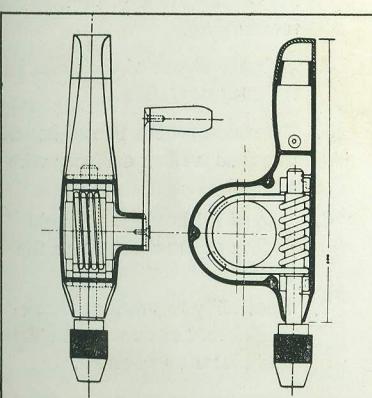
### Hand-drill

958/F/6

The manually operated hand-drill is still widely used in our country. The commonly used hand-drill has not changed for many years. An attempt was made to arrive at innovative solutions keeping control on the cost of the product. The alternative solutions are illustrated here.

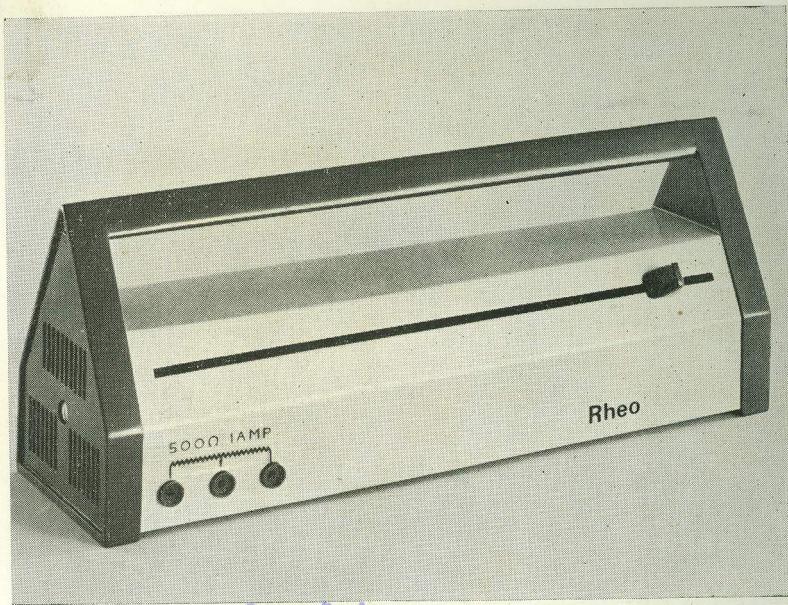
In the first solution there is a new mechanism which eliminates the use of worm gear. The drive is given by a drum through a rubber chord to the central spindle which in turn rotates the drill. The whole mechanism is enclosed in a casing of high density polythene. The shapes used facilitate comfortable holding and drilling. It is also possible to drill holes in vertically upward positions with ease and comfort, using this drill. Drill bits can be stored within the drill in the handle portion, using the top portion of the handle as a cap. The production cost is considerably reduced by the elimination of the worm-gear and the extra handle. The basic mechanism is kept as it is. In the second solution, the place of the handle is brought down thereby reducing the height of the drill. The accuracy of drilling is enhanced due to this arrangement as the support to the drill is brought nearer to the drilling point. Vertical drilling also becomes easier. The speed ratio of the drill is increased by the use of bigger gear. The handle is made of bakelite and the worm-gear of cast-iron.

Design : B. Bhaumik  
S. S. Date  
Guide A. G. Rao

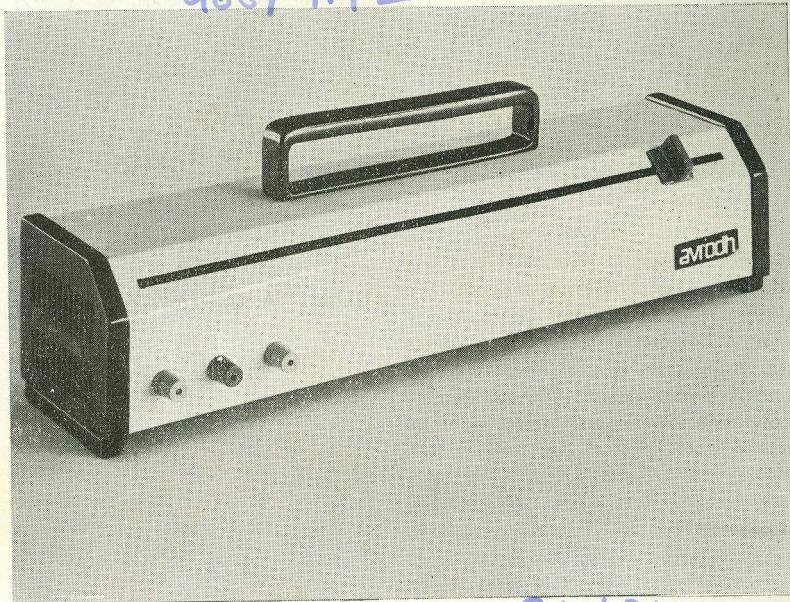


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I. D. C. Library  
I. I. T. Bombay



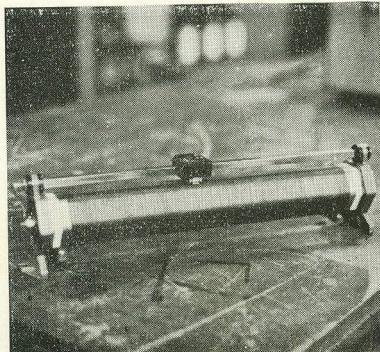
968/A/2



966/B/2

Design : S. R. Menon  
K. K. Trivedi

Guide : M. Chattopadhyay



Existing rheostat

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## Rheostat

No significant developments are observed now-a-days in the laboratory equipment produced in this country. These equipment are mostly used by schools, colleges and research institutions which are mostly Government organisations. The gap between the user and the seller is so wide in these organisations that the actual user has seldom any say in the purchase of these equipment. Cost of the product receives the first consideration rather than the safety and convenience of the users while choosing the product. This can be very well noticed in case of products like rheostat.

In the rheostat, commonly used at present, the resistance coil remains exposed. The top rod supporting the slider knob, bends in due course thus increasing the friction between them. The unit is unstable, and it is extremely difficult to move the slider knob in the absence of any provision to grip the rheostat. The connecting terminals are also not properly organised. The communication graphics appearing on the slider knob gets covered while operating.

The redesigning of the rheostat was taken up after studying the aforesaid problems. Two alternative solutions have been suggested here, and the distinct features are:

1. Complete sheet metal enclosure to prevent contact with the live parts.
2. Provision for ventilation at the bottom and three sides.
3. Inclusion of handle, for holding the rheostat while using, as also for carrying.
4. Suitable shape of the slider knob for easy operation.
5. Provision for the use of banana plugs as well as ordinary wire ends.
6. Use of rubber legs to avoid sliding of the rheostat on the table.
7. Possibility to produce these in different sizes with the same end plates and handle.



967/A/1

**Kerosene Lantern**

In the wide range of artificial lighting devices, electric lights dominate the picture to such an extent that today a man in the city tends to forget other forms of lighting. Even so, the kerosene lantern is widely used in our country at present. It is still a common house-hold product in villages. It has attained a symbolic value in its conventional form and one might not even touch any of the possibilities of developing this product. Yet there are many operational and functional problems in this product. A systematic analysis of the lantern and its use could lead to new solutions. Redesigning of kerosene lantern was tackled with this background. The analysis brought into focus four important aspects regarding the lantern, namely: (1) shadows cast by the lantern, (2) convenience of carrying when held at different heights, (3) filling of kerosene in fuel tank, and (4) lighting of the lantern. It was further observed that the lantern was often used as a portable-light as well as a table lamp. But separate kerosene



967/B/2

lamps which can be used mainly as table light are also in use. Consequently two types of solutions were arrived at with a difference in emphasis. The one shown at the extreme left is the redesign of a portable lantern and the other two solutions belong to the group of table lamps. In the redesigned portable lantern, shadow-casting has been reduced to a large extent. The air-flow ducts at the sides which were the main cause of shadows are completely eliminated by having the air supply from below. A hollow container with vent holes at the base encloses the kerosene container. Air passes through these vent holes to the flame point. Two plastic handles are provided for carrying the lantern easily in two positions. The opening for the kerosene tank is made clearly accessible. The glass part of the lantern is threaded at the top for slow removal and easy handling. This arrangement also helps in preventing the glass part from breaking while cleaning. The other solutions are meant for convenience of reading. In one of the solutions a spherical reflector is used. The reflector made of



967/B/1

sheet metal throws a concentrated beam of light at a spot. This would be particularly suitable for study. Both the table lamps are provided with plastic handles for comfortable handling. The production costs of all the lanterns are kept on par with the respective existing types.

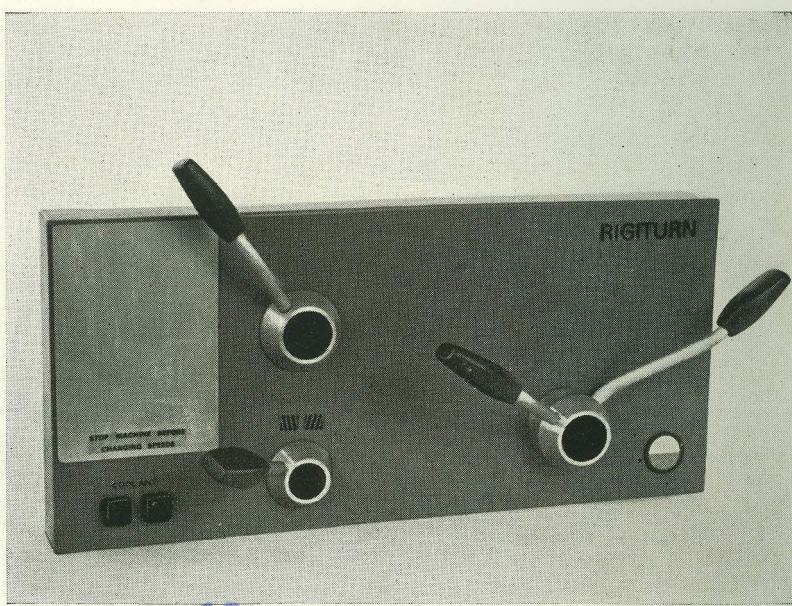
Design : B. Bhaumik  
S. S. Date  
S. A. Mahindrakar  
Guide : S. Nadkarni  
U. A. Athavankar

### Order system

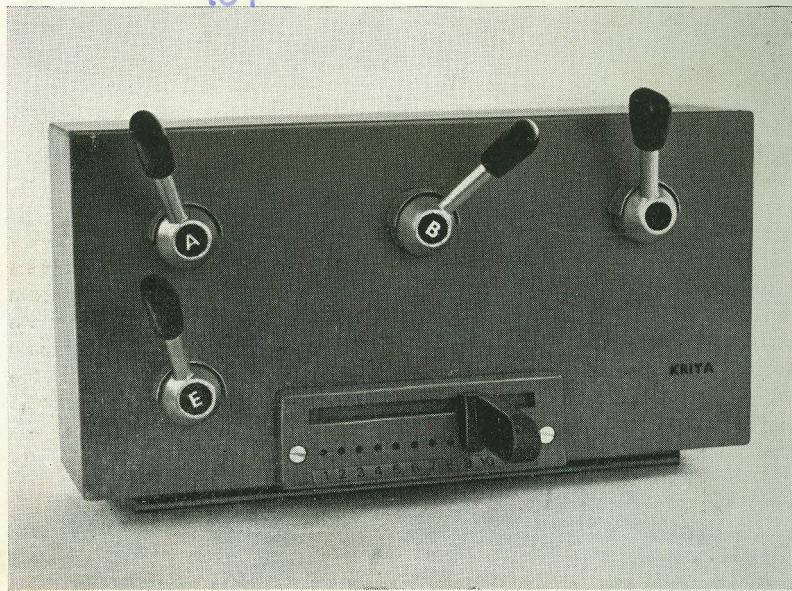
The man-machine relationship is an important aspect of the design of controls and control panels in machines. This is a field dominated by industrial designers. A problem of analysis and redesigning of control panels of different machines was tackled as an order-system problem with emphasis on the ergonomic principles involved. The photographs illustrate two solutions for the controls of a lathe. It can be observed that the commonly used spherical knobs are replaced by more comfortable and functional hand-grips. The communication graphics for the knobs and for the gear-box are usually in the vertical plane and the operator has to adopt an awkward bent position to read them. These graphics have been brought into the horizontal plane so that the operator can easily read them without bending. Each control is designed mainly with human engineering consideration. The overall arrangement is worked out to create a satisfactory relationship among the controls with due consideration to their functions.

Design : K. L. Munshi  
S. Srinivasan

Guide : M. Chattopadhyay



981



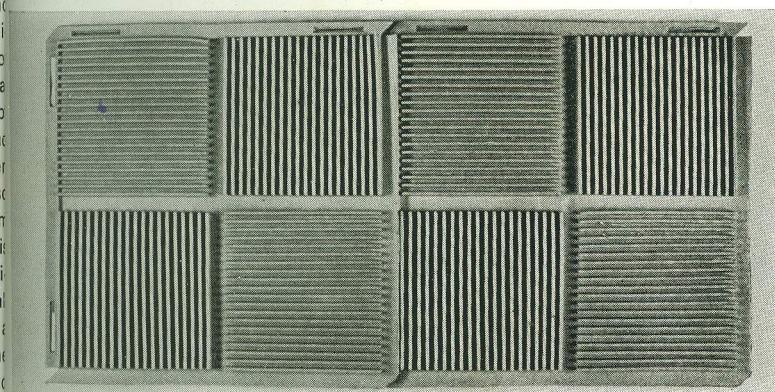
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### Faculty projects

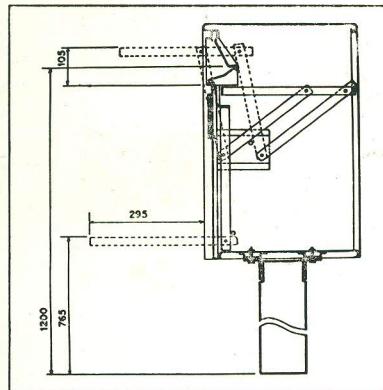
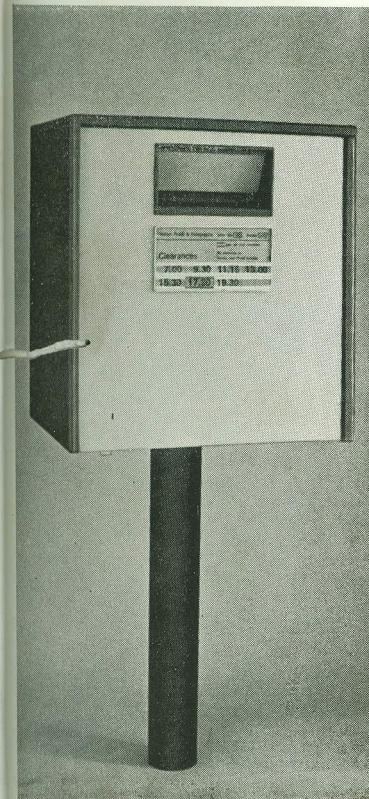
The design of an exhibition "France in Industrial India" organised by Indo-French Technical Association was undertaken by the Centre. The exhibition was held at Kumaraswami Hall, Bombay, in May 1971.

Design: S. Nadkarni  
U. A. Athavankar



A plastic foot-mat for automobiles was designed for the Plastipeel Chemical Corporation. The mat which works on a modular basis, can be joined with the other pieces and can be used in varying sizes. This mat made of P.V.C. will be available in different colours.

Design: M. Chattopadhyay



The pillar-type letter box was redesigned for the Posts & Telegraphs Department by the Centre. A simple form suitable to the present day use and environment as well as for mass production was arrived at with due consideration to various functional problems. The clearance operation will be easier for the post-man with this letter box.

Design: U. A. Athavankar

स्वातंत्र्यवीर सावरकर मार्ग  
लाल बांसवाडा बांसवाडा  
कर नं. १०८ तृणमाला नं. १०८  
स्वातंत्र्यवीर सावरकर मार्ग  
लाल बांसवाडा बांसवाडा  
कर नं. १०८ तृणमाला नं. १०८

Coca-Cola

Coca-Cola

45

## Design Survey/Letter-box

S. Nadkarni  
U. A. Athavankar

"In the world where violence, sadism, aggression, vulgarity, prejudice, waste, cynicism and ostentation reign, environmental design can in a very short time become a farce, or a mere utopian pastime. To avoid this, environmental design would in future have to concern itself not only with dead variables but with live variables" - Tomas Maldonado.

These live variables form the community. Community in the street. Not only a piece of land or their house belongs to them but also the streets, the parkways, the community centres, schools, markets, hospitals, buses and bus stops, pavements and parks-all these are theirs, they can create, control or change them.

Their design and use must be determined by the users. However, the direct or indirect influence of the Government on our environment is so enormous that it has assumed total responsibility for almost our entire environment.

The Government spends lakhs of rupees on everything from working environments to street environments and yet they are hardly aware of the need to follow sound and sensible design policies. If we observe our street-scene today, we only get eyesores. Chaotic in its planning, our physical environment (and the designed objects it consists of) reflect very little concern about the community. Nor, for instance, do objects such as communication signs or post boxes communicate their own function to their users. They look isolated due to the lack of coordination and proper planning. Further,

there is no autonomous and expert authority to control designing at the decision-making level as in Britain where the Council of Industrial Design (COID)\* makes such vital decisions. There are various departments and agencies who control our street scene in their own way. What is lacking in these various organisations is a common policy commitment and design sensitivity, which often results in the creation of a depressing and sometimes dangerous environment. The aim of this survey is to take up an object of street furniture and analyse it to determine the process which led to its realisation.

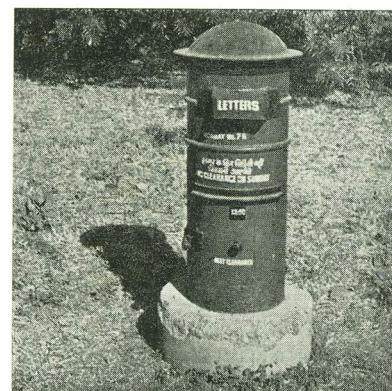
The letter-box is one such product which has a close association with the life of the community. It has its own tradition and has already passed through various stages of development over the last many years. The postal system was introduced in India first in 1766 for official use and was later extended for public use in the year 1774. The very first letter-boxes were

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\*The Council of Industrial Design in England has a Committee comprising of industrial designers, architects, and graphic designers who approve the designs for street furniture and also advise the manufacturers for improving their design qualities. The designs approved by the Council are supported by the Ministry for implementation. The Council also gives commercial rewards to those manufacturers who improve their designs.

### who selects street furniture for bombay

central government	public agencies	private agencies
p & t : mail boxes telephone booths	fire : fire alarm boxes fire hydrants	advertising agencies : posters banners kiosks
	water : drinking fountains	lion club : parks
electricity : street lamps		jaycees : parks
police : police stations and chowkies		
sanitation : litter bins ash tray		
traffic : traffic signals street signs		
park : park lamps benches plants		
commerce & public events	commisioners of roads : banners	



designed and manufactured in England and shipped to India to be tried out in the year 1857. Subsequently, they were manufactured in India. Not many changes have taken place in the design of the letter-box since then and it would be worthwhile to make a detailed analysis of this product.

Any product can be evaluated by a detailed analysis of its determinants and their variables and the alternative weightage which can be given to each of them. A product is designed for the users by the sellers and the manufacturers and each of these three parties have their own requirements. The designer's concept of design is based on these requirements and their comparative weightages. Analysis helps to develop a deeper understanding of the product and establishes the shape of the problem or the basic need that the product is intended to meet. To this extent, it is a judgement made with carefully worked out parameters. The success of the analysis depends on the propriety of these parameters which are conceived after elaborate collection of data and careful investigation into the requirements of the users, sellers and manufacturers. However, in the case of the letter-box no selling agency was involved and the users can be identified as two distinctive groups, namely, the community and the postal department. Therefore, the design parameters for the letter-box depend on the requirements of the community, the postal department and the manufacturers.

The basic need of the community is that it should be possible for people to locate the letter-box easily;

the letter-box should clearly communicate certain information such as, the time of clearance etc.,

the mouth of the letter-box should be at a comfortable height and should have an opening of sufficient length and width to facilitate the dropping of letters and packets of the standard sizes determined by the P & T authorities;

the letter-box should be able to protect the letters from tampering as well as from the effects of the external

environment, such as, weather and climate, sun, rain and dust.

The requirements of the postal department is that the letter-box should provide adequate space for collection and storage of letters till their clearance;

that the letter-box should be pilfer-proof, and should be protected against any climatic hazards;

the clearance should be easy for the postman;

the volume of the letter-box should be sufficient to accommodate the bulk of the letters collected till the clearance (this will vary according to the requirements of the community using it, the size of the community and the specific volume and frequency of its postal communication are vital factors).

The maintenance should be easy and economical from the manufacturer's point of view;

the letter-box should be easy for batch as well as mass-production;

the manufacture should not involve complicated tooling and dies;

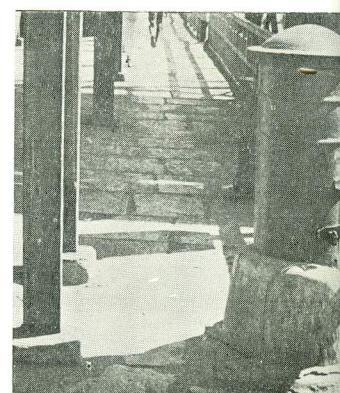
the manufacture should be economical with minimum wastage in material;

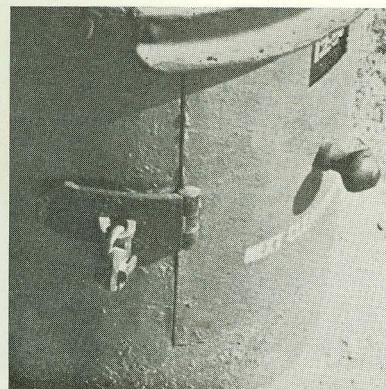
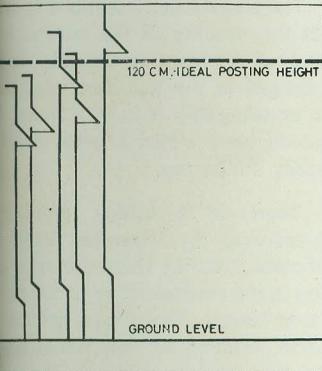
the letter-box should be easy for transportation from the point of manufacture to the points of installation.

With all these requirements in mind we would now consider the present pillar-type letter-box.

One should not have to search for the letter-box in a street. There are neither specially fixed places for this letter-box nor informative signs pointing to its location. It is frequently placed in such a way that obstructs pedestrian traffic. It is at any randomly chosen part of the street. It is sometimes located even at an inaccessible place. The red colour of its body is fairly visible in daylight but it is hardly visible at night or in poor light.

A community means people-people of different ages and different heights. A letter-box should be able to cater to the needs of all these people.





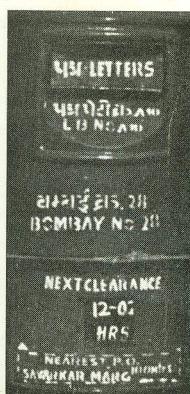
Children, adults and the aged should all be able to post their letters with reasonable comfort. Anthropometric studies indicate that the range of comfortable height for posting should be between 90 cm and 130 cm above the ground level. The present letter-boxes have varying mouth heights from the ground and these hardly come within the comfortable range.

People post letters at leisure as well as in hurry. It should be possible to post the letters without twisting the wrists and hurting the hands. The present letter-boxes have only a diagonal access from below. This forces even the shortest person to bend down or twist his wrist while posting a letter. The sharp edges of the mouth can cause injuries if one is in a hurry.

Security measures are necessary. But their concept and design should change according to the present conditions and needs. Crude and age-old security measures like the use of padlocks could attract the attention of mischief-mongers. Besides they create an over-suspicious image of the authorities.

Letters are invaluable to individuals who write or receive them. Care must be taken to protect them from rain, wind and dust. The present letter-box protects the letters fairly well but dust and raindrops can enter through the present type of mouth-opening.

Informative message addressed to the users of the letter-box should be so arranged that relevant information gets due attention. One should be able to get the most urgent message at the first glance at the letter-box. One should not be made to search all over the letter-box for the required information. The messages on the present letter-box are haphazardly placed without proper classification of the priorities among them. It is also observed that the information is placed on letter-boxes in an irregular and random too manner, either low or too high from the normal eye-level, cramped in a small area or spread over the whole box. The broken stencil letters add to the confusion. All these factors lead to poor communication which is often time consuming.

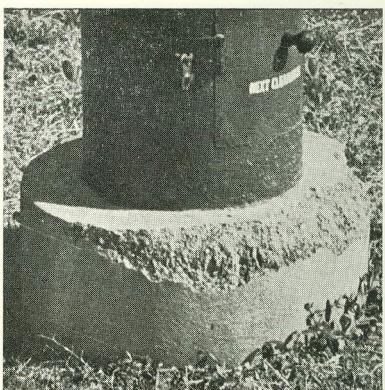


The postal department is responsible for the security of the letters. In the present system where the lock is exposed to the sun and rain, its life is considerably reduced. These locks which have a resale value could be easily stolen too.

There is a further problem of preserving the letter-box itself from climatic hazards. Usually cracks develop in the concrete base of the existing letter-boxes. The edges get chipped soon, creating an ugly visual element in the environment of the street. Postmen collect the letters from the letter box. It should be possible for them to collect the letters without straining their back, without damaging the letters and without getting themselves wet in the rainy season. With the present letter-boxes, the postman has to stoop strenuously as the outlet doors are always at too low level. The letters fly off frequently as soon as the box is opened. And the poor postman with both his hands engaged in collection and his umbrella awkwardly held over his shoulder is indeed in a pitiable condition in the rainy season.



					8150 CU.CM.
					12220 CU.CM.
					48300 CU.CM.
					127640 CU.CM.
					544500 CU.CM.
					228320 CU.CM.



The volume of a letter-box varies according to the size and profile of the population. There can be letter-boxes with different capacities, but all should convey the same message, all should be equally convenient to operate and all should reflect a uniform image of the postal department. There are nine types of letter boxes used at present, some with a pedestal support and some suspended from a support. There is no consistency in the construction, clearance method, graphics or overall appearance, except in colour, among these different types. These letter-boxes fail to create an image of the postal department as a vital and

efficient organization having streamlined systems and management.

Maintenance is a major problem for many organisations. Enough thought given at the designing stage could effect economy in effort and cost. This in turn can make the service more efficient. In the pillar-type letter-box, repainting of the box itself has to be done at the site since the box is integrated with a concrete base. And whenever repainting is done, the graphics are covered with the paint. So the communication graphics have also to be reprinted on the box. And any misalignment with the original graphics is clearly visible and this creates an ugly image.

The production rate of letter-box is bound to increase in due course with the expansion of postal network throughout the country. It would be beneficial to use same dies and similar processes in making the letter-box. The form and the constructional details of letter box should render it feasible for both batch as well as mass production. The present round-shaped letter box contains too many parts and makes use of considerable amount of welding which makes it unsuitable for mass production techniques. The form of the box itself turns out to be uneconomical for mass production.

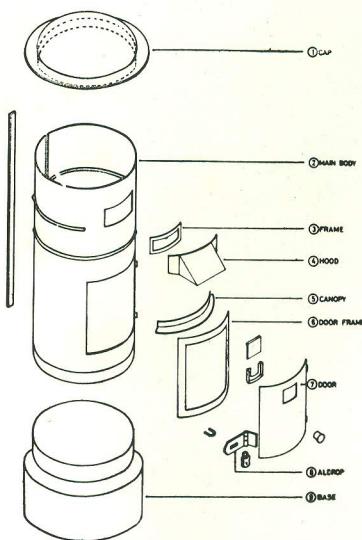
Production economy mostly depends on the processes involved, tool and dies and the efficient use of material.

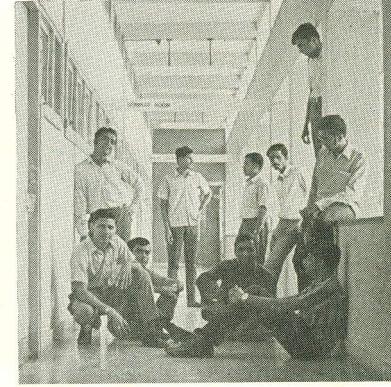
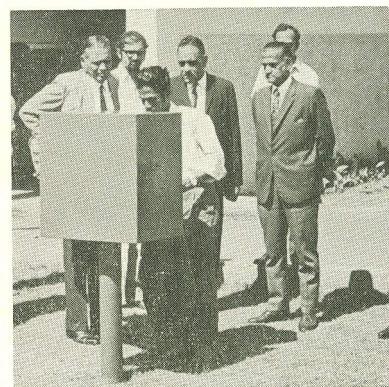
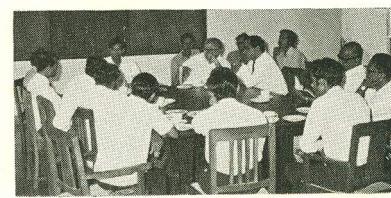
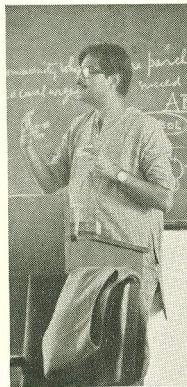
The standard sizes of materials should be made use of with minimum processing and wastage. The number of parts should be optimum. In the present letter-box cut-outs are made in the sheet metal body for door and other openings. This increases the unused material as well as processing costs. The top-cover being circular in shape has to be formed from a square sheet metal which results in an increase in the wastage of material. The thickness of the mild steel sheet does not justify the structural function of the letter-box. It can, on the other hand, lead to higher material and installation costs.

Letter-boxes have to be installed all over the country. A letter-box should

be as light as possible for economic gains in transportation and installation. The present pillar-type letter-box is rather heavy mainly due to the use of thick sheet steel. Further, the present letter box cannot be stacked economically due to its round shape. The bottom part of the present letter box is integrated with the concrete base. This creates problems in installation and maintenance. The whole box has to be carried to the site of installation at the time of constructing the base.

This survey deals with only one of the several objects on the street which make the environment. A detailed study of all these objects is worthwhile and necessary, and this calls for co-ordination to avoid chaos on the street. The final responsibility in this behalf lies with the Government.





## People and events

Mr. Sugiura Kohei, architect and designer from Japan, was commissioned by the UNESCO to study the scripts of East Asian countries. He visited India to investigate the notions of the Devanagari script and its application in designing childrens' books. During his visit to the Industrial Design Centre he delivered a lecture on various communication techniques to be used for educational purposes.

Shri Satish Bahadur, Professor of Film Appreciation at the Film & T.V. Institute of India, Poona, delivered a series of lectures on 'Film as a Medium of Communication' to the students of the Centre.

Prof. Misha Black, the renowned architect and designer from the Royal College of Art, London, attended a seminar on 'Design 1971' at the Indian Institute of Technology, Delhi. The first volume of the IDC/OUTPUT was presented to Prof. Black by the Faculty-in-Charge, and the work done at the Centre was highly appreciated by him.

Delegates from the All-India Instrument Manufacturers' & Dealers' Association, headed by Shri P. Sandell, visited the Centre to acquaint themselves with the work done at the Centre and also for ascertaining how best the Centre could be of help to the small-scale instrument manufacturers in developing their products.

The Centre had taken up, at the request of the Indian Posts & Telegraphs Department, Government of India, the redesigning of the pillar-type post box. The prototype model seen in the picture was presented by the Director of the Institute, Dr. P. K. Kelkar, to Shri B. Lall, Postmaster-General, Maharashtra Circle, along with a documentation of case-study on the same.

Shri C. Subramaniam, Union Minister for Planning, Science & Technology, visited the Centre and evinced keen interest in the work done by the Centre.

The third course commenced on 11th October 1971. The students seen

in the picture have been sponsored by the following industrial undertakings:

1. M/s. Swastic Rubber Products Pvt. Ltd.
2. M/s. Blue Star Ltd.
3. M/s. Rallis India Ltd.
4. M/s. Hobusta Machine Mfg. Co. Pvt. Ltd.
5. M/s. Bright Brothers Pvt. Ltd.
6. M/s. Borosil Glass Works Ltd.
7. M/s. Centron Industrial Alliance Pvt. Ltd.

The students of the first batch have completed their 15-month programme and joined their respective sponsoring industries. In the near future the impact of the training imparted will be seen in the products designed by them. The designers have been well-received by the industries.

Diploma project assignments : Second  
Batch :

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Seed-cum-fertiliser drill  
S. S. Date

---

Housing system for electronic  
instruments  
S. R. Menon

---

Epidiascope  
R. Kadiru

---

Electric geyser  
B. Bhaumik

---

Food carriage system  
J. K. Bansal

---

Sewing machine  
S. A. Mahindrakar

---

Photo enlarger  
K. K. Trivedi

---

Coffee percolator  
V. K. Rao

---

Pesticides sprayer  
S. Srinivasan

---

Catering system for aircrafts  
K. Munshi

---

Bread toaster  
A. K. Siddha

Output 1972

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A. G. Rao

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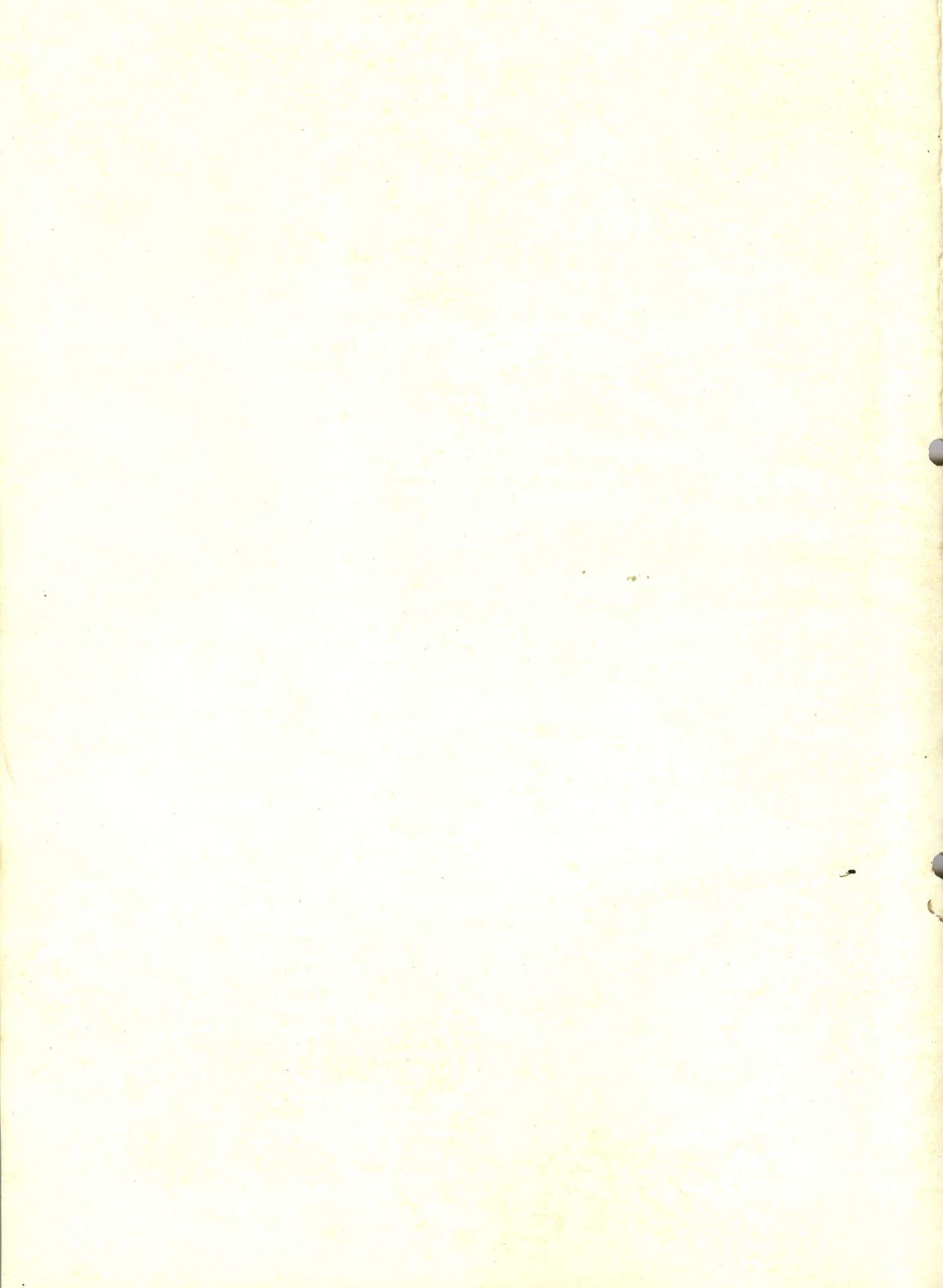
Industrial Design Centre  
Indian Institute of Technology  
Powai, Bombay-76 NB

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Cover : Model of Kerosene Lantern

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