FACULTAD DE INGENIERIA U.N.A.M.
DIVISION DE EDUCACION CONTINUA

A LOS ASISTENTES A LOS CURSOS

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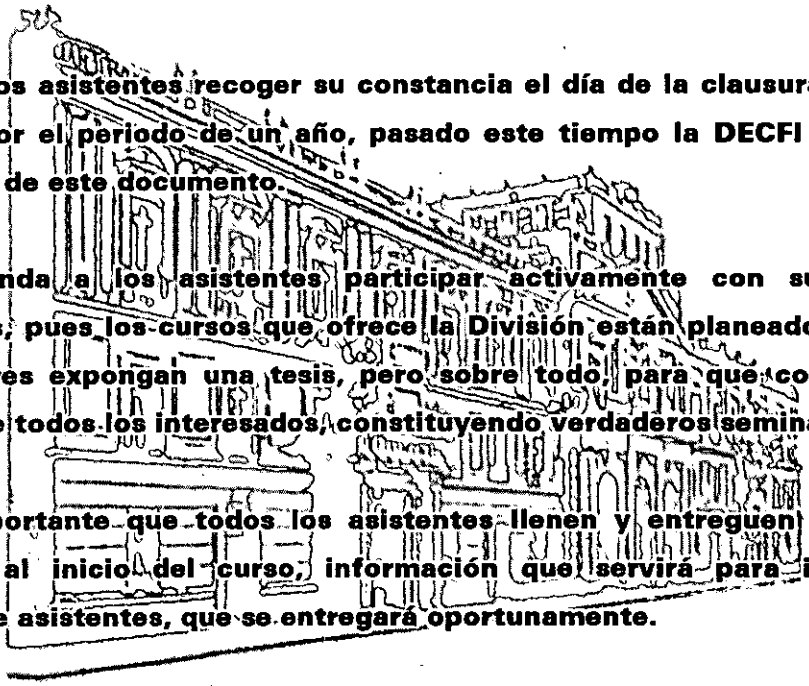
El control de asistencia se llevará a cabo a través de la persona que le entregó las notas. Las inasistencias serán computadas por las autoridades de la División, con el fin de entregarle constancia solamente a los alumnos que tengan un mínimo de 80% de asistencias.



Pedimos a los asistentes recoger su constancia el día de la clausura. Estas se retendrán por el periodo de un año, pasado este tiempo la DECFI no se hará responsable de este documento.

Se recomienda a los asistentes participar activamente con sus ideas y experiencias, pues los cursos que ofrece la División están planeados para que los profesores expongan una tesis, pero sobre todo, para que coordinen las opiniones de todos los interesados, constituyendo verdaderos seminarios.

Es muy importante que todos los asistentes llenen y entreguen su hoja de inscripción al inicio del curso, información que servirá para integrar un directorio de asistentes, que se entregará oportunamente.

Con el objeto de mejorar los servicios que la División de Educación Continua ofrece, al final del curso deberán entregar la evaluación a través de un cuestionario diseñado para emitir juicios anónimos.

Se recomienda llenar dicha evaluación conforme los profesores impartan sus clases, a efecto de no llenar en la última sesión las evaluaciones y con esto sean más fehacientes sus apreciaciones.

Atentamente

División de Educación Continua.

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FACULTAD DE INGENIERIA U.N.A.M.
DIVISION DE EDUCACION CONTINUA

CURSOS ABIERTOS

INGLES TECNICO MODULO AVANZADO

NOTAS GENERALES

M.C.I. JOSE A TENA COLUNGA

NOTAS CURSO DE INGLES TECNICO

MODULO AVANZADO

MATERIAL DE LECTURA

line 55 relapsing fever — an infectious disease in which the fever recurs.

Exercises

1. Give the meaning of:
   aerated (5), breeding places (7), chronic (10), vegetation (15), insecticide (19), mean (24), fly control (42), hydro-electric (45), tick (55).
2. Explain in your own words:
   'out of all proportion to its size' (9), 'low concentrations' (14), 'interrupting the life cycle' (16), 'a concentration of some 0·5 parts per million' (20), 'source of the river' (23), 'evidence of re-infestation' (33), 'sparsely populated' (39), 'high density' (39), 'the incidence of worm infestation' (40), 'a heavy degree of incapacity' (41), 'stable community' (43).
3. Explain exactly what was done in the 1953 Victoria Nile operation.
4. Examine the use of the verb 'to transmit' in lines 9 and 55, and in line 47 of Passage 1. In each case, what is transmitted by what, to what?
5. What is a project? See lines 37 and 60.
6. Use 'which' clauses to expand into easier definitions:
   'small blood-sucking fly' (3), 'aerated river water (5), 'major hydro-electric centres' (45), 'few health measures' (49), 'arthropod-borne infection' (52).

CHAPTER 5

Mechanisation in the Coal Industry

ONE of the most arduous tasks of the miner was that of undercutting the seam at or near floor-level so that the coal above the cut might be free to drop by its own weight aided by the strata pressures, or with the assistance from explosives or other means of breaking it down. Even quite early in the nineteenth century, therefore, efforts were being made to devise a machine which would do this work. It was not until nearly the end of the century, however, that really successful machines were introduced. The commonest type today is the Chain Cutter, which comprises a haulage unit powered by compressed air or electricity and a cutting member consisting of a projecting arm or jib which carries an endless chain armed with small cutting picks. This jib cuts a slot in the coal-face of varying depth according to the length of the jib employed, the average being 5 ft.

In 1906, a further milestone was reached when the first six underground belt conveyors in the world, designed by Richard Sutcliffe, were installed on coal-faces in Glass Houghton Colliery in Yorkshire. The advent of the conveyor, both on the face and in the haulage roads, by speeding up the clearance of the coal made possible a still much higher rate of face advance and led to a further and very significant degree of concentration of the facilities for transporting the coal away to the pit bottom.

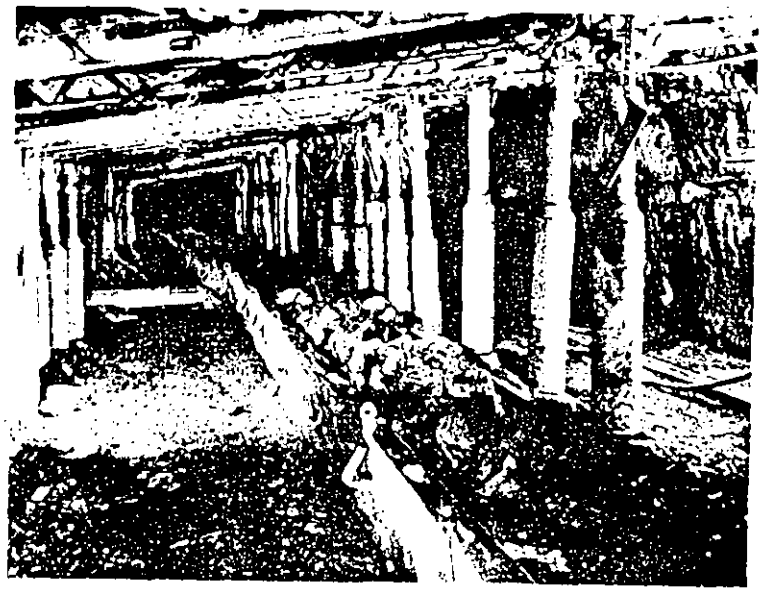
By the 1930's the use of the coalcutter was established practice and the use of conveyors was developing rapidly. Once the face conveyor became fully established and recognized as a means of concentrating the coal at a limited number of loading points, engineers conceived the further possibility of producing a machine which would both cut the coal and load it on the conveyor.

The Meco-Moore Cutter Loader is essentially a development from the coal cutter, having, instead of one cutting jib, two horizontal jibs to free the coal at roof and floor level and a third triangular shearing jib which cleaves the coal

A double jib cutter in use at the coalface.

from the back of the cut; a short traverse conveyor serves to move the falling blocks of coal on to the face conveyor. Thus the cutting and loading of coal in one operation was established. Productivity in favourable circumstances increased by more than 50 per cent compared with orthodox working.

The armoured flexible conveyor, which was introduced from Germany into Britain about 1952, was the next step forward. It is a very heavy and robust piece of equipment which is quite impossible to dismantle and rebuild in a new track as is customary with the belt conveyor. It became necessary, therefore, to devise a new system of roof supports which would allow the conveyor to be moved forward in small steps and kept close up to the coal face. This system is commonly known as the prop-free front.



An armoured conveyor and hydraulic props in a colliery.

Britain's special contribution in this field has been the development of the adjustable hydraulic prop, which works on exactly the same principle as the hydraulic car jack, and which can be just as speedily and easily jacked up to roof level or, alternatively collapsed and withdrawn. The maximum pressure load appropriate to the particular roof and floor conditions can be pre-set on the prop, a release mechanism operating to liberate the pressure should it build up beyond the proper load.

from *Improving the Efficiency of the Mining Industry* by H. A. Longden, B.SC., M.I.MIN.E., A.M.I.C.E., F.G.S. December 1958.

line 2 undercutting — making a horizontal cut in the bottom of the coal seam.

line 11 powered by — driven by.

line 42 armoured — constructed of tough steel plate for strength.

line 50 prop-free front — without pit-props at this part of the coal face.

line 57 pre-set — mechanically arranged in advance.

Exercises

1. Give the meaning of:
   seam (2), endless chain (13), pick (13), coal-face (14), belt conveyor (17), haulage road (20), pit bottom (24), productivity (39), dismantle (45), hydraulic (52), prop (52), jack up (54).
2. Explain in your own words:
   'higher rate of face advance' (22), 'face conveyor' (27), 'loading point' (29), 'shearing jib' (35), 'traverse conveyor' (36), 'orthodox working' (40), 'roof support' (47), 'floor conditions' (57).
3. Describe (*a*) the chain-cutter, (*b*) the belt conveyor, (*c*) the cutter-loader and (*d*) the hydraulic jack.
4. Expand into definitions which retain the actual words:
   strata pressures; chain-cutter; haulage unit; maximum pressure load; release mechanism.
5. The verb 'to collapse' is used here transitively (55). What do you understand by this unusual usage?
6. Use your dictionary to find as many different meanings as possible for:
   member, jib, seam, clearance.

CHAPTER 6

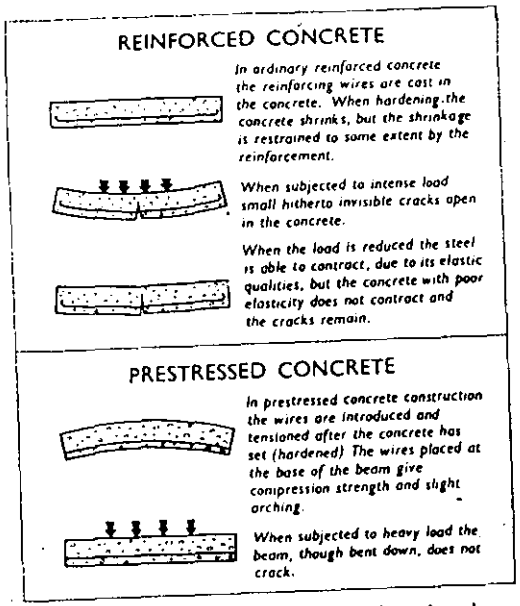
Prestressed Concrete

ALTHOUGH concrete is of great value to builders, it has one drawback so far as engineers are concerned, and that is a weakness in tensile strength. To overcome this weakness, engineers place within the part of the concrete subjected to tensile forces another material having a high tensile value. This material, or reinforcement, is normally steel, usually in the form of rods, round, square, twisted or mechanically deformed. In a beam subjected to bending forces the upper part of the member tends to squeeze together, being in a state of compression, while the lower part tends to stretch, and it is in this area that the steel reinforcement is used to resist the tensile forces. (See diagram on next page.)

Steel is, however, elastic, and when subjected to tensile forces it stretches. As a result of this small cracks of a hair-like nature develop in the surrounding concrete and the overcoming of these cracks is one of the many advantages of prestressed concrete.

As improvements were made in obtaining high compression strengths in concrete, so has the strength in tension of reinforced concrete been improved. The first reinforced concrete had as its tension member, wrought iron, and with the availability of mild steel bars the strength has increased over the years. By cold working of mild steel bars as much as 50 per cent increased strength has been obtained from the basic material, while the use of alloy steels has shown yet further increases in strength. The permitted tensile strengths of steel reinforcement have risen from 15,000 lb./sq. in. twenty-five years ago, to as much as 27,000 lb./sq. in. today.

The search for progress is a continuous one, and in 1928 M. Eugene Freyssinet perfected a system of prestressing concrete by tensioning high-tensile hard drawn steel wire. During the war M. Freyssinet was able to further improve and develop these ideas. The principle involved was to induce into the concrete an initial compression equal to or greater than the maximum tension to which the member



Simple principles of bending in reinforced and prestressed concrete.

would be subject when under load. As bending occurred, the tensile force merely produced a reduction of the initial compression and, within the limit of the elastic range, the maximum stress in the wires would not exceed the initially induced prestress.

There are two forms of prestressed concrete in general use. These are pre-tensioned and post-tensioned concrete. In the case of pre-tensioned concrete the reinforcement is placed in a state of tension and concrete is placed around the reinforcement and allowed to harden. When the concrete is of sufficient strength the tension is released and is then absorbed completely in the concrete. In post-tensioned concrete the tension is induced in the reinforcement after the concrete has hardened and transferred externally by anchorages into the structure.

The diagram illustrates the principles of bending and the application of the external forces involved in prestressing. A much used simile of prestressed concrete which illustrates the principles involved is that of the book-case. If one takes from a book-shelf a number of volumes and holds them together simply by the volumes at each end, it will be found that those in the centre fall to the floor. By the exertion of considerable horizontal force applied to the two extreme books quite a number of books can be retained in position. In this case the whole of the forces are externally applied and the effort exerted by the arms is equivalent to the anchorage forces developed in post-tensioned concrete.

from *Prestressed Concrete* by G. W. Kirkland, M.B.E., M.I.C.E., M.I.Struct.E. Lecture I November 1958.

line 22 mild steel — steel containing little carbon.
line 23 cold working — shaping without the use of heat.
line 27 lb./sq. in. — pounds per square inch.
line 31 drawn steel wire — steel wire made by drawing out or pulling.
line 50 anchorages — places to which the reinforcement is firmly fastened.

Exercises

1. Give the meaning of:
   tensile strength (3), reinforcement (6), compression (10), wrought iron (21), availability (22), alloy steel (25), high-tensile (31), prestress (40).
2. Explain in your own words:
   'subjected to tensile forces' (4), 'mechanically deformed' (7), 'high compression strengths' (18), 'tension member' (21), '50 per cent increased strength' (24), 'within the limit of the elastic range' (38).
3. What are the differences between (*a*) pre- and post-tensioned concrete, and (*b*) mild steel, alloy steel and hard drawn steel wire?
4. Write five sentences in which you use:
   basic material, perfected a system, the principle in-

volved, equal to or greater than, in a state of tension.

5. Notice how the writer uses the word 'member' (9, 21, 35). Compare this with the use in the previous passage (12). Which of the following are sufficiently vague to do the same work: unit, structure, component?
6. Collect in two columns five words beginning 'pre-' (meaning 'before') and five beginning 'post-' (meaning 'after').

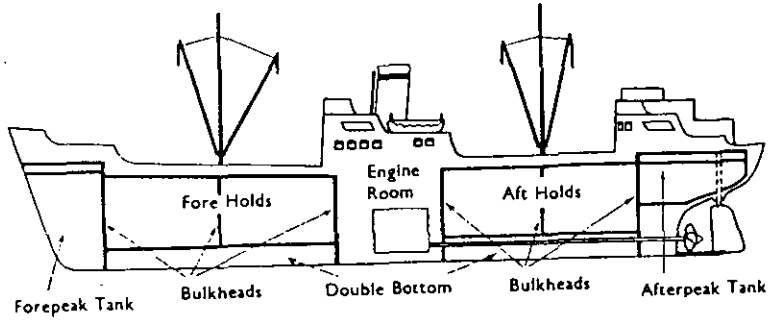
CHAPTER 7

Safety in Ships

An important contribution to safety in ships is subdivision, that is, by transverse bulkheads, and by the fitting of double bottoms, which were first introduced in the Tyne-to-London colliers about the middle of the last century. It soon became standard practice to build these into the structure of all sea-going vessels.

The double bottom in all sizable cargo and passenger vessels extends from the afterpeak bulkhead to the forepeak bulkhead. It is divided into tanks of a total capacity which, together with the forepeak and afterpeak tanks, enables a ship to make a normal sea passage without recourse to the use of dry ballast, thus saving time and expense. Also, as the name implies, they provide additional safety in a double bottom for about 90 per cent of the vessel's length, and the remaining 10 per cent of length is taken up by forepeak and afterpeak tanks, which are usually fitted with a tank top providing double skin for perhaps the most vulnerable spot of the vessel's construction. These tanks may also be used for trimming purposes, and for assisting the stability of a ship when loaded with a light cargo, such as timber or bales. They also provide a level platform, better stowage and safer transport of cargo. Subdivision of a cargo ship must, of necessity, have some relation to the trade in which the vessel is engaged and to the length of the merchandise carried. Experience has shown that ships carrying general cargo require at least 80 feet between transverse bulkheads in one hold. In the sailing ship only one transverse watertight bulkhead was fitted forward.

The risk of fire in steamers led to the fitting of two further watertight bulkheads to divide the machinery space from the cargo holds, so that if the ships were flooded by any cause in the cargo spaces, there was still a chance of working the engines. All steamers, therefore, have a minimum of four bulkheads which may be reduced to three if the engines are placed aft. This applied, of course, to a com-



Cross-section of a ship.

paratively small ship; a ship of 285 feet would have an additional watertight bulkhead, and as the ship increases in length more would be fitted.

The foregoing applied to cargo vessels' subdivision, and the safety measures required for passenger vessels are more complicated. The subdivision is required to be such that they will be able to remain afloat with either one, two or three adjacent compartments flooded, the higher standard being for vessels which are predominantly passenger carriers.

For the purpose of the Safety Rules made by the Ministry of Transport for giving effect to the requirements of the 1948 International Convention for Safety of Life at Sea, passenger vessels are arranged in classes ranging from Class I, engaged in long international voyages, to Class VI (a), carrying no more than 50 passengers for short distances near the land.

The greatest advantage in subdivision is perhaps seen in a tanker where a vessel of say, 460 feet might have as many as 17 transverse bulkheads and two continuous longitudinal bulkheads. The tanks are, of course, part of the structure of the ship and extend over 75 per cent of the length of the ship. There are also double bottoms under the machinery spaces and a deep tank under the forehold. The construction is a near approach to an unsinkable ship, the weak spot in this design being that the engine room is situated aft. It is normally about 20 per cent of the length of the ship. If, therefore, the engine room were holed and flooded while the vessel was loaded with heavy fuel, there would be such an enormous tipping lever as to bring her stern under water. When loaded with a gasolene cargo at 50 to 52 cubic feet a ton she would remain afloat so long as the bulkheads held. Experience has shown that when in ballast a tanker will take a great deal of punishment before she will sink.

from *Safety in Ships* by Captain J. P. Thomson, O.B.E. 9 July 1954.

line 8 afterpeak, forepeak — the extreme sections of a ship, in the stern and bows, respectively.
line 19 trimming — adjusting a ship's balance.
line 21 stowage — storage on a ship.
line 28 forward — towards the front part of the ship.
line 57 forehold — hold in the front part of the ship.

Exercises

1. Give the meaning of:
   bulkhead (2), collier (4), ballast (12), merchandise (24), steamer (29), aft (35), tanker (52).
2. Explain in your own words:
   'subdivision' (1), 'for trimming purposes' (19), 'transverse watertight bulkhead' (27), 'predominantly passenger carriers' (44), 'enormous tipping lever' (63).
3. Draw a plan of a tanker from the facts given in the last paragraph.
4. Explain in simple language:
   (*a*) the principle of subdivision,

(*b*) what uses are made of ships' tanks,
(*c*) how and why a tanker is designed and show what its weak spot is.

5. Write five sentences in which you use:
standard practice, without recourse to, safety measures, for giving effect to, a near approach to.

6. Paraphrase the following sentences:
(*a*) 'It is divided into tanks – – – time and expense' (9).
(*b*) 'Subdivision of a cargo ship – – – merchandise carried' (22).
(*c*) 'The subdivision is required – – passenger carriers' (41).

CHAPTER 8

Insect Behaviour

ONE has only to consider the peculiar behaviour of the solitary wasp, Pompilus, which catches its spider before it digs its burrow and marks, by a remarkable feat of memory, the position of the spider, to realize that memory plays a most important part in the behaviour of these insects.

The sand wasp, Ammophila, seems to exhibit in its behaviour the beginnings of choice and, possibly, a glimmer of intelligence. The sand wasp digs its burrow by using its jaws as mining tools and its front legs as rakes. It burrows into the sandy soil for a few inches, and, every now and then, it comes across a little stone. The wasp takes great care to remove, from the site of its operations, all the debris that it has thrown up in its diggings; all the small stones and pebbles that it comes across, it puts to one side. It finishes its burrow by gouging out the top portion with a slightly greater diameter than the deeper recesses of the burrow. Having done this, it then selects one of the pebbles which will fit exactly into the mouth of the burrow and places it in position, and if the evening is fast approaching, it will cover up the whole area with sand. The insect does this so effectively that it is impossible for the human eye to detect where the underlying burrow is to be found. The intention of the sand wasp seems to be to hunt its prey on the following day when the sun is high up on the horizon. For the rest of the evening it goes off, nobody knows where, to await the dawn for its hunting expedition. The prey that the sand wasp will search for is the grey worm. This grey worm is the larva of a certain moth, and is to be found around the roots of thorn bushes. The wasp hunts the worm in very much the same way as a terrier hunts a rabbit. When the worm emerges upon the surface, the sand wasp falls upon its prey and, according to Fabre, stings it in each of its thirteen separate segments. Gripping the worm in its mandibles, the wasp stands astride it; and although it may

be as much as one hundred yards from its burrow, the wasp makes a straight line from the scene of its hunting to the burrow which it made the previous evening. Having located the burrow, it removes the sand, pushes the paralysed caterpillar into the burrow, lays its egg upon it, fills up the sand and then flies away. Indeed, there is one variety of Ammophila which actually picks up a stone and, using it as a ram, forces the sand down into the burrow, and eventually leaves the surface of the sand so smooth that it is impossible for the human eye to locate the position of the insect's operations. This is truly remarkable behaviour, and one might see in it many elements which could be considered examples of choice, and perhaps of intelligence. It is an example, also, of an animal using a primitive tool for its work.

Against this, however, is the behaviour of mason bees while filling their cells with pollen and nectar, as described by Fabre. The mason bee arrives at the partially empty cell and, putting its head into the cell, disgorges the nectar which it has collected; and then, turning round, it puts the end of its abdomen into the cell to brush off the pollen grains, which it has collected into a load on the underside of its abdomen. This action of the mason bee is constant and may be considered to be an instance of pattern behaviour.

Fabre describes how he interrupts this pattern in the middle. He flicks the bee away when it is about to put its abdomen into the cell to brush off the pollen. Fabre was very interested to see what would happen next. Would the bee fly back, having been brushed away, and resume the pattern of its behaviour at the point at which it was interrupted? Fabre found that it did not do this: it started the pattern all over again. Every time that the bee went to put its abdomen into the cell to brush off the pollen grains from the underside of its abdomen, Fabre flicked it away again with a straw; and every time the mason bee flew back and went through the pattern from the beginning once more. This type of behaviour seems to be common among the bees and the wasps and insects generally; their actions are performed according to a definite pattern, and if this

pattern is interrupted, the insect has to begin all over again in order to finish it.

from *Modern Research into Bees and Bee-Keeping* by Stanley Gooding, M.A., M.SC., M.D., J.P. April 1958.

line 2 solitary — of a kind not living in communities.
line 33 Fabre — great French entomologist (1823–1915).
line 59 pattern behaviour — automatic behaviour following a pattern common to all members of the species.

Exercises

1. Give the meaning of:
   burrow (3), debris (13), prey (24), larva (29), terrier (31), segments (34), mandibles (35), cell (52), pollen (52), nectar (52), disgorge (54), abdomen (56).
2. Explain in your own words:
   'the beginnings of choice' (8), 'mining tools' (10), 'from the site of its operations' (13), 'the action of the mason bee is constant' (58), 'an instance of pattern behaviour' (59).
3. In not more than 50 words, describe the behaviour of the sand wasp.
4. The abdomen is the third section of an insect's body. Find out the names for the other two sections.
5. Arrange these words in order of development:
   adult, larva, egg, pupa.
6. Paraphrase these sentences:
   (*a*) 'It finishes its burrow.....of the burrow' (15).
   (*b*) 'This is truly remarkable.....of intelligence' (46).
7. What workers would you normally expect to use:
   a rake, a gouge, a ram?
8. Entomology is the study of insects. What are the following:
   zoology, anthropology, ornithology, morphology, palaeontology?

CHAPTER 9

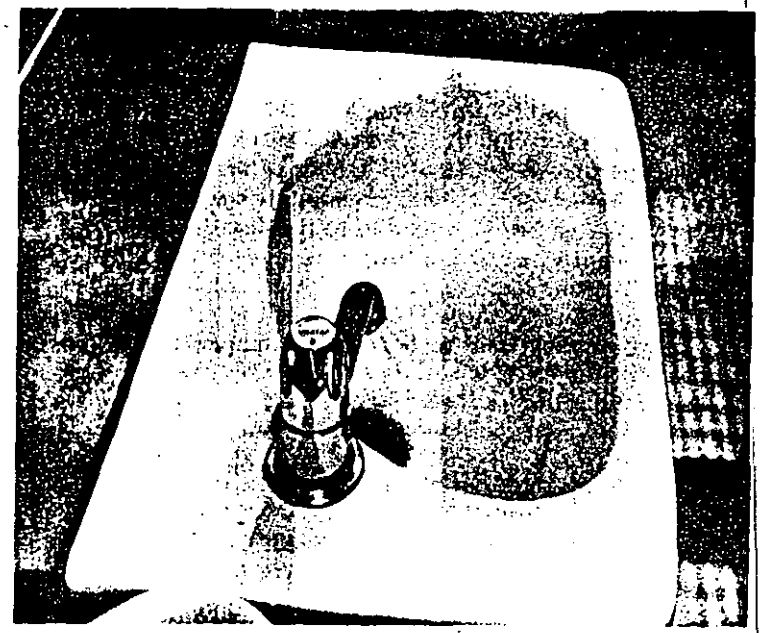
An Experiment in Plumbing

A MODERN development of an existing practice is washing under sprays at basins in office and public buildings. This has been a provision in factories where washing-troughs and washing fountains have been fitted with spray-taps for some years, but from which no information regarding economy appears to have been obtained.

As an experiment, and with the knowledge that shower baths showed considerable economy of water and fuel when compared with slipper baths, the Ministry of Works changed normal hot and cold water supplies over to a blended supply delivered through spray taps to a range of basins in a men's lavatory and in a women's lavatory in an office building; but in each case they kept one basin on normal supply, and they removed plugs from the basins having spray taps. This washing under running water had medical backing and this preliminary experiment was to obtain user reaction. This turned out to be favourable, and it was found that a rate of supply of three to five pints per minute of the blended water gave satisfaction, which indicated a considerable saving of water and of fuel. With the assistance of the Building Research Station a fully detailed experiment was put in hand involving the installation of water meters to hot and cold supplies in all lavatories in the building, whether on normal or spray tap supply, and electrically wiring the taps to recorders. The results over a year's working were obtained, and these show that, compared with normal taps, only half the water is consumed when using spray taps, and the saving in fuel also is substantial. The quantities of water used only for ablutions in this one office building per week are shown in the table opposite.

This amounts to a saving of over 570,000 gallons of water per year in only one of London's buildings.

An interesting point concerns the larger saving in hot water; much of this is attributed to the loss of heat, which, in normal supply, is taken up by the basin, and which was



A modern wash-basin and spray-tap.

Type of Supply	Water consumption in gallons		
	Hot	*Cold*	*Total*
Normal hot and cold supplies	16,000	6,000	22,000
Spray taps delivering water at 105°F	7,000	4,000	11,000
Saving in water	9,000	2,000	11,000

shown to reduce the hot water temperature by some 10°F.

The adoption of this system for office and public buildings would introduce savings additional to water and fuel. A simpler basin is possible, there should be no plug, chain and staple, and there is no need for the controversial and un-

hygienic overflow. Service piping may be smaller, for we are here concerned with a delivery of four to five pints per minute in place of 3½ gallons, that is, 28 pints per minute, from the two taps of normal supply. On the waste piping side, not only may pipe sizing be reduced but branch venting to traps may be omitted if the traps are secure from syphonage induced by the discharge of other appliances.

A user comment drew attention to the fact that everyone might not want water at the temperature given by a master blender. A manufacturer has now produced a spray tap which in one turn of the tap head mixes hot and cold supplies from unmixed cold to hot so that temperature of the supply is in the control of the user. The system with taps of this kind has been installed as a permanent feature in an office building, and very laudatory things are being said of it by the users.

from *Plumbing* by G. L. Ackers, O.B.E., M.I.C.E., 2 August 1957.

line 9 slipper bath — originally a bath-tub shaped like a slipper with a covered end, here the conventional bath-tub.
line 41 overflow — outlet for spare water.
line 45 sizing — size.
line 45 branch venting to traps — branch piping relieving positive or negative air pressures which may build up in waste-pipe systems.
line 47 syphonage — syphoning.
line 49 master blender — device which has complete control of the mixing of hot and cold water.
line 55 laudatory — full of praise.

Exercises

1. Give the meaning of:
   washing troughs (3), spray tap (4), plug (14), staple (40), service piping (41), waste piping (44), discharge (47).
2. Explain in your own words:
   'an existing practice' (1), 'a blended supply' (10), 'had medical backing' (15), 'user reaction' (16),

'a fully detailed experiment was put in hand' (21), 'user comment' (48).
3. What do you think was the purpose of:
   (*a*) the water meters, (*b*) electric recorders?
4. Find at least three different meanings for the word 'basin'.
5. Notice the writer's fondness of noun forms in -ing, (service piping, waste piping, pipe sizing, branch venting). What might he have written in place of each of these nouns?
6. The suffix -age (as in 'syphonage') is often used to mean action, condition, or function. What, then, is the meaning of:
   haulage (Passage 5, line 10), anchorage (Passage 6, line 50), stowage (Passage 7, line 21)?
7. The sentence beginning 'This turned out to be favourable—' illustrates the rather loose construction seen in much technical writing. Clearly the clause 'which indicated a considerable saving of water and fuel' does not refer to 'satisfaction'. What then does it refer to?
8. Paraphrase the last paragraph.

CHAPTER 10

The Radio-Carbon Test

DURING the past fifty years, and not least during the last ten of them, science has made remarkable contributions to the study of the human achievement: so much so that we have been compelled to accustom ourselves to a recurrent readjustment of primary values.

The crowning glory of science in this humanistic context is the famous radio-carbon test which came to us from Chicago as a by-product of atomic research in 1949 and has already given a new definition to much hazy thinking. The theoretical principle of this test is simple enough. Under the influence of cosmic rays from the outer space, radio-active carbon atoms of atomic weight 14 — whence they are known as Carbon 14 or C 14 — are formed in the atmosphere and are there associated with ordinary carbon atoms of atomic weight 12 — Carbon 12 or C 12. Furthermore — and this is the important if theoretic factor — between the two groups of atoms, C 14 and C 12, a fixed ratio is maintained in the carbon dioxide of the atmosphere. Now the carbon dioxide containing this fixed ratio is absorbed by plants, and, since plants enter directly or indirectly into the substance of all organic nature all living things (whether animals, shell-fish, or plain you or me) incorporate C 14 and C 12 in this known and supposedly constant mutual proportion. *But*, from the moment of death the organic subject begins to lose C 14, and the proportion of C 14 to C 12 thereafter decreases in it *at a known rate*. Your boots, for example, have proportionately less C 14 than your body. Now, within limits, the surviving amount of C 14 is measurable, so that, since as I say the rate of decrease is known, the length of time since death can be calculated within a present maximum of just over 40,000 years. There are, as might be expected, pitfalls in this process, and from start to finish the test is subject to many controls and some reservations. But by and large it is now accepted, and its reliability will increase with experience and mechanical improvement. The number of machines and available operatives is still tiny in relation to the potentiality of the test; in this country, there are as yet only two or three machines, of which I believe that no more than one is at the present moment (1957) in working order, and that intermittently.

A few random examples will serve to illustrate the sort of achievement which may be expected from this test. In North America the last advance of the Wisconsin glaciation passed over tree-trunks, the average age of which by the Carbon 14 method is about 11,400 years from the present day, less than half the age formerly expected by geologists. The oldest artifacts determined in America are, or were recently, some rope sandals covered by volcanic deposit in Oregon; the age indicated by the test was about 7,000 B.C., a very unimpressive record for the Western Hemisphere, but subject, I have no doubt, to supersession in due course. Nearer home, wood from a mesolithic settlement skilfully excavated a few years ago by Professor Grahame Clark at Star Carr, near Scarborough, yielded a date of about 7,400 B.C., which is now one of the few fixed time-points in pre-neolithic Britain. In the Near East, two dates of high importance to any study of Man's achievement have been obtained by the test: a village of primitive farmers in the Khurdish hills was thus dated, on the basis of charcoal and land-mollusca, to about 4,700 B.C.; and more recently at Jericho in Jordan the earlier towns of that very remarkable site have been provisionally attributed to a date in the vicinity of 7,000 B.C.

from *Science in Archaeology* by Sir Mortimer Wheeler, C.I.E., M.C., D.Litt., F.B.A., 27 September 1957.

line 6 humanistic — putting most stress on human interests.
line 43 glaciation — (Ice Age) covering by glaciers.
line 52 mesolithic — of the middle stone age.

Exercises

1. Give the meaning of:
by-product (8), cosmic rays (11), radio-active (11),

atomic weight (12), volcanic deposit (48), land-mollusca (60).

2. Explain in your own words:
   'a recurrent readjustment of primary values' (4), 'a fixed ratio is maintained' (17), 'all organic nature' (20), 'known and constant mutual proportion' (23), 'within a present maximum' (30), 'subject to supersession in due course' (51).
3. Explain in your own words how the radio-carbon test works.
4. Write five sentences in which you use:
   'the theoretical principle', 'the important factor', 'at a known rate', 'subject to some reservations', 'a few random examples'.
5. Put into chronological order: palaeolithic, neolithic, mesolithic.

CHAPTER II

Problems with Submarine Cables

Most cable makers know that at times, for no apparent reason, certain types of cable (not necessarily submarine cable) will fail, and when examined it will be found that the conductor is broken, and on rare occasions one or both ends of the conductor will protrude through the insulation. Usually this occurs where there is a comparatively strong insulating material and a single and rather weak conductor. Experience of this type of fault has been found in certain varieties of polyethylene-insulated cables for radar operation, particularly those cables insulated with straight polyethylene as opposed to Telcothene. Until 1948, however, such a fault had not developed in submarine cable core. During 1948, when Cable and Wireless, Limited, were laying one thousand nautical miles of the renewal of their St. Vincent-Pernambuco cable in very deep water (2,500 fathoms or 15,000 feet) and in very trying weather conditions, it became necessary during the operations to buoy an end of the cable on the surface, and after forty-eight hours, when the ship returned to pick up the end, it was found that a fault had developed. On inspection it was found that the copper conductor had broken and forced itself through the insulation and even between the armouring wires (these are laid quite close together) so that a length of an inch or more of bare conductor was exposed. At first sight this would seem impossible, but after careful study, with a full appreciation of what occurs when laying cable, and more particularly when one end is free-buoyed, the following became clear.

When a cable is strained, as it is under the stress of laying and still more when picking up, the cable itself stretches, armouring wires and all, partly elastically and partly by rotating, so unwinding the turns of the armour wires. The core, which is virtually free to slide inside the armouring, may under these conditions stretch considerably at any one place, and the conductor (fully annealed

MATERIAL DE COMPOSICION

UNIT 12

Writing Narratives: Telling a Story

Introduction

1 A **narrative** usually describes a sequence of events which took place **in the past**. This unit looks at narrative in relation to telling stories.

Read the story below. While you are reading, think about these questions, then discuss them with your group.

a) Has the woman been in the room before?
b) Is the woman surprised to find someone in the wardrobe?
c) What do you think the relationship is between the man and the woman?
d) What do you think has happened before this episode?
e) What do you think will happen next?
f) From whose point of view is the story told? Through whose eyes do we see the room?
g) Now give the text a title.

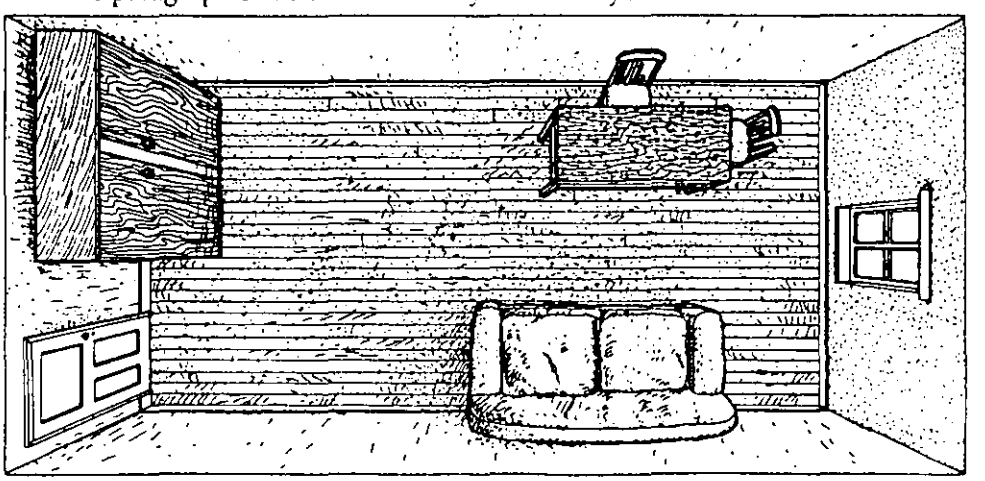
I moved silently up the stairs towards the door. I turned the handle slowly. The door was not locked. It opened noiselessly and I peered in. The room was small and airless with a layer of dust covering the bare floorboards.

I entered and closed the door behind me. There were a few pieces of old furniture in the room – a table with two broken chairs and a dirty sofa stood each side of the window and a large wooden wardrobe stood in the corner. Everything was quiet.

I crossed the room to the window and looked out. The street was empty. I turned to face the room again, and as I did, I thought I heard a scraping sound. I could feel that I was getting close now.

I walked towards the wardrobe trying to move as quietly as possible. As I reached for the handle my hands began to tremble . . . I pulled suddenly at the door . . . and there he was . . .

2 a) The action in the text above is presented in the order it happened. Look at the diagram of the room below and draw lines to show how the woman moved around the room. Put numbers 1, 2, 3, 4 to show where she stopped.
b) Now compare the points on the diagram where the woman stopped with the paragraph structure of the story. What do you notice?



Vocabulary development

3.1 a) Study the text again and write down all the words the writer uses to tell the reader about **sounds**.

silently,

b) The writer tells us that the woman 'moved *silently* up the stairs'. Work with your partner and write down words that can replace *silently* in the first sentence of the text to describe all the different ways someone can walk. Use a thesaurus/dictionary to help you.

loudly,

3.2 a) Now write down all the words the writer uses to describe the **condition of the room:**

small,

b) Work with your partner and write down as many other words as you can that you could use to describe the condition of this room and the furniture. Look at the examples to help you.

Room: dirty,

Furniture: shabby,

3.3 The writer lets the reader know that the woman is looking for or expecting something/someone. Write down the parts of the text where the writer suggests this.

Organisation

4 Narratives in stories are organised in different ways by different writers. However, they usually give readers information about the **characters** (the people in the story); the **setting** (place, time); the **events** (things that happened); the **outcome** (what happened in the end). Now complete this grid for the text in exercise 1.

SETTING	CHARACTERS	EVENTS	OUTCOME

5 Although this story has an **outcome** – the woman finds the man – it is not a very satisfactory one. The reader still wants more information. What questions do you think the reader wants answered? Write them here.

_____

_____

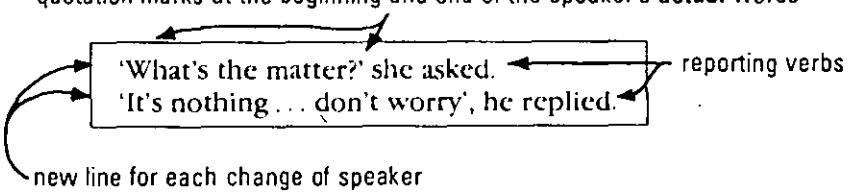
_____

6 a) The text below finishes the story started in exercise 1. Read it carefully and find out whether the questions you wrote down in exercise 5 are answered.
b) There is something important wrong with the text. What is it?

> Talbot stared out at me, a thin nervous smile on his lips. So . . . here I am he mumbled. What are you going to do now? I looked back at him in amazement. How different he was! His hair was grey and his skin was pale and wrinkled. His filthy clothes hung from his skinny body. I'm going to do what I've been waiting to do for three years I whispered calmly. I raised the gun slowly until it pointed towards his chest. His lips parted slightly and a flicker of fear passed across his eyes. No . . . not that . . . you have to listen . . . But I was finished with listening. My search was over. The sound of the bullet leaving the gun shattered the silence and echoed in the empty room. He slumped to the floor gasping for air. In the distance I heard a dog bark. I turned away and walked out of the room.

Writing task: Writing dialogue

7 The problem with the text in exercise 6 is that the punctuation and layout of the **dialogue** is incorrect. Look at this piece of dialogue.



Now rewrite the text so that it is correctly punctuated and laid out.

Writing task

8 The writer of the narrative in exercise 1 chose to write from the point of view of the **woman**. We 'see' the room through her eyes. Now rewrite the story through the eyes of the **man**. Make the man the 'I' in the story. Imagine that he hears someone coming up the stairs and hides in the wardrobe; when the woman comes into the room he can see her through the keyhole of the wardrobe door. He is terrified that she will find him. He knows her. Her name is Jean.

Remember!

- Write about **events** in the past tense
- Use the past tense of the verb 'to be' to write **descriptions**
- Organise the paragraphs as follows:
  - Paragraph 1: from the time the man first hears the woman until she enters the room
  - Paragraph 2: the woman enters the room, crosses to the window and looks out
  - Paragraph 3: the woman hears a noise from the wardrobe, walks towards it and opens the door
- Use appropriate words to describe the **sounds** you can hear and to describe the woman's movements
- Only write about what the **man** is thinking and can see

Begin like this:

Suddenly I heard the sound of footsteps on the stairs . . .

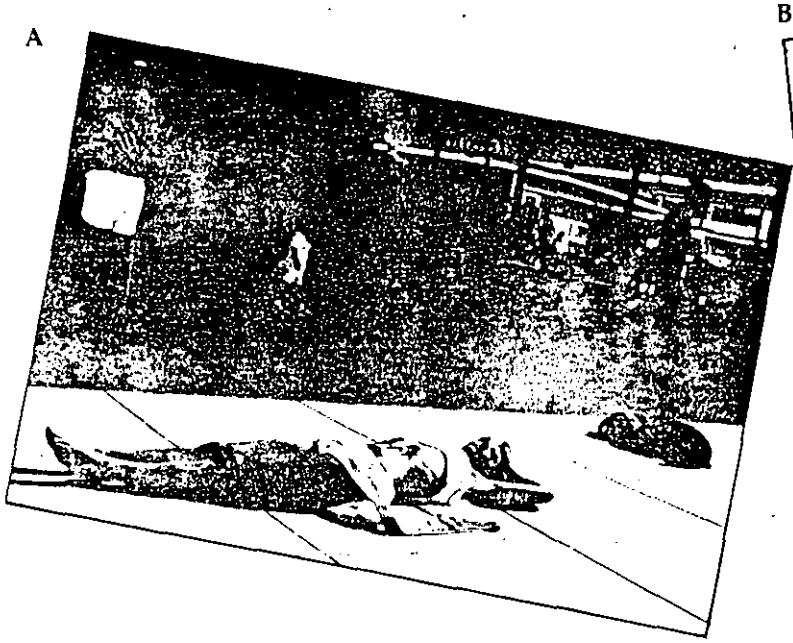
After writing

9 a) Work with the **Improving Your Writing** checklist in Unit 1. Try to improve what you have written.
b) Exchange texts with your partner. Compare his/her text with the checklist. Can it be improved?
c) Compare your text with the key text on page 78.

Extension activity

10 Now try writing a story of your own. Choose one of the pictures below and, working with your partner, plan a story around it. You will have to imagine what happened before the situation in each picture as well as what happened after. Think about the pictures in terms of **setting, characters, events** and **outcome**. Imagine you are one of the characters in the picture you choose and write from that character's point of view.

A



B

UNIT 13

Writing Letters: Expressing Opinions

Discussion

1 When people disagree with something that is happening in their society or want to support a particular idea, they will sometimes start a **campaign**. A campaign is an organised way of working for something you believe in.

1.1 Campaigns start for a variety of reasons. With a partner, make a list of five problems or policies that have caused campaigns (of protest or support) in your country or countries.

Example: Whaling

1. _____
2. _____
3. _____
4. _____
5. _____

1.2 How successful have these campaigns been? Choose one of the problems on your list where a campaign was successful and write a list of two or three things that the campaigners did in order to get what they wanted. When you have made your list use it to tell a partner what happened during the campaign and why you think it was a success.

Example: Stop buying whale meat products

1. _____
2. _____
3. _____

Preparing for writing

2 In Britain there have often been protests about factories that local people believe to be dangerous. The newspaper article below is typical of the sort of problem that people face in many small communities.

Wessex Gazette, May 10th 1988

Anger over armaments factory extension

Residents in the Wessex village of Dornington were furious today as a result of a Ministry of Defence decision to extend an explosives factory where there have already been two serious accidents during the last three years. Residents held a protest meeting in the village hall and a campaign against the proposed expansion was launched by local councillor Mary Loughlin.

2.1 One way of letting people know your opinion is by writing letters. In Britain it is very important to write to your Member of Parliament, the minister responsible for taking decisions and to the newspapers or other interested organisations. The letter below is a good example of this sort of letter. It was written to protest against the factory extension.

The writer of the letter below has organised her writing so that it will get her opinion across as effectively as possible. After you have read it, match the following section labels against the sections in the letter.

- ☐ ADDRESS OF SENDER
- ☐ ADDRESS OF RECEIVER
- ☐ CLOSING
- ☐ PROBLEM/COMPLAINT
- ☐ DATE
- ☐ FINISHING STATEMENT
- ☐ JUSTIFICATION FOR COMPLAINT
- ☐ SIGNATURE
- ☐ REASON FOR WRITING
- ☐ REQUEST FOR ACTION
- ☐ SALUTATION

24, Agnes Street, [1]
Dornington
Wessex
WX2 5PU

May 17th, 1988 [2]

Rt Hon James Dewar
Minister for Defence
Ministry of Defence [3]
Main Building
Whitehall
London SW1

Dear Sir, [4]

I am writing to you because of possible changes at the MOD factory at Dornington in Wessex. [5]

We have heard from recent reports that you propose to allow the factory here to expand. This will lead to a considerable increase in explosives production at Dornington. We feel that it is unfair to impose such a large danger on our community. [6]

There are two main reasons for our fear: [7]

1. There have been two serious accidents at the Dornington factory in the last two years. In one, three workers from our village were killed and others badly injured. In the other an area of 10 square kilometres was polluted with chemical waste. There has never been a public enquiry into these accidents.

2. We have heard that the planned extension will be for the production of even more dangerous materials.

Because of these very real fears the whole village of Dornington has come together to defend itself against your department's proposals. We shall fight any plan to expand MOD Dornington until your department has agreed to hold a full public enquiry into the accidents at the factory. We also demand that the plans for expansion are made public and inspected by an independent expert. [8]

We hope that you understand how worried we are by the changes you want to make at Dornington and look forward to hearing from you soon. [9]

Yours faithfully [10]

Mary Loughlin [11]

Councillor Mary Loughlin

Vocabulary development

3 Adjectives and nouns often go together as pairs. Work with a partner to match the nouns in the box with the adjectives in the grid. Then think of a new noun of your own which goes with each of the adjectives. The first one has been done for you.

accidents	changes	enquiry	expert	fears
increase	material	reasons	reports	

a)	considerable	increase interest	f)	dangerous	
b)	independent		g)	main	
c)	possible		h)	public	
d)	real		i)	recent	
e)	serious				

Writing task

4 Wessex Gazette, May 18th 1988

Village fury after third explosion

Villagers in Dornington were horrified today when they heard the sound of yet another explosion at the nearby MOD factory.

A spokesman for the MOD said: 'So far we are not sure what caused the explosion. One production worker has been killed and serious damage has been done to the factory's roof. All manufacturing has been stopped for the moment.

Councillor Mary Loughlin – a leading opponent to planned expansion at the factory – told our reporter that the villagers would continue with their campaign against the MOD plans for Dornington. 'We won't let them turn this place into another Chernobyl,' she said.

4.1 Mary Loughlin wrote a letter to the Minister after this new accident. Here are the notes she used:

1. accident 18 May completely unacceptable
   3rd accident 2 years
   now 4 dead
2. demand
   a) immediate close factory
   b) full public enquiry accident
   c) public enquiry into future of factory
3. No more deaths in Dornington
4. must understand how serious situation - act immediately

Use these notes and the vocabulary lists from Section 3 to write Mary Loughlin's second letter to the Ministry. The letter outline below will help you organise your writing. Let the Minister know that you are very angry about the situation – but remain polite.

- Address of sender
- Date
- Address of receiver
- Salutation
- Reason for writing
- Problem/complaint
- Justification for complaint
- Request for action
- Finishing statement
- Closing
- Signature

4.2 When you have written your letter, first check it against the **Improving Your Writing** checklist in Unit 1. Then exchange your work with a partner and see if you can improve their writing while they work on yours. Discuss any improvements you want to make with your partner before you go on.

4.3 Compare your letter with the key text on page 78 and make any final alterations you think are necessary.

Extension activities

Either

5.1 You live in a quiet part of town and are very happy there until a restaurant starts to leave large amounts of rubbish in the street outside your front door. You talk to the restaurant owner but he refuses to stop so you feel you must write to the Local Environmental Health officer, Ms Jean Archer. You will need the information in the box below.

Ms Jean Archer
Environmental Health Officer
Civic Hall
Leeds
LS1 4UP

17, St Anne's Lane
Burley
Leeds
LS24 3KF

Pacific Cafe
18, St Anne's Lane
Burley
Leeds
LS24 4KF

dustbin
rubbish
health hazard
warning
object
request
refuse (vb)

The letter outline you worked with in the earlier parts of this unit will be very important when you write this. Try to plan your writing so that your argument is clearly and effectively presented.

or

5.2 Work with a partner and write a letter that might have been used during one of the campaigns you discussed in Section 1. Use the letter outline you have worked with during this unit and plan your letter carefully.

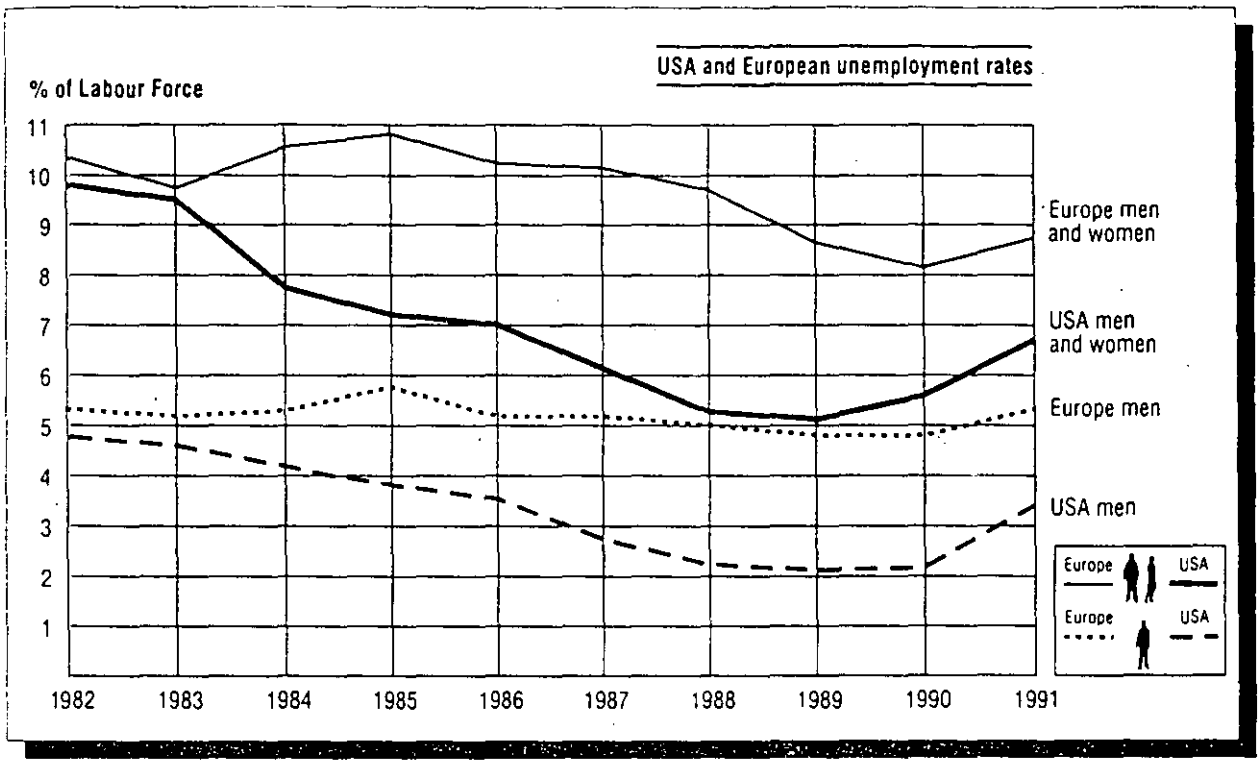
After you have written your letter give it to another pair of students. They will now have to write a reply, trying to answer as many problems as they can.

MATERIAL PARA PRESENTACIONES

Language Summary 4

Approximations are particularly useful when describing graphs which are not designed to give exact information but rather to show an overall picture.

Look at the graph of the USA and European unemployment rates and read and listen to the approximations in the comments 1 to 8 which follow.



1 In 1982 the percentage of the labour force unemployed in the USA was *nearly* ten percent.

2 This figure was *just under* seven percent in 1991.

3 In 1987 it was *approximately* six percent.

4 In 1982 the figure for Europe stood at *just over* ten percent.

5 Three years later in 1985, it was *coming up to* eleven percent.

6 Both figures moved in opposite directions, after 1983, USA unemployment falling by *roughly* two percent over the next year.

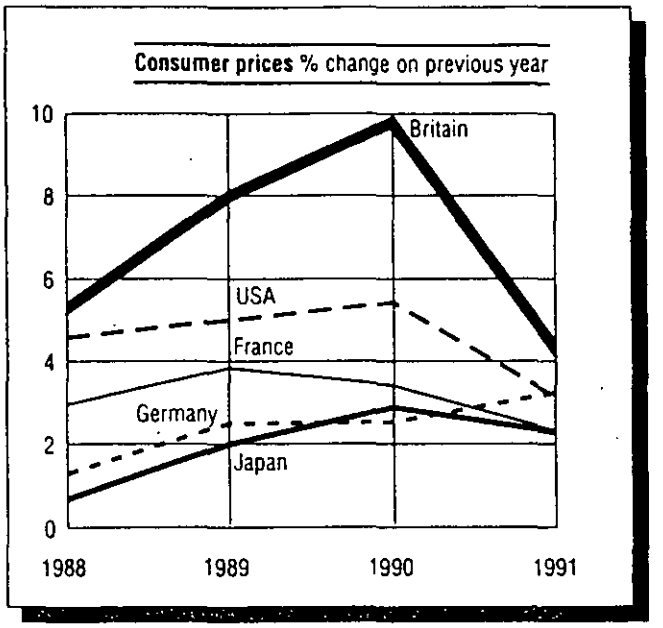
7 By 1991, the European figure was *more or less* nine percent and the US figure was *getting on for* seven percent.

8 This made the unemployment figures for Europe *well over* those of the USA by 1991.

PART 1

Language Summary

The graph below shows the changes in consumer prices in five major countries between 1988 and 1991. Read the text of a presentation about this graph and notice the use of signals.

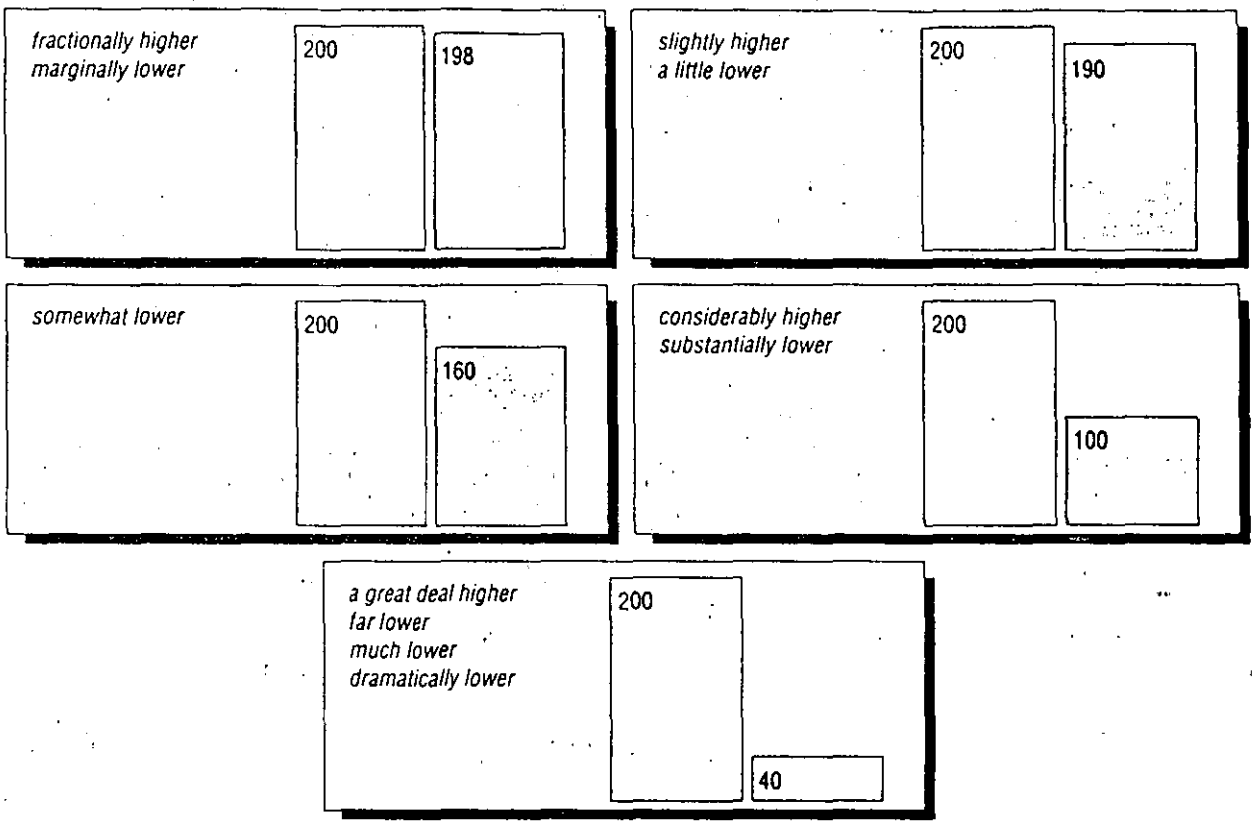


	NOTES
Good morning, ladies and gentlemen. Today, ***I'm going to talk about*** *changes in consumer prices in Britain, the United States, France, Germany and Japan during the period 1988 to 1991.*	Introduces presentation.
First of all, let's look at *a country whose price inflation was higher than anyone else's during this period.*	Refers to Britain.
As you can see from the graph, *price inflation in Britain stood at around 5% in 1988, rising to almost 10% in 1990, before falling back to 4% in 1991.*	Refers to visual.
Now, if we turn to *another large trading country, Japan, we can see that the situation is different. Price inflation in Japan was as low as 1% in 1988, and even though it subsequently rose, it was always well below 4%.*	Changes topic to Japan.
Finally, let's look *at Germany, the only country experiencing a rise in inflation in 1991. This rise from around 2% in 1990 to over 3% in 1991 was largely due to the extra costs of re-unifying East and West Germany.*	Changes topic to Germany.
In conclusion*, we can observe that Britain had the highest rate of inflation of the five countries examined throughout this period, although the gap narrowed substantially in 1991.*	Finishes.

Language Summary 2

Intensifiers and softeners

The following bar charts show some of the most important intensifiers and softeners which indicate the extent of change.



Intensifiers and softeners can be expressed in sentences like this:

Sales were slightly lower *Sales dropped slightly* *There was a slight drop in sales*	*in the second quarter.*
Productivity was dramatically higher *There was a dramatic increase in productivity* *Productivity rose dramatically*	*in the Swindon plant last month.*

Focus on Language 2

Listen to the cassette and complete the sentences. The populations of three towns are being compared.

You probably know that Avonville's population is a _____ _____ _____ than Bathford's, but what surprises many people is that Abbotsbury's is only _____ _____ than Tipworth's population. Tipworth's population is now _____ _____ than ten years ago.

Check your answers in the key.

Comprehension Read the following extract from *Europe in Figures Deadline 1992*[1]. Some of the trend language is in italics.

INDUSTRY AND THE ECONOMY

European industry *remains* a major force in the world economy, and although its share of the European economy as a whole *has dropped*, it still contributes more than a third (37%) of gross value-added: more than in the USA, but less than in Japan. Gross value-added represents the contribution of a given economic sector to the creation of a nation's wealth. Industry's share of gross value-added has *fallen* in all the large industrial countries, and nowadays it is the services sector which has *increased sharply* to provide the largest slice, with agriculture now playing only a very small part. This trend is *most marked* in the USA, but can also be seen clearly in the European Community.

Industrial production in the Community *grew in spectacular fashion* in the 30 years following the end of the Second World War. Since 1974, however, the growth rate has *slowed down* and even registered two slumps in 1975 and 1980–1982, when the knock-on effects of the two oil crises *forced up* the price of oil, industry's basic source of energy. An analysis of the industrial production index shows that the slump in industrial production was *more marked* in 1980–82 in the EC and the USA than in Japan, *where growth continued without any real interruption*. Industry in the EC *picked up* again in 1983, but at a *relatively slow pace*. This recovery was *quicker* in the USA. When industrial production *slows down or falls*, this is generally accompanied by a *drop* in employment, and therefore an *increase* in the unemployment figures. In the EC the lower rate of employment *continued* until 1986–87, while in the USA there has been a *sharp increase* in employment opportunities since 1984. In Japan, employment figures have progressed at an *almost even pace*. In short, industry in the European Community has *lost ground* relatively speaking, to US industry and in particular to Japanese industry.

Now look at the following statements about the passage.

- Are they *true* or *false*?

1 Industry is increasing its share of the European economy.

2 Agriculture has experienced a decline in its contribution to the European economy.

3 Services have risen rapidly and are now the most important sector of the European economy.

4 The growth of industrial production decelerated after 1974.

5 The growth of industrial production since 1974 has fluctuated less in the EC and the USA than it has in Japan.

6 Japanese industrial production experienced a steady, uninterrupted rate of growth in the early 1980s.

7 If industrial production declines, so too will the level of employment.

8 Employment opportunities have increased more rapidly in the USA than in the EC since 1984.

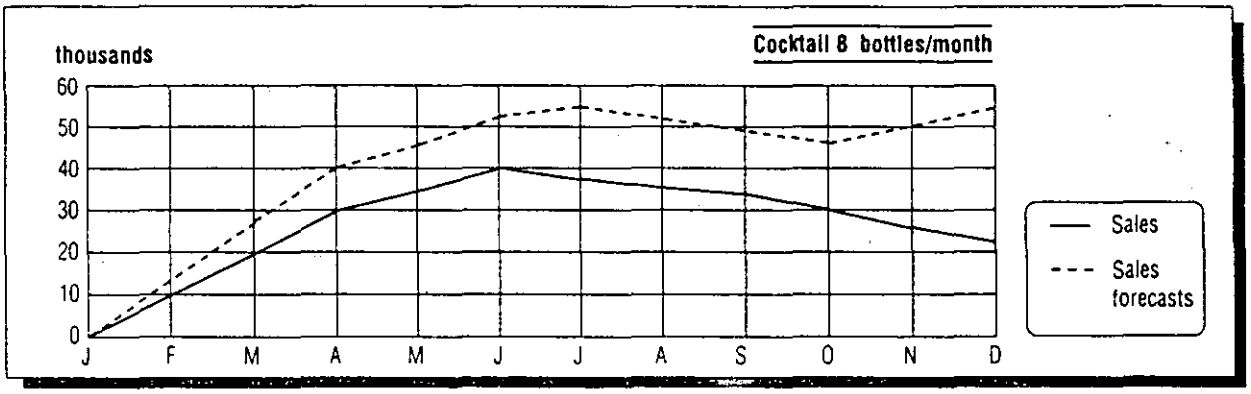
Check your answers in the key.

[1]Published jointly by Macmillan Education Ltd, Gill and Macmillan Ltd, Office for Official Publications of the European Communities and HMSO.

PRACTICE 3 After Mary Roger's presentation Wessex Information got the go-ahead to carry out a market survey on behalf of Vinoitalia. A year later, the product that resulted from that survey – *Cocktail 8* – was on the market.

As you can see from the graph below, sales for the first year did not correspond to the forecast.

Study the graph and then read the interview published in the magazine *Marketing in Wessex* between Mary Rogers and a reporter. Complete the interview.



Reporter *Mrs Rogers, as I understand it, you conducted a market survey. There were no distribution problems, so what went wrong?*

Mary Rogers *First of all, I wouldn't accept that anything 'went wrong', as you put it. Cocktail 8 was launched in January, and immediately sales* **1** _____ *quickly, and from April to June this trend* **2** _____ .

Reporter *Yes, but surely the forecast for April was for higher sales around* **3** _____ *bottles and isn't it true that actual sales were consistently* **4** _____ *than forecast?*

Mary Rogers *Yes, but that's only true for the last month. We'd forecasted a* **5** _____ *in the summer months because of barbecues, the warm weather. And, in fact, I admit we were overoptimistic, because sales tended to* **6** _____ *even towards the Christmas holidays.*

Reporter *So you predicted a* **7** _____ *of about* **8** _____ *bottles around July followed by even better sales towards the end of the year?*

Mary Rogers *Yes.*

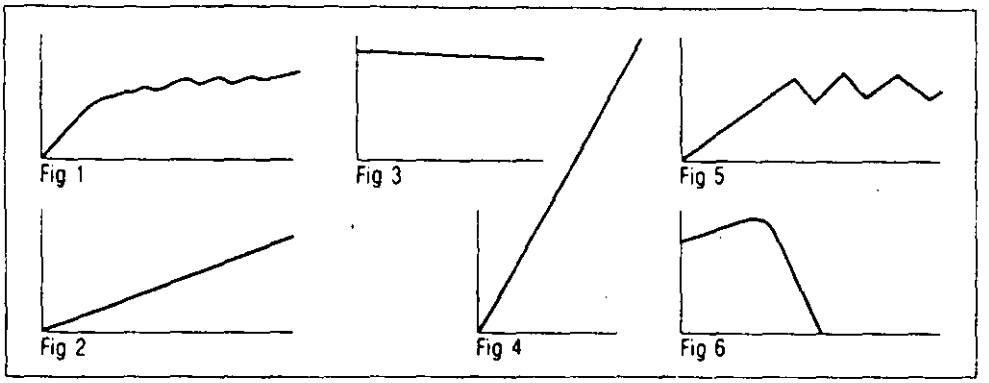
Reporter *So, to return to my first question. What went wrong? .*

Mary Rogers *Frankly, I believe that in the analysis of Cocktail 8 certain factors were not taken into account . .*

Check your answers in the key.

PRACTICE 4 Match the following expressions with the appropriate curve.

a a dramatic rise
b a barely noticeable decline
c a sudden drop
d steady growth
e a fluctuating performance
f a stable situation



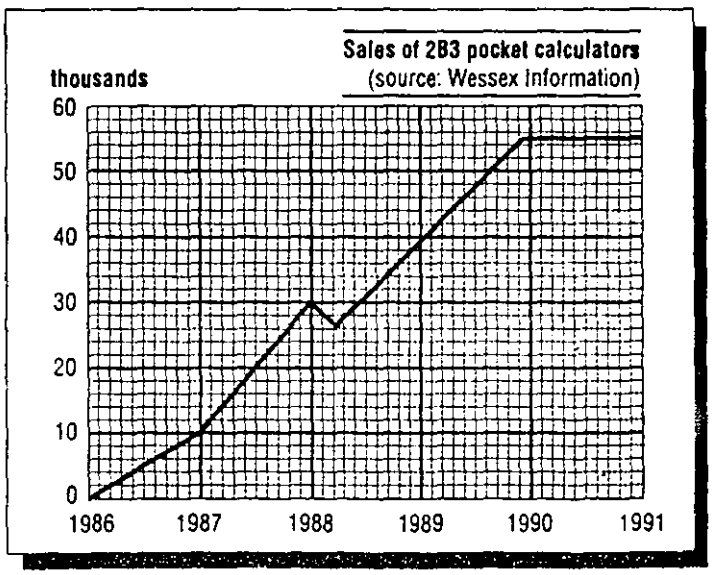
Check your answers in the key.

PRACTICE 5 Rewrite the following extracts from Wessex Information reports, using the form *There is/was...*

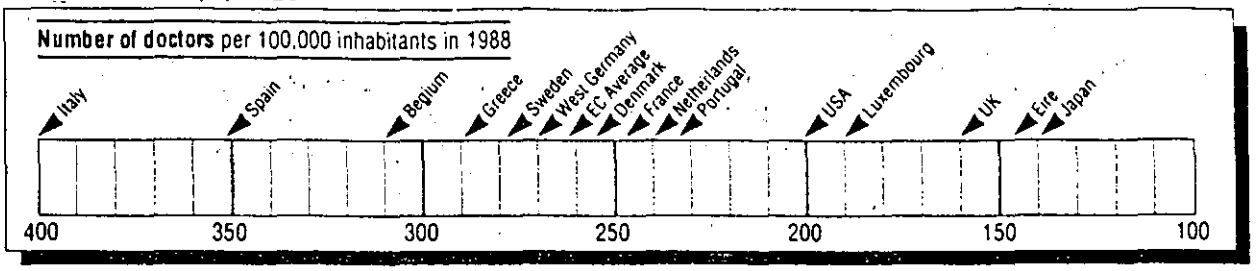
1 Production rose by six percent.
2 In Spain consumption is increasing steadily.
3 Sales fell dramatically from 200,000 to 60,000 in one year.
4 It will probably fluctuate considerably this year.
5 1989 saw steady increases in production.
6 The market has been growing substantially over the past two years.

Check your answers in the key.

PRACTICE 6 Describe the following graph using these words: *after that, subsequently, afterwards.*



Compare your version with the model in the key.



PRACTICE 1 Write a short commentary on the chart which gives information about the numbers of doctors per 100,000 inhabitants. Use the model in Language Summary 2 as a guide.

Use these words: *slightly considerably a great deal a little.*

Compare your version with the model in the key.

Language Summary 3

Contrast

When facts or figures are contrasted, the contrast word or phrase underlines the idea of opposition.

Look at these two sentences:
Sales were low last year.
We made a good profit.

The easiest way of expressing this in **one** sentence would be:

*Sales were low last year **but** we made a good profit.*

Now look at these other ways of expressing contrast. They are often used when giving presentations or in written reports.

***Although** sales were down by ten percent last year, we made a good profit.*

***Despite** there being more jobs on the market, unemployment will rise by two percent next year.*

***In spite of the fact** that there are more jobs, unemployment has risen.*

***Whereas** inflation went down in Japan in 1990, in all other countries it increased.*

*Last year production rose by 11%; **however**, this was not reflected in increased sales.*

*Last year's trading figures were very satisfactory. **Nevertheless**, we mustn't become complacent.*

Other phrases to indicate contrast include:

In contrast (to)...	*...while...*
On the other hand...	*...against...*
On the contrary...	*...compared to...*
	In comparison (to)...

PART 2

Background Voltomatico is the Spanish subsidiary of a US electronics firm and is situated in a rural area. The company has been considering policy changes involving work patterns.

Garcia Llinares, Voltomatico's Personnel Manager, is meeting his US director soon and must present a report of his recommendations for alternative work patterns. However, he lacks adequate background and statistical information.

One morning, he was leafing through a magazine and the following paragraphs in an article caught his eye.

Comprehension Read the extract carefully and say if the statements are *true* or *false*.

Swedish and Dutch firms prove to be the most experimental in trying out most of the alternative work patterns. Companies from both countries, however, show the highest resistance in the survey towards sabbaticals.

Swiss firms, on the other hand, make the most use of sabbaticals and homebased workers. The shorter working week is most widely practised in Belgium, where there is relatively little interest in such things as phased retirement and job sharing.

French and German firms show relatively high usages of flexible working hours but have very little interest in either job sharing or the shorter working week. Early or late retirement schemes are most widely practised in UK firms and least popular in Danish firms. Many of the practices remain virtually untried in Spain and Italy.

However, even Italian and Spanish managers are in accord with their European counterparts on the practical need for corporations to introduce changes in working patterns.

Companies are going to have to adapt their future working patterns to cope "with a shortage of conventional manpower due to an older population and reduced birth rate," observes a Spanish manager. "Workers are looking for more humane and worthwhile jobs", adds an Italian manager.

There is also broad agreement among respondents on the main pressures that will induce changes in future working patterns. Of the total, 58.8% cite rising unemployment as the primary factor; while 57.4% cite worker demands for more leisure and more convenient working hours.

1 Although the Swedes and Dutch experiment with some ideas, they reject others.
2 The Swiss are similar to the Swedes and Dutch in their work patterns.
3 The Belgians have a shorter working week and favour early retirement.
4 Early retirement is most common in the UK.
5 Early retirement isn't very common in Denmark.
6 Spanish managers aren't ready to introduce new practices.
7 Rising unemployment isn't the only thing that will help create new work patterns.

Check your answers in the key.

PRACTICE 5 The following day Garcia Llinares telephoned Wessex Information. He was very interested in the idea of flexible working hours. Jim Craig's name had been given to him and Llinares wanted Wessex to get some statistics on flexible working hours.

The following statistics are those Jim Craig located. Study the statistics for France and Spain. Then complete the extract from the report which Llinares wrote for his US director, using the words and phrases given.

	FLEXIBLE WORKING HOURS						
	Base	Has not tried and has no plans to try	Has tried	Plans to try within next five years	Plans to enlarge the programme*	Plans to maintain the programme at it's present level*	Dropped the programme or has plans to drop it*
Germany	90	20.0%	67.8%	5.6%	14.8%	83.6%	1.6%
Italy	86	32.6%	50.0%	17.4%	18.6%	76.7%	4.7%
Belgium	107	29.0%	56.1%	14.0%	10.0%	85.0%	3.3%
France	62	17.7%	74.2%	8.1%	39.1%	60.9%	0%
Spain	70	38.6%	48.6%	10.0%	2.9%	88.2%	8.8%
Sweden	95	14.7%	68.3%	13.7%	12.7%	88.7%	0%
Netherlands	86	19.8%	68.6%	11.6%	8.5%	84.7%	3.4%
UK	125	33.6%	45.6%	12.8%	14.0%	71.9%	14.0%
Denmark	83	20.5%	60.2%	15.7%	24.0%	76.0%	0%
Switzerland	92	15.2%	68.5%	10.9%	14.3%	84.1%	1.6%

* Calculated as a percentage of those firms that have tried flexible working hours.
Totals add up to less than 100% because those who did not answer have been omitted.

against compared to whereas in contrast to

France and Spain, as you can see, show considerable differences. **1** _____ nearly 75% of French respondents had tried flexitime, this was the case in only about 50% of Spanish respondents. **2** _____ French companies, a very large number of Spanish companies had no intention of trying out the programme. The high percentage of Spanish respondents with no plan to change the level of the programme (88.2%) is **3** _____ the 39% of French companies which plan to enlarge their programme. Perhaps the most significant contrast is between those who have dropped or will drop the programme: 8.8% in Spain **4** _____ 0% in France.

Check your answers in the key.

PRACTICE 6 Now write a report on the UK and Switzerland, using the statistics in the table above.

Compare your version with the model in the key.

PRACTICE 1 Here are two incomplete texts. Text A comes from a brief report on an airline. Text B comes from a report on a bank.

Read the texts and complete them, using the words or phrases in the left hand column.

Text A

The longer-term prospects of an airline are hard to assess since it is difficult to forecast the political and economic conditions. Owing to growing protectionism, it is safe to say that landing rights will be increasingly difficult to obtain. For this reason and in view of the existing surplus capacity in international air travel, the keen competition and price pressure is likely to **1** _____ with costs **2** _____ to rise. There is little likelihood of Swissair escaping these **3** _____ . But thanks to its modern aircraft fleet and solid financial base, the company commands an excellent market position. Given reasonably favourable conditions, the outlook is **4** _____ .

1 *go down*
persist
fall

2 *continuing*
stopping
needing

3 *costs*
pressures
influences

4 *gloomy*
bright
average

Text B

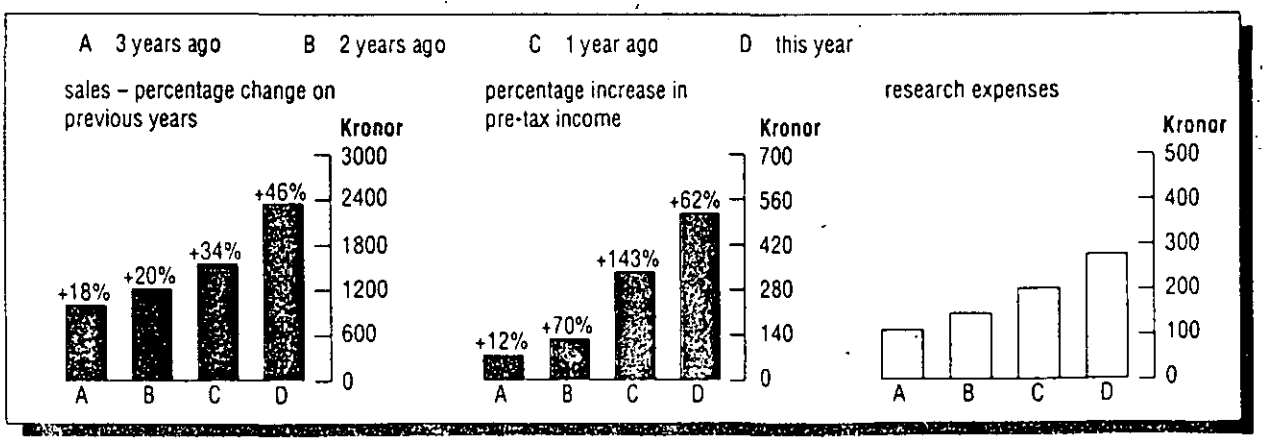
The greater risks encountered both at home and abroad in lending operations will, however, again necessitate appropriate allocations to provisions. **5** _____ , a good net result can be expected once again next year. Over the long term, the broad earnings base consisting of income from interest, commissions, securities and foreign exchange and precious metals trading constitutes a sound prerequisite for continued **6** _____ .

5 *In the same way*
Nevertheless
As a result

6 *growth*
risk
allocations

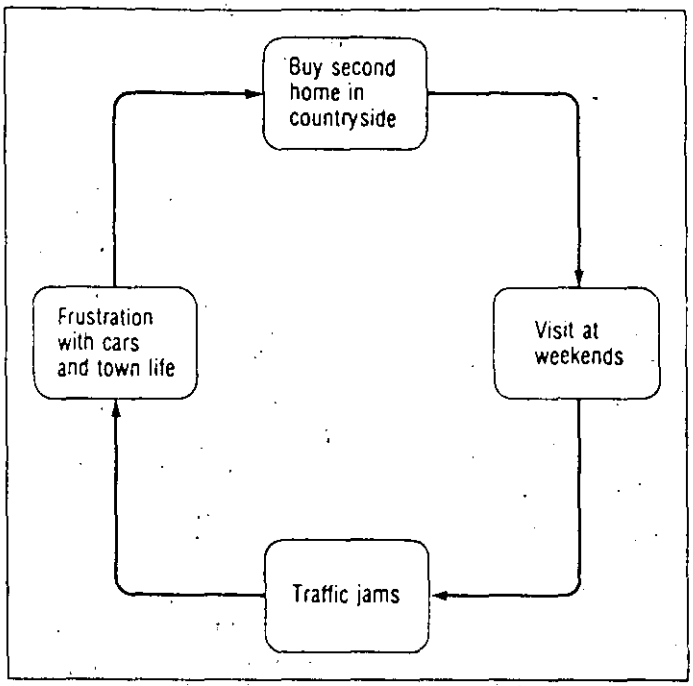
Check your answers in the key.

PRACTICE 2 You are an employee of a Swedish pharmaceutical company and you are due to make a short presentation about prospects for the coming year. You have information about performance so far in the three areas in the graphs below.



Language Summary

The diagram below shows a situation fairly common to many developed countries.



Read the following passage which describes the *vicious circle* shown above.

THE WORDS AND PHRASES IN ITALICS SIGNIFY

Many town-dwellers buy weekend homes *so that* they can spend peaceful weekends in the country. — Purpose

However, this *results in* huge traffic jams leaving the large metropolitan areas every Friday evening. — Cause

This means that there is a lot of frustration on the roads and that, coupled with a general dissatisfaction at living in towns, — Effect

leads people to buy weekend homes *in order to* find peace, but . . . — Cause / Purpose

Notice these other cause and effect signals.

- *Since* the company wasn't making profits, it was unable to invest in new machinery.
- The product didn't sell well *as* there was not enough money spent on marketing it.
- Prices rose *as a result of* the increase in oil prices.
- *Due to* the excellent labour relationships there were no strikes.
- Exports fell *owing to the fact* that the US economy was doing badly.
- The company became very competitive *because of* the great concentration on research and development.

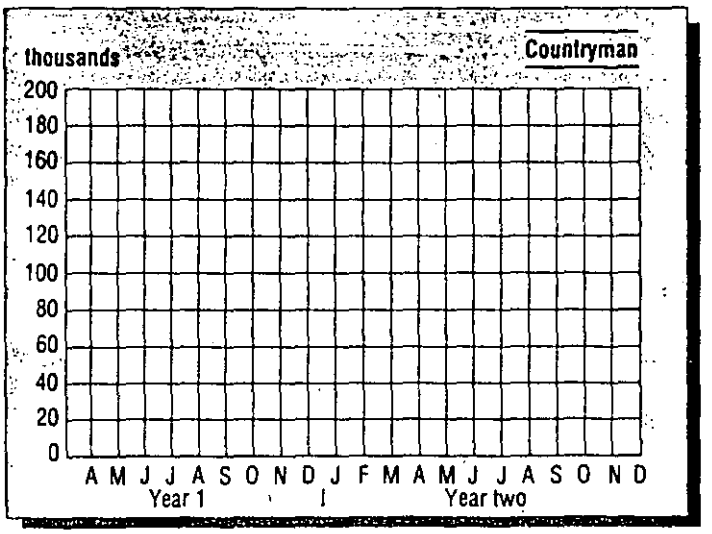
PRACTICE 1 A couple of years ago, the manufacturers of *Countryman* soap realized that their product had not been selling well. The marketing manager of the company said this was due to bad packaging while the production manager blamed poor distribution. The advertising manager said it was a consequence of unclear marketing objectives. However, they all agreed that something had to be done to rectify the situation.

Below is part of a report from the marketing manager on the current situation with the product. Read it and

a underline all signals of cause and effect.

b complete the graph.

Countryman's initial success was due to our vigorous TV and Press promotion. This raised sales to 30,000 bars by the beginning of June. This rise continued till September when Samson came onto the market. By October our sales had levelled off at just over 100,000 units a month, and remained fairly static until December. At the time the colour of Countryman was changed from Apple Green to Azure Blue. As a result, sales went up steadily and by March of Year Two were around the 120,000 mark. After that, we started selling widely through supermarkets, having decided that Countryman could become a more down-market product. Owing to our supermarket outlets, sales rose to about 150,000 by June of Year Two. However, by October of Year Two distribution costs were rising fast and to offset this rise the price of Countryman was increased. This led to a slump in sales, which we are now experiencing – no more than 100,000 bars a month.

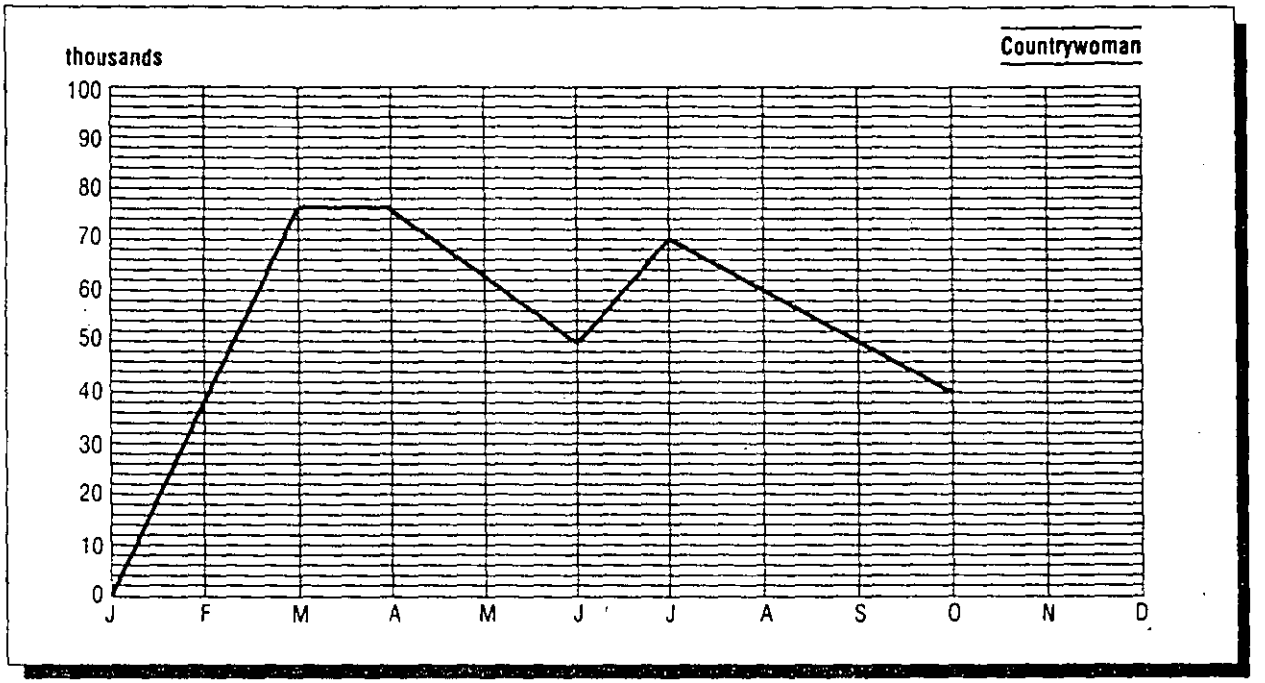


Check your answers in the key.

PRACTICE 2 *Countryman* was not abandoned and sales rose dramatically after a well-conducted TV advertising campaign.

On the strength of this, the manufacturers decided to launch *Countrywoman* a year later. It was not a success.

Make a presentation showing why *Countrywoman* should be abandoned. Use the information in the graph and in the handwritten notes.



YEAR THREE

JAN - launch, regional radio advertising
FEB - sponsorship of women's sports events
MAR - advertising in up-market journals, sales outlets in beauty shops.
APR - Ash Grove, a competitor's soap, launched (20% cheaper)
MAY - Ash Grove in supermarkets
JUNE - COUNTRYWOMAN in supermarkets
JULY - company computerizes stock distribution
AUG - new packaging, 4 bars at 15% discount
SEP - regional distribution problems
OCT - withdrawn from market

Compare your version with the model in the key.

NOCIONES DE TRADUCCION

I Translate the poem into Spanish.

Notes

1 See Adjectives, Appendix A1.
2 Try to find an expression that will convey visually the image implied in the English description.
3 There is a specifically ready-made expression in Spanish to convey exactly the meaning of *turned up*. Find it.
4 *Sentóse sobre él, entronizada en toda su gracia, a la altura del talle.*
5 *reventaba de risa*
6 See Adjectives, Appendix A1.
7 What is the exact meaning of *face* in this context?
8 The author plays with the word *amateur* in this whole sentence. How are you going to achieve the same effect in Spanish?
9 Think out the order in which the various ideas expressed in this sentence will be conveyed in Spanish.
10 See Modulation, Appendix B6.
11 See Adjectives, Appendix A1.
12 How would you make this satirical statement sound equally funny in Spanish?
13 You have two ways of translating this expression: by using either an adjective or an adverb. Say which you choose and explain why.
14 How would you translate *time* in this specific context?
15 How do you translate this colloquial English expression into Spanish?
16 *organizarnos para entrar en formación en la plaza de las barracas*
17 See Transposition, Appendix B5.
18 *un impresionante siseo para exigir silencio que al cabo se logró*
19 *apenas*
20 White horses especially trained for performance in the Spanish Riding School of Vienna.
21 What is the most matter-of-fact way to translate this expression into Spanish?
22 Compare the difference in meaning between the verb *roll* + adverb *away*, used here, and *roll* used further down in the passage.
23 *echaron una última mirada*
24 Beware of the way you translate English possessive articles into Spanish.
25 How would you express this verb with complete accuracy in Spanish?
26 Consult dictionaries for the exact meaning of this word and find the best Spanish translation.
27 Notice the figurative sense in which this verb is used and picture the image the author is trying to convey.
28 Compare the use of prefixes and suffixes in English and Spanish.
29 What preposition do you propose to use here?
30 What is the meaning of *arrow-like*?
31 See Modulation, Appendix B6.
32 Try to find Spanish words that will produce alliterative effects similiar to those sought by the author of the English text.
33 What Spanish verb will you use here?
34 Read this phrase carefully. Try to re-create in Spanish the rhythmic pace of the English text.
35 Note that in some cases you have to use several words in Spanish in order to convey a concept which, in English, can be expressed in one single word.
36 To avoid repetition in Spanish use verb only once here.
37 *mirando ante sí*
38 Notice how the suffix affects the noun here. How would you express this in Spanish?

PART IV Technical Translation

Technical language is distinguished from natural language by the frequency of occurrence of terms to which meanings have been assigned within specific intellectual disciplines or fields of technology. Technical texts are also characterized by the consistent use of certain conventions of presentation. The terms of technical discourse refer to bodies of knowledge outside the general experience of the great majority of the speakers of a language, hence texts with a high density of such terms are often not immediately comprehensible to non-specialist readers.

Throughout this introductory course, great emphasis has been placed upon full comprehension of the text as an indispensable first step in the translation process. In the case of a technical text this implies acquiring some degree of familiarity with the body of knowledge to which it refers. The use of specialized dictionaries and lexicons is obligatory, but not always sufficient. The translator should also consult specialists and study text-books and articles on the subject in question. Such reading will also acquaint the translator with the appropriate conventions of presentation.

In order to limit the need to consult a variety of technical dictionaries, the passages for translation which follow have been arranged in pairs, each serving as a source of information for the translation of the other. Both passages, together with their accompanying exercises, should be read before attempting one of them. A technical dictionary is required only in the case of the medical texts.

The texts have been chosen to illustrate very broadly the range of difficulties the technical translator must confront. Most of the texts have been edited to reduce slightly the density of unfamiliar technical terms. Awkward constructions have been preserved.

Contents of PART IV

2B La construcción de caminos de mano de obra y el subempleo rural
3A Ups and Downs
3B Crecimiento del circulante monetario
4A Foundation Treatment
4B Tratamiento de la cimentación
5A Unsuspected Uveal Melanomas
5B Melanoma de coroides

1A Teleprocessing

Teleprocessing is the processing of data received or sent to remote locations by way of communications facilities.

A teleprocessing network consists of communication lines connecting a central data processing system with remote teleprocessing devices. Such devices can be terminals, control units, or other data processing systems. The elements of the complete network consist of a host processor (central data processing system), communications control devices, modulation/demodulation devices (modems), communications lines, other terminals and programming systems. Three of these, the communications control devices, modems, and communications lines, comprise a *data link*.

Requirements for the host processor include multiprogramming capacity, adequate storage capacity, storage protection, adequate speed and potential for expanding storage capacity and speed. It must be able to handle random and unscheduled input, as well as serialized and scheduled input.

Communications control devices are hardware components that link the host processor to the communications lines. The transfer of data requires non-information transmissions for setting up, controlling, checking and terminating information exchange. These non-information exchanges constitute data link control. Their functions include synchronization of receiver and transmitter, identification of sender and receiver, code translation and error detection and recovery. For data to be sent over communications lines the data must be converted (serialized) to a serial stream of binary digits and reconverted upon reception into machine language for processing. Control devices perform these functions.

After the data has been serialized the binary signals must be converted to audio-frequency signals (modulated) for transmission and reconverted (demodulated) at the other end. One modem is required at each end of a data link.

The type of terminal used for handling data flow depends on the complexity and capability required for the network.

A programming system is a developed, tested, and documented group of support programs for controlling and scheduling I/O devices, job and data management, and application programs.

from *IBM System 370 Summary*

I **Summarize what you understand by the following terms:**
a host processor b input c binary d I/O

II **Discuss the advantages and disadvantages of the following different standard translations:**

a storage
memoria almacenamiento

c I/O
entrada/salida ingreso/salida

b hardware
equipo físico hardware

II **Translate the passage into Spanish.**

1B Teleproceso

Un sistema de teleproceso permite que el proceso de datos se efectue en un punto alejado de aquél en que se originan los datos. O sea, el teleproceso supone introducción de datos remotos de una computadora o la recepción de datos desde una computadora.

Por ejemplo: la función de proceso de datos coordina las actividades de dos fábricas y controla las existencias en un almacén. Se coordina, digamos, el número de componentes producidos en fábrica B con el número de chasis de automóvil en fábrica A, mientras se mantienen los niveles de existencias en el almacén que requiere la producción.

Un sistema de teleproceso puede desempeñar funciones de transmisión, recolección y comunicación de datos. El sistema actúa como transmisor de datos cuando transmite y procesa a alta velocidad grandes volúmenes de datos remotos. Actúa como recolector de datos cuando dispone de varios puntos de entrada de información (terminales), procesa cantidades limitadas de datos remotos y utiliza para fines de entrada y salida de información dispositivos de I/O lentos. Un sistema de comunicación de datos tiene características tanto de recolección como de transmisión y suele incluir varias terminales y permitir comunicación en ambos sentidos. Las características del sistema se pueden cambiar dándole un enfoque u otro, según convenga. En un banco, por ejemplo, el sistema de teleproceso puede transmitir, durante ciertas horas del día, información respecto a los estados de cuenta y, después, puede recolectar de cada terminal detalles de las transacciones realizadas. Más aún, el sistema puede poseer dispositivos de pregunta y respuesta.

Los sistemas de teleproceso cuentan con tres partes principales: la unidad central de proceso y las terminales se unen mediante líneas de comunicación a través de dispositivos de control.

from *Introducción al Sistema 360 IBM*

I Summarize what you understand by the following terms:

a proceso de datos b dispositivo c unidad central de proceso

II Translate the passage into English.

2A Middle-Range Analysis of Modernization

In this study modernization is viewed as essentially a communication process: modernizing messages must reach the peasant via such communication channels as the mass media, change agents, or trips to the city. These concepts, plus literacy (which facilitates media exposure), are considered the major antecedent variables in our model of modernization. The main consequent variables are innovateness, political knowledge, and aspirations. Empathy, achievement motivation, and fatalism are used as possibly intervening variables between antecedents and consequences.

There are three possible shortcomings of both the model and the method: conceptual oversimplification, arbitrary time-order categorization of concepts (antecedent, intervening and consequent), and the dangers of cross-cultural equivalence.

The methodological approach to theory construction in the present work is *middle-range analysis*, a procedure designed to close the gap between grand theory and raw empiricism. A *theory* is a postulated relationship between two or more concepts, which are defined as dimensions stated in their most basic terms. An *empirical hypothesis* expresses the postulated relationship between two or more operations. An *operation* is an empirical measure of a concept. The correspondence between a concept and its operation is an *epistemic relationship*. In middle-range analysis one may proceed from the theoretical to the empirical level (deduction), or from the empirical to the theoretical (induction).

Data-Gathering

Less developed countries are internally heterogeneous and the wide sub-cultural differences among the village study areas led us to utilize somewhat different sampling procedures in each. However, standard criteria for inclusion of a household in the sample were used within each community. All respondents were both (1) the head of the family and (2) the most influential member in making farm innovation decisions. These criteria excluded family heads who were employed only in nonfarm work or who worked only as farm labourers. Both farm owners and tenant farmers were included. Most respondents were males, but a few widows who satisfied the criteria were included in the sample.

Modernization Among Peasants, Rogers and Svenning

I Summarize what you understand by the following terms as they are used in the passage:

a antecedent variable
b innovateness
c empirical
d dimension

II Select the most appropriate translation of the following expressions.

a media exposure
- ☐ contactos con los medios masivos de comunicación
- ☐ estar expuesto a los medios mastivos de comunicación
- ☐ estar sujeto a los medios masivos de comunicación

b intervening
- ☐ interpuesto
- ☐ interventor
- ☐ intermedio

c close the gap
- ☐ reducir el espacio
- ☐ reducir la distancia
- ☐ anular la diferencia

d household
- ☐ unidad familiar
- ☐ familia
- ☐ grupo familiar

III What in your opinion would be the most appropriate translation of:

the dangers of cross-cultural equivalence

- ☐ los peligros de establecer equivalencias entre culturas
- ☐ los peligros de suponer equivalencias en distintas culturas
- ☐ los peligros de suponer equivalencias culturales

IV **Discuss the problem of translating** *arbitrary time-order categorization of concepts.*

V **Translate the passage into Spanish.**

2B La construcción de caminos de mano de obra y el subempleo rural

Se propone que la hipótesis fundamental del análisis sea que la construcción de caminos de mano de obra actúa sobre la comunidad rural, en cuanto al fenómeno de subempleo, a través de la variable ingreso.

A objetivos de análisis distintos, distintas serían las hipótesis relevantes y la forma de tratar el fenómeno del subempleo rural, es decir, hay una correspondencia entre objetivos de estudio e hipótesis y formas de conceptualización y cuantificación.

Se señala lo anterior puesto que es necesario hacer el siguiente ajuste a la conceptualización en función del salario mínimo regional: dado que la organización de la producción en el campo es colectiva, con transferencia constante de tareas y frutos de trabajo, se cree que una mejor forma de abordar el problema es mediante el concepto de ingreso familiar anual mínimo. El concepto operaría a efectos de cuantificación de la siguiente manera:

a) Determinar la estructura por edades de la familia a efecto de señalar cuales de sus miembros están en edad de incorporarse al proceso de trabajo.

b) Determinar, mediante el señalamiento de ocupaciones e ingresos familiares, el concepto de ingreso familiar real, y

c) Asignar a los miembros incorporados al proceso de trabajo el salario mínimo regional oficial a efecto de arribar a un ingreso familiar mínimo anual que funcione como el dato pivote y actúe como un ingreso mínimo de subsistencia.

La confrontación de los dos conceptos de ingreso, ingreso real y el ingreso mínimo de subsistencia, permitirá determinar si la familia está subempleada o no.

Desde el punto de vista teórico hay dos asuntos que habría que resolver:

a) Determinar la edad mínima para que una persona se incorpore al proceso de trabajo, y

b) Determinar cómo tratar el problema del trabajo femenino en la familia campesina.

Debe enfatizarse que estos problemas rebasan la esfera del análisis económico y que pueden ser resueltos mediante criterios sociológicos.

Caminos y Mano de Obra S.O.P.

I **Summarize what you understand by the following terms as they are used in the passage:**

a subempleo
b -iable
c cuantificación
d el punto de vista teórico

I **Select the most appropriate translation of the following expressions:**

caminos de mano de obra
- ☐ labour intensive roads
- ☐ hand built roads
- ☐ manual labour roads

tareas
- ☐ jobs
- ☐ tasks
- ☐ responsibilities

c dato pivote
- ☐ pivot datum
- ☐ key datum
- ☐ base datum

d familia campesina
- ☐ farm family
- ☐ rural family
- ☐ peasant family

II **What in your opinion would be the most appropriate translation of the following in context?**

El concepto operaría a efectos de cuantificación de la siguiente manera
- ☐ The concept will operate for purposes of quantification in the following way
- ☐ This concept would function for purposes of quantification in the following manner
- ☐ This concept would be applied, for purposes of quantification, in order to

III **Discuss the difficulty of distinguishing between** *ingresos familiares, ingreso familiar real, ingreso familiar mínimo anual,* **and** *ingreso mínimo de subsistencia.*

IV **Translate the passage into English.**

3A Ups and Downs

American monetary growth has been bedevilled by two factors. First, the Federal Reserve has yet to master the techniques of monetary control which it introduced last autumn. Instead of showing modest growth, the money supply figures have been lurching about all over the place. Second, Wall Street is still not sure what the changes mean and, as a result, it is nervous and has feared over-expansion when over-contraction is the real problem.

The Federal Reserve plan, announced in October, was designed to control the money supply through bank reserves (the base for credit creation) rather than by direct manipulation of interest rates. By January and February, however, the money supply had started to bulge as borrowers arranged new credit before the expected credit controls were introduced and interest rates rose higher. In response the Federal Reserve reduced reserves further.

Although the target was for an annual growth of 4–6 1/2% in the money supply, in the six months to the end of April it had grown at an annual rate of only 3% and in March and April it actually fell. Some relaxation is needed if the targets for money aggregates are to be reached.

The growth of bank reserves reached an annual growth of 13.2% in January. By the end of April their growth had fallen by more than half (to 6%) and had steadied. Interest rates are falling not because of intervention by the Federal Reserve to reduce the federal funds rate (which banks charge on loans to each other) but because of the recession and the falling demand for credit. Declining interest rates are therefore not a sign that the Federal Reserve has changed its policy and decided to restimulate the economy.

Economist

I Summarize what you understand by the following terms:

a over-contraction
b relaxation
c recession
d restimulate

II Select the most appropriate translation of the following expressions:

a lurching about
- ☐ moviéndose irregularmente
- ☐ tambaleándose
- ☐ con movimientos erráticos

b target
- ☐ blanco
- ☐ objetivo
- ☐ propósito

c money aggregates
- ☐ medios de pago en circulación
- ☐ circulante monetario total
- ☐ base monetaria

d federal funds rate
- ☐ intereses sobre fondos federales
- ☐ la tasa de intereses sobre préstamos interbancarios
- ☐ crédito federal

III What in your opinion would be the most appropriate translation of the following in context?

a American monetary growth has been bedevilled by two factors.
- ☐ El aumento en el circulante monetario en los Estados Unidos ha sido influido por dos factores.
- ☐ Dos factores han complicado el control monetario de la economía de los Estados Unidos.
- ☐ El control monetario en los Estados Unidos se ha debilitado debido a dos factores.

b it is nervous and has feared over-expansion when over-contraction is the real problem.
- ☐ está nervioso y teme la sobre-expansión cuando la sobre-contracción es el problema real.
- ☐ está nervioso, temeroso de tendencias inflacionarias cuando en realidad el peligro es de la contracción de la economía.
- ☐ se ha mostrado nervioso, temeroso de una sobre-expansión cuando el problema principal es de la contracción excesiva.

IV To translate *the money supply had started to bulge* a translator opted for *se notó un súbito aumento de los medios de pago en circulación*. Can the use of *súbito aumento* for *bulge* be justified?

V Translate the passage into Spanish.

38 Crecimiento del circulante monetario

El mercado financiero se ha caracterizado este año por una considerable expansión de los medios de pago en circulación y avances significativos de la captación y el financiamiento de la banca. Estimamos que el medio circulante aumentó 35% en promedio durante los primeros tres meses del año respecto al mismo período de 1978; creemos muy difícil que la tasa de crecimiento anual de esta variable sea inferior a 26% en 1979, cifra que ha sido calificada como idea

por las autoridades hacendarias en las presentes circunstancias. Por el impulso que llevan y, sobre todo, por la tendencia de las finanzas públicas, lo más probable es que los medios de pago registren una expansión promedio de 31% en todo 1979. Se corre el riesgo de que el exceso de circulante se refleje principalmente en una mayor alza del nivel de precios y en un elevado déficit del intercambio comercial y de servicios del sector no petrolero. El crédito concedido por el Banco de México, determinante principal de la base monetaria sobre todo al sector público, ha sido la principal variable explicativa de los aumentos de los medios de pago. Debe mencionarse que también ha contribuído a la afluencia de fondos del exterior en los últimos meses.

Banco de México, April 1979

I Summarize what you understand by the following terms in the context of the passage:

a medios de pago
b finanzas públicas
c intercambio comercial y de servicios
d sector no petrolero

II Select the translation of the following expressions most appropriate in this context:

a significativos
- ☐ meaningful
- ☐ important
- ☐ significant

b expansión
- ☐ growth
- ☐ expansion
- ☐ increase

c circulante
- ☐ money in circulation
- ☐ money supply
- ☐ money stock

d afluencia
- ☐ income
- ☐ inflow
- ☐ affluence

III What in your opinion would be the most appropriate translation of the following in context?

a Por el impulso que llevan y, sobre todo, por la tendencia de las finanzas públicas
- ☐ Given the present tendency, above all in the financing of the public sector
- ☐ Taking into account the rate of expansion and, above all, the tendency in the public sector
- ☐ After such a beginning and taking into account, above all, the trend in public financing

b un elevado déficit del intercambio comercial y de servicios del sector no petrolero
- ☐ a high deficit in the interchange of goods and services of the non-petroleum sector
- ☐ a considerable deficit in the balance of payments in all other than the petroleum sector
- ☐ an increased deficit in the balance of trade in goods and services of the non-petroleum sector

c El crédito concedido por el Banco de México, determinante principal de la base monetaria
- ☐ The credit offered by the Bank of Mexico, which largely controls the monetary base
- ☐ The relaxation of credit controls by the Bank of Mexico, which mainly determine monetary growth
- ☐ The credit given by the Bank of Mexico, the principal determinant regarding the growth of the money supply

IV The phrase *la captación y el financiamiento de la banca* has been translated as *bank reserves*. Is this translation too broad to convey the precise sense of the original?

V Translate the passage into English.

4A Foundation Treatment

Treatment of the foundation rock was carried out to impermeabilize, consolidate and drain the rock affected by the dam. Suture grouting of the rock-concrete contact was also undertaken.

The primary curtain consisted of two rows of boreholes, upstream and downstream, each drilled at 5-m centres. This curtain was drilled and grouted from the arch gallery to a depth of 100 m in the central portion of the arch and to a depth of 40 m below the thrust blocks. Permeability tests and grouting were carried out in descending 5-m long sections. Injection pressures per metre depth of the grouted lengths were 0.2 and 0.6 kg/cm^2 for the upstream and downstream rows, respectively. Some 6,900 m of EX-diameter boreholes were drilled, with a mean cement consumption of 225 kg per metre drilled.

Consolidation treatment consisted of three rows of grouted EX-diameter boreholes. The upstream and downstream rows were drilled from the outside at the base of the dam faces, whereas the intermediate row was drilled from the arch gallery. Lengths of the boreholes varied from 15 to 30 m. Some 4,800 m were drilled, with a mean consumption of cement of 75 kg per metre.

The rock-concrete suture curtain comprised three rows of boreholes drilled from the arch gallery to a depth of 10 m into the rock. Approximately 1,800 m of EX-diameter boreholes were drilled, with a mean cement consumption of 40 kg per metre.

The drainage curtain was drilled both from the arch gallery and from the two abutments.

I Summarize what you understand by the following terms:

a ...uting
b ...ain
c arch gallery
d consolidation treatment

II Select the most appropriate translation of the following expressions:

a grouted
- ☐ tratada
- ☐ inyectada
- ☐ llenada

b arch
- ☐ cortina
- ☐ presa
- ☐ arco

c lengths of the boreholes
- ☐ tramos perforados
- ☐ la longitud de los barrenos
- ☐ las profundidades perforadas

d abutments
- ☐ márgenes
- ☐ lados
- ☐ empotramientos

III What in your opinion would be the most appropriate translation of the following in context?

a drilled from the outside at the base of the dam faces
- ☐ se perforaron fuera de la traza de la cortina
- ☐ se perforaron desde las bases exteriores de la cortina
- ☐ se perforaron al pie de la cortina

b from the arch gallery
- ☐ desde el túnel en la cortina
- ☐ desde la galería de la cortina
- ☐ desde la galerie del arco

c The rock-concrete suture curtain comprised three rows of boreholes drilled from the arch gallery.
- ☐ La pantalla de sutura se perforó a partir de la galeria de la cortina y consistió de tres hileras de barrenos.
- ☐ Se perforó la pantalla de sutura de tres hileras de barrenos desde la galería de la cortina.
- ☐ Tres hileras de barrenos formaron la pantalla de sutura ligando la roca al concreto, perforadas desde la galería de la cortina.

IV A translator chose to translate *primary curtain* as *pantalla de impermeabilización*. Is the decision justified?

V Translate the passage into Spanish.

4B Tratamiento de la cimentación

El tratamiento tuvo como objeto consolidar e impermeabilizar la roca por medio de inyecciones y aliviar, mediante drenes, las fuertes presiones intersticiales aguas abajo de la presa. Comprendió las siguientes pantallas: impermeabilización, consolidación, sutura y drenaje.

Impermeabilización. Se llevó a cabo desde el sistema de galerías de ambas márgenes y de la cortina. La pantalla se formó con dos hileras de barrenos separados 5 m entre sí. La hilera aguas arriba tuvo una inclinación de 15 grados hacia aguas arriba y la de aguas abajo una inclinación de 12 grados en el mismo sentido. Se perforaron 25,800 m de barrenos con un consumo total de cemento de 635 ton, lo que corresponde a un promedio de 25 kg por metro lineal.

Consolidación. Para mejorar las propiedades mecánicas de la roca en una de

cimentación de las pilas y vertedor, así como en la cimentación del espolón y atraques de la cortina, se efectuó un tratamiento de consolidación. Para tal efecto, los barrenos se dispusieron al tresbolillo con separación de dos consecutivos y profundidades alternadas de 5 m y 10 m. La inyección se efectuó en tramos de 5 m. Para ejecutar la pantalla de consolidación del espolón y del vertedor se perforaron 3870 m de barrenos con un consumo total de cemento de 65 ton, lo que corresponde a un promedio de 18 kg por metro lineal.

Sutura. El tratamiento de sutura concreto-roca abarcó toda la cimentación de la cortina y el espolón. Se perforaron tres hileras de barrenos separados 2 m entre sí de manera que penetraron en la roca 10 m. Se perforaron 13600 m de barrenos con un consumo total de cemento de 44.4 ton, lo que corresponde a un promedio de 3 Kg por metro lineal.

Drenaje. En ambas márgenes las pantallas de drenaje se dirigieron hacia aguas abajo de la pantalla de impermeabilización. La perforación se hizo después de terminar la inyección.

I Summarize what you understand by the following terms in the context of the passage:

a inyección **b** pantalla **c** sutura **d** cortina

II Select the translation of the following expressions most appropriate in this context:

a galería
- ☐ gallery
- ☐ tunnel
- ☐ boring

b márgen
- ☐ bank
- ☐ margin
- ☐ abutment

c barreno
- ☐ drill
- ☐ borehole
- ☐ boring

d atraque
- ☐ abutment
- ☐ landing
- ☐ wharf

III What in your opinion would be the most appropriate translation of the following in context?

a La pantalla se formó con dos hileras de barrenos
- ☐ The curtain comprised two rows of boreholes
- ☐ The curtain was formed by two rows of boreholes
- ☐ Two rows of boreholes formed the curtain

b separados 5 m entre sí
- ☐ 5 m apart
- ☐ at 5-m centres
- ☐ with 5 m between each

c para ejecutar la pantalla de consolidación del espolón y del vertedor
- ☐ to carry out the consolidation curtain beneath the thrust-block and the spillway
- ☐ to consolidate the thrust block and spillway zones
- ☐ to effect the thrust block and spillway consolidation curtain.

IV In this passage the term *pantalla* is best translated as *curtain* in every case except one: in this case the original translator selected the word *system*. In which case is this latter term the more appropriate and why?

V Translate the passage into English.

5A Unsuspected Uveal Melanomas

The diagnosis of malignant choroidal melanoma is difficult to establish in some cases, despite advanced diagnostic aids (radioactive tracing, fluorescein angiography, ultrasound). Only the histopathological report reveals the diagnostic error. Unsuspected malignant uveal melanomas (MUM), and especially choroidal melanomas are histopathologically most frequently discovered in eyes with opaque media and raised intraocular pressure. In published statistics, the frequency of unsuspected melanomas ranges from 7 to 11%.

In the course of 20 years, of 2,370 enucleated eyes, there were 300 histopathologically diagnosed MUM (iris, 4; ciliary body, 26; and choroid, 270). In 24 cases the diagnosis of MUM was clinically unexpected.

All 24 eyes were blind, 18 had raised intraocular pressure and all had opaque media. Often, the unsuspected MUM was concealed by the clinical diagnosis of secondary (33.3%) or primary absolute glaucoma (25%); three eyes had been unsuccessfully operated on earlier for glaucoma. Besides the main diagnosis, which was the indication for enucleation, there were secondary diagnoses such as cataract. Transillumination gave a negative result in all cases except one, with a diagnosis of hemorrhagic glaucoma and hemophthalmus.

The MUM found in one of the three phthisic eyes is of special interest; histologically, it showed both a malignant choroidal melanoma and sympathetic ophthalmia. The clinical picture was that of bilateral sympathetic ophthalmia, with the onset of visual impairment three years prior to enucleation. The perforating injury had occurred two months earlier, and vision became impaired in the uninjured eye 15 days before enucleation.

One injured eye, in a 20-year-old man, had a subluxated cataract that had been operated on two years before enucleation. In a 25-year-old man with retinal detachment, the eye was enucleated because it was painful and glaucomatous. In a third patient, a 29-year-old man, there was a clinical picture of endophthalmitis at the time of enucleation, and histologically, the tumour showed a massive invasion of the sclera.

American Journal of Opthalmology,
Olga Litricin

Summarize what you understand by the following terms:

a histopathological **b** intraocular **c** indication **d** sympathetic

II Select the most appropriate translation in context of the following expressions:

a raised
- ☐ alta
- ☐ aumentada
- ☐ subida

b clinical picture
- ☐ cuadro clínico
- ☐ diagnosis clínico
- ☐ historia clínica

c visual impairment
- ☐ pérdida de visión
- ☐ disminución de visión
- ☐ deterioro visual

III Discuss the word order of *histopathologically most frequently discovered* and rephrase it if necessary.

IV Translate the passage into Spanish.

5B Melanoma de coroides

No obstante que en la actualidad se cuenta con excelentes medios de diagnóstico clínico, que permiten un tratamienta temprano y con procedimientos terapéuticos como son la fotocoagulación, la radioterapia, la quimioterapia y la combinación de éstas, el prognóstica de melanoma uveal dependerá de la correcta evaluación de cada caso en particular. El motivo del presente trabajo es dar a conocer un caso de melanoma uveal en una mujer de 21 años de edad, quien desarrolló la neoplasia durante el embarazo.

La paciente ingresó al hospital por dolor intenso del ojo izquierdo, ardor y enrojecimiento conjuntival Refirió el inicio de su padecimiento en relación con su último parto un año antes, con fosfenos y disminución progresiva de la visión del 0.1. con escatomas nasal y temporal superiores. Se la había diagnosticado desprendimiento de retina inoperable en otro hospital.

La exploración oftalmológica mostró 0.1. con midriasis, ausencia de reflejo fotomotor, dolor intenso, fotofobia, hiperemia conjuntival, rubiosis iridis y tensión ocular aumentada. El estudio radiológico de órbita no mostró alteraciones patológicas. La ecografía reveló la presencia de un tumor coroideo.

Se realizó enucleación del 0.1. con diagnóstico clínico de 'tumor del tejido coroideo por detrás de la retina'.

Se remitió al servicio de Oncología, en donde se dieron 9 sesiones de radioterapia a dosis no especificadas. Actualmente no hay manifestaciones de actividad neoplásica local, ni de metástasis, y está asintomática.

Es interesante señalar la relación con el puerperio. Los melanocitos se estimulan durante el embarazo y una melanoma silenciosa pre-existente cobra mayor actividad. Por otra parte, el desprendimiento de retina puede desenmascarar a una melanoma que sólo se manifiesta en el campo visual por un escotoma que muchas veces pasa inadvertido. Sin embargo, el desprendimiento de retina dio pérdida de los campos superiores en el caso que nos ocupa, en la fase inicial. Este desprendimiento ha sido señalado por Heathy como un signo más en el diagnóstico del melanoma coroideo.

Anales de la Sociedad Mexicana de Oftalmología
González Alvarez y Contreras [illegible]ita

I Summarize what you understand by the following terms:

a desprendimiento b alteraciones patológicas c enucleación d asintomática

II Select the most appropriate translation in context of the following terms:

a medios de diagnóstico clínico
- ☐ aids to clinical diagnosis
- ☐ means of clinical diagnosis
- ☐ diagnostic techniques

b disminución progresiva de la visión
- ☐ progressive loss of vision
- ☐ progressive reduction of vision
- ☐ progressive visual impairment

c dio pérdida
- ☐ resulted in the loss
- ☐ caused the loss
- ☐ brought about the loss

III What in your opinion would be the most appropriate translation of the following in context?

Los melanocitos se estimulan durante el embarazo y una melanoma silenciosa pre-existente cobra mayor actividad.

- ☐ The melanocites are stimulated during pregnancy and a pre-existing silent melanoma is activated.
- ☐ The melanocites are stimulated during pregnancy and a dormant melanoma becomes more active.
- ☐ Pregnancy stimulates the melanocites and activates a pre-existing dormant melanoma.

IV Criticize the composition of the second sentence of the second paragraph (*Refirió el inicio . . .*) and rewrite it.

V Translate the passage into English.

NOTAS DE GRAMATICA

FACULTAD DE INGENIERIA U.N.A.M.
DIVISION DE EDUCACION CONTINUA

C U R S O S A B I E R T O S .
INGLES TECNICO MODULO AVANZADO.

THE BRAIN INSIDE YOUR COMPUTER

ING. JOSE A. TENA COLUNGA

The Brain Inside Your Computer

Did you know you carry around a central intelligence agency everywhere you go? It's your brain, the squishy gray matter inside your head. Just like you, your personal computer has a brain that controls all of its functions. But instead of tissue, your computer's brain consists of a single **microprocessor chip** inside the computer case.

Joe Kua, president of Arche Technologies Inc. and director of R&D worldwide, says the microprocessor chip is much like a brain in the human body. "It's the one that controls everything. Basically it will send out commands, bring information in, then process it, calculate it and transform it into different data and put it out again," Kua says.

In this article we'll learn more about how microprocessors work. You'll be amazed that a chip about the size of a postage stamp can have so much power. (Remember, Napoleon was little, too!) Let's take a closer look!

Microprocessors Defined

Microprocessors are also referred to as a computer's **central processing unit** or **CPU**. Did you know that the microprocessor in your computer probably wasn't manufactured by the same company that made your PC? Microprocessors for IBM and IBM-compatible computers are manufactured by Intel Corp. in Santa Clara, Calif. Microprocessors for Apple Computer's Macintosh computers are created by Motorola Inc. in Austin, Texas. You can also find manufacturers who make **clones** (copies) of both Intel and Motorola microprocessors.

Inside your computer case you'll find an impressive arrangement of miniature **transistors**, called **integrated circuits**. These circuits are often referred to as chips because they're made from a single piece of **silicon**. A transistor is sort of like a building block in the creation of the CPU; groups of transistors make up the circuits that make up chips.

Carl Larson, product manager for the 386/486 product family at Intel Corp., says the most important chip in your computer is the microprocessor.

"The microprocessor just happens to be the most complex of the chips in the computer because it winds up controlling all the other chips and also providing a lot of the intelligence in terms of the numerical calculations that occur in the computer," Larson says.

The microprocessor or CPU is a miniature electronic circuit. It contains thousands of components like transistors and resistors on a single computer chip. This tiny chip, a few millimeters bigger than your thumbnail, does all the "thinking" for your computer. (Wow! If actual brain size indicated intelligence, your PC would be in trouble.) The microprocessor assesses and executes every instruction written in the software you're using. It controls all of the components that make up your computer system, such as memory, screen displays, disk drives, printers and more. In most computers, the CPU also handles all mathematical calculations (some systems have other chips called **coprocessors** that help out the CPU). And where does the microprocessor live in your computer? It's attached to the main circuit board or **motherboard** of course.

How Does It Work?

Larson of Intel says the microprocessor basically executes a series of instructions that tells itself and the other components in the system what to do.

"The instruction comes in a program that's in the memory of the computer. The microprocessor will look at the instructions in memory and either do internal commands like 'do additions' or 'do subtractions' or move numerical values from one location to another, or it will talk to other components in the computer. It will talk to the disk drive and either get or receive information, send a letter out to the screen to be displayed, or accept input from the keyboard," Larson says.

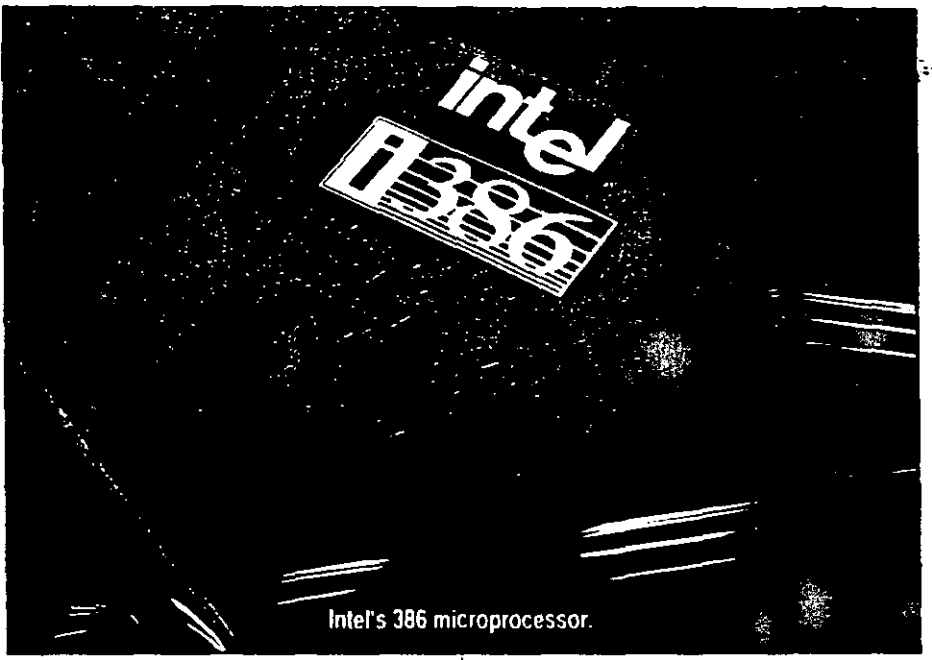
The microprocessor sends and receives this information through **buses**, which are basically a group of wires, Larson says.

You see, your computer is a binary system, which means it only recognizes the signals *on* and *off*, like a light bulb. **Binary code** is made up of 1s and 0s—1 represents on and 0 off. Each 1 or 0 (on or off) is referred to as a **bit**. And eight bits make up a **byte**. Basically, computer programs, when interpreted by the computer, are just differ-

ent arrangements of these 1s and 0. The microprocessor responds differently to these various arrangements of bits as dictated by instructions in the software. **Binary words** are created out of eight bits, 16 bits or 32 bits. This refers to the number of bits a computer can process at a time. We'll talk more about this later.

Memory: Another Chip Off The Old Block

While your CPU is adept at thinking, it can't remember anything. That's why you also have **memory chips** inside your PC. When your CPU is working on a mathematical problem, it looks to these memory chips to know what the problem is.



Intel's 386 microprocessor.

The tiny electronic circuits that make up the microprocessor are etched or engraved on a piece of silicon. The interconnected circuits help control the behavior of the electricity going through the microprocessor. Larson says an individual transistor acts much like a gate as it sometimes allows the electric current to pass through and sometimes not.

"The transistor operates like a switch or a gate in that depending on what electrical impulses you send into a transistor, it will open or close the gate. If you have a bunch of transistors arranged a certain way, you can send an electrical impulse to a group of these transistors and it will store an electrical impulse in this group, basically turning on a bit of information. And you can send another electrical impulse to tell it to turn off. So by sending these electrical impulses and turning transistors on and off, that will send and store the information," Larson says.

By manipulating electricity, according to the program instructions written in the software, the transistors control the functions of the computer. In other words, the software that you pop into your diskette drive turns these gates on and off. Then your microprocessor interprets these controlled patterns of electricity and tells the rest of your computer how to function.

Two different types of memory exist: **read-only memory (ROM)** and **random-access memory (RAM)**. ROM chips have information that your computer needs to start up; once started, the computer then looks to the diskette drive or operating system for further instructions. ROM is permanent memory whereas RAM is only temporary. RAM chips store the programs and data that you are working on. This information is lost when you turn the computer off (unless you save it first on a diskette or your hard drive).

Number Power

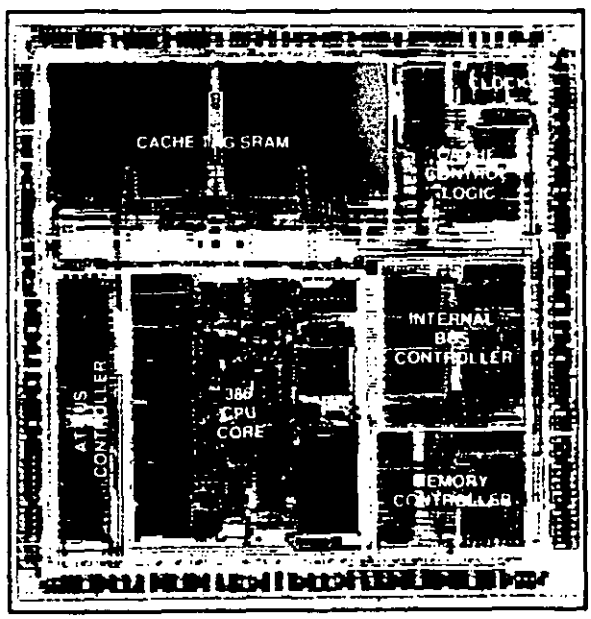
You've probably heard that some computers are faster than others. Rest assured that it isn't brand name that determines speed, but the type of microprocessor used in the computer. When a microprocessor is born, instead of a name it's given a number which indicates how "powerful" the CPU is. Right now in the IBM PC world you have several different types of Intel microprocessors to choose from (in order of least powerful to most powerful): 8088, 80286, 80386SX, 80386, 80486SX and 80486. F and fewer companies are making 808 80286-based PCs; most people now consider the 80386SX to be the basic entry level computer. But what makes some microprocessors faster than others?

As you already know, computers store and move data in measurements called bits and it takes eight bits to make a byte. Logically, the more bits a microprocessor can move at a time, the more information it can process at a time and the faster it will operate.

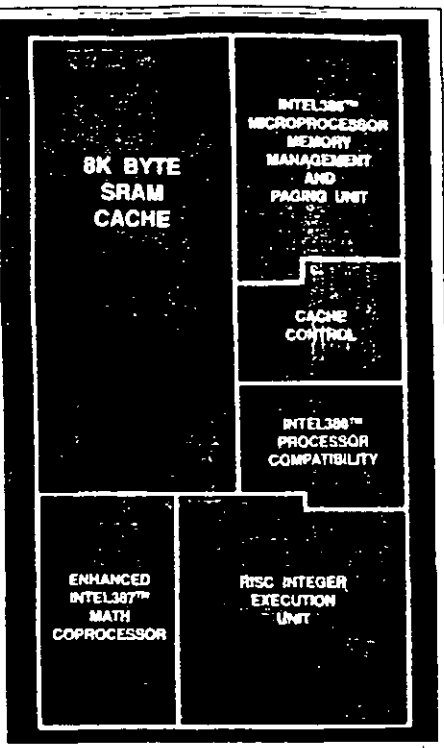
The **input/output bus** is what your CPU uses to receive and send information to your system's peripherals (like a mouse or a printer). Another bus, the CPU bus, communicates with memory. So the wider your bus or data path, the more bits that can travel on it at a time. And a larger bus width or data path makes for a faster PC. Most computers built today use a 16- or 32-bit word size, meaning they have either a 16- or a 32-bit bus width.

Microprocessor speed also is determined by **clock speed**. Like your wristwatch, a microprocessor uses vibrations from a source such as a quartz crystal to regulate speed. The faster the clock speed, the faster the computer executes commands. Clock speed is measured in r **hertz (MHz)** and one megahertz equal million cycles per second. Early computers operated at 4.77MHz, while today computers operate anywhere from 16 to 40MHz and

But bus width and clock speed are just two of the many reasons why some microprocessors run faster than others.



Inside the 386 microprocessor.



Here you can see inside the 486 microprocessor complete with math coprocessor and 8KB cache

Coprocessors And Smart Devices

Additional microprocessors are sometimes used inside a computer to handle some of the CPU's workload. These pinch hitters, called coprocessors, also help speed up the operation of your computer. Among the most popular of these, math coprocessors increase your computer's speed and precision when performing complex numerical calculations.

Devices that have their own microprocessors, like terminals or printers, are called **smart devices**. They have the ability to function independently of the main CPU in the computer. So even if you disconnect a smart printer with enough memory, it will be able to complete a printout.

As common sense would have it, the more smart devices you have, the faster your computer will be able to run as your CPU doesn't have to babysit so many components.

Once Upon A Silicon Chip: XT And AT

Now we'll take a look at specific Intel microprocessors for IBM and IBM-compatible computers. (See the sidebar entitled "AMD: In The Running" for information about clones of Intel microprocessors.) When referring to CPUs like the 80286 or 80386, people drop the "80." So instead of 80286, they call it a "two-eighty-six."

One of the first microprocessors used in early IBM personal computers is the 8088. All IBM and IBM-compatibles that use this CPU are called XTs (XT stands for eXTended). The 8088 was introduced in June 1979. It featured 29,000 transistors plus 1MB of addressable memory. Though few XT-level computers are still being made, many are still around. The XT can process eight bits of data at a time and transmit data at speeds between 4MHz and 10MHz, which is considered slow by today's standards. The XT is too slow and does not have enough memory to run many of the newest software programs. Today the XT is considered a dinosaur in a brave new world of speed-demon microprocessor technology.

Intel created the **286** in February 1982. IBM and compatible systems based on the 286 are called ATs (IBM named its original 286 system AT, which stands for Advanced Technology). With a more powerful microprocessor and larger data path or bus width, the AT can process information much faster than the XT. It features 130,000 transistors—101,000 more than the XT. The 286's bus or data path was expanded to 16 bits from the XT's eight bits. Where the 8088 could use up to one million bytes of memory, the 286 is able to use up to 16 million bytes (16MB).

With the AT, **extended memory** also was introduced. Extended memory is memory beyond the 1MB that can be accessed by XTs. ATs have 16 times more available memory than XTs when they use extended memory.

The 286 can also use **virtual memory**, which allows the processor to use disk storage to simulate a large amount of real memory. So beyond the 16MB of directly addressable memory, the AT has the potential to use up to one **gigabyte** (1 billion bytes) of **virtual memory**.

Kua of Arche says virtual memory allows you to run a 4MB program even if you only have 2MB of physical memory. It tricks your computer into thinking it has more physical memory than it does.

"It is able to go out to the hard disk and swap some data out to the hard disk," Kua says. "Because your hard disk can be about 300MB, you can put a lot of things in hard disk, but you cannot run from the hard disk. You load into main memory and then run. Virtual memory support allows you to page data in and out and then execute without the user even knowing it," Kua says.

386 And 386SX

Next Intel created the **386** on October 17, 1985. The 386 handles up to four billion bytes of real memory and up to 64 trillion bytes of virtual memory. It features 275,000 transistors (145,000 more than the AT).

The 386 is a 32-bit microprocessor: it processes 32 bits at a time. It also has a 32-bit data bus. It can process information up to four times as fast as the original IBM PC at speeds between 16 and 33MHz.

A few years later Intel introduced the **386SX**, a scaled-down version of the 386. Although this chip can internally process 32 bits of data at a time, it can only transfer 16 bits at once over the data bus. The 386SX is a less expensive chip than the 386 but can run the same software.

The 486 And Beyond

The **486** microprocessor, the fastest member of the Intel family, was introduced in April 10, 1989. The sophisticated technology in the 486 features 1.2 million transistors and a 32-bit data path. Like the 386, it also has four gigabytes of addressable memory and 64 **terabytes** (trillion bytes) of virtual memory. So what makes it so much faster? (The 486 offers 50 times the performance of the old XT.)

The reason the 486 operates faster and more efficiently is because of a more **integrated** chip. In other words, more things are included on one 486 microprocessor chip, such as a math coprocessor, 8KB of **cache memory** and a 386 microprocessor.

Basically cache memory is special high-speed memory that the CPU can quickly access. We'll talk more about this later. The 486's 387-compatible math coprocessor is used for number crunching in spreadsheets and Computer-Aided Design (CAD). The 387 math chip is an optional separate chip on the 386, but it's built into the CPU of every 486 chip for faster access.

Larson says that by integrating these three components—microprocessor, coprocessor and cache—on one chip, engineers have greatly increased the chip's efficiency.

"Also, Intel is incorporating some RISC design technology in the 486 and that allows instructions to execute faster than on the 386. So there are some things the designers do better that make it run faster," Larson says.

RISC (Reduced Instruction Set Chip) technology speeds up data transfer because the instructions contained on the CPU are simpler and easier for the computer to process.

Now let's talk more about cache memory in the 486. Cache (pronounced "cash") memory is often used with the more powerful 386 and 486 microprocessors. But with the 486 it's located right on the microprocessor chip. Cache is a small area of RAM in addition to the computer's main RAM. Cache speeds up the computer without

adding much cost to the system. The 486's internal 8KB cache and cache controller speed up memory access by using faster **static RAM** chips (called **SRAM**). The **dynamic RAM** or **DRAM** chips used in the main memory are slower but less expensive than SRAM chips.

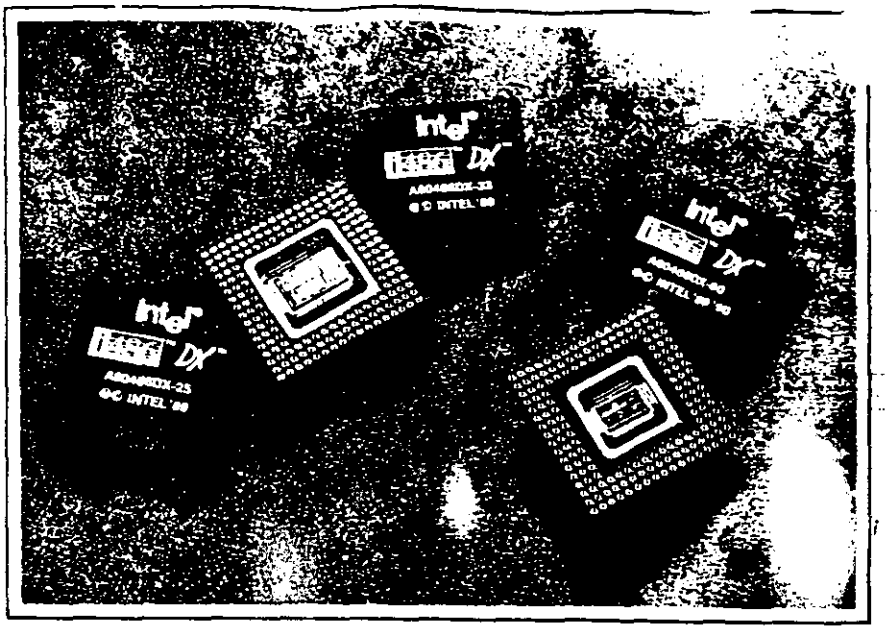
A copy of the most frequently used data is kept in the cache so the CPU can look in the cache first, which makes its search faster. According to Larson, cache came about because the newest 32-bit computers required faster memory chips than the standard DRAM.

"The normal, inexpensive memory chips used in other computers weren't fast enough to keep up with the new 32-bit processors. So cache memory was developed. Most of the memory is the slower, inexpensive kind, but a small amount of fast memory is also used, which is reserved for the data the microprocessor reads most often," Larson says.

"If you're able to find it in the cache you're able to find it faster than if you would have to go out to the other memory to get it," Larson says. "It's basically a way of keeping the microprocessor running as fast as possible and not getting bogged down with accessing slower components."

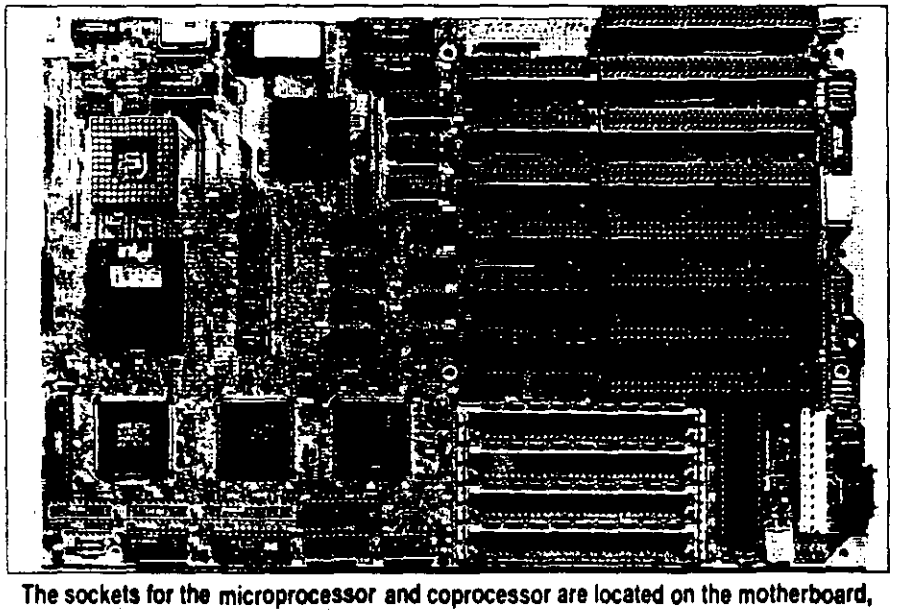
The **486SX** was introduced on April 22, 1991. Like the 486, it has a 32-bit bus and four gigabytes of addressable memory plus 64 terabytes of virtual memory. Basically the 486SX is meant to give users a low-cost entry point to Intel 486 microprocessor technology.

Putting Speed In Perspective



The 486 family of Intel Microprocessors.

Remember, it's more than clock speed that makes a CPU operate fast. As we discussed before, microprocessors are usually available in a variety of different clock speeds. You will find 386 models with the same clock speed as some 486 models, but that doesn't mean the chips will process data at the same speed. "A 33MHz 486 has more performance than a 33MHz 386. They are running at the same frequency [speed] but because the 486 has a better design and because it is more integrated, it has greater performance," Larson says.



The sockets for the microprocessor and coprocessor are located on the motherboard, the main circuit board inside the PC.

In The Making

Now, back to the microprocessor chip itself. You're probably wondering how they pack so much power into one tiny chip. Basically electronics engineers begin by drawing a lar of all the electronic components that wil the chip. Larson at Intel says the engineers usually begin this design on paper.

"It starts on paper. [The engineers] basically start on paper or white boards with a really rough block diagram of the major components and as they progress they define these major blocks of the microprocessor in more and more detail. And eventually they get to the point where they're actually designing the circuitry in those blocks," Larson says. Then the engineers use CAD, using a computer to build a computer.

When designing the circuitry, Larson says, the engineers actually design the transistors that make up each function for each of the really small functional blocks. A negative of the finished drawing is used to photograph or etch the circuits and components onto a silicon wafer. The actual piece of silicon that all these transistors go on is referred to as the die, Larson says.

The way that you actually get the transistors the silicon involves putting some chemicals e wafer that will basically make the transis-," Larson says.

Silicon is used, Larson says, because semiconductor. "In that like copper is a co. tor, it conducts electricity very easily. Silicon is a semiconductor and although it conducts electricity it doesn't do it virtually instantaneously

AMD:
In The Running

Before 1991, consumers didn't need to make any choices about CPUs—any personal computer you looked at in the store had an Intel chip inside it. But that same year, something happened—the same something that happened to IBM in the '80s; the consumer-friendly, horrific nightmare of big brand-name companies: cloning.

Browsing through the computer section of a store, you might see little stickers on the PCs sitting on the shelves that say "Intel inside." Now, you know a little bit about computers and wonder why they would go to the expense of putting little stickers on a computer stating what is usually assumed to be a given — that the PC has an Intel microprocessor. But since 1991, that given has gone the way of the IBM monopoly as CPU clones have slowly claimed an increasing share of the microprocessor market. A name to watch for: AMD.

CPU clones have slowly claimed an increasing share of the microprocessor market.

Advanced Micro Devices (AMD) of Sunnyvale, Calif., claimed its biggest CPU market share (nearly 30 percent) with its 386 family of processors. In addition to being completely compatible (AMD chips do the same things as Intel chips), AMD chips are often sold for less. (AMD chips are commonly offered as Intel alternatives at higher megahertz speeds, for the same price.)

As a result of the newfound competition, 486 and 386 chip prices are lower, and consumers are noticing the increased affordability of 486DXs. AMD has not introduced a 486 microprocessor yet, though plans have been announced for 1993—a timely move as PC producers' interest shifts in favor of the higher-end 486 models.

AMD's second claim to chip fame is its microprocessors' low voltage needs—an especially important advantage to laptop users. According to an update released by AMD, a test on two comparable laptop systems showed that the laptop with AMD's Am386SXL-25 microprocessor had a battery life more than an hour longer than the laptop with an Intel i386SL-25 microprocessor.

As AMD continues to pry its way into Intel's microprocessor monopoly, Intel is shifting focus to higher-end 486s and the future introduction of the 586, two areas that AMD has yet to enter. In the meantime, AMD will continue to tap the Intel-generated rising popularity of 386 systems for in-home use. For AMD, that's good enough for now, but future success will depend on the 486. ❑

or it doesn't do it too easily. It's that property that enables you to control the electrical impulses with transistors," Larson says.

A silicon chip is extremely fragile, so when handling, often engineers attach thin wires to its edges. The wires are connected to connectors, sometimes called spider legs, which extend from the edges of the microchip.

Future Microprocessors

As microprocessors continue to advance they're becoming faster and more efficient than ever.

Larson says microprocessor chips in general are getting larger in terms of the number of internal components. "Intel and other companies are improving the technology for putting transistors on silicon so we can put a lot more transistors at a time on a piece of silicon and make it work. For example the 386 has around 275,000 transistors, while the 486 has 1.2 million transistors on it," Larson says.

Microprocessors in the future may actually have 100 million transistors, he says. Larson says this increase in size and complexity will enable microprocessors to operate faster. "They'll be able to do more of the operations of the computer in the microprocessor and on the silicon than ever before," he says.

"With all that capability on it we might be able to include things like voice recognition on the silicon on the microprocessor. And the graphical user interface might be on the microprocessor also," he says. (A graphical user interface, or GUI, is a program that allows users to manipulate the computer with the aid of visual cues instead of typed commands.)

Conclusion

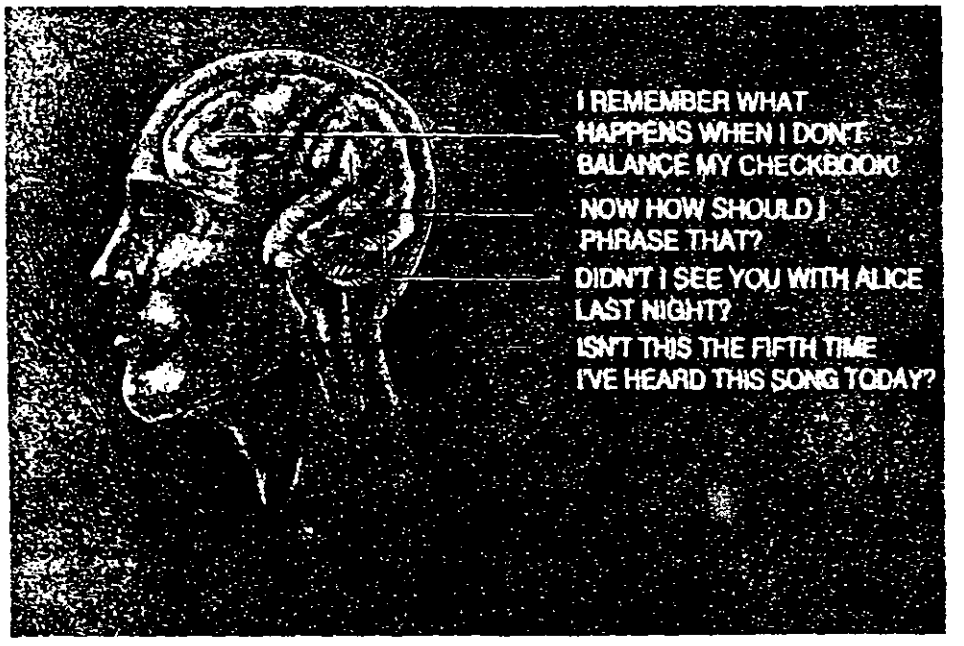
As you can see, the world of microprocessors is a complex one, and new and improved technology awaits around every corner. But after reading this article you should have a better understanding of how your computer works.

If you're in the market for a new computer, you will probably first want to decide what type of software you want to run before rushing out and buying the fastest, most expensive computer you can find. You have more choices than ever before.

While a computer is capable of great things, it takes the human brain to learn how to control it. As you master the computer basics, you and your PC will make quite a pair!

by Gretchen Boehr

Understanding Computer Memory



Our brains use several different kinds of memory—without our having to think about it. We use one type of memory for problem-solving, and another for understanding and using speech; we have a particular type of memory we use for recognizing people and objects and another for placing visual scenes and music.

A computer's **main memory** is called **random-access memory**, or **RAM**. RAM is also referred to as **primary memory storage**. Many computers today also have hard disk storage. For an explanation of the difference between the two, see the sidebar entitled "Hard Disk Storage Vs. RAM Storage."

There are several types of random-access memory. It's the aim of this article to define RAM, first in general terms, then in each of its three "flavors:" **DOS memory**, **extended memory**, and **expanded memory**. Among other things, you'll discover why DOS memory is limited to 640KB, why extended memory works best on 386-based PCs, and how expanded memory practices "sleight of mind."

Understanding RAM

Random-access memory is temporary electrical storage space where program instructions and program data are kept. With instructions and data conveniently suspended in RAM, the computer's **microprocessor** can access them quickly and as often as necessary. The computer's microprocessor functions as its brain.

In a sense, human memory and computer memory is similar. Our recollections of rules, behaviors, and objects are always available. It seems as if we humans "automatically" remember faces, polite phrases, and how to drive our cars. Likewise, thanks to RAM, computers automatically carry out the program commands we use to change our documents.

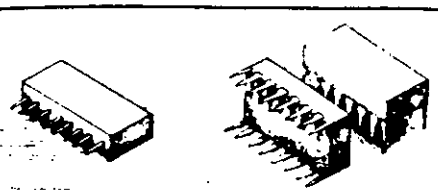
One major difference between human memory and computer memory is that most of a computer's memory is utterly dependent on electrical current, and is therefore temporary, or **volatile**. And while neurologists tell us that the neurons in our brain send out electrical signals, we humans don't need to worry about our power supplies. We're always on. To guarantee that your computer remembers the document you're working on, be sure to save it to hard disk or to a floppy diskette.

- **Measuring Memory.** We measure computer memory in **bytes**. A byte stores the equivalent of one character, one letter of text or program code. It's the basic unit of measure for computer storage. For example, a single page of double-spaced text contains about 1,500 characters (1,375 letters and about 125 formatting and control characters). Thus the page takes up about 1,500 bytes of memory space.

The most convenient way to discuss memory is in thousands and millions of bytes. One double-spaced page of text (1,500 words) equals about one and a half **kilobytes** (1.5KB). 1,024KB equal one **megabyte** (1MB). Don't let the numbers confuse you. Since computers do most their processing on the basis of 2 instead of our familiar 10, it takes 1,024 (just over 1,000) kilobytes to make one megabyte.

• **But Where Is It?** We see RAM in action when we start up an application, type with our word processor, or add cells in a spreadsheet. But where is it—and what does it look like?

RAM usually comes in the form of memory chips called dynamic RAM chips, or DRAM chips. (Pronounced Dee-RAM.) A DRAM chip uses capacitors (mechanisms that store electrical charges) to hold our data. It's hard to believe, but these little chips—about the size of a pinky fingertip—hold our documents and the program instructions that allow us to work on them. Again, with program instructions suspended constantly in RAM, our computer's microprocessor can quickly and randomly access them and carry them out.



You will find DRAM (dynamic random-access memory) chips on your computer's motherboard, the main circuit board. DRAMs come in several forms: Single Inline Packages (SIPs) fit into sockets with a single row of holes; Dual Inline Packages (DIPs) fit sockets with a double row.

DRAM chips are located on the **motherboard**, the main circuit board of the computer. The motherboard is a large, squarish circuit board that sits on the bottom of the computer's case. Along with memory chips, the motherboard holds a computer's microprocessor chip and its **expansion slots**. Expansion slots are outlets where we can insert additional circuit boards. When people need more RAM for their computers, they either add chips to their motherboard, or they add an **expansion board** with extra memory chips on it.

• **Memory Addresses.** We can see our documents in RAM, and we can see where the RAM chips sit in our computer cases, but you can imagine that the computer's microprocessor needs to "see" its individual bytes of RAM very precisely in order to execute program instructions.

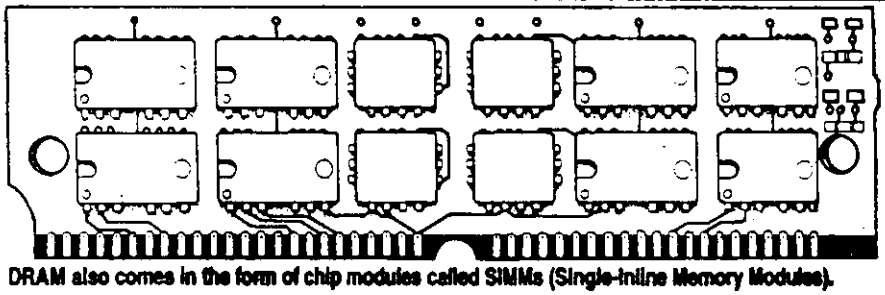
To make things easy for the computer's brain, each byte of memory is assigned an **address** from a limited range of addresses. How much address space a computer has available for memory depends on its microprocessor. The address numbers themselves begin at 0 and go up.

A computer may have 16 megabytes of address space, but it might only have two megabyte's worth of memory chips installed on the motherboard. On the other hand, if a computer has just one megabyte of address space, it makes no sense to have more than one megabyte of memory installed in the computer; it simply won't be able to find it. This shortage of **addressable memory space** is especially a problem for computers based on the 8088/86 microprocessors.

Memory Types

Now that you know what RAM does, where it's located, and how it's organized, let's discuss the three types of computer memory: **DOS memory**, **extended memory**, and **expanded memory**. Each uses a different portion of the available memory addresses, and each works best with different software applications. To illustrate the whereabouts of memory as a computer sees it, we'll be using **memory maps**. A memory map is a commonly used technical diagram.

DOS Memory is the one megabyte of memory that can potentially be used by DOS-based PCs.



DRAM also comes in the form of chip modules called SIMMs (Single-Inline Memory Modules).

DOS memory is divided between **conventional memory** and the **reserved memory area**.

Conventional memory, often called **base memory**, is allotted the address spaces between 0 and 640KB. It's where DOS and other software programs execute their functions and store document data. The reserved memory area occupies the addresses from 640KB to 1,024KB (1MB) and is used by the computer to control system functions like the monitor, keyboard, and system start up.

See Figure 1 for a memory map illustrating DOS memory as it's configured (set up) on most

The ROM Chip

Wouldn't you know. Just when you're starting to get the hang of computer memory, there's another term you have to learn. You've heard about RAM (random-access memory), but **ROM** is an important type of memory, too. But don't panic. Although they sound alike, they have very different jobs.

ROM stands for **read-only memory**, which means that it can be *read* by the microprocessor, but not changed. In other words, ROM is permanent. You probably remember that RAM is the temporary memory that allows us to run programs and create documents. Now remember that ROM is permanent memory, and it gives the computer the instructions it needs to start itself.

Again, programs and data may exist temporarily in RAM, but the instructions in ROM are permanent. They've been burned into the ROM chip, making it impossible for the user or the computer to erase them. These programs in ROM are called the **BIOS (basic input-output system)** instructions.

The very first thing your microprocessor does when you turn on the computer is check the BIOS programs in ROM. There the microprocessor will find its startup instructions. They tell your computer how to activate its ties with its peripherals, the printer, the keyboard, and the monitor. The ROM BIOS programs also tell the computer where to find the DOS operating system on your hard disk; it even runs a check on the system's available RAM.

Like RAM, ROM comes in the form of a computer chip. But while a computer may need a handful of RAM chips, it usually needs just a single ROM chip. The most important similarity between RAM and ROM is that they are both primary memory, meaning that they're both directly accessible by the computer's microprocessor.

In order for the microprocessor to find the ROM programs, they need addresses, just like RAM. Unlike RAM, however, the BIOS instructions occupy the reserved memory address space permanently. The ROM instructions have guaranteed memory addresses in the reserved memory area of DOS memory.

So next time you turn on your PC, watch carefully. One of the first things you'll see is a company name (like "Phoenix Technologies") along with a copyright date. This is the label for your ROM chip, which appears when your computer's microprocessor loads the ROM BIOS programs into RAM. ❑

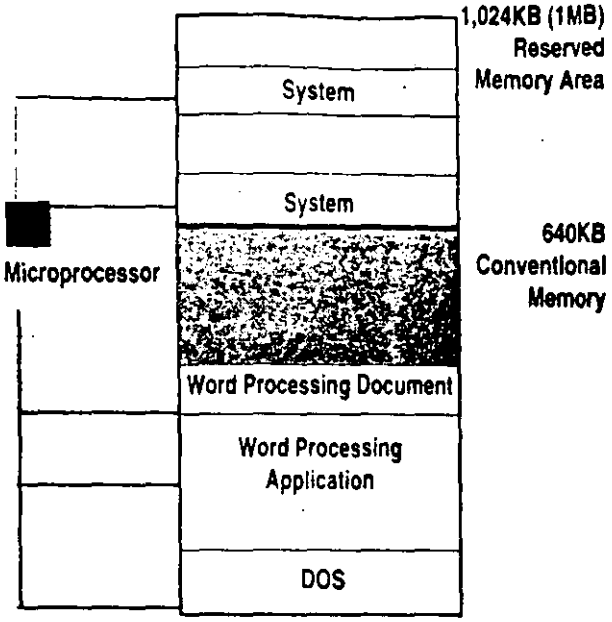


Figure 1. DOS memory is divided between conventional memory and the reserved memory area. DOS and other programs execute and display documents in conventional memory. The reserved memory area is used by special system functions. Remember, DOS memory is limited to one megabyte.

of today's PCs, with 640KB of conventional memory and 384KB of reserved memory space. Remember, since the 384KB of address spaces are reserved, applications cannot take advantage of them.

Although the earliest PCs had as little as 16KB to 64KB of conventional memory, most of today's personal computers have at least 512KB of conventional RAM. The maximum amount of conventional RAM that any PC can have, however, is limited to 640KB—a fact that has vexed many a user. The historical reason for the limit illustrates how far technology has come in the last 10 years.

In 1981, the first computer designers were working with the 8088 and 8086 microprocessor chips, "brain" chips which could only address one megabyte's worth of RAM. At the time, a megabyte of memory seemed like quite a bit. It's unfortunate, but the early designers simply didn't foresee that only a few years down the road users would need at least two megabytes of memory to run sophisticated spreadsheet and graphics programs.

In any case, the early PC architects decided that of this 1MB, 640KB should be used for programs and documents, and the remaining 384KB should be reserved for system functions like startup instructions and control of the monitor, printer, and keyboard.

Also in 1981 Microsoft Corporation released DOS, our disk operating system. All computers need an operating system like DOS, a "master" program that manages the computer's internal functions and provides users with ways to control the computer.

The DOS operating system was designed specifically to work on PCs using the 8088 and 8086 microprocessors, so at its most fundamental level, DOS was designed to work within the one megabyte memory limit—640KB for programs and 384KB for system functions. This is why we who use DOS still live within the "640KB software limit."

Although in 1984, the 80286 (286) microprocessor was designed to address 16 megabytes of memory, and in 1986, the 80386 (386) microprocessor was designed to address four gigabytes of memory (4,096MB!)—those of us who use DOS and plain old DOS programs are still limited to 640KB of RAM.

Extended Memory

"But wait," I can hear the protests, "I have two megabytes of memory on my computer—the manual says so." Quite possibly so. For example, if your PC has two megabytes of RAM, you have 640KB of conventional memory, a 384KB "gap" of unusable address space, and then 1,408KB of *extended memory*, which all together totals 2,048KB, or 2MB of RAM. By definition, extended memory occupies the address spaces over 1,024KB, or 1MB.

In other words, if you have more than one megabyte of RAM on your PC, you have two different types of memory, conventional DOS memory and extended memory. See Figure 2 for a memory map illustration. For an example of how the reserved addresses between conventional and extended memory are used, see the sidebar, "Th Vi Chip."

The problem with having extra memory in the form of extended memory is that many computer programs can't use it. That's right: programs designed to work in DOS can't use extended memory. Unless you use the DOS-based operating environment like *Microsoft Windows* and Windows compatible programs, or any other programs written specifically to use extended memory, your extended memory will remain idle. Where DOS and plain DOS-based programs are concerned, any memory over one megabyte is invisible.

Those who use a computer based on the 80386 (386) microprocessor, however, are in luck; they can use memory management software to convert dormant extended memory into vibrant *expanded memory*. For those of us on 286-based machines, extended memory is useless—again, unless you run applications written expressly to take advantage of it.

Because some newer software programs like Windows and *OS/2* (a powerful alternative to DOS) do take advantage of extended memory, experts in the computer memory field predict extended memory is the wave of the futu h the proper software, extended memor users to **multitask**, or to run two or more programs concurrently.

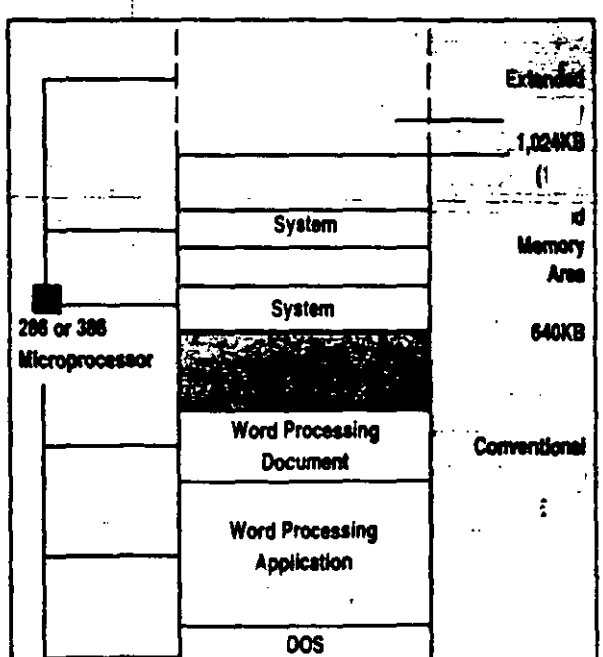


Figure 2. Extended memory uses the address space abo megabyte. The 286 microprocessor can address up to 16MB of extended memory; the 386 microprocessor up to 4,096MB (four gigabytes).

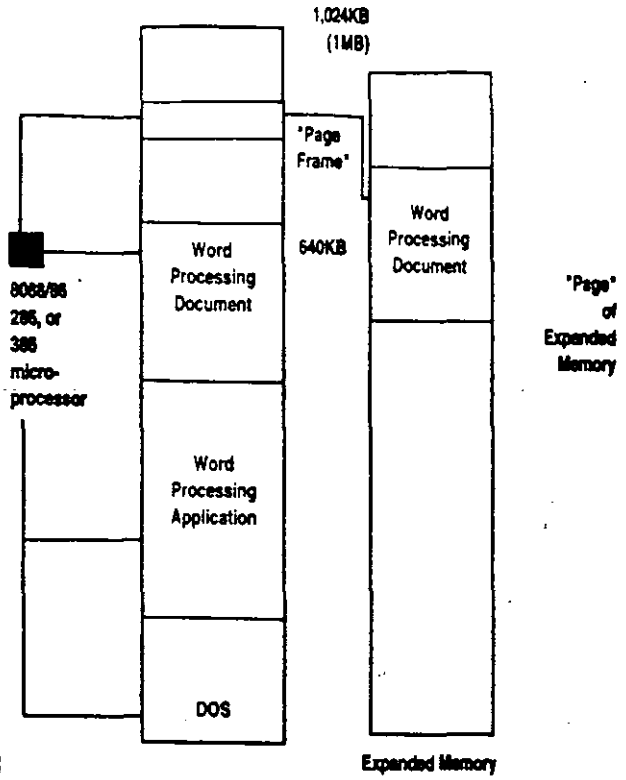


Figure 3. Expanded memory is accessed when a "page" of expanded memory is called into specific free memory addressed (a "page frame") in the reserved memory area. It's a trick designed to get around DOS' one megabyte memory limit.

Expanded Memory

Expanded memory occupies an unusual position on the PC memory map. While DOS memory and extended memory addresses follow a linear progression, expanded memory occupies an outside "island" of memory. Expanded memory is accessed by allowing portions of this "island memory" to "borrow" specific unused address spaces in the reserved memory area.

When you need them, sections of expanded memory, called **pages**, instantly "borrow" empty reserved memory addresses, or **page frames**. The pages of expanded memory need to "take on" addresses from reserved DOS memory in order for DOS to recognize them. The page of expanded memory is filled with program data until it's no longer needed. Then the page frame moves to another page of expanded memory or assumes its original place in reserved memory. DOS, which you remember can only see one megabyte's worth of addresses, is completely fooled by expanded memory. See Figure 3 for an illustration.

With expanded memory, it's as if the page frame in the reserved memory area acts as a periscope through which DOS can "see" expanded memory.

For example, you may have two megabytes of expanded memory on your PC. When you call up a two megabyte spreadsheet, part of the spreadsheet on your screen resides in conventional memory, and part of it is "paged in" from expanded memory. When you add a column of numbers in expanded memory, a "page" of expanded memory borrows an appropriate address from the reserved memory area. Then the numbers are added and the sum is placed in the proper cell. When the task is complete, the page of expanded memory loses the borrowed address.

Many applications today are compatible with expanded memory, meaning that most software programs are written specifically to work with expanded RAM. It's possible to add as much as 32 megabytes of expanded memory to your computer.

Picky Microprocessors

In sum, most computers less than two years old have 640KB of usable conventional memory, the maximum possible. When it comes to extended and expanded memory, however, the type of memory your computer can accommodate depends on its microprocessor.

For those with XT PCs, computers based on 8088 or 8086 microprocessors, the only type of memory your machine can use after conventional memory is expanded memory. To add expanded memory to your machine, however, you'll have to buy a special **memory expansion board**. An expansion board is a special circuit board equipped with extra DRAM chips.

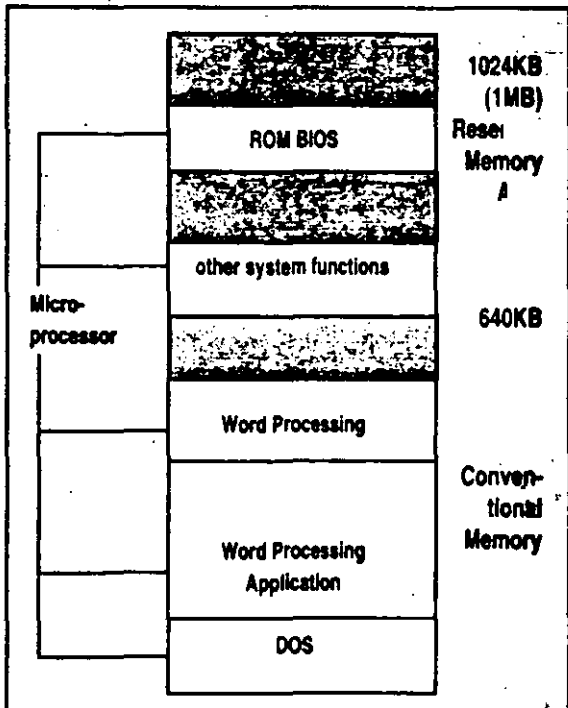
For those users working with 286-based PCs, it's possible to use extended memory and expanded memory. To get any use out of extended memory, however, you need to be using software that takes advantage of it, like Windows. And if you want to have access to expanded memory, like the XT users you must add a memory expansion board.

386 and 486-based computers can easily use both extended *and* expanded memory. As long as you have more than 640KB of memory chips inside your machine, you can use memory management software to **configure** (set up) your PC to use one or the other or a little of both, depending on the software you use.

Your PC's Memory

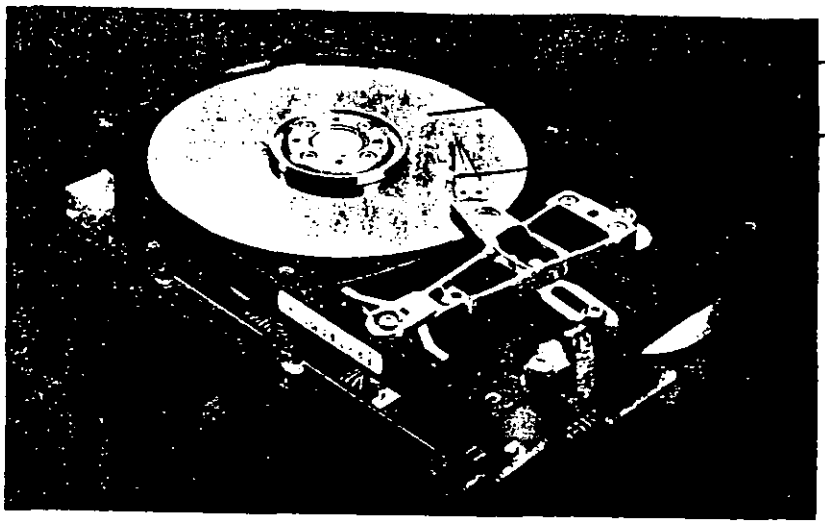
Now that you know the particulars of the three different types of computer memory, wouldn't you like to know how your PC stacks up? One way to find out is to watch your PC count it's bytes of memory when it starts up.

Press the RESET button on your PC and watch carefully. First your computer will count its conventional (or "base") memory and any extended memory you have. The common tally for computers with two megabytes of memory is 640KB base memory and 1,408KB extended memory. If you have expanded memory, a third count should follow, telling you how much expanded memory you have.



This memory map illustrates how the ROM BIOS' programs fit into its permanently assigned space in the reserved memory area.

Hard Disk Storage Vs. RAM Storage



Inside a hard disk. When you save a document, the read/write head copies it to the surface of the hard disk, where it remains unchanged until you save it again.

RAM is temporary memory where a computer stores document data and program instructions. Most computers today also come with another place to store information: the **hard disk**. The hard disk is the permanent place to keep our programs and documents.

When you are new to the world of computers, it's easy to confuse RAM storage with hard disk storage. After all, they both store programs and documents, and they both measure their storage capacity in kilobytes (KB) and megabytes (MB).

In fact they are very different types of storage that depend on one another. RAM stores data in electrical charges—in memory chips housed on the computer's main circuitboard—and the information RAM holds is temporary. A hard disk stores data magnetically—on the metallic disks inside the hard drive mechanism—and the information it holds is permanent. RAM and the hard disk together give us a workspace for creating and altering documents and a warehouse for storing them safely.

RAM stores information in memory chips, which use **capacitors** to store electrical charges; these charges in turn hold our information. Bruce McCormick, product marketing manager at Intel Corp., a well-known chip manufacturer, explains that a capacitor holds an electrical charge the way a bucket holds water. The problem is that memory chips are "leaky buckets," and they need to be continually "refilled" with electrical current in order to hold programs and documents.

In other words, without a steady supply of electricity, RAM chips can't retain our data. Any interruption of current to the RAM chips and everything in RAM disappears. That's why it's important to save our documents to a floppy diskette—or better yet to a hard disk, which is like a permanent databank inside your PC.

While RAM stores information in memory chips, a hard disk drive stores information magnetically on rigid metallic disks called **platters**.

Here's how it works. When we save a document in RAM to our hard disk, the computer translates the document into a binary code, a series of electrical "on" and "off" pulses that a computer can understand. The stream of on and off pulses flows down into the disk drive's **read/write head**, which is an electromagnet. By magnetizing the metallic surface of the hard disk platters, the read/write head records our document permanently, in the binary code, to the hard disk.

This way the document is safely housed on the disk, although it's in a form we can't use. When we call up the document from the hard disk, the read/write head sends the document's code of pulses back up through the electrical channel where it's translated to RAM, the image we see on the screen. Thus RAM and your hard disk work in tandem.

Think of RAM as your computer's desktop and your hard disk as its warehouse. Computers today often come with one or two megabytes of RAM storage and at least 40 megabytes of hard disk storage. ❑

Another way to assess your computer's memory is with memory analysis software. One free memory analysis program is *ASQ* (pronounced "ask") developed by Qualitas, a company that specializes in memory management products.

ASQ is a simple program that both summarizes PC memory and offers tutorials on basic memory concepts. If you or a friend has access to a computer bulletin board, you can **download** (copy) ASQ for free. Otherwise, for a $5 shipping and handling charge, Qualitas will mail you a copy of ASQ. To request a copy of ASQ, call Qualitas at (800) 676-0386.

Remember Everything?

Reading about computer memory is one thing; retaining all the information is another! That's one advantage a computer has over us. Computer memories are copycats. They immediately "know" the things we tell them. We humans are harder to "program." We often need repetition (and sometimes coercion!) to comprehend certain things.

Don't feel you have to memorize the ins and outs of computer memory; instead, consider this article a reference tool. In it we've discussed how random-access memory is used, where it's located, and how it's organized. We've also learned about the different types of memory—things like why there's a limit to conventional memory, why extended memory works best on 386-based and higher computers, and how expanded memory works its magic. We've also offered a few ways to analyze your own computer's memory.

Now, wasn't there something else you were supposed to do today? ❑

by Marti Remington

Special thanks to Qualitas' director of technical marketing, Paul Tarlow, for his technical support.

FACULTAD DE INGENIERIA U.N.A.M.
DIVISION DE EDUCACION CONTINUA

C U R S O S A B I E R T O S .
INGLES TECNICO MODULO AVANZADO.

TWO MODERN CRANES

ING. JOSE A. TENA COLUNGA

Two Modern Cranes

THE mobile or tower crane is characterized by a high tower with a long jib able to slew through 360°, and is an electrically driven self-propelled machine running on rails. By virtue of its height, long reach and mobility, it is possible through one machine to cover a building site with a means of vertical and horizontal transport.

As compared with the power-driven hoist, tower cranes have certain distinct advantages. Firstly, loads may be transferred in one operation from stock pile, production point or delivery vehicle practically to their destination on the building. Secondly the size of the handling team is reduced and its composition is not appreciably affected by the type of load being moved. Lastly, considerably greater loads in both weight and size can be handled. This is particularly noticeable when dealing with concrete shuttering. This can now be prefabricated on the ground in units which are easily assembled, without being too severely limited as to size. In fact, units of formwork extending the length of the component to be cast can readily be handled. In addition the crane can not only hoist the unit into position, but can maintain it there until the necessary fixing is complete.

The tall buildings which are now going up in our city centres have, however, introduced new handling problems. Mobile tower cranes can be used to very good effect up to building heights of about 100 ft., but in excess of this it becomes increasingly difficult to utilize the travelling motion on a crane of economic size. A recent development fortunately presents an alternative method of use which is of particular interest. The 'Climbing Crane,' originally developed in Russia and Sweden, has recently been introduced for use on high buildings as shown in Figure 2.

This type of crane has a short fixed tower but in many other respects is similar to a mobile tower crane. The crane is first erected as a fixed crane to a height of about 50 ft. by

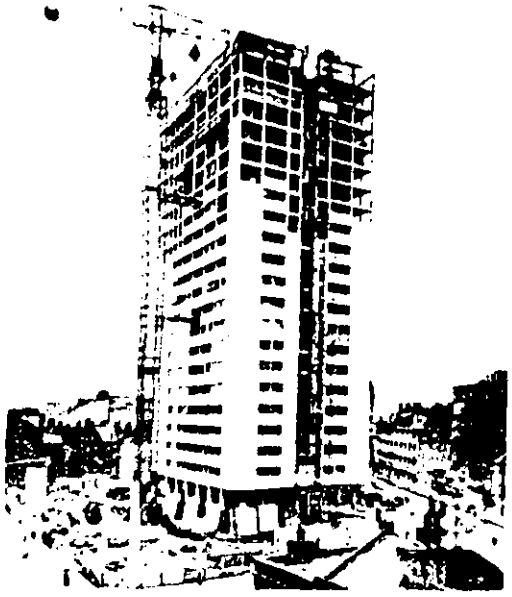


Figure 1. A tower crane.

securing it to a prepared base inside the building. As the building grows in height, and the floors are installed, holes are left for the passage of the tower, and at a suitable height two guide-collars embracing the tower are mounted on adjacent floors. The whole crane is then raised by means of a winch and fixed to the collars at a higher position. The climbing process is repeated every two or three floors and the ultimate height it can serve is only limited by the amount of rope that can be wound on to the hoist drum.

The use of the crane in this way naturally involves the structural designer, because all its loads, including both lateral and vertical forces, are transmitted to the building. If weights greater than about 30 cwt. are likely to be handled by the crane, special provision may have to be made in the design to withstand the loads transmitted in this way to

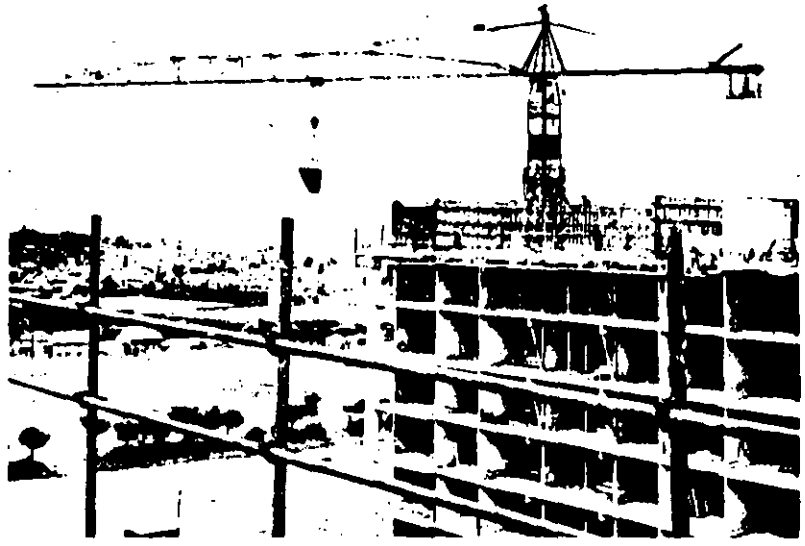


Figure 2. A climbing crane.

the structure. A notable advantage of this type of crane is that since it is located within the building the fullest use can be made of the reach of the jib. All the movements are remotely controlled by means of push-buttons on the end of a wandering lead. This enables the operator to move about and keep the load constantly in view, thus facilitating accurate placing of the material.

from *The Mechanization of Building Constructional Processes* by D. G. R. Bonnell, M.SC., PH.D. April 1959.

line 2 jib — the long arm of a crane.
line 9 stock pile — storage heap.
line 15 shuttering — temporary wooden framework to support drying concrete.

line 18 formwork — framework, structure which helps to shape the building.

line 39 guide-collars — strong metal supports which guide and hold the tower of the crane.

line 54 push-buttons — switches which are worked by pushing a small knob or button.

line 55 wandering lead — long, flexible electric cable which enables the operator to move away from the crane.

Exercises

1. Give the meaning of the following:
   self-propelled (3), reach (4), production point (9), prefabricated (16), developed (30), fixed (33), mounted (39), structural designer (46), transmitted (47), remotely controlled (54).
2. Explain in your own words:
   ' The mobile or tower crane is characterized by— ' (1), ' able to slew through 360° ' (2), ' considerably greater loads in both weight and size can be handled.' (14), ' can maintain it there until the necessary fixing is complete.' (21), ' can be used to very good effect ' (25), ' method of use ' (29), ' prepared base ' (36), ' adjacent floors ' (40), ' ultimate height ' (43), ' all its loads, including lateral and vertical forces, are transmitted to the building.' (46), ' thus facilitating accurate placing of the material.' (57).
3. Explain:
   (*a*) Why the tower crane is more useful than the hoist.
   (*b*) How the climbing crane works.
   (*c*) How the use of the climbing crane affects building design.
4. Rewrite paragraph 4 in such a way that you use no passive verb forms. Compare your version with the original for length and clarity.
5. Examine the following phrases in which the ' -ing ' form is used adjectivally. Expand these into definitions which retain the same noun and verb in each case.
   Handling team; handling problems; building heights; travelling motion; climbing crane; climbing process.
6. Notice how the writer uses the word ' tower ' as an adjective (tower crane). From the passage find at least five more examples of this pattern (noun qualified by noun used as adjective).
7. Pick out from the passage all the -ly adverbs. Point out
   (*a*) those which are essential to the meaning of the sentence,
   (*b*) those which are used loosely and could be omitted.

CHAPTER 15

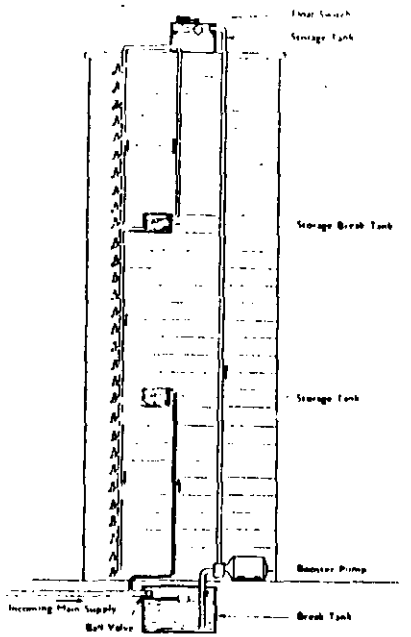
Plumbing and Sanitation in High Buildings

UNLIKE the electrical services, plumbing services vary substantially with increased height. It is considered ideal to store the equivalent of one day's hot and cold water consumption in storage cisterns within a building to prevent a shortage of water in the event of a breakdown of the supply services. Excessive pressure on the valves and fittings of all sanitary appliances would cause not only wastage of water and make it difficult for the user to draw off the exact amount of water desired, but it would also increase the maintenance necessary. Cold water down services should not have a vertical drop longer than 100 ft. Therefore cold water storage should be arranged on every tenth floor or so to serve the section of the building below. Alternatively, the storage can be placed at a higher level to serve two or three sections, e.g. 20 to 30 floors, with break tanks at lower levels.

Booster pumps are required to raise the incoming water supply from the local Water Board's street main. They are usually in duplicate, one acting as a stand-by, and they would commence operation when 'called in' by a float switch in the high-level cisterns.

In some localities one is able to fix the booster pumps together with all necessary reflux, recoil and isolating valves on a by-pass to the incoming main, which would be continued up to the storage cisterns without a break. Such an arrangement makes use of the existing pressure in the incoming service, which in the London Metropolitan Water Board area may well be 80 to 100 ft., and the booster pumps only have to add to this head to raise the water to the required level. Naturally, the local water company will have to be satisfied that the pumps are not too powerful — not able, that is, to fill the storage cisterns within an unreasonably short time, thereby depriving the adjacent properties of their supply.

In other localities — and this is generally the case where



A typical cold water service in a tall building.

the water supply is restricted or intermittent — a break tank has to be provided from which the required water is pumped.

The size of soil stacks, and indeed that of branches receiving the discharge from several fittings, must be carefully calculated on the basis of the likely incidence of use of the fittings which are connected to it. There is a constant danger that during heavy use, air compression may occur within these stacks, particularly at changes of direction, or a partial vacuum in any straight length of pipe. Generally speaking, each soil stack has its companion anti-syphon stack to which periodic relief connections are made to overcome compression or syphonage (which may otherwise result in considerable nuisance) and to stabilize the pressure conditions in the stacks. The bottom of the soil stacks, where

they discharge into horizontal drains, should be installed in long radius curves to facilitate an easy and swift flow and to prevent compression.

from *The Architect's Approach to Engineering in Tall Buildings* by Sir Thomas Bennett, K.B.E., F.R.I.B.A., February 1961.

line 15 break tank — intermediate tank to break up the otherwise too great vertical drop.
line 17 booster — giving supplementary power.
line 19 in duplicate — in pairs.
line 39 soil stack — vertical sewage pipe.
line 41 incidence — frequency.
line 46 anti-syphon — preventing syphoning or sucking back.
line 48 syphonage — syphoning.

Exercises

1. Give the meaning of:
   sanitation (chapter heading), cistern (4), main (18), stand-by (19), by-pass (24), head (29).
2. Explain in your own words:
   'cold water down services' (10), 'on every tenth floor' (12), 'float switch' (20), 'a partial vacuum' (45), 'to stabilize the pressure conditions' (49), 'long radius curves' (52).
3. Explain in simple language what problems of plumbing are met in high buildings.
4. Write five sentences in which you use:
   booster pump, head of water, incidence of use, sanitary appliances, water main.
5. The verb 'to discharge' has many uses:—
   a ship can discharge its cargo
   a battery can become discharged
   an employer can discharge an employee
   a debtor can discharge his debts
   a wound can discharge
   a soldier can be discharged from the army.
   Put five of these uses into sentences.

6. Look up in your dictionary the words 'head' and 'service(s)'. Find for each as many different meanings as you can.

REBAR DETAILING PLACING DRAWINGS AND APPROVALS

CRSI

ENGINEERING DATA REPORT NUMBER 38

A SERVICE OF THE CONCRETE REINFORCING STEEL INSTITUTE

933 N. Plum Grove Rd., Schaumburg, Illinois 60173-4758

INTRODUCTION

The investigations into the collapse of the mezzanine level walkways of the Kansas City Hyatt Hotel in 1981 uncovered the critical relationship between steel frame design drawings and structural steel shop drawings. Since then many architects/engineers and agencies have taken the point of view that structural steel shop drawings and reinforcing steel placing drawings are the same in nature, scope, and purpose. This correlation is not true.

The *ASCE Manual*[1], *"Quality in the Constructed Project"*, has clarified the difference between the two types of detail drawings. In Chapter 16 of the *ASCE Manual*, the two types of detail drawings are called "Shop Drawings for Structural Components" and "Placing Drawings for Concrete Reinforcing Steel".

This report explains the primary function of a rebar placing drawing, defines the qualifications of a rebar detailer, describes how a placing drawing is produced, and clarifies the responsibility of a fabricator of reinforcing steel.

Q1: Who is a "DETAILER", and what does that person do?

A: A detailer is usually an employee or subcontractor of a fabricator. A detailer uses design information shown on the design drawings and project specifications to "detail" or list all the reinforcing steel items required for a particular portion of the structure. These individual rebar items are then listed, or scheduled, or shown by plan or section on a detail/placing drawing.

Q2: What design information is required by building codes?

A: The ACI 318 Building Code[2] states in Chapter 1, Section 1.2.1, the general requirements governing the design. Specifically, with regard to reinforcing bars, the Code states (in part) that the design drawings shall show "size and location of all structural elements and reinforcement"; "anchorage length and location and length of lap splices"; and "type and location of welded splices and mechanical connections of reinforcement".

Q3: Why is it necessary "TO DETAIL" design information?

A: Design information normally will be specific with regard to the dimensions of structural members and systems, the quantity or spacing of reinforcing bars, and bar sizes, but general as to bar lengths and bar configurations. This general or typical information is not specific enough to be able to cut to length, fabricate, ship, and place (install) reinforcing bars directly from the design drawings. Hence, the requirement that detail/placing drawings be furnished.

Q4: What are the qualifications of a rebar detailer?

A: As a minimum, a person with a high school education, with good mathematical and visual skills would qualify for training as a rebar detailer. Any additional education in computer sciences, drafting or engineering would enhance the qualifications.

Q5: How are rebar detailers trained?

A: Detailers are trained by attending a vocational technical school, by using the CRSI Detailer Training Program[3] with the guidance of a fabricator's staff, by "hands-on" training under the supervision of an experienced rebar detailer, or by a combination of all three methods.

Q6: **Does a rebar detailer use computer detailing and/or computer-aided drafting programs?**

A: Yes, most rebar fabricators employing detailers have a computer program specifically as an aid to the detailer. Many fabricators have computer-aided drafting programs which produce the placing drawings.

Q7: **Does a rebar detailer require an engineering degree?**

A: No, a detailer is a highly trained technician skilled in interpreting data presented on design drawings. Knowledge of structural design is not necessary to become a good detailer.

Q8: **Would it be better if a rebar detailer were a graduate engineer?**

A: With the premise that any higher education will improve the skills of a person, the answer is yes, but as explained in the previous answer, it is not a required qualification. A detailer relies on the architect/engineer to provide the data necessary to properly detail the rebar.

Q9: **Why are the detail drawings for reinforcing steel called "PLACING DRAWINGS"?**

A: As the term implies, "placing drawings" are used by ironworkers at the job site to place (install) the reinforcing bars within the formwork. In preparing placing drawings, detailers determine the quantity of bars from pre-established spacings, bar lengths, bend locations, and bar positioning from instructions provided in the design drawings and project specifications. While preparing the placing drawings, detailers also prepare bar lists. The bar lists are used by personnel in a shop to fabricate the reinforcing bars. It should be noted that "placing drawings" are not used in the shop, per se. Thus, the term "shop" when applied to "placing drawings" is erroneous.

Q10: **Is there a standard type of placing drawing?**

A: Each fabricator produces placing drawings that fit his particular requirements and those of the placing contractors in the geographical area where the project is located, but a standard for detailing reinforcement does exist. The title of the standard is "Details and Detailing of Reinforcement," and it has the designation ACI 315-80(86). The American Concrete Institute publishes the *ACI Detailing Manual*[4], which contains the 315 detailing standard. Illustrative placing drawings and other related information are also included in the *ACI Detailing Manual*. The CRSI book, *Reinforcing Bar Detailing*[5], is based on the ACI 315 standard, and is used to teach trainee detailers.

Q11: **What should a rebar detailer do when design data are incomplete or conflicting or both?**

A: The detailer should either directly or through the contractor establish a line of communication with the architect/engineer in order to obtain the missing data or a ruling as to which data are correct. The procedure which the detailer should follow is to leave the data blank with a request that the data be supplied when the architect/engineer reviews the placing drawing for approval. If the construction time schedule makes this procedure too slow, the detailer should request that the missing or correct data be furnished via telephone or fax transmission. Any design information must be supplied to the detailer, because detailers do not have the engineering expertise or design knowledge necessary to make a judgment as to what may be required. Even if the detailer had some engineering and design knowledge, the detailed structural analysis is usually not available for review. In any case, engineering and design fall outside the scope of the detailer's responsibility.

Q12: **Most project specifications require that placing drawings be submitted to the architect/engineer for approval prior to fabrication. What is CRSI's opinion of this requirement?**

A: CRSI believes that placing drawings should be submitted for review and approval to the architect/engineer. Only the architect/engineer-of-record has performed the structural analysis and design and thus is in the best position to provide interpretations and corrections to any and all details. Review and approval by the architect/engineer-of-record allows corrections to be made prior to fabrication and shipment of the material to the jobsite.

Q13: **Doesn't the previous answer suggest that it might be advantageous to have a registered professional engineer, employed by the fabricator, "seal" the placing drawings?**

A: Detailing is not a design function so the answer is no! The use of a registered professional engineer's seal implies that the person was in responsible charge of, not merely a contributor to, the work. The work in this context is the structural analysis and design of the structure to resist the prescribed loads. A detailer is not that person.

Q14: Why is the CRSI opposed to the requirement that a registered professional engineer seal and sign off placing drawings?

A: The answers to Questions 7 and 8 state that a detailer is a technically trained person experienced in converting design data into a specific detail format. Requiring a registered professional engineer to seal placing drawings is meaningless and only adds to the cost of detailing without enhancing the product. A detailer does not make engineering decisions. Rather a detailer only determines the quantity, size, length, and bending shapes of bars from specific instructions and data provided by the design drawings and project specifications.

Q15: Can the answer to Question 14 be considered a "POSITION STATEMENT" by the Concrete Reinforcing Steel Institute?

A: Yes, CRSI does not think that any useful purpose is achieved by the requirement. Aside from the possible ethical and legal violations, the registered professional engineer who sealed a placing drawing would not have been "in responsible charge" and would have little knowledge of the structural analysis and design other than what was shown on the design drawings. The result would be another layer of engineering expense, but certainly not another layer of engineering expertise safeguarding the public.

Q16: What is CRSI's position regarding the interpretation of building codes?

A: An experienced detailer can undoubtedly interpret some provisions of a building code, but CRSI believes that code interpretation rightly and properly is the responsibility of the architect/engineer. Only the architect/engineer-of-record, through their structural analysis and the specific design resulting from their analysis, can interpret how the code provisions apply in that particular case.

Q17: When project specifications require submission of placing drawings for review and approval, what does that imply?

A: An architect/engineer's review implies that the placing drawings have been checked for conformance to the intent of the design drawings and project specifications. For example, in the case of slabs, that the correct bar size and spacing are called out on the placing drawings; and in the case of columns or beams, that the correct bar size and the number of bars are shown. Approval signifies that the placing drawing reflects the structural design.

Q18: What is the fabricator (detailer) responsible for?

A: The responsibility of the fabricator is to supply all the reinforcing steel requirements shown on the design drawings and project specifications. This means that the fabricator is obligated to furnish the proper number of pieces in the correct bar size, and cut and bent to the correct lengths shown. Should any error occur, such as a quantity shortage, incorrect bar size, wrong bar length, or incorrect bending, the fabricator is obligated to rectify the error expeditiously.

CONCLUSION

Rebar detailing is not a complicated procedure. It is performed by a technician with good skills at interpreting design drawings. Rebar detailing involves the use of information from the design drawings and project specifications to determine the quantity, size, length, and required bending of the reinforcing bars. The detailer then records this information or data on a placing drawing in sufficient descriptive detail so that the field ironworker can place (install) the rebar where intended by the design drawings and project specifications.

CITED REFERENCES

1. "Quality in the Constructed Project" *ASCE Manual* No. 73, American Society of Civil Engineers, New York, 149 pp.
2. "Building Code Requirements for Reinforced Concrete (ACI 318-89) (Revised 1992) and Commentary—318R-89(Revised 1992)". American Concrete Institute, Detroit, 1992, 347 pp.
3. *Reinforcing Bar Detailer Training Program*, Concrete Reinforcing Steel Institute, 1989.
4. ACI Committee 315, "Details and Detailing of Reinforcement," ACI 315-80(86), in *ACI Detailing Manual—1988*, SP-66(88), American Concrete Institute, Detroit, 1988, 218 pp.
5. *Reinforcing Bar Detailing*, Third Edition, Concrete Reinforcing Steel Institute, 1988, 256 pp.

OTHER REFERENCES

"Reinforced Concrete Design Includes Approval of Details", *ACI Concrete International*, V. 10, No. 1, Jan. 1988, pp. 21-22; also CRSI Engineering Data Report No. 28, *Reinforced Concrete Design Includes Approval of Details*.

Placing Drawings for Reinforcing Steel—Obligations/Responsibilities, Engineering Data Report No. 20, Concrete Reinforcing Steel Institute.

D. P. Gustafson, "Designing and Specifying Rebar Embedments and Splices: Who is Responsible?", *ACI Concrete International*, V. 14, No. 5, May 1992, pp. 49-50.

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DIVISION DE EDUCACION CONTINUA

C U R S O S A B I E R T O S .
INGLES TECNICO MODULO AVANZADO.

APLING FOR A JOB

ING. JOSE A. TENA COLUNGA

1A Applying for a Job

WORDS TO KNOW

advertisement (ad)
(to) apply
applicants
appreciate
(to) confirm
employment
(to) enclose
enclosure
Human Resources Director
interest
job
office manager
position
receptionist
resumé
(to) schedule
secretary
stationery
wpm (words per minute)

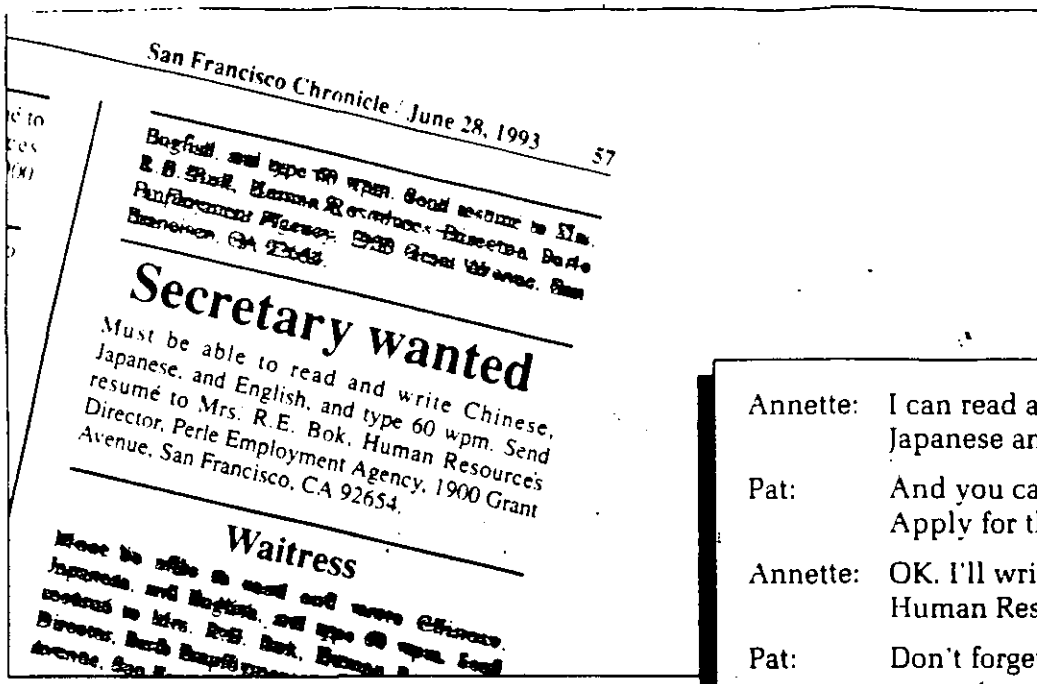
▶***Read this conversation.***

Annette: I need a job, Pat.

Pat: What kind of a job, Annette?

Annette: I want to be a secretary.

Pat: Look at this ad in the newspaper.



San Francisco Chronicle / June 28, 1993 57

Secretary wanted

Must be able to read and write Chinese, Japanese, and English, and type 60 wpm. Send resumé to Mrs. R.E. Bok, Human Resources Director, Perle Employment Agency, 1900 Grant Avenue, San Francisco, CA 92654.

Waitress

Annette:	I can read and write Chinese, Japanese and English.
Pat:	And you can type 80 wpm! Apply for the position.
Annette:	OK. I'll write a letter to the Human Resources Director.
Pat:	Don't forget to enclose your resumé.

▶ ***Complete each sentence with a word from the box.***

advertisement (ad)
(to) apply
Human Resources Director
job
position
secretary

Example:

Annette is applying for the position of secretary.

1. Annette will write a letter to the _____ .
2. Perle Employment Agency needs a _____ .
3. Annette needs a _____ .
4. She will _____ for the position of secretary.
5. Annette saw the _____ in the *San Francisco Chronicle*.

COMMON BUSINESS EXPRESSIONS

In many companies the title of the person who hires new employees is *Human Resources Director*. In other companies the title of this person is *Personnel Director*.

MODEL LETTER: Applying for a Job

▶ *Annette Lee is applying for the job. Read her letter.*

16 North Road
Berkeley, California 95436
June 29, 1993

Mrs. R. E. Bok
Human Resources Director
Perle Employment Agency
1900 Grant Avenue
San Francisco, California 92654

Dear Mrs. Bok:

I am applying for the position of secretary which was advertised in the San Francisco Chronicle of June 28.

I have enclosed my resumé, and I would like to schedule an interview. I will call you early next week.

I look forward to discussing this position with you.

Sincerely yours,

Annette Lee

Annette Lee

Enclosure

▶ *Circle the correct answer.*

1. Who wrote the letter?
   A. Mrs. Bok
   B. Annette Lee
2. Who is the letter to?
   A. Mrs. Bok
   B. Annette Lee
3. Where does Annette live?
   A. 1900 Grant Avenue
   B. 16 North Road
4. What did Annette enclose?
   A. The San Francisco Chronicle
   B. Her resumé
5. What is Mrs. Bok's title?
   A. Human Resources Director
   B. Secretary
6. When was the letter written?
   A. June 28
   B. June 29

GOOD BUSINESS NOTE

"Follow-up" is very important. After you send the letter, you should call the employer. In your letter give either general or specific times to call.

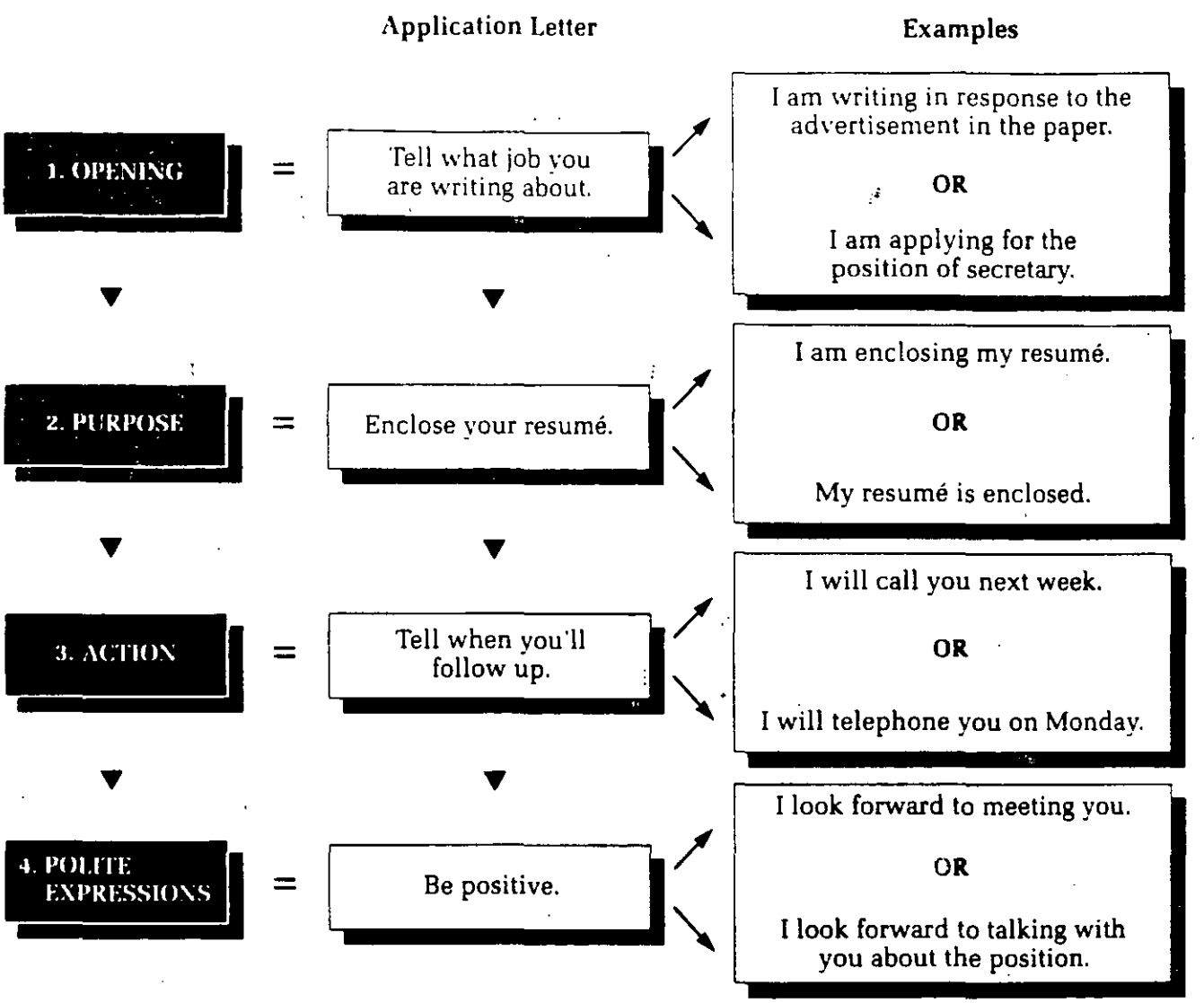
General: I will call you early next week.

Specific: I will call you Monday or Tuesday.

This keeps your name in front of an employer.

BUSINESS STYLE: Body of an Application Letter

A letter of application generally has four parts.



▶ ***Look for these four parts in the Model Letter, page 10. Write the sentences.***

1. Opening I am _____

_____

2. Purpose I have _____

3. Action I will _____

4. Polite Expressions I look _____

PUNCTUATION: Greetings

Colon

Use a colon (:) after the greeting in a formal, business letter.

Dear Mrs. Bok:
Dear Sirs:
Dear Madam:

Comma

Use a comma (,) after the greeting in an informal, personal letter.

Dear Mother,
Dear Richard,

Period

These titles end in periods.

Mr. Smith	Any man
Ms. Schwinn	Any woman
Dr. Ross	A man or woman who is a medical doctor (M.D.) or who has an academic degree (Ph.D.)
Mrs. Jones	A married or widowed woman

▶ ***Write the greeting. Use the correct punctuation.***

Example:

Mr A P Safeway Dear Mr. Safeway

1. Mr James A Smith (your friend) _____
2. Mrs Ann Smith _____
3. John R Marker MD _____
4. Mr Ralph Tenley _____
5. Ms Susan Grant (your cousin) _____
6. Ms Augusta Lee _____
7. Mrs Martha Walpole (your sister) _____

GRAMMAR: Subject/Verb Agreement

The subject and verb must agree in number. If the subject is singular, the verb must be singular.

Example:

Singular Subject	*Singular Verb*	
The letter	is	on the desk.
The secretary	types	the letter.

If the subject is plural, the verb must be plural.

Example:

Plural Subject	*Plural Verb*	
The letters	are	on the desk.
The secretaries	type	the letters.

	Third person Singular		*Plural*
He	writes	They	write
She	wants		want
It	was		were
	has		have
	is		are

▶ ***Complete the sentences.***

was *were*

1. The secretaries _____ on time yesterday.

2. The Human Resources Director _____ in her office all last week.

want *wants*

3. Mary _____ to apply for the position.

4. Fred and Henry _____ new jobs.

writes *write*

5. Jim _____ well.

6. We often _____ letters to each other.

has *have*

7. He _____ enclosed his resumé.

8. They _____ enclosed their resumés.

are *is*

9. There _____ only one job.

10. There _____ many applicants for the job.

BUSINESS STYLE: Formal or Informal

Use formal English in business letters.

Informal English	*Formal English*
I want...	I would like...
I want a new position.	I would like a new position.
I want to be a secretary.	I would like to be a secretary.

GOOD BUSINESS NOTE

Be very careful when you type business letters. Errors do not make a good impression.

▶ ***Change these sentences to formal English.***

Example:

I want to schedule an interview.

I would like to schedule an interview.

1. I want a new job.

2. I want an interview.

3. I want to apply for the position.

4. I want to enclose my resumé.

5. I want to call you soon.

6. I want to change jobs.

Letter Practice 1

▶ *Dorothy Jones answered this ad from the Milwaukee Post. Correct the 10 errors in her letter. Write your answers on the list.*

Milwaukee Post
August 16, 1994

Secretary wanted. Must have experience. Send resumé to Mr. Frederick Wolf, Director of Marketing, Smith Printing Company, 590 Sixth Avenue, Milwaukee, Wisconsin 53216.

5695 South 23rd Road
Milwaukee; (1)Wisconsin 53217
August 16, 1994

Mr. Frederick Wolf
Director of Marketing
Smith Printing Company
Sixth Avenue 590 (2)
Milwaukee, Wisconsin 53216

Dear Mr. Wolf, (3)

I is (4) applying for the positin (5) of secratary (6) which were (7) advertised in the Milwaukee Post of August 16.

I has (8) enclosed my resumé; and I want (9) to schedule an interview. I will cail you early next week.

I look forward to discussing this position with you.

Sincerly (10) yours,

Dorothy Jones

Dorothy Jones

Enclosure

Type of Error	Correction
1. Punctuation	
2. Word order	
3. Punctuation	
4. Grammar	
5. Spelling	
6. Spelling	
7. Grammar	
8. Grammar	
9. Style	
10. Spelling	

COMMON BUSINESS EXPRESSIONS

Positive expressions end most letters. When you write, use positive expressions like these.

I look forward to { meeting you. / talking with you. / working with you.

Letter-Practice 2

▶ *Complete the sentences in this letter. Use the advertisement and the appropriate words from the box.*

Publisher's Monthly
July 16, 1993

File Clerk wanted. Must have high school education. Send resumé to Mr. Paul Rook, Human Resources Director, Rascott Printing, 200 East 57th Street, New York, NY. 10010.

am	July	Monthly	my	Street	yours
East	like	Mr.	position	week	

_____

_____ *(Write your*

_____ *address here)*

July 17, 1993

_____ Paul Rook

Human Resources Director

Rascott Printing

200 _____ 57th _____

New York, New York 10018

Dear _____ Rook:

I _____ applying for the _____ of file clerk which was advertised in the _____ 16 Publisher's _____ .

I have enclosed _____ resumé, and I would _____ to schedule an interview. I will call you early next _____ .

I look forward to discussing this position with you.

Sincerely _____ ,
(Write your name here)

(Print your name here)

Enclosure

Test Yourself

HONG KONG TIMES
AUGUST 9, 1994

Receptionist wanted. Must speak Chinese and English. Send resumé to Ms. Jane Goodman, World Communications, 64 Delrosa Avenue, Los Angeles, CA 90027.

▶ ***Answer these questions.***

1. Where was this position advertised?

   Hong Kong _____

2. What was the date of the ad?

   August_____, 1994

3. What is the position?

   _____

4. Where do you write?

   Ms. Jane _____

   World _____

   64 Delrosa _____

   Los Angeles, _____ 90027

▶ ***Write a letter of application below.***

1B Replying to an Applicant

MODEL LETTER: Replying to an Applicant

PERLE EMPLOYMENT AGENCY

1900 Grant Avenue
San Francisco, CA 92654
415-625-1110
FAX 415-424-5251

July 3, 1993

Ms. Annette Lee
16 North Road
Berkeley, California 95204

Dear Ms. Lee:

Thank you for sending your letter and resumé.

We appreciate your interest in the Perle Employment Agency. We would like to schedule an interview on Monday, July 8 at 9 a.m. Please call us to confirm the time.

We look forward to talking with you.

Sincerely yours,

Mrs. R. E. Bok
Human Resources Director

▶ *Circle the correct answer.*

1. Is the letter from Mrs. Bok?
   A. Yes B. No
2. Is the letter on company stationery?
   A. Yes B. No
3. Did Mrs. Bok receive Annette's resumé?
   A. Yes B. No
4. Did Annette already get the job?
   A. Yes B. No
5. Did Perle Employment fill the position?
   A. Yes B. No
6. Will Annette have an interview on Monday?
   A. Yes B. No

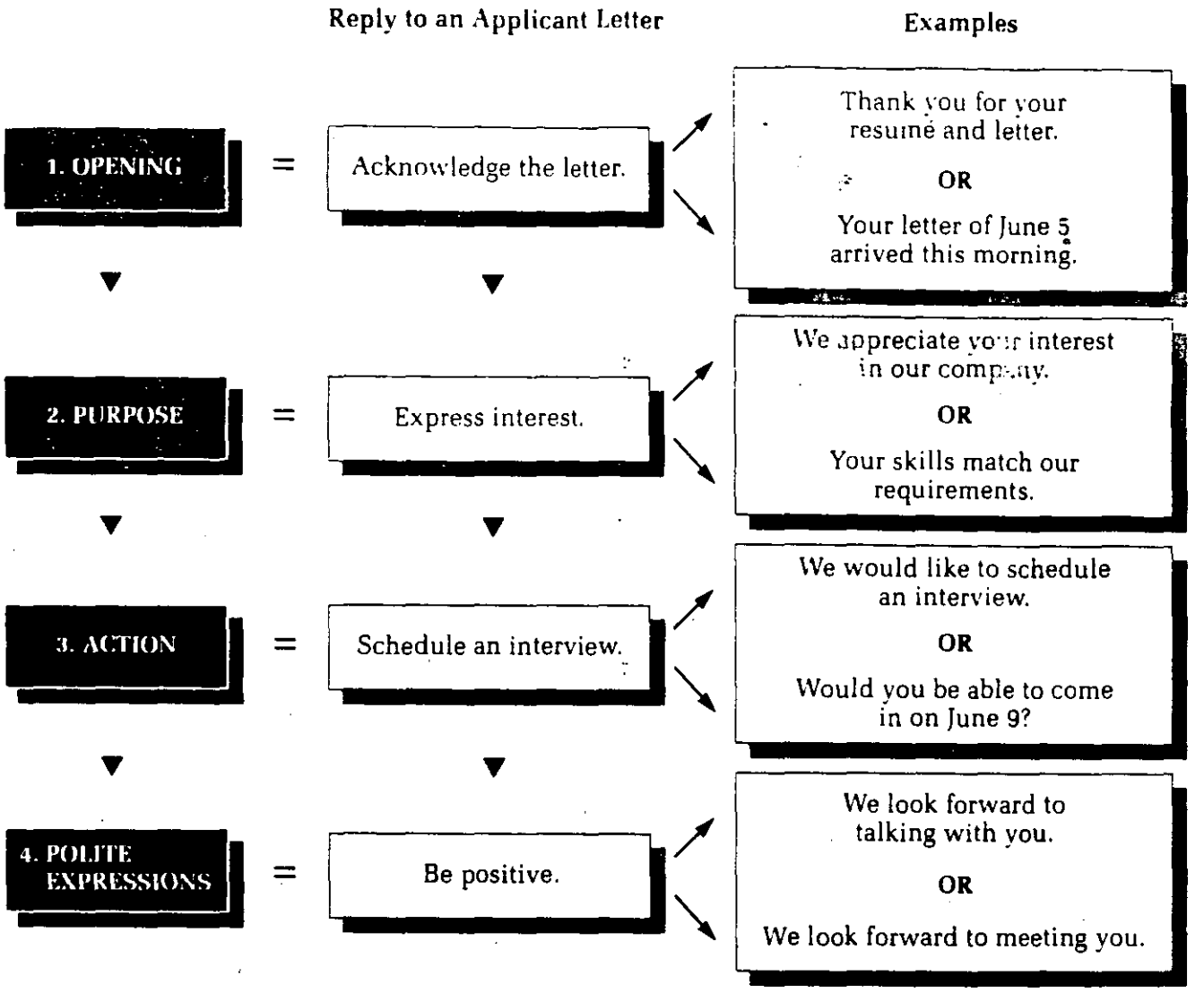
COMMON BUSINESS EXPRESSIONS

Letterhead and Logo
The return address on a business letter is usually printed on the stationery. The pre-printed return address is called a letterhead. The artwork or graphic design is called the logo. When there is a letterhead, the secretary does not need to type the return address — only the date.

ZIP Codes and Postal Codes
The post offices in most countries use letter and/or numbers to sort mail. In the United States, these numbers are called ZIP Codes. In other countries they are called postal codes.

BUSINESS STYLE: Body of a Reply to an Applicant Letter

A reply to an application letter generally has four parts.



▶ ***Look for these four parts in the Model Letter, page 18. Write the sentences.***

1. Opening _____

2. Purpose _____

3. Action _____

4. Polite Expressions _____

GRAMMAR: Capitalization

These words are capitalized:

A. The first word of a sentence

B. Proper nouns: names, cities, states

C. Titles when they are written before a name

D. The names of organizations and companies

E. The days of the week, months of the year, and holidays

F. The first word in the greeting

G. The first word of the closing

▶ ***Capitalize the following words. Write the letter of the rule above that gives the reason.***

Example:		**Rule**
mr. Smith	Mr. Smith	C
1. july		
2. dear Mary		
3. international systems co		
4. there are many applicants		
5. chicago		
6. sincerely		
7. thanksgiving		
8. monday		
9. dr Winslow		
10. los angeles, California		

▶ *Correct the capitalization errors. Write the capital letter over the error. There are 22 errors.*

Gift Galleries
105 West Lake Drive
Sydney, New South Wales
2007, Australia
252-787-6600
FAX 252-786-5600

1 february 28, 1992

2 mr. andrew pan
3 63 fifth street
4 melbourne, 2085 victoria
5 australia

6 dear mr. pan:

7 thank you for sending your letter and resumé. they
8 arrived on february 22.

9 we appreciate your interest in gift galleries, and
10 we would like to schedule an interview on wednesday,
11 March 6 at 9:00 a.m. please call to confirm.

12 we look forward to meeting you.

13 sincerely yours,

14 Bill Reston

15 Bill Reston
16 Human Resources Director

17 Enclosure

GRAMMAR: Prepositions

at + (hour)	We will see you *at 9:00 a.m.* Let's have lunch *at noon.*
on + (day of the week)	We will see you *on Friday.* My appointment is *on Monday.*
on + (month + day)	Your resumé arrived *on June 7.* I called *on January 26.*
of + (month + day)	I received your letter *of May 15.* The ad was in the Boston Times *of June 3rd.*

▶ ***Complete the sentences with the prepositions* at, on *or* of.**

1. Your letter _____ June 16 was received on June 20.
2. My appointment with the Human Resources Director is _____ 5:00 p.m.
3. The interview is _____ Friday.
4. The post office closes _____ 12:30.
5. The letter was mailed _____ November 7.
6. The ad was in the *Publisher's Monthly* _____ January 19.

Letter Practice 1

▶ *Correct the errors. Write the answers above the errors.*

Type of Error	Number of Errors
Capitalization	10
Prepositions	3

NEWSBOOK, INC.
The Newsbook Build: g
Livingston, New Jerse: 07039
201-5911-2113
FAX 201-592-7782

1 September 10, 1993

2 Mikinori Hiratsuma
3 4390 Nagata
4 tokyo, 100 japan

5 dear mr. hiratsuma:

6 Thank you for sending your letter and resumé. They arrived
7 in september 8.

8 we appreciate your interest in Newsbook, and we would like
9 to schedule an interview at tuesday, September 13 on 10:30
10 a.m. please call us to confirm.

11 We look forward to talking with you.

12 sincerely yours,

13 Jean Ryan
14 Jean Ryan
15 Human Resources Director

16 BR/st

Letter Practice 2

▶ *Complete the sentences with an appropriate word or phrase from the box.*

letter	on	resumé
like	on	Shop-A-Lot
Mr.	Reilly	yours

Shop-A-Lot Inc.
100 Washington Street
Scranton, Pennsylvania 18504
717-992-8000
FAX 717-992-8181

February 17, 1993

Mr. William Reilly
96 Columbia Road
Austin, Texas 78746

Dear_____:

Thank you for sending your _____ and _____. They arrived _____ February 15.

We appreciate your interest in _____-___-____, and we would _____ _____ to schedule an interview _____ Wednesday, February 25 at 2:30 p.m. Please call us to confirm.

We look forward to talking with you.

Sincerely _____,

Stanley Price

Stanley Price
Human Resources Director

SP/jk

Test Yourself

▶ *You are Mr. Price's secretary. Follow his instructions.*

From the desk of
Stanley Price

Write a letter to Kimberly Thompson. Her address is 46 Equator Avenue, New Haven, Connecticut 06520. Schedule an interview on Monday, February 23 at 1:00.

Shop-A-Lot Inc.
100 Washington Street
Scranton, Pennsylvania 18504

FACULTAD DE INGENIERIA U.N.A.M.
DIVISION DE EDUCACION CONTINUA

CURSOS ABIERTOS.
INGLES TÉCNICO MODULO AVANZADO.

NOTAS GRAMATICALES

M.C.I. JOSÉ A. TENA COLUNGA.

Negativos especiales.

Negative words:

Nobody	There is nobody home.
Nowhere	He has nowhwere to go.
None	Is auy food left? No, there is none.
Nothing	We have nothing left.
Neithere	I am not 18 years old. Neither do I

Special usageof either

He doesn't speak english well and she doesn't either..
He doesn't speak english well and neither does he.

What causes headaches?
What does the policeman suffer from?

1a
Imagine you are interviewing the policeman. Notice the two different question constructions.

You know that something causes his headaches.
You ask, "What causes your headaches?
You know that he suffers from something.
You ask, "What do you suffer from?

1b
Comment

1 if what or who is the subject, the doer of the action, do not use the question auxiliary (do,does,did).

2 But use the auxiliary if what or who is object, and if you are using a full verb (not be or any of the modals like can, should, must, ought to, etc.).

1c

Now ask the policeman question with who or what.
you now that:

1 Something gives him headches
2 Someone uses the road every day
3 Something happens every morning
4 He does something every day
5 Someone helps him when there is a traffic jam
6 He wear something when it rains
7 He does something when there is an accident

HOW MANY CHILDREN USE THIS ROAD ? HOW MANY CHILDREN DOES MRS. CLAY KNOW ?

2a

Comment
The same rule applics to how much and how many. When they go with the subject the cuestion auxiliary is not used

2b

Now ask the motorist questions with how much how many. You know that:

1 Other motorists use the same road
2 Accidents happen on the road every day
3 He sees accidents every week
4 He knows other motorists
5 His car uses petrol
6 He spends money on his car
7 Super X Petrol costs money
8 Other motorists use Super X Petrol

CONDITIONAL SPECIAL FORMS

If he comes back, we will tell him everything.
When he comes back we will tell him everything
As soon as he comes back we will tell him everything
We won't tell him everything until he comes back

SHOULD

If he should ask me, I will tell him everything.
If it should happend again, call the police

WISH

I wish y had a car. I wish I had done it in time.
I wish it would stop raining.
I wish you wouldn't say that again.
I wish you pay attention to what I say.

VERBS OF INTENTION *

The doctors recommended that I rest more
We insisted that he be present at the meeting.

* (suggest, demand, require, recommend, etc.)

REPORTED SPEECH

Basic situation 1a. suppose a girl like Linda asked you various questions. Now, the day after, you are telling a friend about these questions. Observe the difference in form and tense between the question Linda actually asked and the way you report it afterwards.

"Does the 79A stop on the corner?"	She asked if the 79A stopped on the corner
"Where does the 79A stop?"	She asked where the 79A stopped.
"How far away is Marble Arch?"	She asked how far away Marble Arch was.

Now do the same. Report these questions to a frined. Linda asked them yesterday.

1.- "when does the next bus arrive?"
2.- "Where does the 79A go?"
3.- "Why do buses stop runing at night?"
4.- "Where is marble Arch"
5.- "How long does it take to get there"
6.- "Do many buses go there"
7.- "What's the fare?"
8.- "Is there a cheaper way to get there"

COMMENT 1b

1.- As in all reported speech, the present (is) transformet to the past (was).
2.- The question auxiliary (do, does) is not used in the reported question. thus
" Does it stop here?" becomes "She asked if is stopped here "
3.- Obseve in particular the position of the verb be in report question with, where, how far. etc. (She askedwhere Marbie Arch was.)

Reported Speech

2a. Did you notice this in letter?

My flance's father has told me that ha cannot go on the living without me. y have told him that our love is impossible.

When say, tell, explain, etc. are in present simple or presente perfect.there is

Exercise 2b Study this dialogue.

A: I love you
B: What did you say ?
A: I said I loved you !
B: (a few seconds later) Tell me... do you really love me ?
A: Of course y do! i've just told you that I love you!

Paired Practice 2c With someone else, use the dialogue above as a "frame" for more conversations just like that. A shoul begin with these statements.

1 I want to kill myself.
4 It's raining.

FACULTAD DE INGENIERIA U.N.A.M.
DIVISION DE EDUCACION CONTINUA

CURSOS ABIERTOS.
INGLES TÉCNICO MODULO AVANZADO.

THE AGE OF PARADOX.

M.C.I. JOSÉ A. TENA COLUNGA.

THE AGE OF PARADOX

New developments in technology, global economics, and the ever-intensifying pursuit of efficiency have altered forever our organizations, our careers, and our lifestyles. Fewer full-time jobs, the end of lifelong careers, and the growth of time and knowledge as commodities to be sold all demand that we rethink the fundamentals of society.

In The Age of Paradox, *which the Harvard Business School Press will publish in March 1994, Charles Handy — author of the bestselling* The Age of Unreason — *confronts these enormous changes, prescribing bold solutions for the twenty-first century. In the following adaptation, Handy speaks about today's social and economic trends.*

If we are to cope with the turbulence of life today, we must start by organizing it in our minds. Until we do, we are victims of events beyond our control. The nine paradoxes that follow are one way of framing our confusions. There are obviously many more. Paradox has always been a part of life, going hand in hand with economic progress. Paradox does not have to be resolved, only managed.

The Paradox of Intelligence

Intelligence has become the new form of property. Unfortunately, it does not behave like any other form of property. It is impossible to give people intelligence by decree. It is not possible to leave it to your children. Of course, there is education, but it takes a long time. The situation gets odder. Even if I do manage to share my intelligence, I still keep it. Nor is it possible to own someone else's intelligence. The good news is that it is also impossible to stop people from getting it. It should make for a more open society.

Unfortunately, intelligence tends to go where intelligence is. Well-educated people give their children a good education. The most likely outcome, therefore, is an increasingly divided society, unless we can transform it into a permanent learning culture where everyone pursues a higher intelligence quotient.

The Paradox of Work

Enforced idleness seems to be the price we pay for improved efficiency. Why should we worry? "If work were so great," quipped Mark Twain, "the rich would have hogged it long ago." They have, Mr. Twain. The result is that some people have work and money but too little leisure time, while others have all the leisure time but no work and money.

Why has work become so lumpy? Part of the problem is money. Work is society's way of distributing income. Unfortunately, we also use money as the measure of efficiency.

Organizations are exporting unproductive work and people. Instead of keeping a pool of slightly surplus labor inside the organization, they are pushing those skills outside and pulling them in when necessary. Put many of the full-time workers outside and it is they, not the organization, who bear the costs. The irony is that these unused workers still have to have some money if they are to live. The money has to come in some way from the organizations they left, usually in the form of higher taxes. In the end, much the same work gets done, and much the same money gets paid out, but in different ways. Odd, isn't it?

The Paradox of Productivity

Economies have traditionally grown by turning unpriced work (such as farming) into priced work. The irony is that, although the economy appears to grow, the work that is done may actually be reduced. By pricing the work, we turn "activity" into "jobs," but then some work gets too expensive and so no longer gets done. In many cases, we can't do it ourselves for free because we have forgotten how.

By pricing work, rich societies have increasingly drawn more types of work into their formal economies. They have encouraged specialization and efficiency but, as a result, have priced some of that new work out of existence, deskilled many of their citizens, and created a class of people who have nothing to do if they have no job.

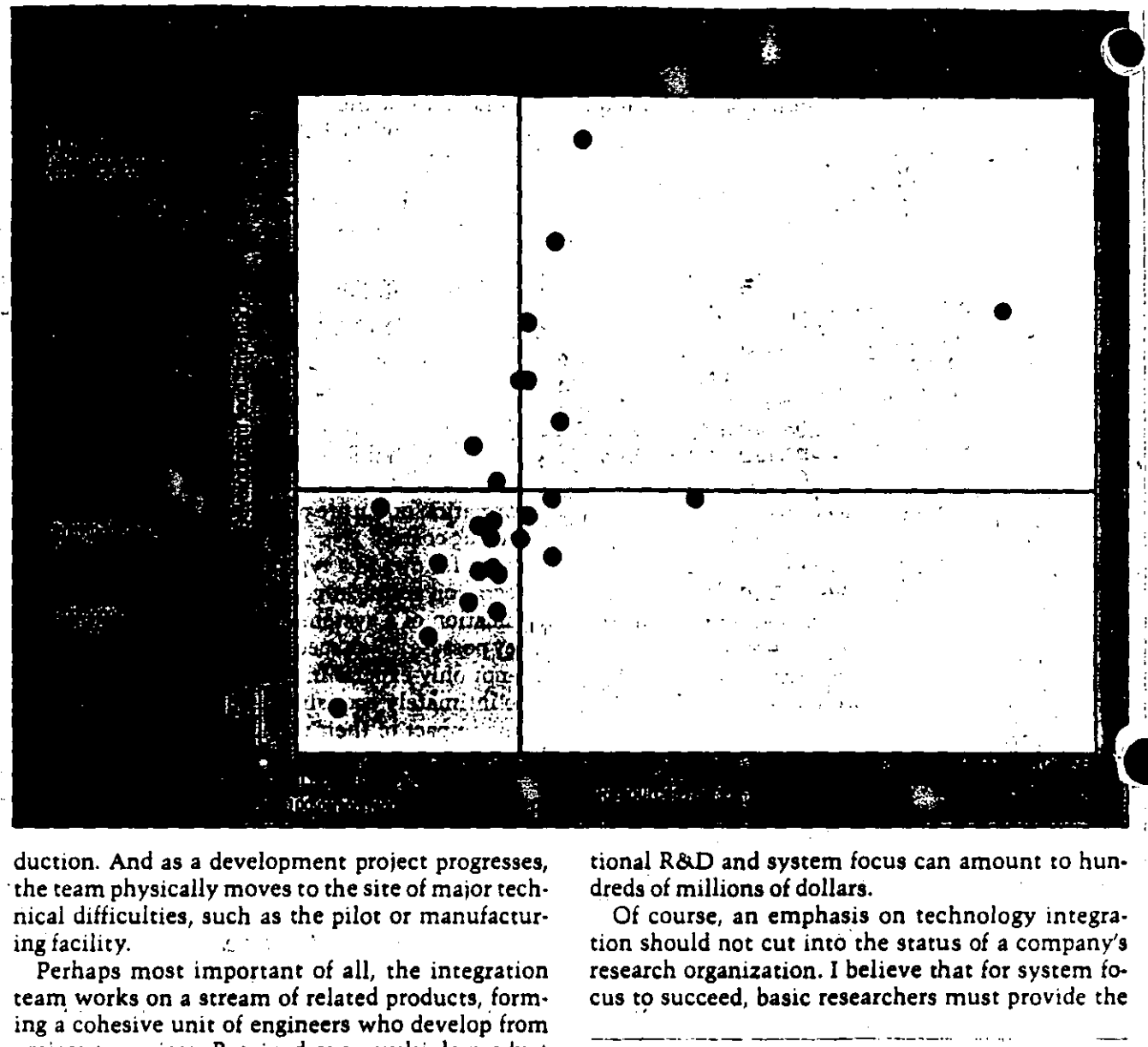
The Paradox of Time

We never seem to have enough time, yet there has never been so much time available to us. We live longer and use less time to do things, so we should have more time to spare. Meanwhile, time in the workplace is becoming unfixed. Organizations have finally realized that there are actually 168 hours in the week, not 40, and are re-chunking time accordingly. Flex-time, job sharing, and sabbaticals are but a few examples. On the face of it, there is enough flexibility for everyone. Why, then, does Juliet Schor need to write a book called *The Overworked American*, which sells so well that it must have struck a chord?

The trouble started when we turned time into a commodity, when we bought people's time rather than buying their produce. Under these conditions, the more time you sell, the more money you make. Organizations, for their part, want less time from the people they pay by the hour but more from the people they pay by the year.

Busy people will spend money to save time. Time, therefore, creates the new growth area. It is no accident that these growth areas will not be best served by large corporations but by small independents providing personal and local delivery, linked into bigger combinations.

(please turn)



duction. And as a development project progresses, the team physically moves to the site of major technical difficulties, such as the pilot or manufacturing facility.

Perhaps most important of all, the integration team works on a stream of related products, forming a cohesive unit of engineers who develop from project to project. Retained over multiple product generations, team members become the company's repository of technically integrated "system" knowledge. While various research groups continue to develop and present new options, it is the integration team that turns new ideas into useful work by conceptualizing new products and providing continuity.

Such continuity over product generations pays off. Even when it comes to individual research projects, system-focused companies can save many years of staff effort and development time (see the graph "Finding the R&D 'Sweet Spot'"). Even one less engineer working on a project saves roughly $100,000 a year; for projects like the multichip module, which extend over a decade and across product generations, the difference between traditional R&D and system focus can amount to hundreds of millions of dollars.

Of course, an emphasis on technology integration should not cut into the status of a company's research organization. I believe that for system focus to succeed, basic researchers must provide the integration team with a broad array of technical possibilities. Most integration teams will have a natural bias toward using older approaches to materials and manufacturing, because that's what team members are familiar with. However, research (whether conducted internally or by outside suppliers) must offset this potential inertia by championing a variety of alternatives. Though they fre-

> For projects that jump several product generations, system focus can end up saving hundreds of millions of dollars.

ties. Yet system-focused companies still achieved superior overall performance because technology integration from the start of the R&D project more than compensated for apparently inferior materials. In other words, the traditional R&D pipeline adds up to a whole that is less than the sum of its parts, while system focus produces a whole greater than the sum of its parts.

Development: How System-Focused Companies Get Results

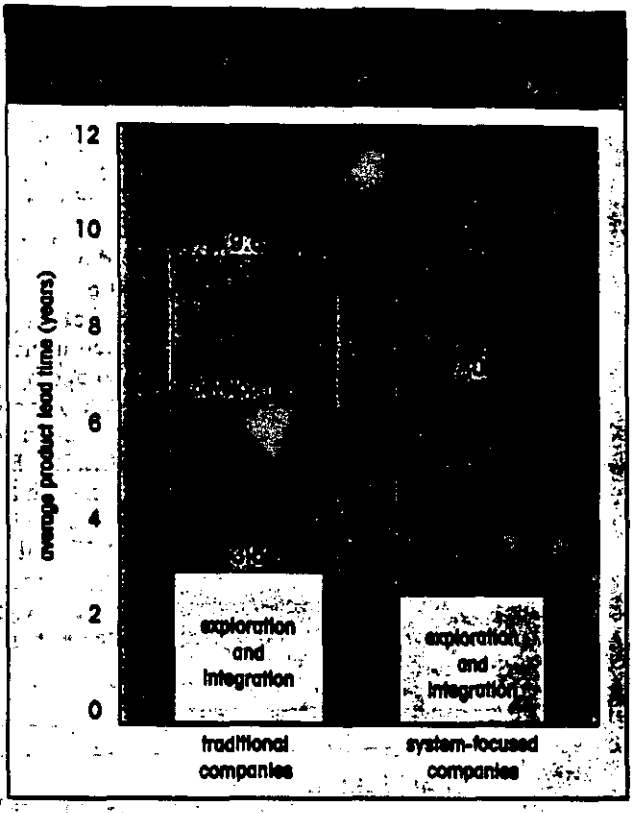
Although comparing the research phases in Company A and Company B shows the importance of system focus, it's in the development of new products that the approaches yield dramatically different results. The "Multichip Module Project Maps" provide graphic evidence of why system-focused companies ultimately save on both time and money in rolling out new products and their subsequent generations.

Company A. When it came time for Traditional Company A to implement the new ceramic material for the multichip module, the resources devoted to the project mushroomed. As you can see in the project map for Company A, a large development group was necessary because of the difficulty of increasing production yields and product reliability. Many of the details of the winning technical concept turned out to be extremely difficult for Company A to implement.

As the head of development for a traditional company in our study observed, "We completely underestimated what it would be like to ramp up." After extensively redesigning the product and manufacturing process, the development group transferred the new multichip module system to the production facility. But pilot production also proved difficult, requiring additional design changes. After many false starts, targeted yields were finally achieved, volume production began, and the development group moved on to the next generation of module, taking over their end once more from the research group.

Due to promotions and individual career choices, many of these development engineers shifted to unrelated projects. In all, it took Company A over 6¼ years of development time and about 800 person-years of engineering and scientific activity to complete the development phase.

Company B. In contrast, System-Focused Company B completed the development phase in less than 4½ years and 300 person-years. The chart



"How Many Engineers Does it Take...?" indicates the big difference in average resources used during development. In Company B, the integration team, which had been responsible for the basic conceptual design, remained in charge of the project during

> One frustrated development engineer said: "By the time we got involved, the basic technologies were more than 90% established."

development. A few team members worked part-time on integration of the next generation. Most were deeply involved with development, working directly at the plant or with materials suppliers.

As development progressed, integration team members gradually shifted to work on the next generation, yet the team still led the process until the plant had achieved full production yields. Many members continued to be responsible for production yields even after the product had been introduced, and they were called into the plant when major problems occurred. In fact, the same people who were responsible for improving production yields of the current generation also often worked

A System-Focused Résumé

The hypothetical "Mr. Furube," a typical engineer at a system-focused mainframe computer company, is years old. In less than a decade, he has worked on three generations of the same product.

Mr. Furube

1991-1992 Engineer
Currently designing chip set for *gen 3* mainframe.

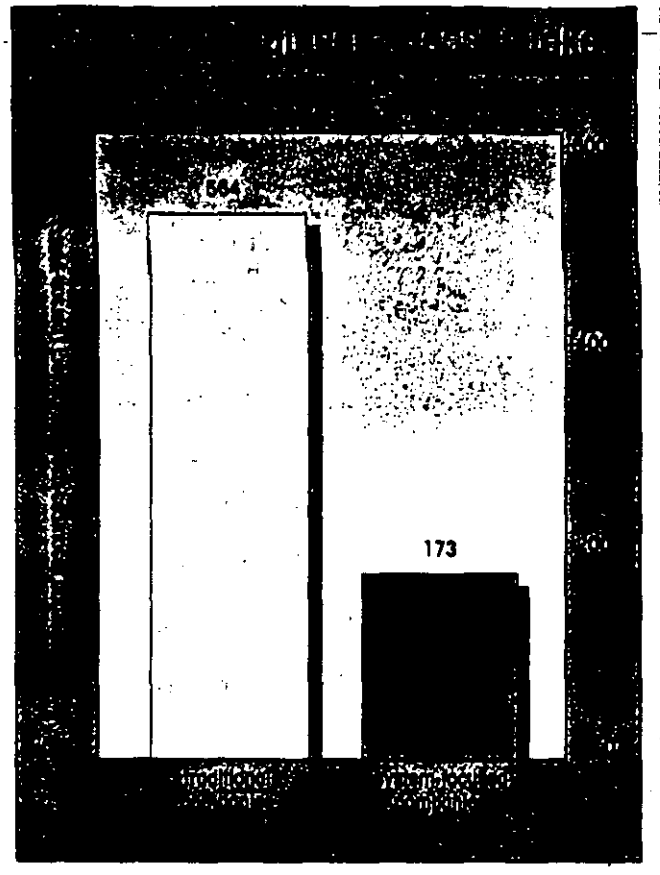
1989-1990 Massachussetts Institute of Technology: M.S. in electrical engineering.

1987-1989 Worker and Trainer
Developed *gen 2* module assembly process, working with suppliers. Designed, ordered, and set up production machines for microchip carrier.

1985-1986 Worker
Improved production process for *gen 1.5* module. Conducted feasibility study for new *gen 2* module concept. Worked on basic conceptual design of *gen 2* module; applied for patent.

1983-1984 Trainee
Developed production process for LSI modules for *gen 1* mainframe; set up specialized machines and trained workers on pilot production line. Designed production process for *gen 1.5* module.

1979-1983 Tokyo University, degree in mechanical engineering



sunk into technology development. Yet without fundamental changes to the whole R&D process – namely, the use of integration teams to facilitate organizational learning – their R&D became even less efficient than before.

Integrated Problem Solving

The companies I've been calling system-focused depart from the traditional R&D pipeline both in philosophy and organizational design. They also differ significantly in their approach to solving problems. Our study included 61 different problem-solving attempts. While the traditional companies took a relatively narrow approach to solving problems, the system-focused companies were remarkable for the breadth of theirs. Consider the following example.

Problem. The core of this multichip module contains more than 40 ceramic layers, each one carrying a complex circuit. The layers first are patterned, then stacked, and finally fired together at a high temperature. However, as the ceramic bakes, it shrinks. Therefore, the challenge is to achieve uniform shrinkage without buckling so that the module retains its shape and has a smooth surface for connecting integrated circuits.

Solution A. Scientists at Company A identified the buckling problem early on in the research phase. At this point, they worked with a simplified model of the multichip module core, using scaled-down equipment in the lab. After making a number of adjustments to the ceramic composition and the firing process, they succeeded in eliminating the buckling.

Later, during the development phase, a more representative model of the multichip module was used on a new pilot production line, which closely – though not exactly – represented the manufacturing conditions of volume production. The buckling problem reoccurred. Development engineers spent much time and energy adjusting the ceramic material and the production process in order to fix the problem again.

At the end of the development phase, the new product was moved to the actual manufacturing plant. Once again, the buckling reoccurred, causing additional delays in the production schedule. After a great deal of effort, the third and final round of reengineering succeeded in eliminating the problem for good.

Solution B. For scientists at Company B, the problem wasn't narrowly defined as "how to eliminate all buckling" but instead as "how to get the entire system to function effectively." The integration team focused earlier on a prototype of the product and the manufacturing process, using a pilot production line with equipment representative of actual conditions but flexible enough to allow experimentation.

Developing a module prototype that was representative of high-volume production conditions allowed the team at Company B to characterize precisely the extent of the buckling. And by asking a broader question at the start and drawing on a broader knowledge base, the integration team found a faster and cheaper solution: controlling the buckling and coating the ceramic substrate with a polymer to smooth the surface. When the project moved from research into development, the buckling problem did not reoccur.

In fact, the system-focused companies in our study were only slightly better at identifying problems early on; they identified 74% of the significant problems in multichip module development, but the more traditional companies found 61% of their own early problems. The most striking difference came in achieving real rather than apparent solutions. Only 40% of the early fixes made by traditional companies stood up to the requirements of

later project phases. Yet 77% of the early solutions discovered by system-focused companies actually worked in the long run.

A New R&D Philosophy

System focus is a philosophy rather than a specific technique, one that underpins and reinforces the importance of technology integration: the mutual adaptation of new technology, product design, manufacturing process, and user needs. An engineer from a system-focused company said, "We get together with the semiconductor and systems group people to discuss future possibilities. Everyone talks about this, and negotiations occur throughout. There's lots of give-and-take."

Compare this remark with that of an R&D manager from a traditional company: "The strategy is always to take a piece of the technology and set up a group to own it. If coordination problems exist, we set up a task force." These two remarks reveal fundamentally different assumptions about what R&D is all about.

Most companies that live by a system-focused philosophy emphasize the work of an integration team during all phases of a project. Yet the substantial advantages of technology integration don't come without investment and the commitment of senior managers as well. It takes time to develop the skills of integration teams. The new approach may appear slow and cumbersome at first. And even after good results start to roll in, team leaders and senior managers still may need periodically to redirect the work of individual team members, helping them to fight inertia.

Still, the most effective companies in our study demonstrated the value of system focus in an environment that is both complex and changeable. Their experience shows that an integration team can build a solid and powerful base of knowledge about the interactions between the most critical decisions in the design of a new product. Of course, while similar in purpose and character, integration teams of various organizations will develop different focuses depending on the nature of the technical environment. In high-performance computer processor design, the link between material choice and manufacturability presents the toughest challenge. Therefore, successful integration teams, like those responsible for the multichip module projects in our study, will emphasize retaining detailed knowledge of the impact past materials choices have had on manufacturing.

In contrast, the pharmaceutical industry provides a very different set of R&D challenges. Integration teams there would find that the most complex interactions are between the chemical formulation of a new drug and its safety and efficacy, as perceived by both users and regulatory agencies. In this case, these would replace manufacturing difficulties and history as the foundation of a rich R&D knowledge base.

But regardless of the industry, the traditional R&D pipeline is not up to managing technology integration in any environment that is characterized by development complexity. A company marketing cosmetics, for example, had to postpone rolling out a new product because its novel chemical formulation proved incompatible with the planned packaging. A forest products company barely avoided the complete failure of a new venture in engineered wood products; it discovered in the nick of time that there were subtle inconsistencies between the preset production process (which had been optimized for northern pine) and the properties of southern pine.

And a pharmaceutical company failed to obtain approval for a new cancer drug due to poor integration of regulatory requirements and the development process. A competitor with a more system-focused approach integrated its regulatory activities and drug formulation accordingly and was able to roll out the new drug, gaining sole access to a very large market.

With sophisticated customers who demand greater performance and new, aggressive, and often subtle product characteristics, developing successful products requires managing an increasing number of complex design decisions. Compared with old-line industries, which carefully nurtured deep knowledge of narrow specifics, today's shifting markets call for a flexible breadth of experience, backed by the organizational and technical ability to integrate.

For system focus to work, then, the company must have a consistent technology strategy and view the whole R&D process as a continuous stream of competence-building projects, not as a series of isolated efforts. Successful companies will target core technical areas and gradually build technology integration in those areas. Such a consistent approach, driven by the long-term commitment of senior managers, will allow integration teams to acquire the knowledge, tools, and procedures necessary for the efficient integration of new technology, ultimately producing the innovative products that customers want.

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INTRODUCTION

The spectacular growth of consumer credit during recent years has been paralleled by an expansion of customer instalment financing services by banks. This growth, with its opportunity for profit, has not been without corresponding problems — pressure from competitors offering additional customer services, increased or changed governmental regulations, control of borrower credit-granting and delinquency, etc.

Bank management faces problems beyond the sheer volume of loan paper handling and record-keeping. In addition to the rising complexity of individual transactions and the personnel skills required to process loans, bank management is under increasing pressure to analyze profitability, effective earnings, cash flow, and forecasted unearned income.

The purpose of this manual is to enable the reader to:

- Define more fully the bank's instalment loan application objectives
- Design reports and reporting procedures to meet the loan officer's requirements
- Start the detail instalment loan system design

From an overall banking viewpoint the advantages of a computer-based instalment loan system are reflected in the following areas:

- Loan management controls
- Customer service
- Dealer service
- Loan department assistance
- Operating improvements

LOAN MANAGEMENT CONTROLS

- Profitability can be analyzed by effective earnings calculations, and by forecasting unearned income.
- Portfolio forecasts, by month, are made of total principal balance outstanding and the amount of earnings to be realized in each of the next 120 months.

Portfolio forecasts are also made by dealer, type, and branch as a means of analyzing this activity for potential expansion.

- Dealers are analyzed, individually and comparatively, for bank earnings, delinquency, and repossessions; also for reserves, outstanding loan balances, and monthly volumes.
- Branches and loan types are analyzed similarly.
- Delinquency is flagged immediately for late first payments and at preset intervals for subsequent late payments.
- Late charges are assessed according to policy and law; reports include late charges waived, collected, and outstanding.
- Audits are provided by balancing to control totals, by transaction audit trails, and by reports on error exceptions or unusual conditions (for example, small balances, long-term prepaids). Individual transaction audits are made to ensure adherence to bank policy, state laws, and dealer agreements.

CUSTOMER SERVICE

- Payoff quotes are accurate and readily available from the trial balance.
- Special handling (for example, no mailings, no late charges) is accommodated.
- Checking accounts can be used for automatic repayment.
- Information on loan interest paid can be provided for tax filing purposes.

DEALER SERVICE

- Sales prospect lists are available from account data on borrowers with good repayment histories.
- Assistance can be provided in credit granting and protection of reserves subject to contingency agreement.

UNEARNED INCOME DISTRIBUTION — INSTALMENT LOAN — 01/11/6- PORTFOLIO PROJECTION

MO/YR	OPENING BALANCE	INCREASES	REDUCTIONS	CURRENT BALANCE	FUNDS IN USE	% RETURN	MO/YR
01/6- 02/6- 03/6-	198,613.85 183,334.57	15,989.13 14,621.45	239.81 207.40	214,363.17 197,748.62	25,183,801 23,180,033	0.85128 0.85318	01/6- 02/6- 03/6-
11/7- 12/7-	0.00	8.72	0.00	8.72	947	0.92048	12/7
MONTH-TO-DATE TODAY'S CHANGES	2,457,197.70	101,679.85 12,453.32	2,738.61 0.00	2,556,138.94			

Figure 1. Unearned income distribution and portfolio projection for next 120 months