Section Three:
ENGINEERING

11.
Instrument engineering

[Image removed at request of London Metropolitan Archive as a condition of digital distribution.]

Asbestos measuring equipment, manufactured in London, being used by a local authority. Precision instruments of this kind are world leaders in their field.
Photo: John Smith (IFL).

Instrument engineering

Summary

1.   London with its concentration of research and university departments is a viable centre for instrumentation with over 200 scientific equipment companies operating in the area.

2.   Although the London sector only employs 12,000 people, i.e. 5% of all engineering employment, these figures understate the strategic importance of instrumentation.

3.   Instrumentation feeds directly into the electrical/electronics sectors — both major employers in London. In addition, innovation in this sector encourages process innovation in the manufacturing and service industries.

4.   The sector is at the forefront of British engineering in adopting electronics in both process technology and products. As such, the industry combines the precision engineering skills of London's labour force with the new demands of micro-electronics.

5.   Although multinationals like Fisher Controls, Landis and Gyr and GEC dominate the London sector, there still remain some 27 medium sized family-owned companies concentrated in the subsectors of environmental monitoring, electrical/electronic instruments, temperature monitoring and laboratory equipment.

6.   An investigation of these independent London companies found that although most are operating in niche markets alongside multinationals, their strong links with the research establishments has enabled them to bring forward products that are often at the forefront of their respective fields. Indeed some are playing important roles in the development of new technologies and products in the areas of pollution, new materials and medicine.

7.   However it was also clear that many of the long-established companies are failing to address the problems associated with the transition from electromechanical systems to electronics. Companies lack both the finance

and skill to implement retraining programmes new production, testing equipment and international marketing strategies. The latter element is especially true for the newer high technology companies.

8. It is for this reason that an institution like GLEB, which can bring together both finance and industry expertise, has a crucial role in restructuring certain subsectors in the instrument sector.

A viable centre for instrumentation

11.01   London has long been a centre where many scientific businesses have originated. The nearness to important academic centres, the teaching hospitals, Government departments and trained labour have been central to the development of this industry. Although the past decades have seen the decentralisation of this industry to the south east generally, where 50% of the sector's employment is now located, London remains an important and viable location for the sector. Today more than 200 scientific equipment companies still exist in the Greater London area, largely based near the perimeter, concentrated in Enfield, Barnet, Ealing and Hounslow, and to the south in Merton, Croydon and Lewisham. Much of this development is the result of the growth of new industries in the interwar period and is linked to the high degree of concentration in the south east of military facilities, government research establishments and the aerospace industries.

11.02   The London scientific and industrial instrument sector is dominated by well known multinationals like Western Scientific, Smith Industries, Dolby, GEC and Landis and Gyr. The largest 31 establishments account for nearly 80% of employment, whilst the majority of companies employ less than 100 people. Between 1979 and 1981 there was a job loss of 11% in this sector; this compares favourably with 18% in the electrical and mechanical engineering sectors in London.

11.03   The instrument industry originally had its roots in the workshops of the craftsman instrument maker who catered for the needs of tradesmen, navigators and scientists. However, today it is difficult to define the industry, and an important characteristic is that new technologies and new market opportunities are constantly changing the sector's area of influence. Indeed, the sector encompasses an extremely diverse set of products, ranging from gas meters to advanced telecommunications control equipment, from thermometers to complex analytical equipment for industry, science and medicine. The products of the sector feed directly into many industries, for example, food processing, defence, chemical research and agriculture.

Strategic importance

11.04   Today there are nationally over 1,000 instrument firms, employing 80,000 people, with a turnover, excluding medical instruments, of £1,700 million. This represents about one-third of EEC production and the UK is the second largest producer in the community after Germany. In the Greater London area the sector employs some 12,000 people, i.e. 15% of national employment in the sector.

11.05   Instrument engineering fared well compared with other engineering sectors throughout the 1970s, both in terms of output and employment; it grew

at about 5% per annum in real terms. Since 1979 exports have partly offset declining home markets. Warwick University consider that instrumentation is a robust sector in the UK economy and that growth in both employment and output is projected throughout the 1980s. This may be optimistic but industry commentators expect present employment levels at least to be maintained.

11.06   Although the sector accounts for only 5% of engineering employment in Greater London (nationally this figure is 1.5%), these figures understate the strategic importance of the sector. Instrumentation feeds directly into the electrical/electronic goods sector, a major source of employment in the London area. In addition, product change and innovation in instrument engineering tend to work through into process innovation in the manufacturing and service industries. Close collaboration between the end-user and the instrument sector is important for the efficiency and future development of these sectors. Advanced instrumentation, for example, is important to manufacturing control systems, to systems for conserving energy, health care and to the monitoring and control of industrial pollution. The influence of scientific and industrial instruments represents roughly 17% of plant and machinery investment of the principal user industries.

11.07   This sector is at the forefront of British engineering in adopting electronics in both products and processes. As such, the industry combines the precision engineering skills of the London labour force with the new demands of micro electronics technology.

Basic characteristics

Sector trends and their implications for London

11.08   In line with other European countries and the USA, process control instrumentation has dominated the UK sector, although its importance has diminished throughout the 1970s. There is a high degree of multinational involvement (mainly US) in this sub-sector, where about two-thirds of UK output is produced by US companies like Honeywell, Fisher Controls and Foxboro. There is no large British company operating in the process control industry. This part of the industry has borne the brunt of the recession. The cutback in capital investment, together with the transition to electronics in the last five years, has meant that some major companies in the industry like Brown Boveri & Kent and Fisher Controls have faced serious financial problems.

11.09   Restructuring for these companies has meant cutting back on their older production sites in London, where they were once important employers, and concentrating their developments in their newer green field sites, generally still in the south east.

11.10   London has missed out on the recent growth markets in electronic test and measurement and automatic test equipment where growth is projected to

be around 10-20% throughout the 1980s. The leading companies in this sector like Racal and Datron have tended to locate outside the GLC area but within the south east region, where attractive surroundings have made it easier to recruit technical staff. Nevertheless, with its research infrastructure London still remains a viable location for companies in this sub-sector, where new market niches and low barriers to entry have enabled many smaller companies to operate alongside the larger groups. Another potential growth area, especially overseas, is environmental protection and monitoring. This is well represented in the London area.

Multinational involvement in London companies

11.11   Large instrument companies have not derived their strength principally from economies of scale in production, but from economies in research and development and marketing. Although the advent of the micro-processor has led to a move towards standardization, especially in the process control sector, customisation and small markets still predominate. Even today in the UK, there are only 20 companies like Marconi and Racal which employ over 1,000 people and even these are comprised of small manufacturing units.

11.12   It is for this reason that there has been a two way movement in multinational involvement in London companies. Whereas the established companies took the opportunity of rationalization to move to green field sites, other companies have actually been buying into the smaller London firms. The increased profitability of the sector, as a result of microprocessor technology in the last few years, has made certain sub-sectors, especially electronics and medical instrumentation, an attractive investment opportunity. It is therefore probable that multinationals, not necessarily from electronics or instruments, will continue to have a significant presence amongst London instrument firms.

Foreign competition

11.13   This sector operates in a strong international market. Its main competitors are the USA, Japan, Germany and to a lesser extent the Scandinavian countries. 55% of its output is exported and it boasts of a trade surplus. Over the last decade the trade position of instruments has been deteriorating, with import penetration rising from 39% in 1977 to 50% in 1982. The world market will continue to grow, but it is unlikely that the UK industry will retain its market share.

11.14   Throughout the 1970s the declining performance of the industry has been attributed to two main areas. The first is the lack of integration of the instrument sector into electronics firms. This is in contrast to US companies where the interaction of technologies between the sectors have given them a technological lead. The other has been the failure of companies to get their products on to the international market. The UK home market is too small to support the research and development and marketing needed for the

specialised equipment, so exports are essential. While, in recent years, the sector has improved its export performance (the trade association and government departments have focused attention on this area) the UK industry continues to have a negligible share of world markets.

The role of family firms

11.15 In London there are some 27 independent family companies employing over 40 people. Given the strong international dynamics of the sector, the rapid change of technology and the need for international market penetration, the question arises whether the independent company can survive, without the backing of a stronger financial parent, and whether there is a role for local enterprise board initiatives in retaining and creating viable jobs in this sector.

11.16 Four sub-sectors where family-owned firms exist were identified for investigation. These were environmental monitoring, electrical/electronics, temperature monitoring and laboratory equipment (work on this latter sub-sector is incomplete and has not been included in this chapter). In total 17 companies fitted into these categories, most of which were long established family companies operating in niche markets alongside multinationals. Two companies had been established in the last decade and these were involved in high technology products.

Meteorological and environmental monitoring equipment

11.17 This is one sub-sector where existing London companies already have some considerable strength, albeit at the low technology end. In general, these firms employed around 100 people and most forecast employment growth in the technical, design and electronics divisions. All are second generation or older family companies, but in most cases the family has stepped sideways in the last few years and employed professional management from the instrument sector.

11.18 These companies are basically electromechanical but well advanced in introducing electronics into both production processes and products. All companies have made substantial rationalization in their product ranges and were trying to cut their dependence on government precision engineering subcontract work (mainly from the MoD) and strengthen their pollution monitoring division especially in the export markets where profit margins are more attractive. One company, for instance, has built up pollution monitoring equipment to 50% of turnover in four years, while another is developing environmental equipment to complement its original products in water measurement.

11.19 London companies have been strengthening their position in the pollution area through acquisitions, through buying in higher technology products, often from large US companies, and in the last few years through

substantial investment in product development, not only in electronics but in new measurement techniques. The basic strategy of companies is to maintain their exposure in low technology products, for which there will always be a need, but at the same time build up their overseas markets with more technology-led products.

11.20 One of the strengths of this sub-sector in recent years has been their quickness to take advantage of new opportunities in the asbestos markets and in total dust monitoring where the UK research establishments have a strong and internationally respected depth of knowledge.

11.21 In low technology products, competition comes mainly from UK companies. For example, two London dust monitoring companies share the UK market with very little competition from foreign companies whose products are generally more expensive. In the high technology international markets, competition is mainly from subsidiaries of US multinationals. Nevertheless, because of the fragmented nature of instrument markets one London company has managed to penetrate the technology-led international markets with a continuous workplace dust monitor using laser technology and, indeed, the company boasts that within its price range this instrument is a world leader.

11.22 One of the weaknesses of the sub-sector has been in the transition from precision engineering to electronics — one London director described the changes as a 'miniature industrial revolution'. This has had far reaching structural effects within companies which have faced the problems of changing skill base and the consequent need for different types of labour and, in some cases, in-house training programmes. It has also led to new factory and plant requirements. The environment of precision engineering does not meet the requirements of the dust and noise free environment of the microprocessor world. Similarly, the increasing complexity of products requires improved quality control and testing equipment. It was in this area that many companies had failed to keep abreast of recent developments. Indeed, one of the London companies relies on its customers' test equipment to provide exact measurements of its products' performance.

Electrical/electronics sub-sector

11.23 The electrical/electronics group was the most diffuse with little common ground between companies. They ranged from relatively low technology electrical meter companies to younger high technology companies catering for specialist niches, where the world market for a product line could be as small as £5 million. Companies were smaller in general than in environmental monitoring, employing around 30-60 people, with projected growth in the higher technology companies.

11.24 Small companies like these play an important part in the dynamics of this sector, especially in London. It is often the small company started up by a technologist from a large instrument company or research department that

exploits some of the opportunities of new technologies and develops these into products. Indeed, one such London company, with its main competitors from abroad, has an important role in linking into the research and development of some of the UK leading engineering/electronics companies. Nevertheless, technology-led companies such as these are facing constraints on development in two main areas, i.e. the need to strengthen their business and commercial expertise and the necessity to build up a strong international profile.

11.25 London companies in this group spend well over 10% of their turnover on research and development. To sustain this level a strong international market is necessary. Although most companies already export about half of their sales, other more successful UK instrument companies export some 80-90% of production. However the lack of finance and managerial expertise can mean that the costs of such a strategy are high. One such London company which has been at the forefront of its technology in the last decade has had a disappointing financial performance for this reason.

11.26 Industry commentators argue that there is likely to be a polarisation in the industry between the small and the larger companies, with the independent medium sized companies finding it difficult to finance both the costs of research and development and an international marketing strategy. Nevertheless, there are examples of UK companies like Racal and Datron which have successfully bridged this small/large divide by breaking into major export markets. A recent report on the financial aspects of the industry found that the smaller companies which have made the effort to penetrate international markets are some of the most profitable in the sector.

Temperature measuring equipment

11.27 Companies in this sub-group manufacture clinical and industrial thermometers. Although the average size of a company is still around 100 employees, they are essentially electromechanical and appear to have been slower than other groups in adopting electronics into their product ranges. Indeed, all new digital thermometers were bought in from Japanese and US companies.

11.28 The slow reaction to electronics in the clinical sector may be the result of the need for products to be covered by approval to British Standards which has ensured that so far the home market has gone to British companies. Nevertheless, the overseas markets, representing roughly 50% of sales, is under threat from competitors like DuPont which are locating the production of their standardized products like thermometers in low cost Third World countries, like India, and exporting from there. Similarly, industrial thermo-meter companies showed little attempt to keep up with product development in their field, probably as a result of poor family management, and were surviving on the production of one-off pieces of equipment. Although these companies are now rationalizing their product range and bringing in new technical directors the low level of investment in plant and machinery and dated products must be a serious handicap for any turnaround.

The changing skill base and implications for women's employment

11.29　The rapid adaption to electronics in some of these companies has meant that the need for traditional skilled workers, such as instrument makers and mechanical fitters, has been drastically reduced while companies are increasing their technical and scientific staff. Although some companies have implemented in-house training programmes to tackle the problems of technical change, much of this transition has been effected through redundancy and recruitment. These recruitment trends are reflected in EITB training courses which have declined drastically since 1979. Indeed, the occupational structure of the industry shows a higher proportion of technical and scientific workers than the engineering industry as a whole and the CBI have identified the sector as now facing severe labour shortages which is restricting the industry's development.

11.30　The increase in skill requirements in the industry may explain why the proportion of female workers, which is higher than in other engineering industries has declined. Women are concentrated in clerical and operator positions and, as women are poorly represented in higher education, they have less access to the growth areas in the industry. EITB data for April 1983 shows that there were only 36 women technicians and scientists in the London instrument sector compared to almost 1800 men.

11.31　One criticism of training more generally is that, while there are university research departments specializing in test and measurement, there are no specific degrees or training courses to take account of the particular requirements of the industry.

Trade unions

11.32　Very few London family companies are unionised and consultation is usually through a works committee often chaired by management. According to the unions covering the sector, namely TASS, AUEW and ASTMS, this was fairly representative of this type of company in the industry while the larger companies like Brown Boveri & Kent and Marconi are generally fully unionised.

The future of the family company

11.33　This is a critical stage in the development of the family company in this sector. The demands of the industry mean changes not only in products but in production, marketing and design. While these companies cannot in general be described as market leaders, there is every evidence that some are utilizing UK research and bringing forward products that are at the forefront of their respective fields. Indeed, some companies are playing an important role in the

development of new technologies and products catering for the new needs of modern life in pollution control, new materials and medicine.

11.34 How is this potential to be realised given the problems of medium-sized famílt firms in this sector? Although finance is available through the DTI and BTG for innovation and product development (most companies have made use of these facilities), companies lacked both the finance and expertise to address the other issues of industrial change. City institutions are in part investing in these companies, but the additional development role is lacking and as a consequence companies are failing to take full advantage of the new markets, thus affecting their long run viability. Only by the active intervention of an institution such as GLEB, bringing together the different elements of financial and industrial expertise, can the crucial process of restructuring be achieved in these firms leading to the maintenance of employment in the instrument sector.

Sources

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Proposals for action

1.   GLEB is seeking opportunities for direct investment into the environmental monitoring sub-sector, which offers growth markets, but where some companies are having to address the problems associated with the transition from electromechanical to electronic technology.

2.   GLEB is also considering direct investment into the high-technology companies which are offering growth potential in quality jobs, but at the same time need both expertise and finance in projecting their products onto international markets.

3.   GLEB is investigating the usefulness of establishing a London based instrument marketing/business organisation, possibly through joint initiatives with one of London's technoparks.

4.   GLEB is seeking to strengthen expertise in companies which it finances, through the development of enterprise planning, where the free flow of information within factories will enable companies to tackle the problems of technical change. In addition, the appointment of non-executive directors from leading companies in the industry will add fresh stimulus.

5.   GLEB is promoting company training programmes (partly to be financed through the European Social fund). Since many London companies employ around one-third ethnic minorities, mainly in electromechanical work, such intervention will enhance the capabilities of the least advantaged groups.

6.   GLEB will investigate the possibility of setting up a centralized Automatic Test Equipment service. This would be linked to other GLEB initiatives like the London Production Centre and the London New Technology Networks.

12.

Arms conversion

[Image removed at request of London Metropolitan Archive as a condition of digital distribution.]

The Lucas Aerospace Workers Combine Committee's plan for the manufacture of socially useful products has served as a model for arms conversion projects all over the world. Shown here is the prototype road-rail bus built from the workers plan.
Photo: CAITS.

Arms conversion

Summary

1.   About 100,000 jobs in Greater London are dependent on the defence budget. The south east, including Greater London, is more heavily dependent on defence spending to support jobs than any other region in the UK. But the total number of jobs in defence is diminishing despite increases in defence spending.

2.   Assuming real annual increases in the defence budget of around 3%, it is estimated that the number of defence jobs in Greater London would fall by 15,000 over the period 1984-1988.

3.   By 1988, and assuming the Trident missile programmes continues, between 2,000 and 4,000 jobs in Greater London will be connected with nuclear weapons production, support and administration.

4.   Savings in defence expenditure can create a higher level of job opportunity if invested in non-military sectors of the economy. Since the vast majority of defence products and components also have a potential civil use, conversion and the development of alternative products will not necessarily be required. However, the developing of alternative markets for existing products currently going to defence will require imagination, effort and money.

5.   Government, or institutional machinery of some kind, will be required to plan and co-ordinate reductions in defence spending with a programme of re-investment in non-military products if large-scale redundancies in the defence sector are to be avoided.

6.   Yet we cannot wait for a change in government policy. If job loss is to be avoided planning for such eventualities needs to start now. To this end the GLC has helped to set up an arms conversion council for Greater London (the GLCC). The GLCC plans to encourage the formation of Alternative Use (or Technology Transfer) Committees at each defence location. It will assist in the preparation of plans for alternative uses of the defence facilities, including

the possibilities for transferring technology to the Third World, and campaign for their adoption. A series of conferences are being organised, for both workers and employers in the defence industries, by the Conversion Council to begin this process.

Introduction

12.01 Employment in Greater London is heavily dependent on government defence spending. In total the defence budget generates 94,500 jobs within Greater London's boundaries: 60,000 in manufacturing industry, 20,000 civil servants in the Ministry of Defence and 14,500 members of the armed forces based in London.

12.02 The geographical spread of the defence industry throughout the UK shows a noticeable clustering in certain areas such as Strathclyde, Manchester, the West Midlands and the south east. The south east, including Greater London, is without doubt the region of greatest concentration. From Stevenage in the north to Crawley in the south there are some 64 companies which have major contracts with the Ministry of Defence. In addition there are eight MoD research and development establishments and a Royal Ordnance Factory. Roughly 40% of all defence expenditure is in the south east. It provides 300,000 civilian jobs in defence and defence-related industry. The south-east is therefore something of a defence-orientated economy, locked into the need for constant renewal of contracts for weapons systems and equipment.

12.03 The number of jobs in defence is diminishing quite rapidly despite substantial increases in defence budgets. The established trend is towards a highly sophisticated technology which is more costly but less labour intensive. Over the last two decades employment in defence has fallen by 25%, while spending has increased (in real terms) by 20%. Since 1963, 400,000 jobs in defence have disappeared and current government estimates suggest a further 200,000 will be lost by 1987-8.

12.04 Regional employment planning needs to be seen against this kind of background. The level of defence dependency in the south east means that there would be serious economic dislocation in the event of any reversal in defence spending. There is therefore an urgent need to begin preparing detailed proposals for technology transfer, the development of alternative non-military products, and alternative markets, all of which would act as a safety net and assist in smoothing industrial transition if, and when, defence spending is reduced.

12.05 To do nothing is to assume an ever-increasing defence budget and a continuation of the arms race. The GLC is opposed to that. It has expressed the need for arms reductions and lower defence spending. But in terms of industrial strategy the GLC recognises that planning for such an eventuality is essential if large-scale redundancies are to be avoided.

Future prospects for the defence industry

12.06 Assessing the future prospects for defence contractors and jobs in Greater London, say over the next ten years, requires assumptions to be made about defence policy and spending patterns. The three broad alternative assumptions made here are:

(a) The continuation of present policies and an annually-increasing defence budget.

(b) Some reduction (or stabilisation) in defence spending arising (say) from changes in policy or for internal economic reasons.

(c) The introduction of a non-nuclear defence strategy for the UK.

First assumption: unchanged government policies

12.07 Defence expenditure for 1985-6 has been confirmed at £18,060 million. This is the seventh successive year of real growth in spending. Yet the number of jobs in defence is diminishing. A number of significant characteristics can be identified in this process of defence expenditure increases and defence employment decreases.

12.08 First, account needs to be taken of Britain's diminishing role as a colonial power. Global military commitments are no longer necessary on the

Table 1: **Employment in Defence (thousands)**

	1963	1981
MoD Employees		
UK Service Personnel (Regular Forces)	427	331
UK based civilians (excluding ROFs)	299	203
Industrial Employment from MoD expenditure		
Direct Employment		
Equipment programme, including ROFs	362	240
Other spending, including construction	130	90
Indirect Employment	379	270
Total Employment from MoD expenditure	1,597	1,134
Export of Defence Equipment		
Direct and indirect industrial employment	95	140
Overall Defence Employment	1,692	1,274
DEFENCE SPENDING (£ million 1981-2 cost terms)	10,345	11,478

Source: Ministry of Defence

same scale. Therefore less military equipment is required, fewer workers are required to produce it, fewer armed forces to operate it, and fewer civil servants to administer defence policy.

12.09   However, adjustment to a new role in world affairs is not the end of the matter. The trend towards a diminishing overall number of weapons systems and delivery platforms continues. In 1950 the Royal Navy had 376 warships (including submarines), the RAF had 1,500 front-line aircraft, and the Army had 1,100 tanks. In 1980 the corresponding figures were: 97, 500 and 800.

12.10   Ships, tanks, aircraft and missiles are also becoming much more lethal and more versatile in function. Accuracy, range and destructive power have all improved dramatically, so again fewer are required. Sir Ronald Mason, former Chief Scientist at the Ministry of Defence, referring to the complex defence strategy debates going on in Europe, says:

> If these debates are reduced to a single question it is: 'What technologies will provide for force multiplication over the next 15 years?' Force multiplication means enhancing capability through improving individual weapons systems rather than through increasing their number.

That can only mean further shrinkage in the total amount of military hardware produced.

12.11   But such performance improvements are costly. For example, according to the 1982 Defence White Paper, the Type 22 frigate is three times as expensive as the Leander-class frigate; the Harrier aircraft is four times the cost of the Hunter; and a new artillery shell is double the price of its predecessor. The programme cost of 385 Tornado multi-role combat aircraft will be over £12 billion. That exceeds the real cost of the entire Second World War Spitfire programme of 21,000 aircraft.

12.12   Weapons design has attempted to incorporate the latest (state of the art) developments in science and technology. More effort and more expense is required to obtain smaller and smaller improvements in performance. A recent government White Paper stated that 'The total amount spent on procurement with British industry will continue to rise, but with a shift of emphasis towards the advanced technologies rather than the older labour-intensive areas.'

12.13   In 1983 half of the total procurement budget went to two industries, aerospace and electronics. The research-intensity of military products is now about 20 times that of civil products. Research and development accounts for 30% of the cost of military production as compared to 1.3% of the cost of all manufacturing output in the UK.

12.14   The composition of the labour force in defence has changed substantially. There is now a much larger proportion of highly skilled, and therefore high cost, labour. That must generate pressures to reduce overall employment numbers. Marconi Space and Defence Systems and Marconi Underwater Systems, for example, employ a total of 26,000 workers, 9,000 of

whom are staff grades and 2,000 of these are honours graduates. The MoD alone employs 35,000 scientists and technologists in its R&D and other establishments.

12.15 With high fixed costs of R&D being spread over a smaller number of units (either because fewer are required or fewer can be afforded within the budget) the benefits of mass production are diminishing. Equipment is taking an ever-increasing share of the defence budget. Since 1950 it has risen from 30% to 46% of total spending. But the trend has accelerated during the last five years, mainly at the expense of spending on personnel. Between 1979 and 1984 the number of MoD civil service jobs — industrial and non-industrial — dropped by 53,000. Industrial job loss accounted for 30,000 of these. Armed forces personnel remained relatively stable over the same period.

The main areas of civilian job loss were:

MoD civilian job loss 1978-9 to 1983-4

Dockyards	8,600
Storage & Supply	5,900
ROFs	4,800
Research & Development	7,000
BAOR	4,400
Other support functions	12,000

Source: *1983 Defence Estimates* Table 5.2

12.16 In theory, increased defence expenditure, together with an increased proportion of budget going to equipment, should have led to higher levels of employment in direct defence manufacturing. But, as Table 1 shows, there was a reduction of 162,000 over the period 1963-81 suggesting a growing capital to labour ratio in direct manufacturing. That, in turn, ought to have generated more jobs indirectly in other sectors providing equipment, goods and services for defence manufacturing. But indirect employment over the same period fell by 109,000.

12.17 One explanation could be an increase in the import propensity of UK defence manufacturing in terms of military components and production equipment. An added explanation may be unfavourable exchange rates which would have the same effect. Virtually all of Britain's military imports are from industrialised countries whereas 80% of military exports go to Third World countries. The Tornado aircraft (which is produced jointly by West Germany, Italy and the UK) is an example of how this can happen. The Comptroller and Auditor General reported that because of changes in relative pay, price levels, and exchange rates, the original work-sharing allocations had resulted in an adverse imbalance of £250 million against the UK.

12.18 'Leakage' of UK defence spending, whether through adverse exchange

Figure 1: Relative percentage of defence budget

% of
Defence
Budget
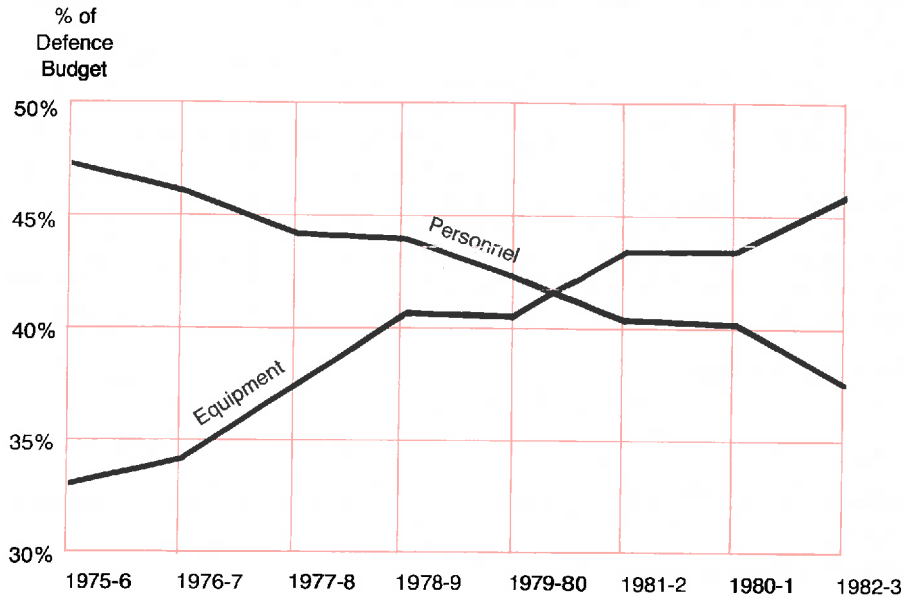
Source: TGWU

rates, increased imports, or direct government purchases abroad such as the Trident D5 missile, could partly explain why there are fewer jobs all round in defence. Another charactistic of defence is its changing corporate structure and ownership through mergers and take-overs, which has brought varying degrees of rationalisation and redundancy. This process has resulted in one-third of all defence manufacturing jobs in Greater London being located within only nine large corporations.

12.19 Britain's biggest defence contractors have all undergone considerable change in recent years. British Aerospace (BAe) had total sales of military aircraft, guided weapons systems and support services amounting to £1,472 million in 1982. It only came into existence as a corporate entity in 1977 and brought together four major companies: British Aircraft Corporation, Hawker-Siddley Dynamics, Hawker-Siddley Aviation and Scottish Aviation. British Aircraft Corporation was itself partly owned by English Electric (a subsidiary of GEC) and Vickers. During public ownership, BAe acquired Sperry Gyro, another major defence contractor. BAe has since been privatised and is now owned jointly by government and a variety of private companies, notably banks and insurance companies. It also has some foreign shareholders.

12.20 Currently there is speculation about a merger/take-over involving BAe, GEC, Marconi and Thorn EMI. There is also a possibility that BAe may conduct its own rationalisation by closing its Kingston location and moving production

to its Weybridge site. (The Greater London Conversion Council is involved in discussions with the Kingston shop stewards committee).

12.21 GEC and Marconi, the two biggest electrical and electronics companies, came together in 1972. The Racal-Decca Group came into existence in 1981. The three main warship builders, Vosper-Thorneycroft, Vickers and Yarrow were taken into public ownership in 1977 and now form the Warship Division of British Shipbuilders. Plans to privatise each of them were included in the government's legislative programme in 1984. British Shipbuilders (Vickers) is the prime contractor for Britain's independent nuclear strategic deterrent, the Trident II missile system. Rolls-Royce which serves about one third of the world's air forces was taken into public ownership when it collapsed in 1971. Rolls-Royce Motors was hived-off to private ownership and a separate company, Rolls-Royce Associates, was formed to cater for nuclear power. Rolls-Royce Aero-Engines was in the National Enterprise Board portfolio until 1982. The government is committed to privatising Rolls-Royce Aero-Engines when it becomes profitable.

12.22 The single most obvious trend in all of this chopping and changing is that each of the companies mentioned reduced employment by thousands during the period. It should be noted, however, that each of these conglomerates have a wide product range spanning both the military and the civil sectors. With economic growth at a virtual standstill in many civil sectors, even those companies with healthy orders for defence equipment are experiencing problems. London-based companies such as Plessey, BAe and Thorn EMI have all had to contract their civil product operations in the last two years.

12.23 Profits from defence contracts are no guarantee that such companies will be able to stem the drift towards overall corporate financial crisis. That is a further problem for London's defence industry so long as the economy as a whole is stagnating.

12.24 If defence expenditure continues to increase at around 3% a year and the trends and spending patterns already identified also continue, then

Table 2: **Estimated future decline in defence jobs in Greater London (assuming unchanged spending patterns)**

	1984	*1988*
Total industrial employment	60,000	47,250
MoD non-industrial civil servants	20,000	17,000
Armed forces personnel	14,500	14,500

Source: Independent estimates based on government manpower targets for 1984-8.

employment in Greater London is likely to decline by a further 15,750 between 1984 and 1988 (see Table 2).

The figures for total employment are based on various independent estimates derived from government manpower targets for 1984-8. They suggest a reduction in defence employment in Britain as a whole of around 200,000 by 1988, comprising:

- 20,000 civil service jobs (excluding the 18,500 Royal Ordnance Factory employees who will be 'privatised').

- a marginal 10,000 reduction in armed forces personnel. The 1984 Defence Estimates say there is little room for significant change in numbers given existing commitments.

- 170,000 net reduction in direct, indirect and export jobs.

London's current share of total industrial jobs in defence is 7.5%. Applying this same ratio gives a reduction of 12,750.

The 10% planned reduction in numbers of MoD civil servants, if applied evenly throughout the UK, would reduce the number in Greater London by 2,000. But the effects of MINIS and the three-service restructuring may have a greater impact on London. A drop of 3,000 by 1988 is therefore assumed here.

The armed forces based in London are largely concerned with ceremonial duties — at the Royal palaces, for example. But London, because it is the seat of government also has a disproportionate number of SAS, bomb-disposal and anti-terrorist units, as well as security, military intelligence and 'minder' squads. It is unlikely that these numbers will change radically in the near future.

Second assumption: some reduction in defence spending

12.25 At the end of the Second World War there were 5.1 million in the armed forces and 3.9 million producing for the military. Over a period of 18 months 4.3 million were released from the forces and 3.5 million from military production. But the working population fell by only 1.3 million; just over a million of whom were women. Registered unemployment rose by only 150,000. Defence expenditure fell from 50% of GDP to 7.5%.

12.26 In 1963, the Economist Intelligence Unit conducted an analysis of this transition and concluded:

From the viewpoint of both output and employment, the disarmament programme at the end of the 1939-45 war was carried out with a minimum of friction and dislocation this clearly indicates that, given the right circumstances, a disarmament programme of considerably greater proportion than would now be necessary can be carried out without major upset to the economy as a whole.

12.27 Perhaps the most significant factor here is the role played by women. At times of war, they have moved in and out of production in vast numbers, including sectors traditionally perceived to be men's work. In this light, conversion raises what is possibly the best opportunity for women and others disadvantaged in the labour market to enter into the new jobs that are created on terms which are equal to those of able-bodied, white males. But this must be a matter of policy.

12.28 After the Korean War and over the period 1952-6, military expenditure dropped from 8.8% of GDP to 7.2%. Unemployment dropped marginally. It would be wrong to assume too much about the ease of transition from these examples. The economic circumstances of the 1980s are somewhat different to the 1940s and 50s. Nevertheless they do show what is possible, given alternative investment programmes and the government machinery necessary to carry them through. The Ministry of Supply and other war-time planning apparatus were used for a long time after the war ended to coordinate the run-down in military spending and reconstruct civil sectors.

12.29 More recently, J.P. Dunne and R.P. Smith used the Warwick University Institute for Employment Research's version of the Cambridge Growth Project Model to investigate the effects of a reduction in military spending on industrial output and employment. Using the 1983 Review of the Economy and Employment two simulations were conducted. The first assumed a reduction in military spending of about one-third (say £5 billion in 1983) and that other public expenditure was increased by an equivalent amount. Total public expenditure was kept constant. The effect over the period 1983-7 was:

Total defence employment	− 250,000
Other employment	+ 350,000
Gross Domestic Product	+ 0.5%
Prices (CPI)	− 1% in first year (smaller differences thereafter)

12.30 The second simulation again assumed a reduction in defence spending of one-third (again £5 billion) but with no compensating increase in other areas. The effect over the period 1983-7 was:

Total defence employment	− 250,000
Other employment	nil
Gross Domestic Product	− 1.28%
Prices (CPI)	− 1.51%

12.31 Another, slightly different, policy change has been examined, namely that Britain should reduce its defence expenditure to the same average proportion of GDP as that of our European NATO allies. That would have involved a reduction from 5.3% to 3.5% of GDP or £4.7 billion (at 1983-4 prices).

Most economists assessing a change of this magnitude are agreed that the resultant minimum loss of jobs in defence would be in the region of 250,000 over a five year period. For comparative purposes it should be noted that cuts in the public sector over the period 1977-82 reduced employment by over 300,000.

12.32   Such estimates of job loss arising from defence cuts are, of course, general econometric calculations across the economy as a whole and make no attempt to measure the effect of cuts or cancellations in specific weapons systems or procurement contracts. If there is to be any reduction in defence spending over the next three to four years it seems likely to be of smaller proportions than those examined above. Defence expenditure for 1985-6 is to be £18,060 million; this represents a 3% real increase over the previous year. Press speculation suggests that the following year, 1986-7, will see a reduction of about 0.5% or £85 million and a further cut of £1 billion the year after that. A review of the Defence Budget conducted by a cabinet committee would appear to have concluded that the costs of major projects already in the pipeline have gone out of control and cannot be met within future spending plans. Military equipment costs have been increasing at a rate of inflation 6-10% faster than the general rate. There are inherent difficulties in accurately estimating costs over a procurement programme which can last as long as 15-20 years, such as Tornado and Trident. Rarely does an initial estimate equate to eventual cost.

12.33   Whatever reductions in spending occur they are likely to be spread thinly across a range of contracts and on a rolling basis over a number of years. Given existing defence commitments and adherence to existing strategy, no single major project is likely to be cancelled. Postponements and delays, combined with some creative accountancy, are more likely. No one, except the MoD, can know precisely which contracts will be reviewed. But obvious candidates would be the Nimrod Airborne Early Warning System, the Emerging Technology programme, the Type 23 frigate, the Trident Missile Programme and the Agile Combat Aircraft.

12.34   If postponements, cuts or cancellation did occur in these projects then the following companies in Greater London would be affected:

Marconi Avionics
Marconi Space and Defence Systems
Marconi Underwater Systems
Plessey
Gresham Lion
Lucas
Thorn EMI
Sterling Metals
Muirhead Vatric Racal

An unidentifiable number of small to medium-sized companies sub-contracting to the companies above (and to others outside London) would also be affected.

12.35   The MoD itself may decide on further internal economies in the number of civil servants, both industrial and non-industrial. The Royal Small Arms Factory at Enfield has so far escaped the substantial redundancies announced in Royal Ordnance Factories. But that was before the latest suggestion of further economies.

Third assumption: a non-nuclear defence strategy

12.36   The precise amount of spending on Britain's nuclear force is difficult to measure. The MoD's *Functional Analysis of Defence Spending* shows the amount spent on 'Nuclear Strategic Force' as 2.4% of the budget, or around £400 million. But this is a narrow calculation which takes no account of other nuclear support costs hidden under separate headings. There is no published government figure for total spending which would include R&D, production, support and operational costs of strategic, long-range theatre, and tactical nuclear weapons. The Armament and Disarmament Information Unit at the University of Sussex has estimated that 37 of the 55 detailed sub-headings of the analysis (Table 2.2 of the 1983 Defence Estimates) have a nuclear component cost additional to the Nuclear Strategic Force.

12.37   The Alternative Defence Commission at Bradford University draw attention to the main difficulty in estimating total nuclear expenditure or the number of jobs dependent on it:

> Nuclear weapons are now so integrated into the British forces that it is impossible to disentangle which jobs arise from nuclear work specifically, as opposed to general defence work. Of Britain's current nuclear-capable weapons systems only Polaris is solely nuclear, every other system is dual-capable.

12.38   It could be argued for example that since Tornado has a nuclear role, the jobs (and costs) associated with its manufacture, operation and support services should come under the nuclear heading. That would mean including the 14,000 jobs at British Aerospace in Preston, as well as others at Marconi, Ferranti and all of those companies producing components which go into Tornado. A large proportion of the 11,000 workforce at Vickers in Barrow are involved directly in nuclear work, previously Polaris and now Trident, as well as the production of nuclear-waste containers. The maintenance, servicing and refurbishing of the Polaris/Chevaline system will provide around 3,000 jobs at Faslane, Coulport and Rosyth Dockyard. The number engaged in the manufacture of nuclear warheads at Burghfield, Llanishen and the Atomic Weapons Research Establishment, Aldermaston, is classified; similarly at British Nuclear Fuels the numbers engaged in producing and supplying plutonium and other special nuclear materials is secret. But in total there is unlikely to be less than 4,000 jobs across these establishments.

12.39   The Institute of Professional Civil Servants prepared a special report for its members on the effect of a non-nuclear defence on civil service jobs. It

estimated that some 6,000 civil servants 'in IPCS grades' are employed on nuclear weapons, their delivery systems, or related servicing or support. There will of course be additional numbers in other grades.

12.40   The 1984 Defence Estimates give a figure of 3,800 civilian and 2,100 armed service jobs created by strategic nuclear defence expenditure of £384 million. Thus the average cost per job is £65,000. The same figures for defence expenditure *as a whole* gives an average cost per job of £31,000. For further comparison it should be noted that the average cost of each job created by the Greater London Enterprise Board was £4,200.

12.41   Such wide diversity points to the need for more work to be done on government statistics concerning the number of jobs connected with Britain's nuclear defence strategy. It is becoming increasingly important to establish a greater level of accuracy about total nuclear costs. The share of the budget absorbed by the strategic nuclear force doubled between 1978-9 and 1983-4. It will increase even more so during the next five to ten years when Trident expenditure gets underway. The government estimated that Trident alone would consume 6% of total defence budget but that was before costs began to rise.

12.42   The drop in the value of sterling relative to the US dollar has added nearly £1 billion to the cost of Trident since the Defence Estimates were published in April 1984. Independent sources put Trident's share of the defence budget at 10% per year over the 15-20 year programme. Malcolm Chalmers of Bradford University estimates that by 1988 the share of the defence budget spent on nuclear weapons of all varieties could be as high as 16%.

12.43   Making allowances for Trident expenditure in the US, that would still provide nearly 100,000 jobs in the UK which were dependent to some extent on nuclear expenditure. The £5 billion Trident expenditure in the USA will of course support jobs in the American defence industry. Using the rough measuring rod of London's share of total defence employment (7.5%) that would mean a job loss of 7,500 if all nuclear expenditure ceased. But closer examination of nuclear weapons production suggests that London's involvement is well below average. Nuclear research and development, warhead production and assembly, plutonium supply and nuclear generator production are all done in other parts of the UK.

12.44   It is in the area of components for the nuclear industry or nuclear delivery systems that London companies have an interest:

GEC-Marconi produce electronic equipment for Tornado at Wembley and Stanmore.

Plessey at Ilford are involved in production of sonar and other navigational equipment for Trident.

Gresham-Lion will do part of the weapon control system for Trident at Feltham and Hamworth.

Thorn-EMI will produce electronic equipment for Trident at Feltham.

Sterling Metals at Dagenham are involved in the production of tubes to house the Trident missile.

Again, alongside each of these companies there will be a number of small to medium-sized companies producing components or supplying services. By 1988-9 the peak expenditure year for Trident, there could be between 2,000-4,000 jobs in London connected with nuclear weapons.

Conversion Planning — Problems and Opportunities

12.45   National security is by definition a national government responsibility. There is no devolving of authority to local or regional government on these matters. Defence procurement decisions to spend, and on what, are taken nationally. Decisions not to spend; to cancel, slow down or cut production or personnel are taken nationally.

12.46   Regional employment planning, as far as defence is concerned, has tended to be a responsive art — welcoming new employment arising from an MoD decision and offering financial or infrastructure assistance to the contractor after the event; or alternatively, the regional planners have been required to mount some hurriedly-prepared rescue operation in the aftermath of the Defence Secretary's public announcement to cut or cancel a specific project or to close a particular location. Chatham and Portsmouth are recent examples of this.

12.47   The national, and heavily centralised decision-making character of the defence industry needs underlining. The Ministry of Defence with some 220,000 employees is the largest single government department. It employs 115,000 'industrials' in Royal Ordnance Factories, Royal Dockyards, Stores, Engineering, Research and Development and other establishments; and a further 107,000 'non-industrials' including 35,000 scientists and technologists.

12.48   Public ownership of major defence contractors such as British Shipbuilders, British Aerospace, British Leyland, UK Atomic Energy Authority, Short Bros, and Rolls-Royce means that government directly employs around 400,000 people in the defence industry — excluding the 328,000 armed forces personnel. As well as being the largest employer in the industry, the government is virtually the only customer. It buys from and sells to itself for most of the time.

12.49   The government will decide any changes in defence strategy or changes in procurement spending. The precise savings will be known in advance. So too will the impact on a particular company's order book and employment position. The ripple-effect on secondary industries and the community or region can be measured. And, most important, the government can decide the timing of changes.

12.50 With these known factors in the equation, transition without dislocation is possible — given willingness by a central government to plan in advance and to assist companies and communities in developing an alternative economic strategy making use of plant facilities, the technology and the skills of its workforce.

12.51 All of this points to the need for a national framework within which changes in defence strategy or changes in the direction of spending can be approached in a more systematic fashion, and which offers workplace representatives, local authorities and communities the opportunity of advanced information and a say in how best that change can be brought about. Such a framework with properly established institutions (say a National Industrial Conversion Commission), adequately funded by government and involving representatives of all interested parties, will be crucial in the event of any reduction in defence expenditure arising from arms control agreement or any phased disarmament programme.

12.52 Reductions in defence spending will affect different companies in different ways. A large part of the procurement budget is for products which have both a military and a civil use — for example, radio communications systems and sonar devices produced by Plessey at Ilford for the Royal Navy can be applied to merchant marine and offshore fishing vessels thus improving both safety and efficiency. In fact all of the components that go into ships, tanks and aircraft right down to switches, plastic tubing and nuts and bolts have an obvious civil use. For the companies making such products the problem is one of finding alternative uses to defence ones, rather than complete or radical change to the product. This probably applies to around 90% of the 10,000 companies tendering for MoD orders.

12.53 The remaining companies will need some change to their product. The difficulties of developing an alternative product should not be under-estimated. Nor should the problems of matching that product to a real demand so that the new product is viable. The tendency within a defence plant, when considering what else to produce, will be to stick as closely as possible to existing skills and technology and to existing plant-layout and production flow-lines. For example, if British Aerospace at Kingston were to consider non-military alternatives to its Harriers and Hawks, it would first examine the possibility of civil aircraft rather than that of new energy sources, or construction, or medical equipment. There will be an obvious reluctance in any company to move too far from the product and the market areas it knows best. The disruption and uncertainty caused by the leap into a completely different field of work will be considered only as a last resort.

12.54 Financing such a change is unlikely to be undertaken by the defence contractor unless market surveys in the new product area give cast iron assurances of quick returns on investment. Or unless that change is heavily subsidised from outside the company. This implies that a crucial part of the conversion process is the planned redirection of industrial capacity now utilised by defence production towards civil ends. Whereas defence procure-

ment has been highly directed and interventionist the same cannot be said for public purchasing generally.

12.55 In 1983 the National Economic Development Office commissioned Sir Ieuan Maddock, former Chief Scientist at the Department of Industry, to conduct an enquiry into 'civil exploitation of defence technology'. One of his findings was that government departments tended to purchase their own civil equipment without a great deal of consultation with other departments buying similar equipment. For example different radio communications systems have been installed in police cars and ambulances: different electric typewriters, word processors and computers were in use throughout government departments.

12.56 Pointing to the fact that more than half the economy is in the hands of central and local government and public-sector authorities, Maddock recommended the setting up of a Central Purchasing Policy Unit which would harness (and publicise) a new civil market of similar proportions to that of MoD's procurement programme. Co-ordinating public sector purchasing in this way could help generate the 'market-pull' necessary to develop a higher level of technology transfer from military R&D to other civil sectors.

12.57 There is no shortage of alternative uses to which the resources released by conversion could be put. New forms of energy, environmental protection, medical equipment, more efficient transport systems, exploitation of the ocean's resources — these are only some of the areas which could be investigated.

12.58 There are similar possibilities for conversion of public expenditure in relation to the Third World. The government currently spends considerable sums in promoting arms sales to, often reactionary, Third World governments; these could be used instead to finance purchases of civilian equipment to meet genuine needs. The existing civilian aid programme could be expanded. But it is essential that the aid programme should not be used, as it now is, to create a market for frequently over-priced and uncompetitive British goods, especially when, as is often the case, such exports are for purposes of dubious relevance to real needs in the Third World, or may actually be harmful.

12.59 There is a need for new kinds of non-exploitative trading links with the Third World. The GLC has set up a new organisation, TWIN Trading, to show that such links are possible, through identifying the needs of progressive governments and organisations in the Third World and beginning to meet these needs from the resources available in London. TWIN Trading will seek to finance these transfers by marketing the products of Third World countries in Britain, including on a barter basis. Government aid programmes could, in future, increase the scale of such activities.

12.60 Because of its political significance, defence is one of the most cushioned of all industries. It has commanded a degree of commitment in expenditure and R&D that sets it apart from most other sectors. Over 50% of all

Figure 2: Military burden and productivity 1960-1980
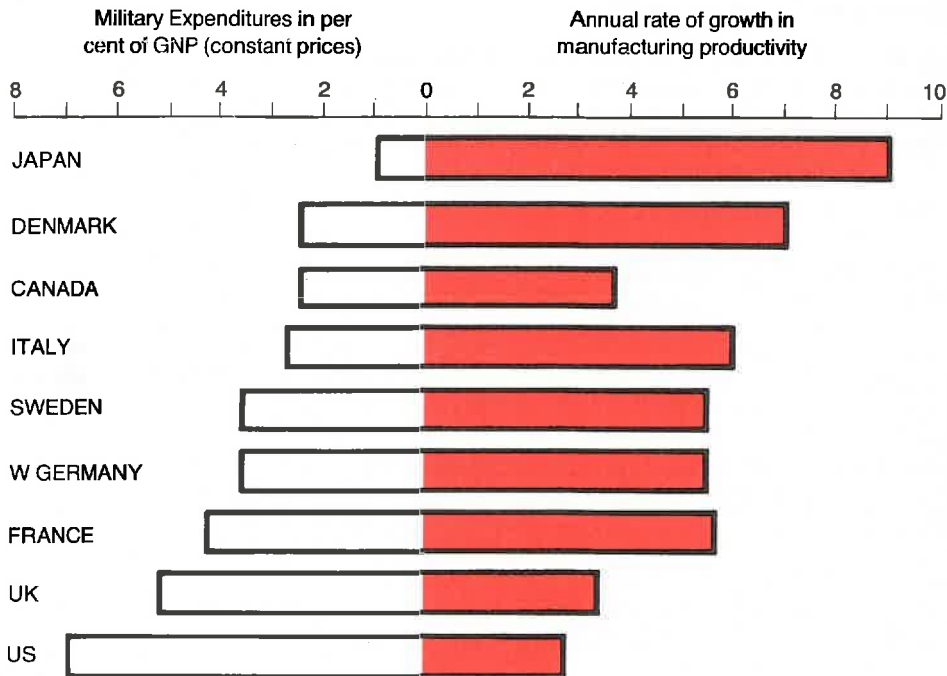
Source: *World Military and Social Expenditures, 1982*

government funded R&D is spent on defence (£2,100 million in 1984-5). The Maddock enquiry, and indeed the MoD (more recently in response to such assessments), are critical of defence contractors' inability (or unwillingness) to exploit new ideas, arising from defence R&D within their own civil-sector operations. But government strategy remains predominantly to leave such 'spin-off' initiatives to the free play of market forces, a lack of industrial strategy which has so notably failed in sector after sector of the rest of British industry.

12.61   It cannot simply be presumed that high national defence expenditure is at the expense of industry more generally, although the negative correlation between military burden and productivity growth is striking (see Figure 2).

12.62   But in the UK, the weight of resources, skills and R&D devoted to defence within specific sectors, in particular those involving new technology, has undoubtedly weakened the already limp hand with which successive governments have grasped industrial policy. To summarise: the effect of military expenditure is to divert resources from alternative uses, to lower the level of employment, to stifle initiative and R&D in civil production and new technology and to weaken the institutional commitment to industrial policy.

London's approach to conversion

12.63 The Greater London Council supports an end to the arms race, a start to disarmament, and reduction in defence budgets. But in terms of industrial strategy it has recognised that planning for such an eventuality is essential if large-scale redundancies are to be avoided. The GLC Industry and Employment Branch, has therefore taken the practical step of helping to establish an independent Conversion Council for Greater London.

12.64 The objectives of the Greater London Conversion Council (GLCC) are:

(a) to encourage and assist in the formation of Alternative Use (or Technology Transfer) Committees at each defence location;

(b) to assist financially, technically and organisationally in the development of proposals for alternative non-military products and alternative markets;

(c) to draw on the experience and work done by the GLEB, and to make this directly available to Alternative Use Committees;

(d) to provide an early-warning monitoring service on defence contracts and their employment implications for specific companies;

(e) to provide a forum for discussion, and the exchange of information, on alternative technologies and technology transfer;

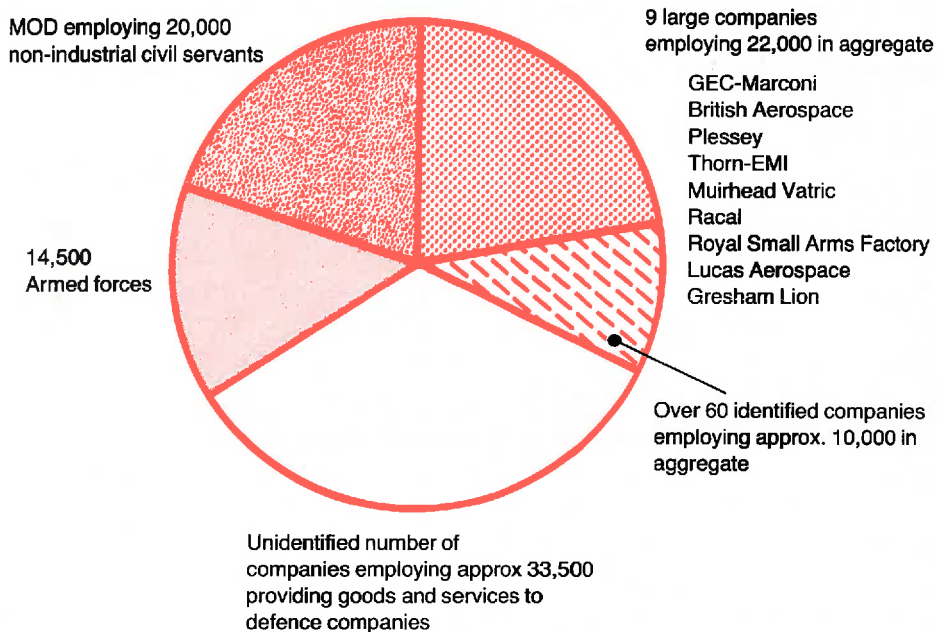(f) to publicise generally the need for conversion planning in advance of decisions to reduce defence expenditure.

There are approximately 25 members on the Conversion Council combining a broad cross-section of interest from organisations and individuals.

12.65 The Conversion Council is being kept informed of the work involved in GLC's Third World project TWIN Trading, whose aim is to find new ways of opening up trade and technology-transfer between the developing economies and Europe. Members of the Conversion Council attended the Third World Trade and Technology Conference held in February 1985 and sponsored by the GLC and the European Commission.

12.66 The Conversion Council has initiated a competition among undergraduates in London's Universities and Polytechnics. The aim is to enable the problems and the opportunities presented by technology-transfer to be brought to the attention of future scientists, engineers and technologists currently being trained in London. The competition will encourage students to consider practical means by which conversion of military technologies to civil use can be exhibited as viable and relevant products. Successful students will receive between £200 and £500 towards their project costs based on the judges' assessment of likely expense and the value of their work.

12.67 The Conversion Council has identified some 70 companies in Greater

Figure 3: Breakdown of 100,000 jobs in Greater London dependent on defence spending

MOD employing 20,000
non-industrial civil servants

9 large companies
employing 22,000 in aggregate

GEC-Marconi
British Aerospace
Plessey
Thorn-EMI
Muirhead Vatric
Racal
Royal Small Arms Factory
Lucas Aerospace
Gresham Lion

14,500
Armed forces

Over 60 identified companies
employing approx. 10,000 in
aggregate

Unidentified number of
companies employing approx 33,500
providing goods and services to
defence companies

London whose products are dependent on defence spending. A special Conference organised by the Conversion Council to bring together shop stewards and union officials from these companies. The purpose of the Conference, held in March 1985 was, was:

(a)   to examine the prospect for jobs in London's defence sector;

(b)   to publicise the opportunities afforded by conversion planning;

(c)   to build contacts between the Greater London Conversion Council and shop stewards in defence companies.

Companies Tendering for MoD Orders

The following companies tender for orders from the Ministry of Defence. All are within the GLC area.

ABMTM, London W1. Consultancy/management services to government marine projects/specialising vehicles.

AD INTERNATIONAL, London W1. Dental instruments/materials for MoD/ armed forces.

AIRCRAFT MATERIALS, London NW1. Parachute equipment/safety/cargo pallets.

P. W. ALLEN, London N1. Visual inspection equipment for ships/aircraft/ fighting vehicles.

ARCON BUILDINGS EXPORTS, London W1. Steel framed buildings.

AVIMO, London W1. Military optical/electro-optical systems.

BARROW HEPBURN EQUIPMENT, London SW8. Leather/webbing goods.

BOAT SHOWROOMS, London W14. Task Force boats for MoD/overseas governments/White Fish Authority.

BRITISH OXYGEN, London W6. Industrial gases/cryogenic equipment.

BONAVENTURE INTERNATIONAL (SECURITY), London SW1. Mine detectors/night observation devices/electro-optical devices/perimeter protection.

G & E BRADLEY, London NW10. Defence electronic equipment/navigation/ video data.

BRITISH AEROSPACE, Kingston, Aircraft.

BROWNLINE, Hounslow.

HENRY BROWNE, Barking. Compasses.

CABLE AND WIRELESS, London EC1. Telecom equipment.

J. I. CASE, Feltham. Four wheel 'Rough Terrain' vehicles.

CHERNIDEEFF INSTRUMENTS, London W4. Electro-mag logs (all vessels).

CHLORIDE, London SW1.

CORINTRA METAL, London W8. Barbed wire: barbed tape concertina/ distribution of mines and ammunition.

ELECTRO ACOUSTIC INDUSTRIES, London N15.

THORN EMI, Hayes. Sound and vision equipment - surveillance.

THORN EMI, VARIAN, Hayes, Microwave radar early warning.

THORN EMI, SYSTEMS AND WEAPONS DIVISION, Feltham. Missile fuses/ammunition and bombs.

EXPAMET EXPLOSAFE, London N7. Safe handling of liquids and explosives/containers.

FAIREY HYDRAULICS, Hounslow. Flight control actuators.

GRASEBY INSTRUMENTS, Surbiton. Sonar systems/RN submarines.

GRESHAM LION, Feltham. Underwater weapon control systems for nuclear submarines.

IAL, Southall. Defence and security systems.

INTERNATIONAL MILITARY SERVICES, London SW1. Commercial subsidiary of MoD.

KELVIN HUGHES, Ilford. Navigation equipment.

McDONALD & JANE'S PUBLISHERS, London NW1. Jane's Yearbooks.

MARCONI AVIONICS, Boreham Wood. Electronic systems.

MARCONI SPACE AND DEFENCE SYSTEMS, Stanmore. Rocket guidance systems.

MORANCE PLASTICS, Staines. ID card systems for armed forces/police.

MUIRHEAD VACTRIC, Morden. Optical shaft encoders and systems for guided missiles.

PARATROOP TRAINING GROUP, London N19. Special forces training.

PLESSEY AVIONIC, Ilford. Manpack charging units/hand generators/antennas and synthesisers.

PORTALS WATER TREATMENT, Isleworth. Trailer-mounted water purification systems.

RACAL ACCOUSTICS, Wembley. Communications/helmets/headsets/head phones.

RACAL AUTOMATION, Ruislip. VHF Centrems.

REDFON, London SW18. Radio communications/navigation equipment.

ROCKWELL-COLLINS, Hounslow. Ground, airborne and marine radio communications.

ROYAL ORDNANCE FACTORY, Enfield. Small arms.

SAUNDERS-ROE, Hayes. Self-powered light sources/optical devices.

SESCO SECURITY, Hounslow. Surveillance cameras and other security equipment.

SMITHS INDUSTRIES, London NW2. Aviation and naval flight deck displays.

STERLING ARMAMENTS, Dagenham. Small arms/sub-machine guns.

UNITED SCIENTIFIC INSTRUMENTS, London W1. Weapon sights/periscope/binoculars/mine detection equipment/webbing/military clothing.

MAGNESIUM ELECTRON, Twickenham. Electron alloys.

M. LAVRIER, London E15. Sandbags/barbed wire fencing.

LASER ENGINEERING, London WC2. Tank suspension systems/transit containers for guided missiles.

GEC - ELLIOTT INSTRUMENTS, London SE15. Nuclear controls/transducers.

GEC - HIRST RESEARCH CENTRE, Wembley. Laser energy meters/laser rods.

FRAZER-NASH, Hampton Wick. Ejection test seats/weapon release systems/skyflash.

FIRMIN AND SONS, London W1. Ceremonial regalia/badges and ancillary equipment for uniforms.

THOMAS FATTORINI, London W1. Badges and buttons/medals/decorations.

AYRES AND SMITH, London SE22. Military caps/helmets.

BARBED TAP CO, London W1. Barbed wire/mines.

ARMALITE ALCOM, London W2. Bullet resistant cars.

THORN LIGHTING, London N18.

RICHARD UNWIN INTERNATIONAL, London W1. Paper targets/listening devices/sentry boxes.

ANDRE RUBBER, Military Products Division, Surbiton. Rubber components for military vehicles/aircrafts.

AERONAUTICAL AND GENERAL INDUSTRIES, Croydon. Aerial recce/Telecoms.

BALFOUR BEATTY (BICC), Thornton Heath. Masts/towers for defence and communications systems/bridges/transmissions line towers.

Distribution of Armed Forces Personnel by Boroughs

The total number of personnel located in Greater London at 30 June 1982 was 14,543. The distribution by service was as follows:

	Males	Females
Royal Navy & Royal Marines	1,788	275
Army	7,122	1,001
Royal Air Force	3,935	462

Because data by local authority deployment is produced specifically for OPCS as a basis for their population estimates the numbers in MoD HQ offices in Greater London are not allocated in returns to individual boroughs since, unlike personnel in other service establishments, they may by necessity be resident in another area. Numbers so excluded from individual borough totals are as follows:

	Male	Female
Royal Navy & Royal Marines	1,503	248
Army	1,023	102
Royal Air Force	1,008	42

The numbers of borough can be classified thus; (bracketed figures indicate percentage of females).

Royal Navy and Royal Marines

1-50	—	Croydon(0%), Harrow(0%), Hillingdon(0%), Lewisham(0%), City of London(0%), Redbridge(0%), Richmond upon Thames(32%), Westminster(0%).
50-100	—	none
100-200	—	Greenwich(6%)

Army

1-50	—	Brent(0%), Bromley(4%), Croydon(0%), Ealing(0%), Hackney(11%), Hammersmith(0%), Havering(0%), Islington(0%), Kingston upon Thames(14%), Lambeth(0%), Lewisham(5%), Newham(0%), Redbridge(12%), Southwark(01%), Sutton(0%), Tower Hamlets(0%), Wandsworth(0%).
100-200	—	none
101-200	—	Kingston and Chelsea(2%), Richmond upon Thames(3%).
201-300	—	Camden(2%).
301-400	—	none
401-500	—	none
501-1,000	—	none
1,001-1,500	—	Hounslow(18%)

1,501-2,000 — Greenwich(26%)

2,001-2,500 — Westminster(3%)

Royal Air Force

1-50 — Croydon(0%), Greenwich(6%), Hounslow(0%), Kensington and Chelsea(0%), Lewisham(0%), Redbridge(14%), Richmond upon Thames(0%), Westminster(5%).

51-100 — Camden(12%)

101-200 — Kingston upon Thames(20%)

201-300 — none

301-400 — Barnet(3%), Bromley(19%), Harrow(13%)

401-500 — none

501-1,000 — none

1,001-1,500 — none

1,501-2,000 — none

2,001-2,500 — Hillingdon(14%)

Boroughs not specified in the above lists contain no deployments of service pesonnel.

Proposals for action

1. The Greater London Conversion Council will continue its research and information work on London's defence sector. Particular attention now needs to be given to subcontracting, secondary supply companies, which are normally small to medium-sized and difficult to identify.

2. The Conversion Council will continue attempts to build relationships with those defence companies affected by job loss.

The Conversion Council will try to improve its monitoring function on specific military contracts thus enhancing its ability to provide an early-warning service to defence companies.

3.   The Greater London Council will press government for better access to MoD information on future procurement plans.

4.   The GLC will encourage other local and regional government bodies to provide resources for conversion-planning activity. The production of a single weapons system normally takes place in many different parts of the country before assembly. The cross-exchange of information gathered in each area would be useful to all.

5.   The GLC will consider the feasibility of co-ordinating its purchasing power with that of other local/regional authorities. The size of the defence market is its main attraction. If sizeable civil markets could be generated, even in some product areas, they could provide the incentive to defence companies to make the change-over.

6.   The GLC will consider the need for a national governmental framework for conversion, including the kind of institutional bodies best suited to assist defence companies in the event of reductions in defence expenditure. (The scale of the defence industry — £18 billion budget and one million jobs — suggests the need for a co-ordinated national approach.)

7.   The GLC will consider a direct approach to those companies which would be affected by reductions in defence spending. Joint efforts could be made to measure (in advance) the impact of postponements, cuts or cancellations with a higher degree of accuracy, and to draw up contingency plans.

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Section Four:
INFORMATION AND COMMUNICATIONS

13.

Computer software

[Image removed at request of London Metropolitan Archive as a condition of digital distribution.]

Low cost 32-bit work station with high resolution graphics developed by Whitechapel Computers, supported by GLEB. A number of companies are being built around the Whitechapel Technology Centre to design software for sectors in which GLEB is involved, building on the skills of the workers in these sectors.
Photo: Whitechapel Computers.

Computer software

Summary

1.   Computer software is a growing industry (several firms are growing at between 20-30% per year); it is labour intensive (though compared to many offices it is *also* capital intensive through its use of computers for software production). It is therefore a potential source of employment growth.

2.   There are approximately 15,000 people working in the industry in London. It is a London centred industry because most of the clients are in London (government, the City, multinational HQs, public services); London is strategically placed for recruiting professional staff from the south east; and in some sub-sectors, such as computer games, there is a need to link up with the cultural industries in the West End.

3.   Software is not just another growth industry — it is *strategic* in that it forms the basis of widespread changes in the organisation of production and services across the economy. New software based computer systems are particularly important for public services over the next ten years.

4.   Software is the basis for the production of new hardware products which provide *employment* in design, manufacturing, installation, maintenance and training.

5.   Recent NEDO reports indicate an increasing trade imbalance in software. Yet UK is one of the world leaders in software production. The international nature of the market in software production implies a danger of US companies dominating the world market very rapidly.

6.   GLC policy is to concentrate on the *application* of new systems to help the rejuvenation of London's traditional industries. This includes the use of computer aided design and stock control systems to increase the quality and reduce the costs of production in sectors such as furniture and clothing.

7.   But the systems that we are developing and using are 'human centred': building on rather than destroying jobs and skills — using computer systems

to improve the quality of product or level of service and cut waste, energy etc.,
— rather than cutting wages or jobs.

8.   We aim to take public services as a major area of work, to use 'human centred' systems to transform the GLC and borough based services. GLEB's technology networks will be used as the resources for these and used as development agencies for human centred systems.

9.   There is a further market for these developments in aiding other public sector bodies in the progressive computerisation of public services. The aim is to facilitate restructuring in a way which uses higher levels of efficiency to improve jobs and expand and improve the service to users. Public procurement of these systems is a major instrument of control and progressive development.

A London centred industry

13.01 The computer software industry is quite young (the oldest company over 20 years old — most are less than ten), and fast growing. Growth rates of 30% per year are not uncommon even in the larger companies.

13.02 London is a major centre of this new industry. 15,000 people now work in software companies in the London area. There are very few of the major UK software companies who can afford not to have a London presence. For some companies, many of their activities are based and have grown up in London. The largest independent software and systems house, Logica, has 1000 people working out of Newman Street in the West End. Across the road from County Hall, Business Intelligence Systems, a world leader in international banking systems, has a factory of 300 computer programmers and system designers working on software products and systems in a small office block. Similarly Hoskyns on Kingsway, CAP on High Holborn, Thorn EMI Software in the West End, PA Technology near St James's Park all have teams of professionals in offices manufacturing and customising new products and systems for different markets. The industry is very heavily concentrated in the West End and the City, with an outlying concentration in Croydon.

13.03 The prospects for future growth in software employment are high. It is a labour intensive industry with strong factors which tie these companies to London. The most important of these is their need to be near their customers. Government and civil service departments, multinational head offices, banks and other financial institutions in the City ... all these form key markets for computer service firms. In this respect, computer services are similar to other professional service functions provided by accounting firms, engineering and design consultancies, large architectural practices and management consultancies. However, not all of the activities of computer services have to be performed near the clients. Consultancy type activities most need to be based in London. One large company claimed that 80% of its staff would be located out of London if they were building up the company again from scratch.

13.04 Other ties come from the heavy dependence of software companies on professional labour. Being at the centre of a transport node for the South East makes Inner London an ideal location for recruiting professional labour from a large surrounding labour pool. For companies which have expanded in London, their crucial dependence on professional labour makes relocation a risky business. However, it is possible for new locations to grow outside London, and this is a likely trend given the cost of accommodation in London. Also, decentralisation is aided by the increasing practice of linking up computers through telecommunications networks.

13.05 The potential of data networks for organisational decentralisation is becoming increasingly clear. One company, F International, specialises in computer programmers working at home doing outwork on computers supplied by the company. It has 700 of these and only 150 who are full-time

workers in the company's offices. Rank Xerox International in Euston Road has a similar scheme. Given the way in which this can cheapen the overheads of employing staff, the trend would dilute employment growth in London. At present, part-time employment is very small in London software firms. But for a combination of reasons we can expect full-time employment in London to form a declining proportion of the total employment of London-based software firms.

13.06 A further labour-related tie comes from the importance of marketing of software products. In some areas, such as home computer games, software products have a limited economic life. Firms are obliged to site their software development centre in offices close to the centres of innovation and creativity. The cultural industries of the West End are a strategic site in this case. Here is a labour pool containing a large reservoir of creative skills which forms the feeding ground of marketing and distribution agencies for new products. In this sense, the software resembles other cultural industries, snatching up new ideas, fashioning them into products and selling them hard on an intensely competitive mass market — whether they be records, videos, magazines, or computer games.

Software at the core of restructuring

13.07 Software is pivotal to the current process of economic restructuring. It is a *generic* product. That is, it has a range of applications which promise radical productivity jumps across different sectors of the economy, manufacturing and services, capital goods and consumer goods, production and distribution. For example the use of automatic tellers in retail banks has reduced the cost of supplying money from 30p to 5p per transaction. On the factory floor, computer aided design and manufacturing systems can reduce the lead time taken to produce small batches of products from several months to several days by reducing the time to produce designs, set up machinery and manufacture different components. This can lead to massive reductions in stocks held and work in progress, shifting the levels of productivity in batch production towards that of mass production. Electronic Point of Sales (EPOS) computer systems in shops and supermarkets can increase the efficiency of a retail outlet by giving better information on the sales of different lines so reducing the need to carry large stocks in order to avoid running out of particular items. The result is savings in the costs of holding idle stock and better availability of different lines.

13.08 In the process of their application, computer systems come to determine the way people work and relate to each other during employment. For example, over the past few years there have been successive plans by London Transport Executive to computerise the Underground System. This has involved schemes to automate ticket issuing and collection thereby cutting the London Transport labour force substantially. Other plans include schemes

to introduce guardless and driverless trains under computer control. Such schemes are brought in to cut jobs and assert centralised control over the jobs that are left, regardless of human factors, including passenger safety.

13.09 Yet an alternative scheme for computerising the scheduling of buses in Leeds incorporated the needs of workers in its design. The aim was both to optimise the scheduling to avoid the need for split shifts and to allow regular breaks. Similar systems might be developed for refuse collection and other distribution and delivery systems.

13.10 This alternative form of restructuring has also been demonstrated in the case of mechanical engineering. Many computer controlled machine tools incorporate programmes which reduce the need for discretion and therefore skill on the part of the operator. The skills of engineering workers on the shopfloor are devalued with a consequent decrease in quality of machining, and increase in the time taken to 'debug' a machine tool programme for a specific job.

13.11 Yet at the Institute of Science and Technology in Manchester, a team led by Professor Rosenbrock has developed a 'human centred' control system for machine tools which builds on the skills of engineering workers by enabling them to control the programming of the tool rather than vice versa. The result is a more efficient system, with faster programming and setting-up times and enhanced product quality. Similar control systems are being experimented with via the GLEB's Technology Networks for use in London engineering companies. Such human centred software systems have a tremendous potential across different industries and services. Not only are they beneficial to, and welcomed by, workers who have to use them day by day, such systems also can be particularly attractive to the users.

13.12 In the New Technology Network at Camden, there is a project under development to make the knowledge and skill of specialist hospital consultants available to patients and their GPs in the treatment and control of diabetes. This 'expert system', developed in conjunction with St Thomas's Hospital, passes to patients and their GP the ability to assess and monitor their condition in order to reduce possible deterioration — such as blindness which is often a result of inadequate care. Rather than deskill the consultant, the aim is to skill the patient, through the GP, and allow a better level of health through self help.

13.13 At the core of the GLC strategy for software is the development and application of such software in the transformation of industrial sectors and public services.

Key issues

13.14 There are a number of *key issues* for the relation of this sector to the rest of the London economy now. These are:

(a)   The extent to which the UK software industry can remain competitive internationally. Below we consider the dynamics of this fast growing sector. At present there is a danger of the United States dominating the market internationally despite the high quality of British software development.

(b)   This leads on to the need for international marketing channels for UK software, in particular to other public services and enterprises in the rest of the world, especially the Third World.

(c)   The need for *application* of software across both the traditional London industries of furniture, clothing, printing, etc, and the public services based in the capital.

(d)   The development of 'human centred' software for these different applications, especially in public services.

(e)   The way that software developments lead to new products and thus provide employment in manufacturing, design, installation, maintenance and training.

(f)   The supply of adequate levels of skilled labour for this people intensive industry and the effects of defence production in crowding out the labour market for civil applications.

(g)   In London, the provision of adequate and well designed premises for this growing industry. In particular there is a need to consider planning laws with respect to this hybrid industry, which involves both commercial and industrial activities.

Software makes a product out of a service

13.15 Over the past ten years, the computer industry has changed dramatically through the introduction of the microcomputer which has followed the increasing capacity of electronic chips. Today, computer hardware often contains within it much readymade software. So, much software is already incorporated into hardware and only has to be written once without need for further modification. But there is still room on computers for further packages of software, whether these are the familiar video games or are for business applications.

13.16 As a result of these hardware developments, a global market in equipment has come about, most notably in companies like IBM, which dominate through reliance on economies of scale. This has influenced software production. It used to be part of a service to supply training, technical support, data processing programmes (payrolls, invoicing) and shared computer time on large mainframe computers. Now, more users have their own computers,

linked more closely into decision making activities, and the lead has passed to suppliers of 'packaged' programs for such applications. Its major firms are poised to grow out of commercial data processing and penetrate into new areas, transforming targetted sectors of the economy one after another as they form 'vertical' markets for their profitable products. The strategic nature of the software industry is visible in the internal structure of the computer service firms themselves. Even the largest firms in London are little more than conglomerates of small divisions aimed at their target market. These are supported by a shared set of marketing and distribution functions and steered by a tight strategic core of top managers and strategists overseeing the whole group. There are also a myriad of small specialist firms; the Computing Services Association estimates there are between 11,000 and 14,000 registered companies nationally. In London, the great majority of computer software and consulting *firms* are very small and specialised, or medium sized but the great majority of *jobs* in computer programming and systems analysis are in larger transnational firms.

London firms

13.17 Looking at these large firms we can distinguish three major types of software producers: there are the 'bespoke' producers of software systems, the 'off the peg' producers of software products, and an intermediate group who alter existing software packages to suit the needs of the customer — we might call this a 'customising' service.

13.18 Logica is a good example of a *bespoke* producer. It designs mainly large, complicated systems for particular clients: teletext systems, control systems for oil pipelines, police 'command and control' systems, international bank funds transfer systems, satellite control software etc. Although some of these systems have to be designed from scratch by the company, previous experience in a field can be used in the construction of other similar systems for different users. Not all the systems need to be produced from scratch; a system can utilise core pieces of software called 'system kernels'. In a £1 million teletext system, for example, a teletext kernel already written costing say £100,000 would form the largest part of the software; yet the programme written for a specific client around that kernel would account for the majority of the cost of the system. Logica has kernels for functions such as graphics manipulation, speech recognition, share trading systems, image processing, funds transfer and process control systems.

13.19 So the experience of making a system for the home market can mean a great advantage to such a company in its attempts to sell similar systems in the world market. This has particular implications for public purchasing. Since many of these systems are produced for government and local authorities, public procurement is an important source of experience for potential export

orders. Currently the GLC has taken a supportive role in the development of a local area network based on Xionics products.

13.20   An 'intermediate' producer is Business Intelligence Systems which specialises in the production of *customised* products for the banking and insurance markets. Their MIDAS package for example has been sold to 350 banks around the world. It consists of a series of modules based around a core programme through which different systems can be constructed to suit the needs of particular banks. Other examples of customised systems include administrative systems for hotels, point of sales systems in retailing, shopfloor planning systems for manufacturing, etc. Such products are much less expensive than individually designed systems yet incorporate a level of flexibility which can fit them to applications better than standard software products.

13.21   At the 'mass production' end of the scale, the rapidly growing software division of Thorn EMI, for example, specialises in *off the peg* software products. These might be computer games on cassette at £4.95, personal computer programmes for spreadsheets or word processing which sell at £200, or packages for doing wages, sales and customer accounts etc. on large IBM mainframe machines retailing for several thousand pounds. All these are sold in a ready-to-use form. The producer does not expect changes to be made to the software and at the price, neither will the buyer.

13.22   The difference between the cost of software packages and the much higher cost of specially designed systems reflects the *contrasting economies of scale in the sector*. There are massive economies of scale in distributing a programme once it is written, but the *initial production* of the software is high cost. This means that small producers are able to compete with large software houses in software development. As one large software house put it, 'it is always possible to be beaten in the majority of contracts by the small two-person company down the road'.

13.23·   The scale of software development work is quite small even in large companies. MIDAS, BIS's banking system, was originally created by six people working full-time for a year while, Logica considers 20 people working on a single job for a year to be a large job. For software development, the real advantage of a large company lies in the *range* of skills and experience which they have to hand; a small specialist company would be much more limited in scope, and more specialised in application. So a ten person team from a small firm working on applying computer systems in the textile industry, for example, would not be able to call on the expertise in image processing possessed by a large company such as Logica. This work would be very relevant to an application like textile design, even though it derives from work done for other projects, in this case satellite pictures and the control of television feeds. Nevertheless, small firms can be very competitive in the production of software products and complete 'turnkey' systems of hardware and software.

Targeting vertical markets

13.24 Whereas most existing business software products available over the counter at present are designed to perform general functions such as word processing or accounting, there are several hundred similar products on sale in such areas from different manufacturers. In response to this high level of competition over 'look alike' software packages, a more specialised strategy is being taken by several software products companies to identify market niches which they might more easily dominate. New ranges of products are being continuously developed targetted at particular 'vertical markets' such as newsagents or solicitors. So, a package for newsagents, for example, might contain details of the newspapers ordered by each customer, calculate the number of different papers and magazines needed, prepare customer bills, and possibly act as a till. A general newsagents system would have been designed, then, from the elements of accountancy and invoicing programmes, along with a database programme to hold customer orders plus some specialised (and probably cosmetic) additions to suit the newsagency business. The actual system in the package is a combination of elements combined in such a way as to meet the majority of needs of the average newsagent. It can then be sold as a standard package to the potential market of the 20,000 or so newsagents in Britain and might be priced at around £500. In contrast a system which is made specifically to the requirements of particular newsagent would cost tens of thousands of pounds. Even though a tailored system would give a better fit its cost would be much harder to justify within the typical business budget.

Marketing and US dominance

13.25 Scale factors are enormous in the *markets* for computer software packages and systems. The software market mirrors the international nature of the hardware market. If a software company wishes to have a substantial presence within a particular vertical market niche in order to sell the volumes of software packages, this requires a distribution network and marketing strategy which is itself international. All the large companies have a network of subsidiaries and agents overseas. In some areas, this also can be a source of new products, reflecting the strength of business software production on the west coast of America. But one major necessity for international presence lies in the size and growth of the world market compared to the home market. The rate of the growth of the world software market is 28% as opposed to 15% for the UK (1983 figures).

13.26 Some markets are more developed than others. The lower level of pay in Europe compared to the US makes the use of business computers more prevalent in the United States than Europe. Consider the relative cost of supplying a manager with a business microcomputer. In the US this could be done for 20% of an executive's salary; when depreciation is taken into account

the real cost is no more than the cost of a pension contribution. In Europe it can cost up to *half* as much as the salary. Hence there is a substantial difference in the take up of this technology between Europe and America. Conversely the size of the *latent* market in Europe is very large. The differences in automation costs drive the development of the markets for software products in the US.

13.27   For example, there will be an estimated 4000 computer stores in the US by the end of 1984 along with 200 software stores. There were none in 1978! The differential rate of growth favours the US industry, and demands international marketing by non US firms.

13.28   As in many other sectors competition within the industry is not just the outcome of the price and quality of the product, which can be very favourable in many British software firms. It also depends on the effort given to marketing and distribution. Take the case of international banking systems. The three world leaders in the field are London based companies, BIS, Hoskyns and Arbat (Hoskyns is a UK subsidiary of a US company). A major new competitor in this area is the US firm Hogan; which has just raised $80 million on Wall Street to invest in products. Last year Hogan spent an incredible $50 million on advertising a banking system which was in the process of being developed. Thus the areas where UK companies have an international lead such as banking and, even more so, insurance systems, are coming increasingly to require significant marketing investment, as a crucial aspect of competitivity. There is a strong possibility at present that US firms will increasingly come to dominate the market internationally.

13.29   To sum up, this high growth, strategic and volatile sector has a number of conflicting dynamics. The shift to selling software packages rather than bespoke computer programmes for particular customers has made more complex software available at a cheaper price and thus extended the market for software.

13.30   Yet in order to obtain the volumes of sales necessary to sell mass produced packages, software producers have to address the issue of marketing and distribution. Some smaller companies avoid this by specialising in particular applications. There are many such companies in London. Yet most of these small firms in London have no marketing base or infrastructure for distribution: new firms are often technology-led and weak on the commercial side. To get round this, some companies sell direct to hardware producers — the software is 'given away' with the hardware and so rides on the distribution network of hardware. Other companies sell a hardware and software package — such as Hoskyns do with their hotel administration system. The larger software houses, though, have built up a network of subsidiaries and agents to market their products internationally. At least one of the large firms in London is considering whether to buy in the initial programs and concentrate on quality assurance, documentation and marketing. This would create a sub-contracting relationship between producers and distributors.

13.31   A further aspect of the sector is the high level of competition in general

applications, especially business software, which is the result of many different software producers attempting to take a share of this growing market. The result is a shift in strategy to identifying 'vertical' markets for particular applications. In the case of large computer systems, in which Logica specialises, national and local government and the public services form the major markets for such products. As a result the use of public procurement is a crucial tool of software development in this area and the major springboard for international markets.

13.32   The international nature of the market for software, reflecting the global nature of the computer hardware market, means that a local sectoral strategy for this industry cannot have the same breadth as the strategies for more sheltered markets of other sectors of London's industry such as clothing, furniture and printing. In this sector, the focus of the GLC strategy is the development and application of computer software along with new technology for London's industry and public services.

13.33   One example of this is Whitechapel Computers, based in the Whitechapel Technology Centre, which is one-third owned by GLEB. It has developed a low-cost, advanced, 32-bit workstation with a very high resolution graphics capability. This product, a development of the work originally funded under the Labour government's NEXOS project, is a *strategic investment:* this is because Whitechapel's product has a wide range of applications — as a stand-alone workstation, as a networked workstation, as a graphics terminal, and as the basis of a Computer Aided Design system. The aim of the strategy is to build a group of companies around the Whitechapel Technology which are concerned with the *application* of the generic technology produced by Whitechapel in different areas. Whitechapel Computers will supply the hardware and basic operating systems, while the satellite companies will develop software applications aimed at targeted sectors in which GLEB is involved such as Computer Aided Design systems in furniture and clothing, computerised phototypesetting and layout for the printing industry, and general stock control and production information systems for use in GLEB's manufacturing enterprises. These systems will be exemplary in their design in that they will build on the skills of workers in the industry as well as extending these skills to groups like women and black people who are underrepresented in particular occupations.

13.34   One particular area of great need is the development of appropriate software for Third World countries. GLC research has indicated that many Third World countries buying computer systems find themselves the recipients of obsolete systems from British manufacturers, such as ICL. Not only are these countries used as dumping grounds for obsolete equipment, the equipment is completely inappropriate to their needs. Since the GLC's Industry and Employment Committee has supported the setting up of the Third World Trade Information Network 'TWIN Trading', efforts will be made through the London New Technology Network to develop the creation of generic systems along the lines specified by Third World countries.

13.35 One of the few examples of government procurement strategy which is continuing is in the production of software and systems for the military. Many of the companies within this sector, especially the larger companies, have a strong stake in defence production. Although *such 'cost plus' contracts* work is a highly profitable area of advantage to individual companies balance sheets, it is an incredible misuse of resources given the shortage of skilled labour in the sector. The level of public sector *civil* contracts awarded by the British government, on the other hand, is amongst the lowest in Europe. A recent NEDO report, *The Civil Exploitation of Defence Technology* by Sir Ieuan Maddock, showed that the rate of technology transfer between defence and civil projects was very low and this was detrimental to technical change and product innovation within the UK civil sector. As part of the arms conversion policy (through the Greater London Conversion Council) and the anti-nuclear policy of the GLC, pressure should be brought to bear on the government to shift some of the funds earmarked for defence computer systems development into civil applications.

The private sector and the public market

13.36 In general, although the strength of UK systems houses is equal to that of the major world competitors (US, France, and in some areas Japan and Germany) this very much depends on the size of the home market for particular applications. So, areas like viewdata which have been developed in Britain, distribution systems such as EPOS in supermarkets, or financial services where London is a world centre, are particularly strong. Yet the relative lack of investment in public administration systems (national insurance, health, transport, etc.) has placed the UK firms at a disadvantage with the larger 'bespoke' systems houses in France, where the level of state investment in computerisation is much higher, as in Europe more generally. With the exception of applications for multinational firms, the vast majority of larger systems are commissioned by state institutions. Once a firm has had experience of constructing a system for the home market it becomes much easier to sell similar systems abroad. The recent NEDO report, *Crisis in the UK Information Technology Industry* identified state procurement as a major tool of industrial stimulation in this sector.

The public services

13.37 Because state purchasing is a major direct creator of the market for larger computer systems, it is clear that the issue of state policy in this area is paramount. Public sector procurement, if co-ordinated, could have a very strong effect on the sector. But the issues of quality, competitiveness and markets are not the only ones.

13.38   Much attention has been focused on the job-displacing potential of computer based systems in state services and elsewhere. The design or specification of the system can be just as important for workers as for users of the services. Computer systems are often a prison for workers within which they are condemned to long periods of keyboard operations following simple routines set by the original design.

13.39   Hence decisions about the *specification* of the system are crucial to the eventual outcome of computerisation. Where, as is often the case in the public sector, computerisation is seen as a means of reducing employment in the particular service, and thus the aggregate cost of the service, it is likely that the eventual system will be resisted by the workforce, as well as provide a poorer service for the users. Given the difficulty of adequately measuring the quality of service, let alone job satisfaction, as compared to expenditure on a particular service, it is much easier to give a job and cost saving specification to the system designers, rather than a specification based on service improvement or expansion. The pressure on governments to cut state expenditure over recent years has led to computerisation being seen as a means to do this. To take one example, in the case of the recent decision to computerise the Inland Revenue, studies were done to demonstrate that it was worth spending £200,000,000 carrying out the computerisation because it would get rid of 10,000 jobs. As one firm of IT consultants put it: 'You can't get a good system design if you start from the position of paying for the system by job losses.'

13.40   In the few cases where pressure to cut services by computerisation has been less strong, an alternative approach to system specification has been viable. A current example of this is in the computerisation of Post Office counters in the UK. Rather than implementing computerisation as the means to slash employment levels in Post Offices, the GPO have decided to install a system which is flexible enough to handle many different types of counter transactions. The Post Office will then expand the range of 'bureaucratic' and financial services which it offers over and above the current ones based around stamps, licences, pensions and allowances. (The negative side of this change is the current attempts by the GPO to contract its basic network of Post Offices by closures, a process that hits London Post Offices the worst.)

13.41   In the case of the Post Office, its revenue-raising powers have allowed it a degree of freedom which most state services and nationalised industries do not enjoy at present. This has allowed forward looking management to widen its horizons and consider how it can restructure the service through *expansion* of the service rather than the contraction of employment. A similar strategy has been followed by Sainsbury in the introduction of electronic point of sales computers to replace cash registers in their supermarket branches. Generally staff displaced by computerisation are redeployed within the store to *increase the service to the customer* through in store bakeries, butchers and delicatessens.

13.42   Since many of the larger software systems are dependent on *public sector contracts* for their development, the GLC should take one of the service areas under its own control (and perhaps one under the control of a borough) and

work out how it might be transformed. The GLC's Central Computing Services (CCS) already have some expertise in this area. Also there are advanced projects within the Council on office automation (in the Scientific Branch) and in the Computer Aided Design facility developed for the GLC Architects Department.

13.43　Given the rapidity of change and the level of new developments in the area of software systems, the GLC plays an important role in advising on the range and suitability of different software packages for particular applications. This is already being done in house by the CCS and through GLEB via the London New Technology Network (LNTN), both for service departments (such as the Fire Brigade) and to other voluntary sector bodies who obtain GLC funding. There are plans to extend this along the lines of a *Which?*-type service for other bodies besides those currently being helped by CCS in the voluntary sector. This experience will enable the GLC and LNTN to develop the specifications for bespoke and semi-customised 'human centred' software directed towards particular generic applications, e.g. for voluntary groups, management information systems for co-operatives, workstation systems for professional staff.

13.44　Given the importance of computerisation within the public services, it is proposed that the GLC, in association with the London boroughs, undertake a review of the specific needs of local authorities and public services in general for computerisation over the next ten years. Detailed research of this kind should aim to identify existing, planned or possible systems which both improve the service available to users while at the same time improving the conditions of work and participation of the workforce in the provision of that service. One example of this might be in the area of transportation. How would a computer system be specified for vehicle scheduling and ticket issuing, so that its effect was to improve the level of service rather than just reduce the number of jobs? In this sense it would be a computer system which embodied the progressive policies of the metropolitan transport authorities. Similar systems might be developed in relation to the Health Service and Direct Labour Organisations.

13.45　In the case of the *production* of alternative products, the major vehicle for this is the GLEB-supported London New Technology Network (LNTN). The LNTN has several projects in the field of socially useful software products and computer systems. These include:

(a)　'expert systems', including the health service package for the diagnosis and treatment of diabetes by general practitioners;

(b)　a low-cost graphics system, with a range of possible applications across the design, educational and general business fields;

(c)　'human centred' control systems for machine tools;

(d)　several possible projects around on-line databases, including support for the 'Helpline' project in the GLC popular planning programme for employment and services in British Telecom.

Small projects such as these are not necessarily at a disadvantage provided that the right product is developed for the right application. GLE B sector strategy division should offer support in this area for job and service-enhancing uses of software in London industrial sectors.

The specific property needs of the sector

13.46   An issue that was raised several times by companies interviewed was that of the particular property needs of software companies. The development of software involves both industrial and commercial operations. The hybrid nature of the industry poses difficulties in finding adequate property. Many firms have to locate in high priced office accommodation or in property zoned for the rag trade. This is exacerbated by the fact that many of the companies wish to retain an inner London location for reasons of transport. This raises the need to consider the existing form of planning regulations in respect of such a hybrid industry in order to avoid a situation where restrictions on of fire use do not take account of industrial activities which are not housed in factory accommodation.

13.47   One option under review is the provision of new build accommodation to specifications appropriate for the kinds of production activity carried out in the sector. At a general level, this might be thought of as an example of what an office of the future would look like, in the sense that most offices would move towards such specifications as the amount of capital equipment based on information technologies increases over the next decade. Such a project would be tied into the Council's policy in relation to equal opportunities and disabilities, both in the design of the building and its facilities, but also through fair employer clauses along the lines of current practice in the GLC factory lets programme.

Proposals for action

1. The GLC will examine the potential for the use of human centred systems within its departments. This could take the form of an audit of the GLC's initiatives in relation to the introduction of Information Technology from this point of view.

2. In conjunction with London Boroughs the GLC will investigate the specific needs of local authorities and public services for computerisation over the next ten years. The aim is to identify existing planned or possible systems for improving both the service and conditions of work including the participation of the workforce in the provision of that service.

3. The GLC will investigate further the options for opening up an international distribution channel for software. This might be done in relation to 'technology transfer' within and between public sector bodies. The diffusion of human centred systems would be a central and unique feature of this.

4. The GLC will develop specifications and packages for the voluntary sector, which better fit their needs for user accessibility than commercially available systems.

5. Through training schemes, Technology Network-based awareness programmes and via GLEB interventions, the GLC will seek to extend knowledge of computers and the use of software to women, black people and people with disabilities in order to avoid the segmentation at work and in the use of information technology which is characteristic of traditional industries and technologies.

6. The GLC will link up the technological capability of GLEB assisted firms, Technology Networks, the voluntary sector and workers in the Public Services in London through a New Technology Forum which will highlight the issues raised in this strategy document and form links between producers of software systems and users in order to develop new products.

7.   The GLC will work through the Third World Information Network to identify particular systems appropriate to Third World needs, and begin to develop such systems in conjunction with Third World users.

8.   The GLC will consider funding experimental projects in software development linking software specialists with trade unions in the public sector and in private firms to develop particular applications. This might take the form of a revolving fund where royalties were ploughed back into the fund leading to new crops of projects.

9.   The GLC will campaign for a shift in state spending on software development from military systems towards the funding of civil applications of an exemplary character. This would reduce the shortage of software specialists in non-military applications.

10.   The GLC will run a London wide competition for the best 'human centred' system or software programme.

Sources

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NEDO, *The Civil Exploitation of Defence Technology*, 1983.

Section Four:
INFORMATION AND COMMUNICATIONS

14.
Information technology and office work

*Computer operator at work in a Southwark office. One and a half
million people work in offices in London, many in jobs which may be
cut as new technology spreads rapidly. For some, new technology
brings less routine, increased skills and more status. For many, it
brings more routine, unpleasant side effects and the threat of
redundancy.*
Photo: Neil Martinson

[Image removed at request of London Metropolitan Archive as a
condition of digital distribution.]

Information technology and office work

Summary

1.   About one and a half million people, or nearly half of the workforce in London, are employed in offices. The proportion has been rising with the decline in manufacturing employment but office employment is now also in decline. Office workers range from clerks and secretaries to managers, with women usually at the bottom of the hierarchy. Because of their supposedly superior social status office workers have traditionally not been unionised, although this is changing. Conversely, office work is often not valued very highly, although it is clearly essential for productive activities.

2.   The introduction of new technologies is having a big impact on office work. As many as 500,000 jobs are at risk. For some people, especially with management functions, it may imply increased skills. But for many it means the increased routinisation of their jobs and often has dangerous and unpleasant side-effects, such as damage to eyesight. New technologies have also introduced the possibility of work, especially routine work, being contracted out to homeworkers. This enables employers to cut costs and carries the danger that the homeworkers, even though they have office skills which are relatively highly rewarded within offices, will suffer the extreme exploitation now common in other forms of homeworking.

3.   The GLC is committed to improving the security and conditions of office staff. It has looked in particular at how temporary work and contracted out work might be better organised. But the priority is the organisation of people employed permanently in offices. It is supporting City Centre, a resource centre particularly for women office workers in the City, to provide a place for them to meet and organise.

14.01 London is a city of offices. Nearly half London's working population can be described as office workers. Office work is however no longer a 'protected' area of employment. Office jobs are being lost on an increasing scale as firms move, merge and close and as the new information technologies are being brought into use.

14.02 Office work covers a range of occupations with many different characteristics. These are found across the whole range of London industries. What appears to unite these workers is only the fact that they work in a similar physical setting — the office; but even this delineation is by no means clear cut. A more useful way of grouping these occupations is as information processing activities, distinct from direct production and the provision of services. While the working conditions are distinct, office work is integral to all production and service activities.

14.03 The expansion of office type activities, whether in manufacturing itself or in the financial or commercial sectors, relates very closely to the changing organisation of production activities; in particular, to the ever increasing importance of information to the internal planning and control activities in the production process, to marketing and to the circulation of financial wealth. Information and information processing have also become ever more important in the activities of the state, whether in organization of the labour force or in the regulation of international trade and relations between states. Development in all these spheres has brought about an expansion of office activities in all sectors: production, marketing and commerce, finance and the state.

14.04 Such information processing activities have a number of features in common which tend to mark them off geographically, socially and politically from production activities. They tend to be concentrated in London and in central London in particular; the work appears more autonomous than factory work, less governed by the pace of machines; class relations in the office are often blurred and office workers are not well integrated in the labour movement; and office jobs, at the lower level in particular, are women's jobs.

14.05 But some of these distinctions are in fact breaking down. In terms of pay, increased work intensity and fragmentation and potential job loss, office workers are no longer a privileged group, if they ever were.

London as an office centre

14.06 Nearly one-third of UK office employment is to be found in London. Historically London is the capital of capitals: the head which directs the hand of labour on a national and international scale. As a trading centre, subsequently as a centre of finance and a market for services as well as a centre of government, London has always been a national centre of information and

control. This is reflected in the growth of office employment in London up until the mid 1960s, when about one and a half million people were employed in offices. After 1966 the number of office workers employed in the central area, inner London and Greater London as a whole began to decline. There was a net loss of some 10,000 jobs in lower level white collar work between 1971 and 1981; some of this is shop work but a good proportion represents the loss of clerical jobs. Despite this loss, office work accounts for between 43% and 46% of London's workforce, depending upon definitions; some 27% of London's resident workforce are clerical workers, while less than 20% are skilled manual workers.

14.07 The development of multi-plant and multinational companies has brought about a physical separation between conceptualisation — decision making, planning and overall control — and production activities. This shows up most clearly in the development of head offices detached from production sites. Between 1971 and 1976 the proportion of turnover of the top 1000 companies in Britain directed from head offices located in the south east increased from 80.9% to 83.0%. As many as 84% of the very largest British companies have London head offices away from their production plants. London had an excess of some 170,000 white collar jobs in manufacturing alone in 1971 over that which might be predicted from London's industrial structure. This reflects very roughly the head office role of London. These 'excess' jobs occur both in administrative, professional and management work and in clerical work required to support it. While some 12% of manufacturing workers in Britain as a whole were clerical workers, in London some 15% of resident manufacturing workers were in clerical grades.

14.08 Even when decentralisation away from London takes place, few firms relocate in their entirety; most retain at least a small office in London. BP and ICI, for example, streamlined their organisations, leaving only strategic planning functions in London. Certain office functions within organisations are more likely to be decentralised than others; these include accounting, data processing and administrative departments. Some industries cannot easily survive a change of setting: national newspapers, commodity dealers, Whitehall government departments, for example, and are likely to stay. In others prestige may override economics.

14.09 The concentration of control in London is also reflected in the fact that London has some 40% of national commercial office floorspace and that office rentals in central London reach their highest peak. This peaking contributes to the concentration of 80% of national office rateable values in London. The demand for office space in London is, of course, one of the factors which brought, at certain points in time, high returns to office development particularly on the fringes of the central area and in certain suburban locations. In some cases this office development has effectively crowded out many of the social needs of Londoners in these areas and has helped fuel some of the decentralisation of manufacturing firms from London. In consequence a political opposition to office development has grown up which, at times, begins to spill over into an opposition to office employment itself.

The nature of work in offices

14.10 Increasingly through this century, administration and information processing have become the domain of a separate group of office workers, distinguished in a number of ways from direct producers and direct providers of services. Office work developed through the standardisation and routinisation of much production work, through a transformation of the knowledge carried in the heads of skilled workers into standardised rules and procedures. The same separation of conceptualisation and execution is being pursued within the office sphere: the differences between, say, a data entry clerk and a junior manager in type of work, pay and security are as wide as, or wider than, those between a data entry clerk and a production line worker. There is nothing particularly new in this process — typing pools were separated out in large establishments from the 1920s and by the 1930s routine clerical work was increasingly taking on features of the production line.

14.11 Despite the high level of differentiation within office work, especially between the work of men and women, and despite the blurring of many of the traditional differences between office workers and production workers, office work does have a pattern and dynamic of its own which mean that office workers share common problems over a range of industries and occupations. The distinct class and sex composition of office work also means that the expansion of office work in one area may well not compensate for an equivalent decline in manual work, especially not in male work. A number of studies have shown that the development of offices in inner city areas like Southwark, Lewisham and Stratford have hardly increased employment opportunities for local people. Thus office employment is no simple substitute for manual employment at the local level.

14.12 Office workers are physically and socially closer to the centres of decision making than production workers. This has tended to fudge office workers' own conceptualisation of themselves as workers. It has been true but in different ways of both men and women. Whilst most male clerical workers never get beyond the clerical grade, the existence of career ladders in local government, insurance and in banking continues to hold out the promise of individual self advancement for men (and a very few women) who conform with required characteristics. Thus some men in 'top jobs' have plodded their way up the promotional ladder from clerical work. For women the barrier has often been the stereotype of office workers as young, single, attractive women working only for a limited period but with close personal ties to an immediate boss. In these circumstances, the main form of resistance to boring work, poor pay and sexual harassment has been to change jobs frequently, rather than to look to forms of collective action. This individualisation of the office worker is even evident amongst those in the typing pool; as compared to the production line workers, typists tend to work alongside one another on unrelated tasks. Temporary work has also tended to undermine collective forms of action. The importance of temporary clerical work appears to be diminishing with the recession. In 1970 76% of central London clerical employers used temps; by

1981 this had fallen to 63%. Employers now cover holidays and sickness by relying on existing staff, increasing the intensity of their work.

14.13 Despite the fact that office work is tending to become less 'mental' and more manual, machines are still largely ancillary rather than dominant. A common estimate is that each office worker uses some £500 worth of equipment: compared to some £5,000 for a direct production worker in manufacturing. This has meant that the standardisation of work is less advanced and the rhythm less governed by the need to maximise output from capital equipment. Office workers tend to work standard hours and be subject to less dangerous working conditions. These factors plus the problem of policing clerical output have tended to mark office workers off as a privileged group compared to those on the shop floor.

Unionisation

14.14 One important reflection of this social differentiation are the differences in unionisation between office workers and others. Despite a dramatic rise in the unionisation of white collar workers from 15% in 1968 to 44% in 1979, white collar workers in the country as a whole are less well unionised than the manual workforce. In 1979 63% of all manual workers were union members. The difference cannot be explained by the predominance of women amongst the white collar workforce, since in comparable situations women are not markedly less well unionised. Indeed, amongst white collar workers in the private sector, some are more likely to be union members.

14.15 There are areas where white collar workers are well organised — better organised, indeed, than workers in certain areas of manual work. But differences in the forms of organisation still show up. Comparing manual and non-manual workers in large manufacturing plants, manual workers are still more likely to be represented by shop stewards and to engage in strike action. Strikes by white collar workers are however by no means unknown and can be very effective.

14.16 By 1979 white collar workers accounted for some 41% of trade union membership in the country as a whole, and probably a rather higher proportion of London union membership. So, despite differences in history and tradition, office workers have to be recognised as a sector, and a growing one, of London's organised workforce.

Sex and race discrimination

14.17 In Britain in 1981 women formed 75% of the clerical workforce. Clerical work which in 1911 was four-fifths male has become 'feminised' throughout this century with the expansion of routine clerical work. The number of clerical

workers rose fourfold from 1911 to 1971 (nearly three times as much as employment in general) and women's employment increased by a factor of 13. In London in 1979 some 68% of clerical workers were women.

14.18 This growth reflected the employers' need to draw in a new labour force into this labour intensive area of work in order to keep costs down. Clerical wages fell in relation to skilled manual wages with the shift towards a female workforce. In London in 1983 women clerical workers, including secretaries and personal assistants, still earned only 82% of male clerical hourly earnings.

14.19 Although clerical work is women's work, there are clear differences across industries in the degree to which clerical work is done by women. Men tend to be involved in production-related clerical work, particularly in male dominated sectors like vehicles and printing and in transport and communications (as counter clerks etc). Women clerical workers are more often found in the sectors dominated by pure office functions — in detached head offices and in finance and insurance. The major sex segregation in the office is however hierarchical: women are 96% of shorthand typists but only 4% of clerical supervisors. This sex segregation has a number of implications. While clerical work is highly sex stereotyped, clerical employment has offered few opportunities for men displaced from other work. Secondly, the hierarchical segregation by sex — with men dominating administrative and technical grades and women the lower clerical grades — makes the issue of office rationalisation particularly important for women. For, in the first instance at least, it is the routine jobs for women that are under threat.

14.20 Clerical work in London is not open to all women. In particular, part-time work is not well developed in the office sector. Only about a quarter of female clerical workers work part time, compared to 35% of all London's women workers. Rather fewer clerical workers are married than one might otherwise expect. This may be related to the concentration of clerical work in central London. Women of West Indian background are also under-represented in London's clerical workforce. Only 27% of women with a West Indian background were clerical workers in 1981 in London compared to 40% of all women: anecdotal evidence and the work of Youthaid in south London suggests that many West Indian office workers are under-employed in relation to their educational qualifications. It seems also that only 4% of Pakistanis and Bangladeshis have clerical jobs but that Indians (men and women) are not greatly under-represented in numerical terms.

Pay

14.21 The highest paid workers in London are, of course, office workers in the managerial and professional strata. Clerical workers (including secretaries) in London are not as well paid as is often supposed. On average men earned £4.89 an hour in London in April 1983, taking manual and non-manual workers

together, but in clerical occupations average hourly male pay was £4.11. For women, average clerical wages in London of £3.36 an hour compared to an overall average of £3.51 an hour in April 1983.

14.22   Average figures are deceptive, concealing large differences between the well-paid and the really low earners. During their 1982 London campaign, workers from the Low Pay Unit observed that the most startling examples of clerical low pay reported to them in letters from the public were almost invariably in small firms, particularly small offices in the professional services sector, such as solicitors and estate agents where one all-purpose worker was frequently found running the office single handed. As many as a quarter of those that responded to the Low Pay Unit because their wages were below the low pay guideline of £90 were clerical workers.

The structure of office work in London

Manufacturing

14.23   Some large manufacturing concerns like Kodak and Standard Telephone and Cable have over 2,000 office workers employed in London. The 1981 census shows that almost half (48%) of employees in the manufacturing sectors were non-manual and professional workers. A substantial proportion of job losses in manufacturing have been amongst white collar and especially clerical workers. In engineering, for example, some 20% of the job loss in London in the years 1979 to 1981 was the loss of white collar employment. This is one reason why clerical work has been a significant area of job loss in London. There was an 11% decline in lower level non manual work for men in London between 1971 and 1981 which can be compared to a 12% decline in skilled manual work. Unemployment amongst clerical workers has also risen substantially. By September 1982 there were 60,000 unemployed clerical workers in Greater London, an increase of a third in eighteen months. In inner London, according to the MSC, the rate of growth of clerical unemployment between 1980 and 1982 outpaced that of unemployment as a whole.

14.24   There has also been significant decentralisation of routine clerical work from London manufacturing in the last ten years. This is a reflection of the growing convergence between the experience of routine office workers and direct production workers. In 1971 some 20% of the national clerical labour force within manufacturing was based in London. By 1981 only some 16% of that group was resident in London.

14.25   To some extent this decline is the result of a tendency to decentralise routine office work from London head offices to the south east region. The proportion of national turnover controlled from London itself has declined from 77.2% in 1973 to 76.7% in 1977. But the decline has not been uniform in extent and rhythm across sectors. In the past engineering and chemical firms

have moved away from London to a disproportionate extent, compared to banking, finance and insurance.

14.26 The closure of factories and the devastating scale of manual job loss in manufacturing has helped transform what 'manufacturing' work is left in London. Almost half is white collar work, much of it in head offices divorced from the production process and engaged to a disproportionate extent on accounts, sales and 'general management' work. This work and in particular the more routine functions are now being subjected to many of the same forces behind the losses of direct production work in London.

The finance sector

14.27 After 1971 the only sectors in the London economy with any sustained expansion have been finance and business services, professional and scientific work and public administration — all with high levels of office employment. Nearly a quarter of London's office workers are employed in finance and business and just under 20% of clerical workers.

14.28 However one chooses to illustrate it, the growth of finance and banking activity in the economy has been large, with important effects on the London economy. Bank deposits increased 23% per year in money terms between 1970 and 1977 and overall banking and insurance doubled their 'output' in the period after an increase of over 5% per year in the previous decade. To some extent this growth reflects changes in consumption: increases in owner occupation, in bank accounts and in car ownership and insurance but, at the London level, in particular, it reflects the City's sustained role in the international financial market.

14.29 Employment in insurance, banking and finance has grown fast at a national level, though not on the scale of output growth. It now accounts for 6% of national employment. The bulk of this employment is office work, with some 56% being in clerical work alone.

14.30 Two trends are apparent in this sector. First, the rapid growth which characterised the 1960s and 1970s is slowing down. With the application of new technologies, discussed in more detail below, both banking and insurance are tending to yield 'jobless growth'. Secondly, in insurance in particular, decentralisation of employment is occurring at a noticeable pace. Not all movement is as destructive of employment as the move made by Commercial Union from the City to Basildon and Croydon when 1,200 jobs were lost in transit. But the pattern — common in manufacturing — of decentralisation being closely related to rationalisation and overall job loss is being established. Thus many of the jobs lost to London are not gained elsewhere. There were indeed some 4,400 redundancies in insurance in 1981 and 1982, 4% of London's total redundancies in the period.

14.31   The decentralisation process has meant that London's dominance of finance employment has been whittled away. In 1961 45% of national employment in finance was in London. By 1971 this had fallen to 40% and by 1981 to 35%. Much of the shift was to the rest of the south east and most was in insurance rather than banking.

14.32   While insurance employment has been increasing rapidly at national level (by 14% between 1976 and 81) employment has shifted away from London to a considerable extent. In 1971 London accounted for 37% of the country's insurance employees — even though regional insurance companies were still important in Britain. It fell to some 30% in 1981. It involved 88,000 jobs or 2.5% of all employment in London. The pattern of national concentration and consolidation followed by decentralisation of more routine tasks seems well established in insurance. What is less certain are future employment trends. For reasons that are not clear, Warwick University forecasts assume a *declining* or barely increasing productivity in insurance in the medium term, which taken together with a modest increase in output of 1.3% per year, make insurance the fastest growing industry nationally in employment terms. But if decentralisation trends continue as in the 1970s, this implies little or no growth in London. If productivity does increase in line with even modest predictions of the effects of new technology, then many of the 40,000 or so routine clerical jobs in London's insurance sector must be under threat.

14.33   Up until 1981 the situation in banking was rather different. At its height in 1974-5 just under 40% of all banking and bill discounting employment in Britain was centred in London, three-quarters of it indeed in the central area. The strength of London as a financial centre is reflected in, and sustained by, the movement of foreign banks into the City, although in employment terms these are of relatively little significance. The dominance of London as a centre of international banking may have diminished, but the scale of banking activity continues to grow, and with it London's banking employment. From 1971 to 1976 the expansion was of 21,000 jobs (21%). This slowed down between 1976 and 1981 to 8% (10,000 jobs) but banking increased its share of London employment significantly from 2.6% in 1971 and 3.3% in 1976 to 3.8% in 1981. A telephone survey by the GLC suggests, too, that employment continued to increase in London banking in 1982-3. Only six of the 19 banks that responded had cut employment. However only two of the major high street banks responded to the survey and it is here that certain new technological developments are likely to threaten employment.

14.34   There has been an outward shift of banking from London, reflecting the shift of population, but banking head offices have remained and consolidated in London. At national level banking employment has continued to grow at a buoyant rate — by 16% between 1976 and 1981. Whether this growth will be sustained depends very much on the speed with which technological developments in money transfer are applied. Even in this area of healthy profits, employment expansion remains less well assured than in the past.

Public administration

14.35 The state expanded its employment rapidly through the 1960s and 1970s. Public administration forms only a small part of total state employment and only a fraction of 'office' type employment in the state sector. In education and health in 1979 in London there were some 70,000 clerical jobs, almost as many as in public administration itself (97,000).

14.36 The growth and decline of local government office employment in London reflects population changes, political decisions and to a lesser extent attempts to increase productivity. London employment in local public administration (most of which is office work) declined by about 5,000 (2.5%) between 1978 and 1981, about twice the rate at which local administration employment fell nationally in the period. London still has a slightly higher ratio of local government employment to population than nationally, but the difference is not great.

14.37 As the centre of government London has about one-quarter of the country's employment in public administration and defence. (This figure excludes health and education administration which are also concentrated in London). This employment has fallen quite rapidly, from 160,000 in 1971 and 156,000 in 1978 to 141,000 in 1981 reflecting a combination of the decentralisation of certain large scale administrative functions from London and public expenditure cuts. Despite the Hardman Report which recommended the decentralisation of some 30,000 central government posts after 1974, the rate of dispersal which ran at some 3,500 a year in the 1960s has diminished. Since 1978 government service employment in London fell by 9.6%, only slightly more than the national decline in civil service employment (7.3%) — suggesting that overall cutbacks rather than shifts in employment are now especially important in the civil service. A number of these lost jobs will have been shifted to the private sector with the privatisation of cleaning and catering. Some typing, computer work, auditing and account work has already been contracted out from the Department of Industry and more contracting out of clerical functions is likely to follow with the hiving off of whole departments to the private sector. In this process many clerical jobs may be lost.

14.38 Though office work has been growing in both the City and the state over the longer period, London's employment in these sectors is subject to similar pressures to that of manufacturing. Although output may continue to expand in the private finance service sector, employment in London other than for higher level professionals and managers is not likely to increase: either it will continue to be decentralised, or it will begin to be rationalised with the greater application of new technologies and the development of self-servicing.

14.39 Public sector office employment is, of course, more directly subject to political decisions both on the location of offices but more particularly on the scale of various departments. The drive to cut public expenditure has certainly reduced civil service employment; it is less clear how far it has cut costs overall.

Information technologies and office employment

14.40   The development of new information technologies has implications for the scale of office employment; its location; the skills of workers and the division of labour between workers and indeed between paid and unpaid work.

14.41   Information technologies involve both computing and telecommunications; the merging of these previously separate spheres of technology is of long term significance. Within the last decade computers have moved into offices, starting from the base of 'memory typewriters' for typing and typesetting; these had a small capacity for storing text on magnetic discs but were otherwise little different from normal electric typewriters. Word processing was introduced from both ends of the computing scale: using terminals of large central computing systems, and using stand-alone machines with small integral memories. There now exists a complete range of alternatives between these two, which extends to include more capabilities than text entry, editing and output. This extension has been stimulated most recently by the success in the marketing of 'personal computers' for executives and middle managers, whose main current purposes are to assist in financial calculations by storing data, doing calculations and presenting results in an increasing variety of forms including diagrams as well as words. Computing capability which a decade ago was only available on large central computers remote from individual offices is now available, via stand-alone machines or networks connected to central computers, on office desks. The uses have been extended and tailored to match a hierarchical range of office tasks by a whole new range of hardware and software based around the microcomputer and its links to mainframes.

14.42   A major underlying tendency, in which computing majors like IBM predominate, is for computers in offices to be linked together in networks. This implies developments in the switching and transmission of electronic signals and a growing convergence of computing and telecommunications. These tendencies are the basis of the idea of the 'electronic office of the future' and 'electronic mail'. When linked with one another, computer systems can store and transmit messages, documents, diagrams and other forms of communication which would otherwise be written and physically carried to the destination. Held at the receiving end on file by a computer, messages may be viewed on a screen or if necessary turned into hard copy on a printer attached to the computer. Manufacturers of telephone exchange equipment are now moving rapidly into a generation of apparatus which will code and transmit data as well as voices; manufacturers of computers are integrating these functions from the other end. Companies like Plessey or GEC, which traditionally supply telephone exchange equipment in Britain, are in competition with companies like IBM in the market for Private Automatic Branch Exchanges (PABXs). These are computers specially designed to manage flows of information of all kinds. The main alternative to using these glorified telephone switchboards and existing phone lines is to lay special cable

networks linking parts of a firm's premises where input and output terminals are to be located. This kind of system is known as a Local Area Network.

14.43 Between geographically remote sites there are three main alternatives for the transmission of electronically encoded voice and data. One is the telephone system. The second is a separate cable TV system. The third is satellite transmission between local dish aerials.

14.45 How much office work remains in London depends to a degree on how the communications infrastructure develops nationally and internationally, and how cheap, efficient, flexible and controllable (by private managers) the different competing services can become. Direct satellite links would enable the greatest degree of decentralising of operations from London. Cable networks, both public and private, operate in a specific geographical space and system of relationships, and thus, in a sense, are more limiting. In particular, cable TV systems installed from scratch or as an extension of existing piped TV networks, would have a markedly more limited coverage than either direct satellite (between selected locations over any distance) or telephone (which already has global coverage).

Control and new technologies in the office

14.45 In the restructuring of existing sectors of capitalist (and state) economic activity, new technologies are introduced predominantly to accomplish two purposes: a renewal of capital accumulation, and a reassertion of managerial control. Both these aspects can be seen in the present and planned introduction of information technologies into office work in London.

14.46 Systems can be designed and implemented to facilitate all or any of the traditional strategies of capitalist management — fragmentation, routinisation, standardisation, pacing and 'policing'. By raising the productivity of labour, extending the working day and enforcing speedup, mechanised office processes can increase production and cut the number of workers employed. By undercutting established grading systems and job definitions they enable cuts in average rates of pay. By shifting divisions of labour, by denying information to workers and by limiting choices in how tasks are to be executed, mechanisation of office work can enable new levels of control by managers.

14.47 Productivity can be increased by pacing work. With many computer systems as with most existing forms of machinery with built-in control mechanisms, people work to the pace of the machine rather than vice versa. Operators of word processing machines get warnings from the machine if they pause for longer than is allowed; new work follows automatically when a task is complete. Productivity can be increased by policing work. Computer systems can be programmed to check the quality of work. Spelling checks, for example, can be part of a word processing program. Productivity can be increased by

automating routine functions. Layouts of documents can be standardised and stored in a computer's memory, so that a worker feeds in raw text which is automatically formatted for output according to which standard form is selected . Consultation of standard costings, address lists, company standards and other 'look up' functions can be written into the software of computer systems, thus maximising the time spent by a worker in doing what a machine cannot (yet) do at an economic rate.

14.48 Information technologies can be used to make tasks obsolete or to automate them. Franking and carrying of mail become obsolete when electronic mail is available between two locations. An example presently being implemented is the Clearing Houses Automated Payments Systems (CHAPS). This system will link the clearing banks and the Bank of England with the result that 8,000 messengers jobs will go and staff who manually process the payments in 90 bank branches and the clearing house will find their jobs under threat.

14.49 Information technologies can be used to unload tasks on to clients. By installing 500 viewdata terminals linked to the company's central computer in travel agencies, Horizon Holidays was able to shift the bulk of cross checking and booking to local agents. Using the telephone system in this way the company cut its own operating costs, made its own office much smaller and thus easier to manage, and fragmented a body of work in a way which made it much less susceptible to collective organisation. Jobs were shifted and, in all probability, jobs were lost overall.

14.50 In other instances tasks can be unloaded on to unpaid workers. Cash tills outside banks (Automatic Telling Machines) do this. The customer does his or her own work in initiating transfers of cash and other processes of a clerical nature. Home banking through viewdata systems (installed in homes on the basis of cable TV or home computers linked to the telephone network) would be a more radical step along this path of job destruction through automation.

Relocating office work

14.51 In providing a cheap high capacity means of communication, cable networks facilitate the dispersal and fragmentation of work, building on existing tendencies towards suburbanisation and an increase in homeworking. Satellite banking is one example of a trend likely to develop with telecommunications investment. By 1982 the Midland Bank had reorganised 40% of its branches to undertake specialised functions for the wider region. Whereas previously a large number of different functions were carried out in each branch under the local manager, branches have become specialised departments under the authority of a regional manager. About 160 managerial jobs were lost in this process. In banks, this trend has been facilitated by the fact that organisations were already dispersed into a large number of fairly small local

sites. However, it is likely that in the future such developments may spread to other sorts of organisations, even where this involves purchasing new property.

14.52 Homeworking is another form of decentralisation which may be fostered by the development of cable networks. Some more senior professional and technical office workers including systems analysts and programmers have set up as freelance sub-contractors. Xerox and ICL have both developed forms of executive level homeworking making use of new technologies employing mainly men. These are very different from the routine copy typing, envelope stuffing and addressing typical of women clerical homeworkers who work at home from necessity rather than choice. In pay, conditions and security, clerical homeworking was firmly based in the old technologies and its scale was limited by them. But the development of distance working for disabled people using remote terminals and developments in France as well as the USA, suggest that this is very likely to change over the next few years. The worry is that the traditional problems of homeworkers of low pay, of limited security and social isolation, will persist (see chapter 17).

14.53 The development of satellite communications may bring about a transfer of clerical work to the Third World in much the same way as new technologies have helped transfer production activities abroad to exploit the advantages of cheaper and weaker labour. In the transfer of production activities, new technology has played a major role; partly by miniaturising components and products, making it much cheaper to air-freight or ship them about the world; partly by routinising the work and reducing the skill requirements; and partly by improving communications to such an extent that it is now possible to control a global production line from one site.

14.54 'Off-shore' information processing is now practised in the US. Large-scale information processing tasks, such as data entry, are air-freighted to countries such as Ireland, Barbados, St Kitts, Grenada, Philippines, India and Pakistan. There, women workers key in the information for a fraction of the cost of the wages of their equivalents in the US, and it is forwarded in the form of magnetic tape or floppy discs. Now, cheap satellite communications greatly increase the scope of this type of operation, enabling the information to be beamed immediately by satellite to the employing organisation. One Californian sub-contractor, Saztec Inc., flies batches of paper copy to Singapore for keying in, then beams the finished work to its Australian office. In this way the company can update the database files of its Australian clients daily. With the growing routinisation of clerical work, combined with the increasing cheapness and ease of high-technology telecommunications, it seems only a matter of time before such developments in office work spread to the UK. There is already some 'off-shore' typesetting and proofreading work sent out from London to India and other countries.

Changes in working hours

14.55   The automation of office work also leads to increased shift working. This is partly so that employers can gain maximum returns on their capital investment on equipment which has a rapid rate of obsolescence; partly to take advantage of cheap off-peak telephone rates for long-distance data links; and partly to provide round-the-clock computer back-up services for customer-operated facilities such as cash dispensing machines.

14.56   One response to the fragmentation of jobs and the loss of skills involved is to argue for job rotation. Any individual worker will then do a range of different jobs rather than being skilled only in the use of one machine. However, given the weakness of trade unions in the office sector, job rotation can give employers the advantages of a more flexible workforce and threaten those with specialist skills. An alternative approach, currently being mooted, is to negotiate for the upward, vertical re-integration of jobs, rather than the rotation of deskilled jobs amongst the workforce.

14.57   In offices where extra shifts are introduced to maximise use of equipment, they usually take the form of twilight evening shifts designed for part-time women workers whose childcare commitments keep them house-bound during the day. These workers frequently find themselves with much worse working conditions that their equivalents on day-time shifts.

14.58   Where 24 hour shifts are introduced to service large central computers, we find an extension of the traditional practice in computing of round-the-clock shifts. Night-shift workers are generally male, on much higher rates of pay than female day-shift workers. Needless to say, this trend has damaging implications for women's employment opportunities, as well as introducing new health hazards and disruptions in workers' social lives.

Rationalisation of office work

14.59   Labour costs account for at least half of all office costs and with office costs rising by 12-15% a year, there is a real drive to increase the productivity of clerical staff. This is happening even without large scale implementation of new technologies. As a proportion of all office jobs, clerical jobs have been in decline for some years.

14.60   For example, in engineering, clerical jobs declined by over 100,000 in Britain between 1970 and 1981 — a decline of some 30%, while administrative and professional jobs increased by some 12,000 over the same period. A case study of one London head office found that between 1972 and 1980, the percentage of clerical workers went down from 78% to 46% of office staff, while professional workers increased. In its first wave at least, office automation

tends to increase this shift away from clerical tasks because it is the more routine jobs which are most readily susceptible to automation.

14.61 This process tends to produce a polarisation between low paid routine clerical jobs at the bottom of the hierarchy and relatively well paid, autonomous technical, professional and managerial jobs at the top. Along with this occupational split goes a sexual division. The clerical workers are overwhelmingly female, and the technical, professional and managerial ones are male. It has been argued, however, that office automation, particularly the development of word processors, has led to an increasing separation within women's office work between 'correspondence secretaries' working full time on word processing and 'administrative secretaries' freed from typing to do administration. In practice, administrative secretaries rarely end up doing managerial work. Even if they are freed from routine typing, their work is tending to be rationalised. There was a noticeable decline between 1970 and 1980 in the number of central London secretaries working for a single boss — from 70% to 50% — but the chances of such secretaries being promoted into administrative grades were as slim as ever, even though 3% were graduates. So, although office reorganisation may appear at first sight to have threatened the traditional patriarchal structure of office power relations, whereby each male authority figure has his own personal female servant in the form of a personal secretary, in fact patriarchal power still prevails. Now, however, it is less individual, less like a replica of the bourgeois family, and more akin to a caste system where men collectively have power in relation to women.

14.62 The form of polarisation and the apparent increase in professional, technical and managerial workers may be only a temporary phenomenon. Many jobs, such as systems analysts and designers and work study engineers, which are connected with planning and managing changeovers to new systems, become redundant when the changeover is complete. In addition, a second wave of office automation seems likely to put many junior and middle management jobs at risk. This second wave, based more heavily on telecommunications augmented by computer software, involves linking all these discrete systems together and by-passing many traditional managerial functions. It seems probable that the second shake-out of labour from London's offices will include many more men than the first, and more 'professional and scientific' workers.

14.63 Such trends are not constant or steady. Many parts of organisations will still be in the first phase of office automation while others are advancing towards the second. There are also likely to be requirements for large groups of technical and professional staff associated with the developments of new products and new systems over the coming years, which may mop up substantial numbers of workers of that kind, displaced elsewhere in the economy. But there is likely to be less call for skills like shorthand and office management. This has several effects on the composition of the workforce and on conditions of employment.

14.64 Fragmentation of jobs into tasks which are then concentrated in

single-task jobs (typing, correcting, filing, answering the phone, and so on) bring with it a drastic reduction in skills called for, a dramatic increase in monotony and boredom, and a major obstacle to workers achieving an overview of the whole organisation which might help them to make their jobs or job prospects better. Routinisation means removing the place for initiative and imagination.

14.65   New technology as a means of fragmenting jobs and automating tasks reduces the range of skills a given worker uses. At the same time some of the skills required may be enhanced; for example more skill is necessary to operate a word processor keyboard than that of a typewriter. But this definition of skill, which suggests that new technology is skill-enhancing because the operator has a more complex set of keys to press, whilst all the other skilled aspects of the work are removed, is a very limited definition.

VDUs and health hazards

14.66   New technology has also brought with it a range of new health hazards such as eyestrain, reproductive hazards, and a growing range of stress-related illnesses. Various studies have been undertaken into the physical side effects of prolonged usage of VDUs and the results and indications of some of these are summarised below.

1.   Eyesight

14.67   It seems to be generally agreed that VDUs will not have a harmful effect on the vision of normally sighted people. However, a study carried out by the Association of Optical Practitioners showed that up to one-third of the employee population has uncorrected or insufficiently corrected vision defects which may lead to additional discomfort when engaged in VDU work. Also, VDU operators who wear contact lenses may find they experience discomfort when using the VDU for long periods. This is because moisture in the eye acts as a natural lubricant for contact lenses and prolonged concentration at the VDU screen may cause the blink rate to be reduced, thus leading to reduction in moisture. Several studies also reveal that VDU operators often experience eyestrain. This symptom is caused by tired eye muscles and can result in soreness, irritation, burning, dryness and tenderness of the eyes. Eyestrain can be caused by inadequate lighting and reflected light.

2.   Facial dermatitis

14.68   Recent research indicates that VDU operators frequently experience facial rashes. However, further research is required to establish the precise cause. It has been suggested that the presence of a static electric field in the

vicinity of the VDU could be a contributory factor and this is probably worsened by wall-to-wall nylon carpeting.

3. Reproductive Hazards

14.69 There have been a number of reports of allegedly high incidence of miscarriages and birth abnormalities amongst women who work with VDUs during pregnancy. Between May 1979 and May 1980 four out of seven pregnancies in the classified department of the *Toronto Star* newspaper resulted in babies being born with deformities. This caused considerable alarm since these women were all VDU operators and this was considered to be well above the average birth abnormality rate. Since then many other instances have come to light. Various possible reasons have been put forward for this link between VDU usage and birth abnormality. It has been suggested that high stress levels experienced by operators could lead to miscarriage and other complications. Another explanation is that radiation leaking out of VDUs could be at too high a level for the human foetus to withstand. Research in this area has been insufficient to be conclusive.

4. Stress

14.70 The white-collar trade unions generally agree that new technology is being introduced into unsuitable work environments and that the workplace is not being sufficiently adapted to meet the new demands. This lack of design often results in bad lighting, unsuitable furniture and many other conditions which can lead to increased stress levels being experienced by the operator. Deskilling, insufficient training, lack of control over the job are all problems faced by VDU users and can all result in high stress levels. It has also been suggested that exposure to excessive positive ions (caused by a combination of VDU screens, nylon carpets/clothing and the human body) can lead to stress, tiredness and irritability.

The office shakeout and a policy vacuum

14.71 Although many spheres of office work have been growth sectors over recent decades, there are certain to be threats to jobs, skills and traditions here too, on a major scale. In April 1983 the *Financial Times* reported a survey by the Institute of Administrative Management under the headline 'Now for the White-Collar Shake-out'. The survey carries 'the clear message that the white collar sector — there are 5 million people involved in administrative and clerical roles in the UK alone — is ripe for a major shake-out of the kind seen in recent years in manufacturing'. We believe this to be the case, and propose that in anticipation a priority should be made of saving jobs in offices.

14.72   The imminent office employment shake-out has little to do, intrinsically, with new technologies. The *Financial Times* article refers to a number of methodologies for rationalising office functions which are logical rather than technological. Such rationalisation may be carried out as a prelude to automation, or as an exercise in its own right. As one American manager said after setting up a typing pool and introducing word processors: 'Ninety per cent of the saving was from centralisation; only 10% of the increase was from the new equipment'. Many of the techniques used are akin to value engineering, which is established in manufacturing operations. Work measurement is finding a new lease of life in application in the office instead of on the factory floor.

14.73   Technologies do, however, have a role in determining the possible outcomes of rationalisation. The new information technologies materially influence the degrees of centralisation and decentralisation that are commercially acceptable in a given case and in large part they do this through the means that they offer for pacing and policing work carried out at computer keyboards and VDUs. The managing director of Olivetti, an industry leader in the design of office systems, says succinctly: 'Information technology is basically a technology of co-ordination and control of the labour force, the white collar workers whom Taylorian organisation does not cover.'

GLC policies

14.74   The GLC's immediate policies and interventions in the area of office work have necessarily been mainly concerned with the question of improvements for the workforce in existing forms of office employment. The GLC has set itself a number of general priorities.

14.75   It has adopted as a general aim the retention of the current level of office employment in London. This implies a strategy of keeping decentralisation from London to a minimum, whilst clerical unemployment remains high. It also implies a strategy of developing alternatives to job loss from new technologies and providing the resources — in particular information — which would help office workers resist job losses. One such strategy might be to shorten the working week; but unless pay is maintained, such a strategy could imply an increasing marginalisation of women as a workforce and needs to be handled with care.

14.76   The rationalisation processes in office work have made issues of work intensity, job content and health and safety increasingly important. The GLC believes that steps should be taken to ensure that London office workers gain all possible benefits from the use of new information technologies where these cannot be resisted. In particular the aim should be to counter the fragmentation of labour which is tending to transform office workers into little more than appendages of machines. In the first instance, workers should have the space

in paid time to be able to develop their own forms of work organisation in response to new technological developments. The increase in productivity promised by these technologies should be the basis for increasing office workers' collective or liberated time and hence their ability to control their jobs.

14.77 Office work reflects and sustains the sexual division of labour. A high proportion of London women are employed in offices, generally in lower grade posts. In many ways office workers share the common problems of women workers, so that general equal opportunities policies and initiatives are important for office workers. A particular aim should be to protect and improve the position of women office workers in the face of the threat posed by rationalisation, since alternative opportunities for women are so restricted. A lot will depend on fostering women's ability to organise on a whole range of employment issues.

14.78 As part of its equal opportunities programme the GLC is broadening the range of training courses available to its keyboarding and clerical staff. It is providing the opportunity of a second chance to allow a small number of clerical staff to train for administrative, technical and professional work and has commissioned a detailed report on the organisation of its own keyboard work. The report makes a number of suggestions for improving working conditions and the status of keyboard workers. It suggests bringing together word processing and data entry within one department but then decentralising the work to local areas so that the keyboard workers can be better integrated in the work of GLC departments.

14.79 The plan is to stop keyboard work being as dead end as it presently is. The idea is to open up a range of jobs — clerical work, programming, instruction and machine maintenance to women with keyboarding experience and to provide keyboard workers with a much greater say in the organisation of the work, possibly through a Keyboard Council.

The GLC as London's strategic development authority

14.80 The ability of the GLC to maintain or expand office employment in London through its land use powers is heavily circumscribed. It is not just that in conditions of oversupply (and a large stock of existing planning permissions) relaxation of development controls will not automatically increase employment. It is also that the link between floorspace and employment is becoming ever more attenuated. With the shift outwards of much routine office work, the tendency has been to increase floorspace per worker. Expanding floorspace may improve the conditions of remaining workers, but it does not produce more jobs.

14.81 Development control *procedures* are important since there are good social and environmental grounds for restricting further development in certain areas, and there is little evidence that office development refused in one area of London leads to a loss of office employment from London; most offices wanting to stay in London do in fact do so.

14.82 The GLC recognises that it is important to ensure that the overall supply of office premises does match demand in the foreseeable future in order that employment opportunities can be secured and to avoid a situation where rental levels may be bid up and some decentralisation beyond the boundaries of London prompted.

14.83 In addition to ensuring adequate provision of office premises in central London, the revised GLDP is attempting to encourage office development outside central London in those areas where it best meets local needs. Such location strategies may be used constructively to enhance the employment opportunities of those groups of women and others with limited mobility.

14.84 In central London office development is to occur only in the Central Activities Zone. A ring of Community Areas is to surround this zone. In this ring office development would be severely restricted in order to maintain the residential communities in the areas. This restriction may help the maintenance of non-office employment in the areas since it is around this fringe that the pressures for redevelopment of existing manufacturing sites and housing are greatest. Since these areas surround the central area, restrictions on development are unlikely to have detrimental effects on employment opportunities for local office workers. The effect on overall rent levels will depend on the scale of development permitted in areas offering comparable communications advantages. Outside this ring, office development is to be allowed in preferred office locations, especially those towards the east of London and, at a smaller scale, in more local town centres.

The GLC and training

14.85 The Greater London Training Board is seeking to improve the quality of training in London and the access of disadvantaged groups to high quality training. This applies to training for non-manual as well as manual work. The Manpower Services Commission has made widespread cutbacks in the provision of clerical courses through TOPS, out of all proportion to the decline in clerical employment and on a larger scale than in other areas of work. As a result, opportunities for the adult unemployed are meagre. The situation is made worse by the dearth of day release training in clerical work. While 24% of all non advanced further education takes place through day release, only 3.5% of secretarial students were on day release in 1979. This training pattern has two effects. While the bulk of clerical training is pre-entry training, class

divisions in entry to office work are maintained. This may sometimes help to limit access by local people to certain types of office work. The second effect is to make clerical training occupation rather than industry specific. In contrast to administrative trainees, clerical workers are not usually given training which would help them understand and operate in any specific field be it banking, accounting, advertising or local authorities. This type of training may then help reduce the divide between men's and women's work; though it will take far more than new training provisions to overcome such a divide. There is therefore a need to support good quality clerical training, in particular training which goes beyond typing, word processing skills and is more integrated with industrially based training.

Industrial intervention and office employment

14.86   The GLC has certain powers to intervene in industry. These include GLEB's powers to assist firms, the development of the GLC Early Warning System to identify potential job losses and the GLC's powers in relation to its suppliers and sub-contractors, dealt with by the Contracts Compliance Unit. In all these forms of intervention the GLC has some leverage to improve the security and conditions of office workers.

14.87   Some office employment has been involved in almost every case of GLEB intervention. Given the pressures to restructure and rationalise office work, it is important that office workers are adequately represented in the decision making process, whether through enterprise plans or the more traditional negotiation machinery. Given women office workers' limited experience of trade unions — and some very negative experiences — this usually requires extra effort to achieve.

14.88   The GLC has considered a proposal to support data workshops in local communities. The proposal was designed to provide a model for the use of new information technologies and also to pre-empt moves towards homeworking, and the extreme forms of exploitation usually associated with it, which may result from cable developments. The idea was for a new form of organisation in office work, intermediate between a centralised pool and dispersed homeworkers. Working in workshops near home, with childcare facilities attached to them, workers would be able to use computer-based data and information processing equipment and remote telecommunications techniques with clients in order to do work normally associated with city centre offices: data entry, word processing, and so on. However it was recognised that such a project might possibly accelerate the tendency of employers to contract out work which has up to now been carried out by permanent workers within offices and that therefore, whatever the longterm benefits, the project was not an immediate priority. But the GLC continues to support work being done to organise existing homeworkers, including workers in the new technologies,

and in particular to help them to escape from their isolation through new forms of co-operative association in local areas (see chapter 17).

The City Centre

14.89   The major GLC-supported project which has come to fruition in this field is the setting up of the City Centre, based in the City of London, to provide support and resources for City office workers. The idea was discussed extensively with bank and other office workers in the City and their unions, and was received with enthusiasm. The Centre has now been set up, with two year funding from the GLC and five full-time workers. City Centre sees its brief as monitoring and helping to solve some of the problems now facing office workers in the City, particularly women office workers; the increasing rate of unemployment amongst clerical staff; deskilling following the introduction of new technology; health hazards associated with new technology; the erosion of employment rights; the declining value of the clerical wage pack.

14.90   City Centre has premises in the City. These provide:

   (a)   Rooms for meetings, for showing films, and for other educational functions.

   (b)   A drop-in centre for reading, informal meetings or even just to eat sandwiches without fear of harassment.

   (c)   Duplicating, photocopying, layout and typing facilities and advice on how to use them.

   (d)   A library including information on trade unions, company information, health and safety, women's rights, new technology and any other relevant literature which could be used for research by user groups.

   (e)   Advice and referral on individual problems such as maternity rights, health or training.

   (f)   Eye-testing equipment for monitoring the effects of VDUs.

   (g)   Wordprocessing familiarity/training sessions.

14.91   City Centre has held a series of lunch-time events in the City, including the showing of films and talks by experts on new technology, health hazards, equal opportunities and racial discrimination, and the history of womens' employment in offices.

14.92   It has already become clear that one of the major pre-occupations of the users of the Centre is with the hazards associated with VDUs. The Centre has put together material on these hazards, which is based partly on the work of another GLC-funded organisation, the London Hazards Centre at the South Bank Polytechnic. The Centre can provide help, support and advice to VDU

users who wish to examine the effects that their work has on their health. It has an extensive range of literature on the subject, including union publications, press cuttings, reports and surveys. Its free quarterly newsletter will keep its readers up to date on the issues, and it can supply speakers for meetings of women's groups and others on health hazards and the new technology. In the meantime the City Centre has made a number of recommendations: for example that anyone about to begin working with a VDU should have an eye-test; that the period spent at VDU screens should be limited; that further research should take place into the potential hazards to pregnant women. The unions organising office workers are negotiating for women who are pregnant to have the right to transfer to other work and for 'New Technology Agreements' which include rest breaks at regular intervals. More generally, both the unions and City Centre are doing more research into job design, the way in which new technology is introduced into the workplace and the way it changes the nature of the work, with a view to organising campaigns in the interests of office-workers.

Conclusion

14.93   The question of new forms of office work is still more difficult than the creation of new forms of manufacturing employment. Drawing on campaigns in manufacturing industries, and particularly the Lucas Aerospace shop stewards' planning practice, the GLC's policy of popular planning focuses on (among other ideas) the notion of alternative 'socially useful' products. In principle this is straightforward in manufacturing (though in practice there are many reasons why it is not easy) because physical things are being produced and definite skills are visible in their production. Thus alternative combinations of skills and products, users and producers, uses and designs, can have a high degree of visibility. This is less often the case with services, and still less with office work. Paperwork in itself is not valued; especially not when it issues forth from the state bureaucracy. What is immediately at issue with paperwork is the usefulness of the whole institution which it services. Ultimately, this is true also of manufacturing and its products, but there is still a residual belief that paperwork is not real work and very little discussion of how administrative work could be made more socially useful and accountable.

14.94   The GLC's strategy for office work is intended to challenge that belief and to open up discussion of how office work could be made more accountable and, at the same time, more satisfying.

Proposals for action

1.   The GLC seeks to protect and increase employment in London's offices. At the same time the development of new offices must be properly controlled to avoid overproduction and the overconcentration of office development in a few areas. The GLDP lays out the GLC's strategy for office development.

2.   The GLC is against any further decentralisation of office jobs from London; it is in favour of a stronger regional planning authority to help put such a plan into practice.

3.   The GLC will also seek to protect office jobs threatened by new technologies. It will encourage firms to reduce working hours wherever new technology threatens employment levels.

4.   Women need more than the protection of their existing jobs; the GLC is committed to breaking down the sex stereotyping of office jobs and the racial divisions in office employment. It is promoting training for its own clerical and keyboard staff to widen their career options. It is using its influence over other employers to promote more equal opportunities for women and black people in office employment.

5.   Better opportunities are needed for women with children. The GLC is encouraging the provision of locally based office employment; it is endeavouring to ensure that large scale office developments include provision for childcare and is helping to finance local childcare facilities.

6.   The GLC will resist the development of home based office jobs; its programme of local jobs and local childcare is an important aspect of this.

7.   The GLC will campaign for better health and safety provisions for office workers, including a statutory limit to continuous working on VDU's.

8.   The GLC will campaign for better conditions for temporary workers;

temporaries should have the same rights to sick pay, holiday pay and pension entitlements as permanent staff.

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9. The GLC will support the unionisation of office workers and the development of women's organisation within unions. It is funding a resource centre for women office workers in the City of London and would support the development of further centres of this kind.

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