

**We may have had equality legislation, but it hasn't made any
difference to job segregation.**

Cynthia Cockburn

Caught in the Wheels

EVERY SELF-RESPECTING MAN knows that 'women are no good with machinery', they are 'hopeless at technical things'. After all, the facts speak for themselves. Women don't fiddle about inside TV sets, keep an oscilloscope in the garage, or aspire to fly a Tornado jet. Every self-respecting woman however, feels there is something fishy about these facts. We know that women make good, competent and enthusiastic technicians and engineers — most of us have met one or two. Just as many women as men reach maturity with a bent for calculation, problem-solving, design and construction. Why then, do most of us finish up using it to interpret knitting patterns and construct patchwork quilts? Have we chosen or were we pushed? And if we chose — what exactly was the choice we were offered?

I recently bought a book of encyclopedic scope on the history of machinery and technical invention. Working through the index I have given up at P (Ptolemy IV) without finding a woman among the inventors. No doubt we women too have had our technologies, but they are not in our history books. Ours are not the technologies that soared into capitalist profitability in the eighteenth and nineteenth centuries.

Anything but an engineer

As a result, the engineering industry today is a sorry tale. 13% of total employment in Britain (1980), it affords only 7% of women's employment. And the 608,000 women in engineering firms fill the lowliest ranks. No less than 93% are employed in the low-skilled categories of clerical, operator and 'other employees', who are often canteen and cleaning workers. 'The female percentage of employment in the different occupational categories is uneven in the extreme' says the Engineering Industry Training Board. 'While no less than 70% of clerical workers are women and 30% of operators, only 2% of scientists/technologists are women. 2% is also the female proportion of technicians and for engineering craft occupations only around one-third of 1% are women.'

A little more should perhaps be said about the 'operators' that account for almost half the women in the industry. These women are after all 'involved with machinery'. But they are confined to routine work, in jobs where little interaction with machinery is required or allowed. Often they work alongside semi-skilled men in a slightly higher paygrade, the 'setter-operators', the ones who make the adjustments to the equipment required by production. Above them again in both pay and skill are test technicians and the engineers who install and maintain the equipment on which the unskilled and semi-skilled work. These are invariably men. Without training in transferable skills, those of craftsman or technician or technologist, women operators, many of whom have capabilities way beyond the actual requirements of the job, cannot progress to better positions.

When we look at the trends over the recent past, we find little movement. It has always been recognised that the Equal Pay legislation of 1970 was going to fail to produce equal earnings unless sexual segregation at work, the tendency for men and women to fill different and unequal occupational niches, was also ended. This was one reason for the Sex Discrimination Act of 1975, which made it unlawful to

prevent us, on grounds of our sex, from entering occupations of our choice. There were two major groups of occupations that were seen as the twin peaks that we needed to scale to achieve equality: managerial (the top jobs) and scientific/technical (the clever jobs). It is now eight years since the Act. Careful observers report some small stirrings of sex-change among lower and middle managers. But in scientific and technical occupations the entry of women is extraordinarily slow.

The Engineering Industry Training Board confirms 'the overall proportion of women in the engineering industry has remained broadly constant over the last ten years. For most skilled occupations also, the female proportion has remained stable.' That is to say, it has remained very low.

Barely visible in the statistics a handful of pioneering women *have* been entering these jobs, however, and this is a factor that I will return to below. For the moment, it is sufficient to note that it is far from being a trend that affects the average woman.

Outlook: slow change

Looking forward to the future, the best indicator we have of the likely presence of women is the present-day statistics of

Women in the engineering industry Female occupational percentages, April 1980.

Source: Engineering Industry Training Board (statutory returns)

Occupational category	Female employees	Total employees	Females as a percentage of all employees
Managers	4,376	139,207	3.14
Scientists and technologists	1,790	67,767	2.64
Technicians	5,045	217,634	2.32
Administrative and professional staff	21,072	157,249	13.40
Clerks, office machine operators, secretaries and typists	226,576	316,006	71.70
Supervisors	10,008	142,693	7.01
Craftsmen	1,907	515,429	0.37
Operators	293,629	996,976	29.45
Other employees	43,563	269,878	16.14
TOTAL	607,966	2,822,839	21.54



One of the few to succeed.

technical education and training. And here we must begin to distinguish between degree-level students and the humbler technician (TEC qualified) and craftsman (City & Guilds). In universities, women are creeping up to 6 or 7% of engineering and technology undergraduates. Among technicians on industry training schemes, whereas women are 2.3% of all technicians, they are fractionally more (2.9%) of all trainees. In craft however where they are 0.4% of craftspersons, they are even less (0.3%) of craft trainees (1980). The picture is one of very slow change, slowest at the lower educational levels.

Meanwhile, economic trends do little to help. One noticeable change that *has* occurred in engineering is a dramatic decline in employment due to the recession, a decline in which women have suffered most. Between 1964 and 1981, total employment in engineering dropped by about 25%. The fall among women employees was 34%. This was due to the fact that where new technology is introduced its first effect is to make redundant the repetitive assembly and operator jobs most frequently done by women. Again the difference is marked between the prospects for women without basic education as a springboard to higher level jobs and for those with degree potential. For the former the prospect is deteriorating. On the other hand, scientists, technologists and engineers together increased their share of total employment in the engineering industry between 1975/6 and 1980/1 by almost 30%. If women were to seek these jobs there are, theoretically, employment opportunities in plenty.

The statistics of school education however do not paint a picture of a tidal wave of determined young women surging through the school system and about to swamp the labour markets of British

industry. Though at O-level girls have 42% of the maths passes, they have only 21% of physics, 22% of computer studies and a mere 3% of technical drawing. And by the time they reach A-level these shares have fallen to 25%, 19%, 20% and 2% respectively.

'Equal chances'?

People concerned with equal opportunities study these statistics and seek to help women get their 'fair share'. With this in mind, the Equal Opportunities Commission, for instance, has funded several projects aiming to understand women's disadvantages in the technical field and to encourage girls into technology. It has sponsored several career-opportunities courses for young women. It has funded a project in which women are working with teachers and pupils in schools to bring girls into technical subjects.

The EITB sees things in a slightly different light. Women are a wasted national asset. In a situation where there is a critical shortage of skilled engineers of the right kind to assist in the re-kindling of British industry, they feel that no resource should be neglected. They therefore run a number of women projects. One is the 'Insight' programme, which offers short courses to sixth form girl students interested in going on to do an engineering degree course. At the lower educational level it has a 'Premium Grant Scheme' which subsidises companies that will take on girl technicians over and above the firm's actual manpower needs.

Most initiatives to date have been based on the philosophy that women must be 'given more confidence'. We are continuing, the argument goes, to *fail* to make our mark in occupations that are seen to be challenging and rewarding. But are women really such weeds? I would suggest that

women know very well both where we are unwelcome and what we are rejecting. We are not failing, we are on strike.

Technology: neither neuter nor neutral

The prevailing belief concerning technology is that it is neutral, mankind's heritage, equally available and relevant to us all. All that women have to do is to reach out and grasp it. The 'man' in mankind, however, is no slip of the tongue. Technology is far from neutral. This should not be a difficult concept to Marxists who are, after all, used to understanding that our technology is capitalist technology and bears the marks and serves the purposes of the class that owns it. It needs only a little further broadening of the mind to understand that our industrial technology also has the imprint and the limitations that come of being both the social property and one of the formative processes of men. Industrial, commercial, military technologies, are masculine in a very historical and material sense. They cannot readily be used in a feminine, nor even a sexless, mode. Women are not merely failing to enter technology. On the one hand we are being repelled, and on the other we are refusing.

Men's greater average physical stature and strength is often cited as a reason for men's preponderance in engineering occupations. Yet it is not self-evident that they should be all male. Many machines, from the lever to the mill, have been developed

We are not failing, we are on strike.

precisely to *substitute* for human physical strength. The masculinity of technology, men's proprietorial grasp of machinery, has to be seen as a product of social rather than biological history.

To this we have to relate the male appropriation of the whole concept of 'work'. The paradigm worker, model for both employer and trade unions, is, by men's design, a man. In this context, women's physiology is seen, not as a worker's norm, but as defective. Men scorn the fact, for instance, that some women need a work load that can be modified or varied to take account of their monthly cycle or of pregnancy. Women feel guilty if they display any 'weakness' in this respect. Yet it could have been held to be to working class advantage, as well as to the

advantage of women, to make our collective demands to the employer on the basis of the weakest, common factor. That this has never been the case can lead to only one conclusion: work, whatever it may mean to the capitalist, is also an important sphere for men in which to establish and maintain power over women as a sex.

All the manly virtues

If the norm for the industrial worker in general is male, that for the qualified engineer, the skilled technician, most certainly is. Engineering represents everything that is defined as manly — the propensity to control and manipulate nature; the celebration of muscle and machine in action upon raw materials; the tolerance of, even pleasure, in dirt, *viz*, grease, swarf and metal shavings. (It is worth remembering that this is not the only kind of dirt however. Men are popularly seen as having a natural aversion to that other kind of dirt, human faeces, blood, vomit, with which women are supposed to feel more ability to cope.) Technical work involves the acceptance of physical risk — exposure to frequent accidents, cuts, contusions. It affords free movement round and about its object, in contrast to the physical confinement of much women's work. It implies control — designing solutions to physical problems, making energy work for you. The all-male workshop fosters and develops masculine patterns of relationships, it is the home of camaraderie based on the exchange of anecdote and slander concerning women.

Add to this that engineering as we know it is firmly embedded in the capitalist business world and the state. The atmosphere is competitive, it is about performance: your firm's machine against the next, your country's weapons against those of its rival. Capitalist industry and contemporary technology both express and embody values that have on the one hand developed out of patriarchy, and on the other have developed to make patriarchy what it is in modern society. The relations surrounding technology continually renew and extend male hegemony over the rest of us. The growth of industrial technology has to be seen as part and parcel of the historical development of gender difference. It has been formative in the growth of class relations. But it has also been part of what has made males into 'men' and females into 'girls'.

Women's values

If engineering occupations have developed

as a heartland, of male hegemony, it is hardly surprising that female incursions into this domain don't occur easily or painlessly. What women and women's work have come to mean, both to ourselves and to men, is something quite different. It is accepting rather than defying physical and social limitations. While 'men's work' means singlemindedly pitting everything you have, in the army, in the mines, on the high seas, 'women's work' means refusing to let go of your other self. Men's work is predicated upon someone looking after them. We look after ourselves. Women's work means staying at home with sick children if need be. It means carrying human preoccupations into the job: nursing, teaching, social work. It seems as though for women more than for men the social purpose of work is important.

To emphasise this *difference* is not to say that women and men are born this way, immutable. It is to recognise that over hundreds and possibly thousands of years society has constructed gender difference, gender complementarity, and continues to confirm and elaborate it every day, in work as well as outside work. And much in the feminine gender is good. Women (and indeed many men) value it above masculinity. We do not want to have to abandon a concern with feelings and people and

We do not want to have to abandon a concern with feelings and people in order to take on technology.

purpose in order to take on technology. We don't want to exchange the society of women for the society of men, to become a kind of de-sexed satellite of a male world.

Of course, men treasure their unique possession of technology. Many skilled trade unions have deliberately kept women out of traditionally male jobs. Individual men resist and resent the intrusion of women into work that is comparable to their own. Managements too, unless it suits them to do otherwise, often recruit personnel into the existing sexually-segregated pattern. Many discourage women from applying for technical jobs and some blatantly discriminate against them.

However, several engineering firms in which I have done interviews claim to be short of skilled engineers and more than willing to employ women. There is no 'discrimination' here, they claim. And I am sure that, broadly speaking, they are telling the truth. But women, they say, are just not coming forward. Now and then

one is offered a job and turns it down. The fact is that, while a handful of women are determined enough to persevere, the great majority are turning aside from each gateway as it is reached: metal-work lessons in school, O-level physics, Youth Training Schemes, technical degrees.

The choice we make

Perhaps we need to question the adequacy of the idea of unequal opportunity and discrimination in explaining women's 'failure' and look instead at the environments offered women and how they may actively choose to absent themselves.

First we should make a distinction between two categories of woman, those who do and those who do not try to work in technology. The great majority of women never set themselves on such a course at all. These are the ones who would need to be mobilised if women were indeed to take up 'their half of the places in skilled technical work. A miraculous wiping out of the sexual division of labour overnight would mean, tomorrow, in the engineering industry alone, another 33,000 women scientists/technologists; around 106,000 female technicians; and a mere quarter of a million craftswomen. These women who are *not* massing into engineering should not, for all this, be seen as being in some way unsuited to work of this kind. Many such women, indeed, may feel some affinity to technology, despite the discouragements and adversities of school and home life. Many women, working in so-called unskilled operator jobs in the industry are actively interested in getting more understanding of their equipment but have little chance of being taken seriously for technician status. Nor, if they had would it be cost-free. Women simply cannot fulfil this side of their nature on the terms presently available.

The personal cost of entering technology

Secondly, there is the handful of pioneers who do step forward and have a go. They are the ones who in the last decade have, by the sum of their individual and isolated efforts, shifted the sexual division of labour a fraction of a percentage point in favour of women. What differentiates the woman pioneer? Perhaps we can detect in her experience what deters the majority.

A survey was recently made of the young women on the EITB 'Insight' course in 1981.² It showed these young women, potential graduate engineers, to be a rather distinct group — not the average A-level student. More than half had a father in engineering, science or education; 87.5%



Getting dirty and sweaty, lying on the floor. . .

came from middle class backgrounds. They were exceptionally well-qualified, with considerably more A-grade O-levels than those intending other degree courses. Their problems are typified by a women chemical engineer I have spoken with. Though she loves her work and wants to move eventually into the even less welcoming environment of production engineering, finds that she has continually to behave out of character, using a combative male style, if she is to have any effectiveness in work or union. She is hurt by being ostracised by the other women in the firm, secretaries who resent her direct relationship with the male engineers. She also says, sadly, that if she wants to marry it will have to be Leonardo da Vinci, since less brilliant men shy away from being associated with a moderately competent woman engineer.

A further study has been made of the EITB Girl Scholarship Scheme, begun in 1976.³ The study showed the technicians to be exceptionally determined young women. In talking about the characteristics necessary to succeed, they emphasised self-reliance and independence, a need to be 'extremely dedicated'. They had to survive discouraging remarks and negative comments — especially from friends their own age, and particularly from men friends. They had to be prepared to lose the society

of other women. This applies both at work, where they were a small minority in their occupation, but also at home. Female technicians found that their female friends often resented the fact that they had so much in common with male acquaintances and were able to converse with them so easily. Many female technicians reported having 'lost touch' with their female school friends, and that their closest friends were now the few other women in a similar position to themselves.

Perhaps, as things are, the cost for most women is just too high. Perhaps it means sacrificing something we value. So long as the dominant technological culture and the uses of technology remain unchanged, when we ask women to 'succeed' in technology we may well be asking ourselves to betray values that are important to us.

Moving forward

Women are caught up in a contradiction over engineering, indeed over all technology. I have heard women arguing: should we keep our hands clean, keep well away from men's technology and run the risk of typecasting ourselves as whimsical earth mothers? Or do we need fire to fight fire, at the risk of burning our hands?

We cannot move forward into the male industrial field without great individual cost, and cost to the women's movement

by a continual drain of strong and able women into mere competition with men and collaboration with capital. Yet we cannot leave things as they are. Why? Because, like it or not, we now live in a world in which power lies in the economic ownership of these technical forces of production (and of distribution, reproduction and war) and in the practical control of these things. We cannot continue to be the passive objects of some technologies (at the receiving end of medical and military technologies, for instance, that we should be questioning or resisting), and the manipulated and exploited operators of others (typewriters, washing machines). We have to learn technical skills. If we are to learn, we have to get in there. It cannot be done at a distance.

Besides, the cultural barrier that is erected between women and technology is all too closely related to other physical taboos that confine and limit us. When you see a woman take a set of spanners and approach a car, you suddenly become aware of the manifold informal pressures against women in public places using their bodies in the way men do: getting dirty and sweaty, climbing up things, lying on the floor, spreading their legs, exerting muscular force. Learning to understand and use tools that work metal and wood, to translate geometry into motion and energy into work, these are things that we cannot do without if we are to stop being the world's victims. We have to get our bodies out of their cocoons, and this involves overcoming a certain physical cowardice and reticence that is the bad side of our gendered character.

On our terms

Is there a feminist and socialist strategy for getting us into the technical world without getting us hurt or doing harm to others? It seems to me we need a firm grasp, first and foremost, of a theory that recognises *systemic* male dominance and the part of technology within it. Only this can help us make informed choices. And when it comes to those choices, at a practical level?

The first thing, surely, is that we should not deny our social values. We should work our way into technology along paths that make sense for us. If, as seems likely, we can do nothing but hurt ourselves and others by breaking into aerospace and ballistics, well, let us leave those fads to the lads, and opt consciously instead for work

² The Report of the EOC/SSRC Conference, *Women in Engineering*, 1982.

³ Ibid.

in industrial sectors that seem to us to be more humanly useful and malleable: engineering for construction perhaps, or for the media, domestic equipment. Women seem to be taking this course naturally. Look for instance at the disproportionate number of women physicists who choose to work in medical physics in the health service. Media resources officers in education, who deal with video and printing, are often women.

A second route is to recognise the alien nature of most business enterprise and opt for self-organised collectives. There are already many small cooperatives, mixed or women only, in printing and building, for instance. They afford a way of separating out the already difficult relations of technology from those of capitalist employment.

Organising independence

In my view, by far the most effective principle evolved to date is separate, woman-only organisation. It enables us to learn (teach each other) without being put down. Provide school girls with separate facilities and the boys won't be able to grab the computer and bully the girls off the console. Provide young women with all-women courses so that they can gain the

great expansion of the autonomous women's sphere in technology.

Nonetheless, we have already learned that while autonomy is necessary, it is also not the whole answer. It only works in some situations and therefore it only gets us so far. What occurs in engineering is very similar to what has long been noted by women trying to make an impact within male-dominated trade unions. It is what some Italian feminists have called the contradiction between 'mutilation and marginalisation'. It is perhaps our essential contradiction as feminists. We begin by standing on the edge of the action, we are marginal. Then we seek equality and make our choice between failure or being a pseudo-man: mutilation. Then we assert our difference and organise autonomous women's groups, committees, demonstrations. This feels great. But over time it is clear just how the male machinery, of trade unions, of left politics, of factory and workshop, the world in short, grinds on regardless. Still we are marginal.

There is a limit to what we can earn and what technologies we can handle in women's collectives. There are limits to the impact we can have and what we can learn. It is a choice more available to middle class than to working class women. So we also

give each other support.

Woman-led, can it work?

There is one further step. Just what do we mean by equal representation of men and women in an occupation? It will never be exactly 50% of each sex. The norm today is a preponderance of men, a handful of women. We should start to visualise women-led situations. How impossible it seems to imagine a technical training course, a workshop, an engineering plant where women are, simply in a majority and in positions that can influence the relations of work and the mode of control. Where do we ever see men under women's tutelage,

We should work our way into technology along paths that make sense for us.

lads learning from women, men obliged to do things women's way? That is more revolutionary than autonomy itself.

If we made this one of our goals, there would be some interesting consequences. The sex/gender struggle in the workplace would change subtly, the balance tipped a little in favour of women. Men's reluctance to participate on such terms would be glaringly exposed. We would see them for what they are: the original separatists.

Of course there are many problems. Such a strategy is impossible until enough women exist, trained and experienced, ready and willing, to enter such situations. Besides, male dominance is not based merely on numbers. It is systemic, every one man is backed up by men's organisation, wealth and ideology in society as a whole. As Beatrix Campbell wrote scorchingly not long ago — 'we are yet to win power in a single institution containing both sexes, from *City Limits* to the City of London.'⁴ Nonetheless, playing the numbers game can be a start. Where positive discrimination in favour of women is both legal and attainable, we should remember perhaps that between the strategy of the sacrificial token woman and the strategy of women-only, there exists another option: putting men into a minority and releasing women's creativeness in a context within which men may learn and things may change. •



The masculinity of technology: an end result.

experience to make an informed choice about an engineering career. The organisation *Women in Manual Trades* is an autonomous women's movement initiative that is in this spirit. Some progressive local authorities are sponsoring women-only workshops and courses. The Sheffield 'Tran-sister Workshop' in electronics, with women instructors, is an example. We need to demand a massive increase in resources from the state, from industry, from industrial training boards, for women-run, women-only initiatives. Everywhere we have tried it, from women's caucuses to Greenham Common, autonomy works wonders for our feelings and our strength. We need, before all else, a

need devices to take us into the sphere of male and capitalist work. We can invent mechanisms that help us to avoid isolation. Progressive teachers and employers, must be pressed to ensure that space is made not just for the token woman, but for groups of women at one time. For women supervisors and managers too. We can ourselves form women's groups alongside work or study to help each other talk through and deal with our minority situation. The YWCA in London has a remarkable scheme to help isolated young woman technicians. Often only sixteen or seventeen years old, they can come together for a week at a time and simply share their experience, talk through their isolation and

⁴ Beatrix Campbell in 'A man's a man for all that'. *City Limits*, September 16-22, 1983.

Thanks for advice received from Liz Allen, Mary Clemmey, Heather Hunt, Anne Phillips and Elaine Sinclair.