

THE ROLE OF WOMEN IN COMPUTING

S Harold

Marketing Executive

F International

S HAROLD is Marketing Executive of F international. She was formerly the Deputy to the Managing Director of a subsidiary, Freelance Programmers Limited, a software house employing nearly three hundred women programmers and programming consultants in all parts of the UK. Prior to joining FPL, where her experience included Project Management and Production Management, and where she was later Head of Marketing Services, Mrs Harold was on the scientific staff of the Science Research Council. She worked at the Atomic Energy Research Establishment, Harwell; the Rutherford High Energy Laboratory; and the Atlas Computer Laboratory, Chilton.

Mrs Harold's particular computer interests centre in the development of the computer services industry and she has served on the Council of the Software Houses Association.

Some studies (122) show that turnover increases as company size increases in industrial firms and other institutions. While there is reason to hypothesize that the relationship is in the stated direction, further research is needed to prove it conclusively.

One study of women white collar workers found that length of employment of women was 60 to 80% longer than that of men. Studies of differences in labour turnover by sex in industrial jobs are not consistent. Studies of labour turnover by education and skill level are inconsistent and not generalizable.

The above evidence, where generalization can be made, should prepare one for a 1966 nationwide study of DP personnel done by F Kendrick Bangs. Bangs (105) shows a distribution of length of time DP people have worked for their companies. The data is shown in Figure 13, page

If we take into account an increase in personnel of at least 15% per year, then we conclude that turnover was in the neighbourhood of 15 to 20% for professional DP people at that time. Considering their youth, sex, and length of service, one can hardly conclude that such a rate is extraordinarily high.

Turnover is usually considered a bad thing that should be minimized. Yet an organization with no turnover may well stagnate. When is turnover beneficial, and how much is enough? Questions such as these can be answered theoretically by reference to the human asset equation shown earlier (p 441). Certainly if the expected contributions minus costs of an incumbent are less than the net contribution of a replacement, then turnover is beneficial to the organization. Yet, practically, the net contribution of an individual or group is not easily measured. So the usual recommendation of management advisors is to have some turnover but not too much. The correct amount is likely to be very specific to a particular organization.

THE ROLE OF WOMEN IN COMPUTING

My lecture this morning is on the role of women in the industry. Now, many men and not a few women feel that the publicity given to women's role in one occupation or another is unnecessary and overdone. Some men still feel as did an old don at Oxford University who never acceded to the Hebdomadal Council's decree admitting women to membership of the University. He began his lectures "Gentlemen". Weekly the proportion of male undergraduates dwindled, but the ladies stayed. Finally one day only the young ladies, the faithful band of Somervillians, appeared. "Tut, tut" said the old sage sadly as he withdrew, "Nobody here."

WOMEN IN COMPUTING

Today, however, we have a new industry and although we naturally retain many of our old prejudices, circumstances cause some softening of these; they need to be hard circumstances, too, at times. I am reminded that Charles P Hecht said, as he lectured in the States a couple of years ago, "Well, gentlemen, in my opinion data processing is a plot to infuse industry with women". So let us see how the software and hardware arms of the computer business look today. What is the present role of women? Let us look at some of the main job types and draw some conclusions; let us survey computer operators, data preparation staff, programmers, systems analysts, software designers, consultants, research staff, management and manufacturing workers.

Operators

Operators are still predominantly men, especially on shift work. However, especially in government establishments and large installations, one sees women working alongside the men doing exactly the same task. There appears to be no reason at all why they should not.

If you looked at the night shift at the UK Atomic Weapons Research Establishment at Aldermaston you would see girls working there as a matter of course. When I tested programs at night at the Atomic Energy Authority's Culham laboratory, there were girl operators. There is no bar on women in this type of employment, though single women will naturally find it easier to make their domestic arrangements.

Data preparation

Data preparation has become what is called a woman's job, that is to say, it is paid at considerably lower rates than a normal family man could exist on! The routine repetition, the purely manual skill and the meticulous detail that the card punch or magnetic tape encoder requires, permit the conscientious girl to fulfil a job requiring no physical strength and little specialized training. The wage rates that apply and the employment conditions that persist in a number of installations make it extremely unlikely that women's dominant position in this job type is ever likely to be challenged.

Programming

In programming it is becoming generally admitted that women have special aptitudes. Their application, their stamina, and their consistently higher regard for standards, have tended to overcome in the past five or six years veritable mountains of prejudice. During the past few months as I have visited installations, I have discovered many programming managers who told me that their best programmer is a women. Not only this, they say that while initially they may not have wanted to employ women because of the chance of single girls leaving to marry, or married women to have a child, they found that the turnover is not as high as that of the average man in data processing who job-hops, or did in happier days, for an extra couple

of hundred pounds per annum.

Mr. Campfield stated at the British Computer Society's Datafair, in 1971, that, in twelve months, 38% of a sample of programmers in the London area left their jobs. 72% of these had under 30 months service. Furthermore, although rather ancient surveys among manual workers showed higher absence rates among women, it should be noted that their length of absence was shorter and that even among manual workers the age group 20 to 40 had a low absentee rate for women. I am told by the few programming managers who keep these records, that the women's rate of absence for the programming job type is very little different from that of men. Many installations now have more than 50% of women in their programming teams and indeed commercial programming especially is in danger of becoming another "women's job". I say "in danger" because employers in the past have seen in women a source of cheap labour and once women are segregated into what thereafter become known as women's jobs, equal pay and conditions are inhibited, as men and women are not involved in the same tasks.

Systems analysis

System analysts (who require longer training) are still predominantly men, as many employers are still reluctant to invest the larger sums needed for training in women, who, they feel, may leave sooner than men. However, a number of women have entered this field and a measure of their growing numbers is that F2, a company that exists to employ women systems analysts and consultants whose skills would otherwise be wasted, put 50 women with an average of over 8 years experience each on its books when it divided from Freelance Programmers Limited at the beginning of this year.

In software design and implementation, I would guess that only about one in 20 employees is a woman, and we find that most of the staff joining us not only have very high academic qualifications before they get experience in this field, but sometimes were recruited as commercial programmers and spent a number of years in programming before they broke into the more esoteric area of software design.

In consultancy the numbers thin out further, although in research there appears to be no bar in government establishments or

universities up to the level of Principal Scientific Officer. There does appear to be some bar at that level, and one finds very few women earning over £3000 a year in this field. One only finds half a dozen women Fellows of the British Computer Society including two at the Atomic Weapons Research Establishment and two at Freelance Programmers Limited.

Management

Management shows approximately the same picture as consultancy and the upper echelons of research. One no more often sees a woman at a Data Processing Management Association meeting than one finds a woman on the list of Fellows of the British Computer Society or on the Council of the Software Houses Association.

A very rough guess on the proportion of women at the professional/technical level could be 25% which would compare favourably with the nearest general industry figure I have, which is less than 10%; for the purposes of this comparison, programming is taken to be similar to the professional or technical work category. If I am right, data processing is certainly more forward looking than industry in general.

Manufacturing

Moving over to the manufacturing arm of the industry and into what are often the less skilled jobs, you will see a fairly high proportion of women again. It does not appear to have changed much in the past two years. In January 1969 the proportions, according to Hansard, were as shown in Figure 1.

	Thousands		
	<i>Males</i>	<i>Females</i>	<i>Total</i>
<i>Scotland</i>	5.2	2.5	7.7
<i>England</i>	29.1	11.1	40.2
<i>Wales</i>	0.1	-	0.1
UK total	34.4	13.6	48.0

Figure 1: Proportion of women employed in computer manufacturing

Already more than one in four workers was a woman. This, in fact,

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was a little below the good average figure of just over 30% of women in manufacturing industry in Britain as a whole. However, there was no significant deviation. Similarly in August 1971 the UK figures were 45 000 men and 16 300 women.

These figures do not show that the manufacturing arm of the industry is more dependent on women than other manufacturing industries. Nevertheless, its dependence is quite pronounced, and the increase in the manufacture of computers will probably cause the proportion of women employed to rise.

Summary

This then gives us a picture of the present position of women in the industry, with fairly heavy weighting towards dependence on females in software and hardware until one gets to the job types requiring very long training or high academic qualifications, or indeed managerial ability, where it appears that, overall, prejudice continues to exist. This we shall look at in more detail later.

WOMEN IN INDUSTRY: THE HISTORICAL PICTURE

Perhaps, before we look at the particular job types which I mentioned last, we should briefly discuss how industry became so dependent upon women, and the implications of the current situation.

The history of working women is not difficult to trace. The industrial revolution caused by far the biggest transformation in society since the discovery of agriculture, to quote C P Snow. This industrialization and the spread of birth control are two of the main factors contributing towards the freeing of women from the home. With increasing specialization and the growing complexity of the labour market, first of all general literacy, and later higher standards of education, were needed. It was not sufficient to hand down traditional skills from one generation to the next, and the function of the family was greatly limited. Schools and training institutions took over instruction from mothers. Previously, for women, the social group which set the scene for most of their functions and determined their roles, was the family. Many of their functions were taken over by the Welfare State, others were reduced

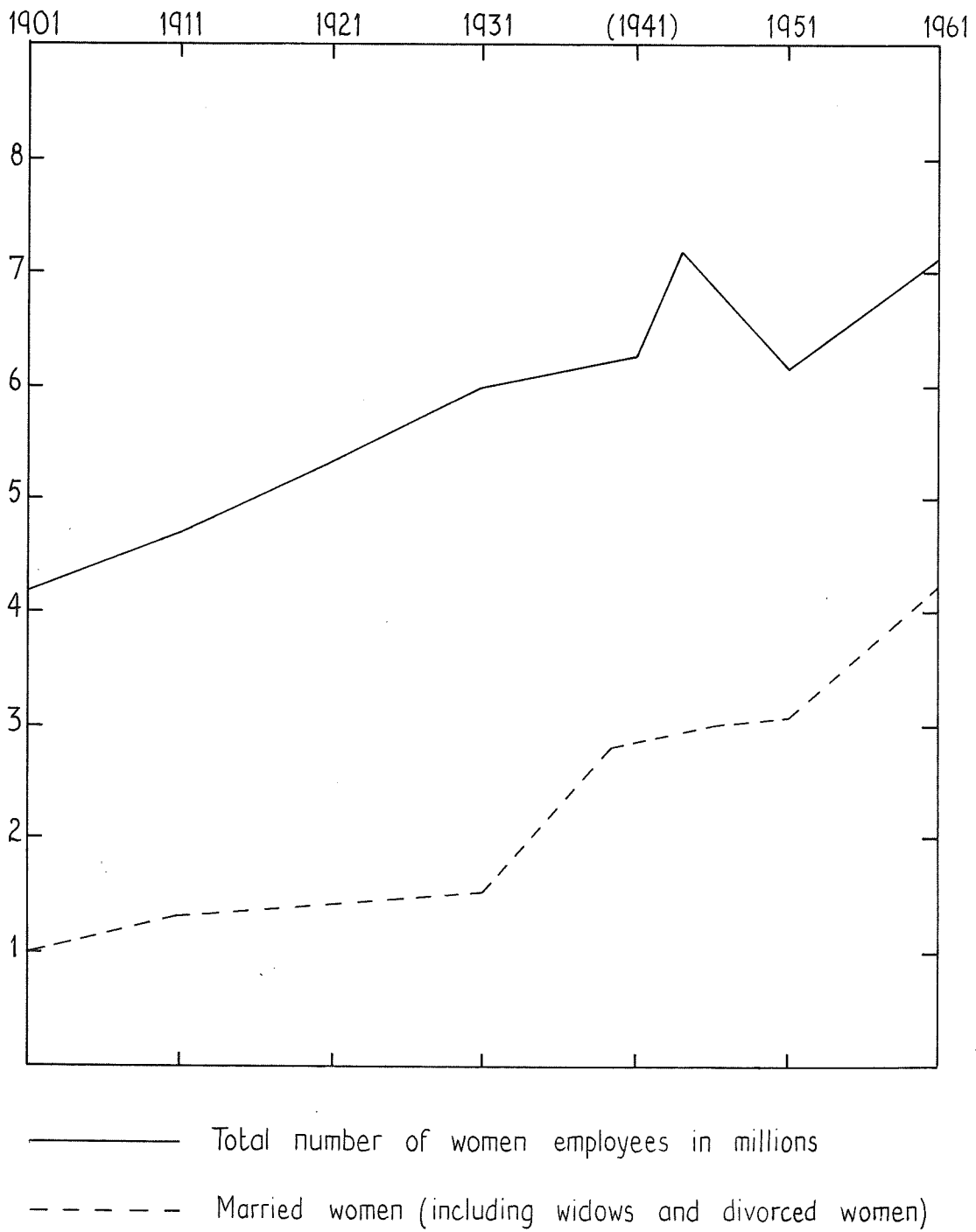


Figure 2: The growth of the female labour force (England and Wales)

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by the products of industry, dishwashers, clothes washers, modern cookers and cleaners. Women began to lose their sense of usefulness.

Today, a century later, after the achievement of a certain freedom, the desire to recover some feeling of usefulness leads ever increasing numbers of women to look for employment outside their homes. The trend is shown in Figure 2. Even middle class girls no longer feel that men are bestowing a favour on them by marrying them, especially now that there is a preponderance of men in the country. "Nice" girls are not content to stay in nice professions, teaching and governessing, any longer, and the type of work women do continues to change.

One hundred years ago they were unskilled factory hands. Light industry as it developed brought them into semi-skilled and white collar occupations. Recently they have been entering executive jobs and what are called the ancillary professions. It is interesting that, even in the early '60s, there was a distinct bias in employment towards well qualified women (see Figure 3).

Each new industry creates a new opportunity for female employment. Progress is now less impeded, and it is fairly constant; but in many areas of industry of an older type, prejudice is still difficult to overcome. I have not got a very good illustration of remaining prejudice but assuming that the ratio of employed men : women is similar to the ratio of unemployed men : women, one of the places where figures over general industry are split into these classifications is in the unemployment statistics. The nearest general classification to computer specialist over industry as a whole is probably the Administrative, Executive, Scientific and Technical category.

The most recent picture with which I can compare came from the statistics branch at Watford who gave me the unemployment figures for the June count for the Administrative, Executive, Scientific and Technical category (see Figure 4).

These figures are pretty suspect as not everyone unemployed in these categories is likely to register with the Department of Employment and Productivity. But it does perhaps indicate, if one wants an indication, that under 10% of employees in this category are women. I should not be surprised to find that probably a heavy weighting of women penetrating the bottom strata of the classification

compensates for very few at the top.

	%
Graduates	55
Graduates + non-graduates	42
Source: 1963 survey of Viola Klein	

Figure: 3 Comparison of proportions of married women gainfully employed, aged 35 to 55 (including part-time workers)

	1969 June Count	1970 June Count	1971 June Count
Unemployed men	21 677	22 977	30 439
Unemployed women	1960	2242	2783
Vacancies for men			8000
Vacancies for women			841

Figure 4: Unemployment in the Administrative, Executive, Scientific and Technical categories

COMPUTING MANPOWER NEEDS AND THE ROLE OF WOMEN

The computer industry, however, is new and is staffed to a very large extent by a new generation of managers, many of them born during or after the second world war. These managers are, on the whole, educated in a more liberal fashion with regard to women working, than comparable management in old industries such as textiles. If all the women were abstracted from computing, the industry would be severely affected. If they were abstracted from banking, the only result would be a pay increase for counter clerks to bring back a few men!

We now have a situation in computing where there is:

- 1 A shortage of suitable male labour in the professional range.
- 2 A supply of suitable female labour in the professional range.
- 3 The breakdown of male prejudice.
- 4 An economic situation in the developed countries overall, and in particular in the UK where, to quote from Edward Boyle a decade ago, "Within the next 25 years, or so, the top of the nation's talent will be working overtime to keep the remainder of the population happy and contented in their leisure time";

so more of our best brain power must be utilized.

- 5 A particular employment boost in that computing is very much a growth industry despite the temporary slackening of pace, with an unprecedented demand for highly qualified specialists. To expand briefly on this last point: I do not think that any speakers will tell you that staff requirement in the industry is decreasing, although during the recession there has been a temporary set back. In fact, the speakers will tell you the opposite.

Mr Wedgwood Benn has told you of our demand for more specialists, more high powered technicians. He has put forward an interesting viewpoint on this.

Mr Davidson will be saying that you should train from scratch because of the expanding staff requirement, omitting some academic background and part of the broad educational base. You may feel, as I do, that this creates another social problem, but whatever your views, one thing is certain: there is an expanding requirement for specialist staff and it will accelerate. The raising of the school leaving age, though it will have perhaps less effect on the availability of suitable recruits to the skilled and professional labour force, will have the general effect of making the numbers of the working population fall sharply in 1973. The Select Committee whose report has just been published and *The Times* agree that computing will be the third largest industry in the world by 1980.

So we see the picture emerging of an industry urgently needing highly skilled manpower resources, and beginning to accept women not only in the unskilled jobs in manufacture, not only in the skilled jobs of operating the computers and the dextrous tasks of the punch room, but also at the highly skilled and professional end of the job scale. We see the industry getting ready for recognition that women can do jobs in this area. There are no good statistics for women in employment in the software branch of the industry at present, as I have said, but I would suspect the proportion is about 25% overall, perhaps higher for programmers, lower for systems analysts, consultants and managers, and very high for data preparation staff. Various sections of the Department of Employment and Productivity have proved equally unable, though often willing, to help.

Now, this paper aims to make one point, and only one. This is it:

the only large reserve of highly skilled labour left in the UK is female and married.

MARRIED WOMEN: THE UNTAPPED RESOURCE

The computer industry competes for the mathematicians, physicists, electronic engineers, potential programmers and analysts, and managers of top ability, with many other smaller industries. The number of women being trained in these fields is growing and although there is still far from equal educational opportunity, a considerable married "reserve" has been built up. The computer industry, being young, is freer of the historical prejudice of the Edwardian and Victoria eras, and this lack of prejudice may enable it to tap this resource. There are several factors that could impede progress in this direction, some of which I have already touched on:

- 1 Historical prejudice.
- 2 Union attitudes towards part timers, while unemployment is used as a threat in a free economy.
- 3 Practical reasons, such as lack of nursery facilities, home help, or household aids, and management techniques. The first two may soon be partly overcome by the use of terminals and we will look at that in depth later.

But suppose we admit that we as an industry will need this reserve labour force of highly skilled and professional people for our optimum performance, and that we will make an effort to utilize it. Let us briefly look at the people available in one particular area, and then look at the objections again.

Dozens of programmers and analysts and some managers apply to Freelance Programmers Limited (FPL) and F2 each year. FPL and F2 are software houses specializing in programming and systems respectively. The organization is shown in Figure 5. An analysis in 1970 of programming applicants gave the information summarized in Figure 6.

From this we can see the quality of personnel being lost. I may add that slightly over half this year's applicants have been in the salary range £2000 plus. In general the more successful the

applicant has been in her computing career, the keener she is to go on working, and we find that large number of applicants have achieved senior or chief programmer status. However, on the side, it is not uncommon for a previous employer to give such glowing references that when we find the applicant is of good but not great ability, we wonder what the rest of his staff were like. Just over 80% of applicants came to us because they had, or were going to have, a family. Some typical staff I will call JF, GA and GP.

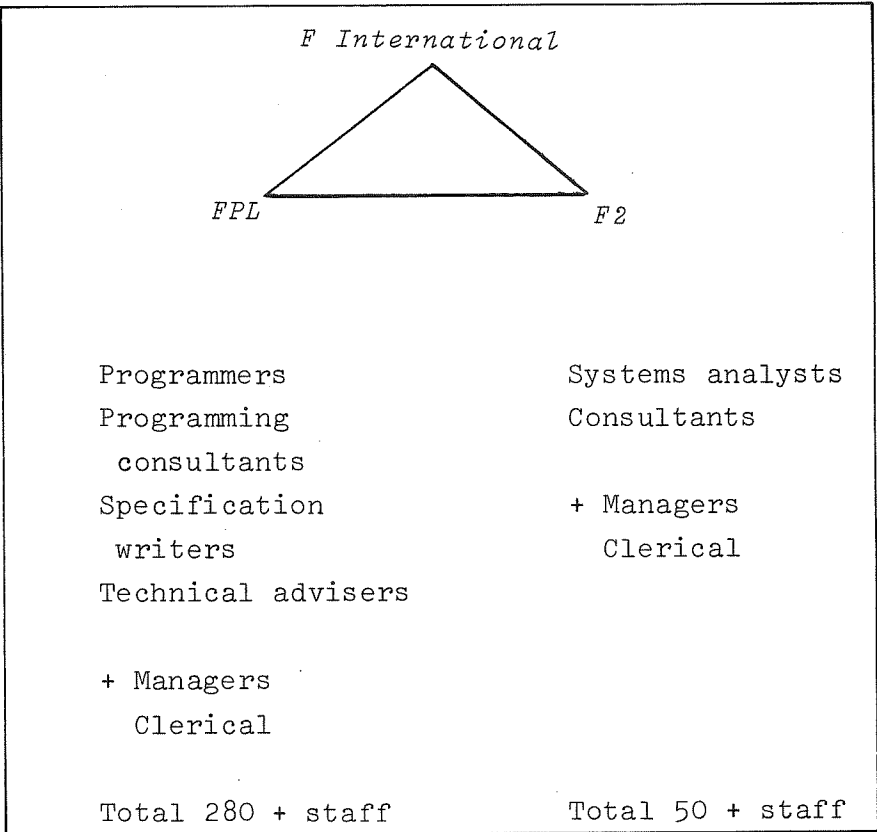


Figure 5: Women employed in F International Group by job type

<u>Length of experience</u>	
Up to 2 years	20%
2 to 4 years	35%
4+ years	45%
<u>Type of experience</u>	
Commercial background	65%
Scientific background	28%
Software experience	7%
Graduate training	42%
Time available per week: 25 hours average	

Figure 6: FPL statistics for 1968, 1969, 1970, 1971: women applying for jobs in programming and systems.

JF is based in Sevenoaks. She is now a Senior Systems Consultant with F2. She is just over 40 years old, and her children are aged 10, 12 and 14. Initially she started studying electronics and then assisted in experimental work in electronics and statistics for large scale atomic weapons trials. She then built up her experience of programming. She joined FPL in 1962 as a programmer and has since published a number of technical articles in conjunction with her programming career and more lately has designed a computerized analysis system for a firm of architects interested in town planning. JF has 30 to 35 hours a week to spare.

GA is based in Winchester. Her degree is in aeronautical engineering. From the British Aircraft Corporation, where she worked in the O and M department, she joined International Computers and Tabulators in Johannesburg and started programming in 1963. She worked on software design and maintenance. Later GA worked with ICT in Bristol as a software adviser, trouble shooter and COBOL lecturer. She joined FPL in 1967 and her work for us has included programming, lecturing, technical advice and trouble shooting. Later she became a highly skilled project manager while keeping up her technical expertise. GA would be unlikely ever to want a full time job as she has a young child and is married to a clergyman, whose duties require her active assistance. But it would seem unthinkable that, with 25 or 30 hours a week to spare, GA should be lost to the industry.

Lastly I will describe GP from Leeds. GP's degree was in mathematics at Oxford. She then taught physics for two years. She came into programming from scientific computing through a research assistantship at the University of Minnesota. There she programmed a CDC 1604 machine in FORTRAN for the Molecular Spectroscopy Research Group. After three years with the University of Leeds Computing Laboratory she joined FPL as a COBOL programmer and project manager. She now manages technical education and information for FPL, apart from continuing with her lecturing career, and FPL is very happy to use her 20 spare hours a week.

OBSTACLES

These then are the sort of people available for employment. What are the objections to using them? Let us recapitulate:

- 1 Historical prejudice of employers.
- 2 Union attitudes.
- 3 Practical considerations.

Prejudice

I do not know whether I need to say much about the remaining prejudice of employers towards women in technical and professional jobs. There have been a number of surveys. I believe that computing is, however, far from typical. In a recent survey conducted about several non-computing firms employing women at various levels in several departments, all the men in charge of the women thought that such fields as research, canteen management, statistics or computing, to name just a few, were suitable for women. Some of these same managers thought that buying and production management were unsuitable, although women were being employed in these fields in other firms.

When asked more specifically why they felt women were not suited to various tasks, their reasons were diverse. Most thought that women were incapable of supervising male labour, although they did not specify whether this was a consequence of women's inadequacy, or men's intolerance! A number thought that women were not qualified for the jobs, as they did not have the education or training. Some said women would find jobs too heavy physically, too cold or too dirty. Others claimed women were subject to emotional crises and offered no continuity.

Survey follows survey and most are good for at least a smile. One of my favourites is the list of replies to a final invitation to reveal all, when managers were asked if they would accept a woman manager over them. One third claimed to be willing, one sixth said that they would be, and I quote, "bloody annoyed", while the other half ranged from the "grin and bear it" brigade, to the more ominous "we would have to see how it worked out". Just one manager graciously said that he would assume that woman would have to be very good to be appointed, which is, of course, equality in practice.

We know that this feeling is, to a large extent, an historical one, and will disappear; that it is far more active in some areas than in others, and that in data processing it only exists at the upper end of the job range.

I have already said that in my opinion the computer industry is freer from this feeling about using women, and in particular married women, than most other industries that I know, so let us leave that topic.

Union attitudes

The second objection could well be more serious. It is the objection of union attitudes.

It is very surprising when you look at the figures on the number of women belonging to trades unions, and the number of men, and see that this is in approximately the same proportion as the number of women and men in employment, that the weekly earnings of women remain so very much lower than those of men. An example for the administrative, technical and clerical employees in manufacturing industries is shown in Figure 7.

<u>Trades unions</u>	
Figures for end 1969.	
Number of unions	508
Number of members	10.3 million
Number of males	7.8 million
Number of females	2.5 million
<u>Weekly earnings</u>	
Average weekly earnings October 1970 for administrative, technical and clerical employees in manufacturing industries.	
Males	Females
£36.49	£15.44
<u>Hours and conditions</u>	
Hours and conditions October 1970: manual workers	
Males	Females
45.5 hours per week	38 hours per week

Source: The Economic Profile of Britain, Lloyds Bank
Figure 7: Unions, earnings and working conditions.

Obviously the earnings are linked with the historical prejudice factor and with many other factors. In my opinion, however, union

attitudes are a positive disadvantage to the employment, in particular, of married women. I must now explain myself.

Most unions, probably even the Association of Scientific, Technical and Managerial Staffs, ASTMS, have a large protectionist element in their makeup. In an economy, whether or not it is capitalist, where unemployment can be a serious personal stigma, the right to work is jealously guarded, and it has always been assumed, quite incorrectly, that women workers and part time women workers in particular, are merely supplementing the family income, while jeopardising the livelihood of their male counterparts who are the breadwinners.

So although many unions and employers have formally taken up the call for equal pay for equal work for many unions, and indeed for many employers, this is more of an aim for the next generation than the present one. Certainly there is more awareness now of the needs of women workers at the higher level of union management. It has rarely, however, reached shop floor. Where it has been accepted it is likely to have been in the particular instances where there has been a traditional polarisation of employment into men's jobs (well paid) and women's jobs (poorly paid) and where this segregation offers considerable scope for sophistry on what is and what is not equal work. In addition the call for equal opportunity has not been taken up with any enthusiasm at all by the unions and for this reason there remain serious problems in bringing into play a significantly greater proportion of the reserve of brain power which is tied up in married women who are able to work a 25 hour week, but not a 40 hour week.

I believe that the first employer who decides to take a significant number of less than full time programmers and analysts on his staff and allow them to work under different conditions of employment, is going to have a number of union problems and should look carefully at the Post Office's difficulties in its proposals to use part timers. It may even be necessary in the long run for separate unions to be formed for such staff, in order to bring such a significant proportion of the reserve fully into the labour market. This is not political nonsense. Even Muriel Turner, the Association of Scientific, Technical and Managerial Staffs negotiator, admits that women need support both from the Government and their unions before even the situation of women working full time in industry is rectified. How much greater is the need of the part time workers.

So I say that, even though the National Joint Action Campaign Committee for Women's Equal Rights is being wound up, it is possible that a separate union will finally be needed, and will be formed. It is one of the most likely consequences of trade union reaction to a changing labour force. Yet in the USSR there appears to be no problem in married women working. Almost all do, many of them part time. Their labour is considered valuable and their output benefits the state. It should also benefit the state in an economy such as ours. We should be able to use more of the skills and abilities of women, not just the tiny proportion that we do.

Practical problems

However, let us be more mundane when we consider my last point: the practical drawbacks.

Earlier I mentioned a few; nurseries, home helps, household aids. These I need not expand on here, except to say that I believe the pressure groups for nurseries and nursery education will be effective within a time span of seven to eight years, within the time span of two more governments.

You will then be able to employ more married women in computer rooms and offices.

The management techniques used for female staff programming, or doing systems work, or operating, in your own premises will not differ very much from those you use for men, whether the women are on site for 30 hours a week or 40 hours a week. For an employee working 30 hours a week, of course a few costs, such as insurance, are higher per hour worked. But since the work achieved per hour is likely to be as great or greater than that achieved by the 40 hours a week employee, this may not be an over-riding objection. For married women it may also be wise to negotiate a reasonably long holiday period, say four weeks, as opposed to two or three, to cover incidents such as family sickness. The extra holiday will no doubt be considered when salary and pension rights are decided. But I digress. Management techniques are similar for male and female employees working on site, in my opinion.

However, with more sophisticated management techniques, it is also worthwhile and possible to utilize excellent computing brain power

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remotely. This may surprise you. Unfortunately most people who have tried to use remote labour have not realized that considerable management is required. But my firm has been doing it for years and has developed the technique project by project. The methods apply to any remote work force, male or female. The very powerful controls and work regulators we now use, particularly in the programming work phase, have had a surprising spin-off now that project size, in commercial work especially, has grown so fast. We have found that the controls we use to weld perhaps thirty to forty staff, spread over several counties, into a team, are the very controls and techniques needed to operate a large project with numbers of sub-groups or specialist teams working to a budget and timescale in a large operation. Our managers and staff also have their own programming and systems standards which are used on a wide variety of work types; such standards reinforce the controls that management techniques provide. In addition, a further backup to projects using more than about a dozen staff is a simplified critical path method.

So, to utilize a work force not wholly on-site (except possibly during the specification writing or testing phase) line managers must be educated to manage more and manage differently. In the programming phase our management ratio is budgeted at 1/5, but this includes semi-technical functions such as checking for standards and assessing testing control sheets. We successfully operate this remote work force as well as on site services, and some other firms are now beginning to develop the same management techniques. Remote management is certainly not an impossibility and I hope that over the next few years more attention will be paid to it.

The last practical difficulty we should probably deal with is the present high cost of terminals. How important this will be in the future, is debatable. If the programming phase of a computer project can be developed on terminals (and only a small proportion at present can, (by far the majority still being tested out on site in person and with the aid of card handlers or testing assistants, with the results being produced on hard copy), then there are possibilities in installing terminals either in a house or in a neighbourhood office, where staff working remotely can have ready access to it. Experiments along these lines have been attempted, only one or two successfully. The problem is that the costs of terminal use, to date, are rarely recovered by even two or three programmers working outside the local telephone area of the machine to which

they are keying in. However, the break-even point would be passed more rapidly by a user with a single machine, provided he has a small data transfer load, than by a software house, such as FPL, whose workload shifts from machine to machine, manufacturer to manufacturer, in a swiftly changing pattern. For instance, our last year's 360 and System 4 COBOL clients are at present outweighed by 360 PL/1, and 1900 and Honeywell COBOL; and FORTRAN has taken a more significant portion of business.

FPL looks at the possibilities of terminals annually, but the most recent assessment we have done was done independently by one of our staff. The investigation was restricted to terminals producing hard copies of the information transmitted, rather than VDUs, firstly the conventional teleprinter terminals and secondly the type with the "golfball" head and magnetic tape cassettes as backup store.

Even for software houses I believe that within the next two to three years it will become as economic to use staff working in their own homes (thus saving all the office overhead costs) provided that they live in a local or perhaps a rate telephone call area. The technology is moving so fast and the competition among manufacturers of terminals is intense enough to presume that within a further period of years it may be possible to utilize more remote staff economically. Of course, the state monopoly over the telephone service itself may artificially distort the costs.

CONCLUSION

To recapitulate, the difficulties in using professional computing staff who happen to be married women are as follows:

- 1 Prejudice. This is disappearing and is anyway less prevalent in computing.
- 2 Union attitudes. These might constitute a fairly long term threat in the present employment situation, encouraging the use of some poor full-time staff rather than good part-timers.
- 3 Practical considerations such as: lack of nursery facilities, which should diminish with time; pension negotiations for staff only working a short week; management problems, for some of which answers already exist, although they are not widely known; and lastly the cost and practicability of terminals for

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special circumstances. Even this last point could be a fairly temporary problem for some types of application.

We should consider whether or not the difficulties of using the best of the married women, who now constitute a considerable reserve work force and who by virtue of our considerable present use of female labour are increasing as a work force yearly, are outweighed by the undoubted advantages which we have discussed, and which are:

- 1 Their previous training and experience.
- 2 The possession of a fair proportion of the best brain power left unused in the country.
- 3 A thankfulness for work which shows itself in a high cost/performance ratio.

I hope that what I have said today will lead some management to grasp what is, used cleverly, a golden opportunity to increase the quality and quantity of computing in the UK. I also hope that, with the goal in mind, the training of women will accelerate, particularly in those fields where at present it is being neglected; and that employment policy and conditions will be more imaginatively constructed by employers and trades unions in order to optimize the economic use of the work force.

At present in the UK about 50% of women of working age go out to work, and of these over half are married. It has been predicted that there will be a steady rise in this figure to about two thirds, and a similarly increasing proportion of the women, in part due to the lowering of the marriage age, will be married. In computing I believe that data preparation and routine programming will remain and become, respectively, women's jobs, and that operating, systems design, research and management will see a substantial increase in the proportion of women employed in the next ten years. My guess is that if general industry saw an increase of 15% in similar work, the proportions in computing will rise by 20 to 25% of its present level.