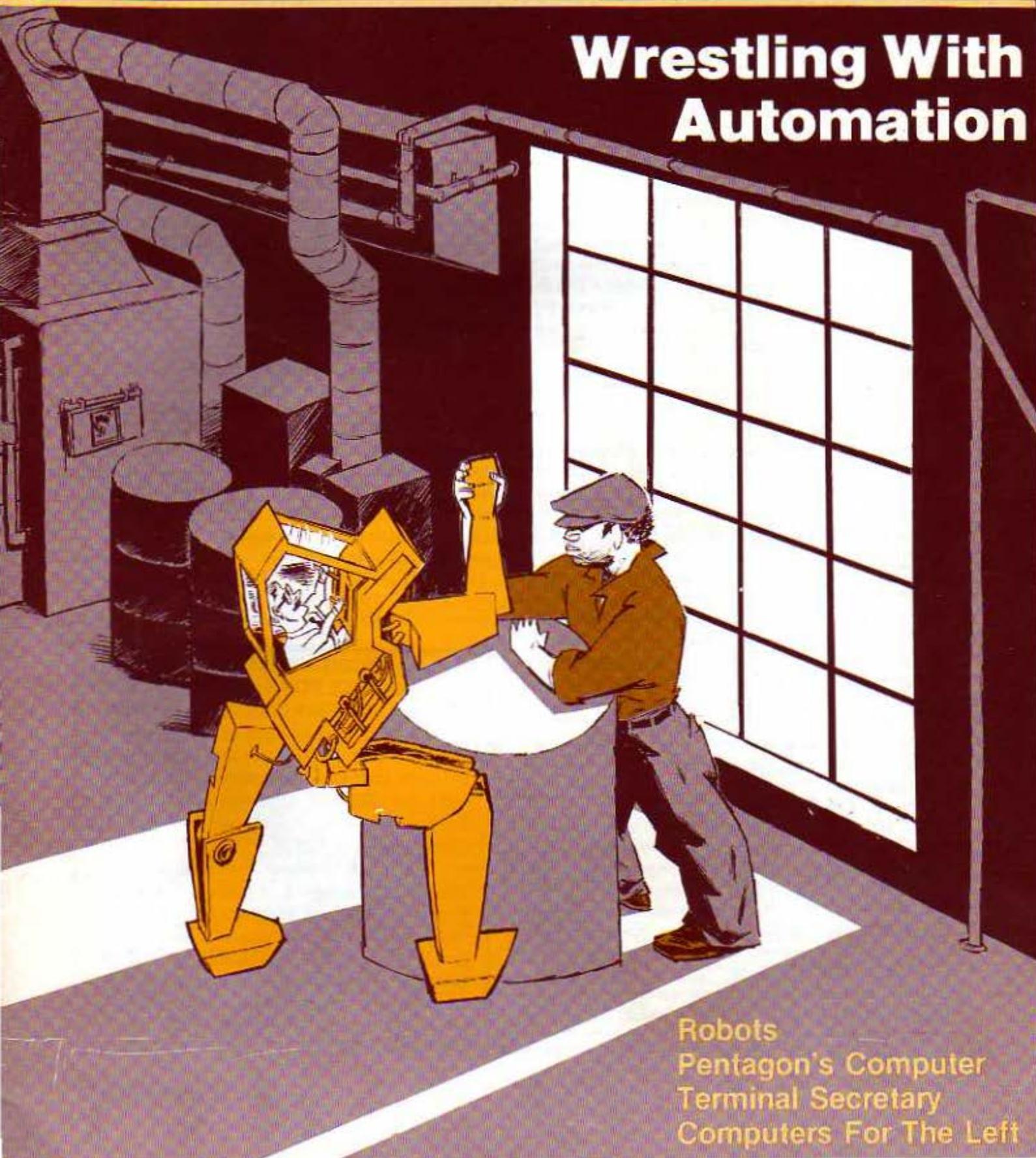


SCIENCE FOR THE PEOPLE

Wrestling With Automation



Robots
Pentagon's Computer
Terminal Secretary
Computers For The Left

about this issue

Reams are written in popular publications on new computerized machines and their applications. The "gee-whiz" tone toward computers still common in the popular press has extended to the growing development of microprocessors (computers on a chip). Their small size and ever falling costs have allowed microprocessors' inclusion in an ever larger array of everyday devices such as watches, sewing machines and cars. There is little doubt that computerized products will be entering more and more into everyone's lives. Some of us are interested in hearing about the latest computerized widgets, others are not. Like the metric system, most of us wait for people who understand the process to educate us and take it as it comes.

But pocket calculators and digital watches are having a small impact compared with workplace changes being forced by growing computerization. Like previous automation, computer automation is being introduced in ways which tend to increase management control and corporate profits. Automation is altering the workplace of millions of people with little organized force defending workers' rights.

The impact on office workers of computerized automation is perhaps even greater, since the largely unorganized clerical workforce has had little experience in resisting the kinds of changes that management is attempting with the introduction of computerized processes. These changes in the office mean not only fragmentation and deskilling of jobs, similar to changes in manufacturing jobs, but also the introduction of timekeeping and productivity monitoring methods which make the office more like the factory. It may be only a matter of time before computer programmers, too, find their "professional" status seriously challenged by managers already grumbling about lack of control over programming productivity.

Unions and other workplace organizations in this country have only begun to grasp the threats to their membership of the growth of workplace computerization. Long established unions' issues of pay, benefits, and job security remain in the fore, while the new kinds of problems that computerization is having have been dealt with timidly or not at all.

Education is the first step to decrease the fear, ignorance, and intimidation currently surrounding computerized automation. In order for workers to benefit from this new technology, their participation in the process of computerized automating is essential. Automation can benefit workers with shorter work hours, longer vacations and interesting jobs prepared for with retraining. Instead we find workers being displaced, paid less, and deskilled. Unions must gain momentum in educating workers so automation can become a beneficial tool for workers, rather than their replacement.

Through realization of the crucial importance of these problems and how working people are responding to them we have decided to focus this issue of *Science for the People* on computerization and the workplace. Machines are designed and built with particular purposes in mind. As long as the profit motive defines social benefit instead of equality and improved working conditions, science and technology will continue to benefit only the few economically advantaged instead of the mass of working people. We feel that the crucial issue of control of workplace computerization is vitally interrelated with all the rest of today's major labor issues.

UPCOMING ISSUES OF SCIENCE FOR THE PEOPLE

The *SftP* East Coast Editorial Committee is now soliciting articles for the March/April 1982 special issue on science and racism. Material should be sent to: Boston Editorial Committee, Science for the People, 897 Main St., Cambridge MA 02139.

The *SftP* Midwest Editorial Committee is planning a special issue on Feminist Science for July/August 1982. They are seeking ideas, articles, review and commentaries. Material should be sent to: Midwest Editorial Committee, Science for the People, 4318 Michigan Union, Ann Arbor, MI 48109.

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letters

MILITARISM AND SCIENCE

Dear SftP:

I read the July/August issue of *Science for the People* with great interest. Militarism in the U.S. has always been used to benefit the ruling class interests at the expense of the masses of U.S. people as well as the people of the world. *Science for the People* has a proud history of opposing militarism as well as exposing the way that the U.S. scientific establishment plays a key role in all phases of the development of the U.S. military. The problem that I find with the issue is that several articles ("The Basic Economics of 'Rearming America'" & "U.S./U.S.S.R. Strategic Policy") seem to take the position that Soviet militarism is not a threat to the people of the world. Secondly, this view appears to be supported by the view that in the U.S. militarism exists for its own sake. I disagree with both of these views.

First of all, I disagree with the idea that militarism, in itself, generates such large profits for the capitalists, that the capitalists find it desirable in itself: "Unfortunately, critics of the war effort did not probe the taproot of militarism—the link between corporate needs and military waste." (in "The Basic Economics..."). While it is true that large corporations reap huge profits from military expenditures, those profits are nothing compared to the profits which come from the exploitation of the Third World. I believe it is clear that the size of the U.S. military is more related to the imperialistic needs of the U.S. ruling class. The recent (in the last 20 years) military role of the U.S. in South East Asia, Africa, the Middle East and Central America would seem to bear this out.

I think that the above reasoning also tends to understate another important consequence of militarization—war. In particular a war between the U.S. and the U.S.S.R. The whole issue seemed to avoid the question of war and the basis for it. I believe that both the U.S. and the U.S.S.R. are imperialistic nations embarking on a program of world domination to assuage their own internal contradictions. The U.S. is losing its hold while the Soviets are extending their influence. This is all taking place on the backs of Third World nations. That is the U.S. and the U.S.S.R. are competing with each other and the object of the

competition is Third World countries. As the U.S. loses its grip and the Soviets become more aggressive, the U.S. ruling class reacts by changing its nuclear weapons strategy and increasing its military, both to the detriment of the people of the U.S. Recent Soviet activities in Afghanistan and the Horn of Africa certainly do not indicate that the U.S.S.R. is decreasing its military or that "The central Soviet strategic priority has been fortification against a land invasion..." ("U.S./U.S.S.R....").

Furthermore, these same articles try to make it appear that the U.S. is the only superpower undergoing militarization. Because of this competition over the Third World, the Soviet government is also becoming more militaristic. The Soviet navy has 1769 war ships as opposed to the U.S.'s 485. The U.S.S.R. has 950 submarine launched missiles as opposed to the U.S. count of 656. The Soviet navy has permanent task forces patrolling the Indian Ocean and the Mediterranean. From 1975-1978 the Soviets increased their military spending from \$124 billion to \$148 billion while the U.S. only increased its from \$88 billion to \$105 billion. The U.S.S.R. has at least 150 SS-50 medium range nuclear missiles aimed at Western Europe, with more on the way (which is, of course, prompting the U.S. to force Western Europe to accept the same kind of missiles from the U.S. pointing toward the U.S.S.R.). And I think it is very hard to see the recent military maneuvers on the Polish border as defensive moves.

The conclusion of these articles, seems to be that the proper thing to do is simply to oppose U.S. militarism. I think that the implication of the competition between the two superpowers is World War III. Opposing U.S. and Soviet militarism is certainly important, but what I think is just as important is supporting and strengthening the independence of Third World countries. The more Third World countries which come under the domination of either superpower, the greater the threat that the other superpower will feel it necessary to attack to preserve its precarious position.

Simply stated, I believe that present day superpower militarism is rooted in competition for the domination of Third World countries. Therefore, opposing militarism should mean not only opposing the growth of large militaries, but also supporting the independence of the Third World.

Ivan Handler
Chicago, IL

Authors' Response:

In responding to Ivan Handler's criticism of our article—"U.S./U.S.S.R. Strategic Policy"—we appreciate the opportunity to clarify and extend our views on this large subject.

We agree with the assertion that the Soviet Union is also "undergoing militarization" as evident in the decline of the U.S.'s lead in the superpower nuclear arms race, the expansion of Soviet conventional arms capabilities, and we might add the U.S.S.R.'s increased share in the international arms trade—about half of the U.S.'s 47% share. And in the nuclear arms race the Soviet Union may soon be provoked into introducing its own counterforce weapons and scenarios, bringing us all closer to nuclear annihilation.*

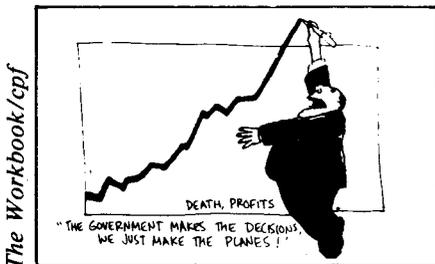
However, these developments are not inconsistent with Soviet military doctrine which centrally mobilizes its military forces for a full scale engagement with the West and on the whole is defensive. As we pointed out, the border-oriented Soviet versions of marines, para-troops, amphibious lifts, air transport, and especially the small aircraft carrier fleet do not support an effective "Third World contingency." Stated in Pentagon parlance, the Russians are not set up for the "long distance, forcible insertion into enemy-occupied territory against armed opposition." For example, the invasions of Eastern Europe and Afghanistan—Soviet border regions—were carried out and backed by military forces ill-suited for performing similar actions in Africa and Asia.

Arguments based on isolated facts and sold as proof of a Soviet "military threat" do not withstand a serious analysis of the U.S./U.S.S.R. military balance. As James Cypher points out (July/August, SftP, page 15) popularized figures showing the Russians outspending the U.S. on military hard-

*Until 1974 U.S./U.S.S.R. nuclear targeting strategy was based on keeping only enough nuclear weapons in reserve for a devastating retaliatory second strike on the opponent's cities as a means of deterring war. The U.S. counterforce doctrine broke down this deterrent by targeting Soviet missile sites—establishing a first strike limited nuclear war strategy.

ware are deceptive—they ignore disparities between each country's economic base, troop and weapon qualities, etc. Simply stating that there are "1764 Soviet warships to 462 U.S. warships" overlooks not only U.S./N.A.T.O. (allies count too) naval superiority over the Soviet/Warsaw Pact Navy in tonnage and fire power, but ignores the geographical facts working against the Soviet Navy: the Russian naval defense structure with-out foreign bases must support four main fleets (Black Sea-Mediterranean, Baltic, Northern and Northern-Pacific) in widely separated areas—subject to Western military blockage at the bottlenecks and geographical barriers between. Similarly, the number of submarine based missile launchers is a misleading index of Soviet military strength since it is number of warheads that counts: "mirving" (multiple warheads) gives the U.S. over a 2:1 margin of superiority¹ over the U.S.S.R. in SLBM (Submarine Launched Ballistic Missiles) forces, an advantage compounded by the U.S. sub fleet's greater readiness—50% of U.S.'s "forward deployed" military strategy. ** Thus, for instance, while the Soviet Navy has grown significantly since the Khrushchev era—in numbers of warships, tonnage of fleets, etc.—the build-up is structured on the defensive military priorities of, 1) destroying U.S. submarines and aircraft carrier based nuclear forces stationed in the Mediterranean Sea, Norwegian Sea, and the Indian Ocean within striking distance of the Soviet Union in the event of war; 2) maintaining a secure submarine based nuclear deterrent against a pre-emptive

**A major thrust of U.S. military forces is overseas, with a string of military bases stretching from the Far East to the principal East-West frontiers in Europe.



The Workbook/cpf

U.S. nuclear first strike i.e. the ability to retaliate and cause "unacceptable damage" on U.S. urban and industrial centers—a task made more difficult by the U.S.'s feverish program in anti-submarine warfare.² Nor does the new Soviet SS-20 missile pose a threat to Europe when counted against U.S. forward-deployed aircraft carriers, fighter bombers and the combined ground, naval and sea contingent of 2000 "theater" nuclear weapons in Europe that can strike Russian cities.³ It is precisely these forces that the Pentagon has swept under the rug in order to get public backing for a qualitatively new escalation of the arms race. The new N.A.T.O. missiles for addressing the "SS-20 threat" will not, militarily speaking, enhance the West's deterrent. Rather under the U.S. doctrine of fighting limited nuclear war—in Europe and the Western U.S.S.R.—Washington will be provided with a perceived psychological advantage over Moscow with a more usable appearing nuclear arsenal—seriously increasing the chance of accidental nuclear war.

The rivalry and domination of the U.S. and U.S.S.R. in world affairs—in the arms race, arms trade etc.—does not mean that there are two competing imperial threats, in particular from the point of view of the Third World. For one thing, the Soviet Union's trade relations over the last 25 years with the Third World have not served as a pathway for surplus investment capital flowing out of the Soviet economy—for Soviet owned foreign production/extraction facilities, bank branches, etc. in the Third World.⁴ In contrast U.S. direct corporate investments in Third World countries are over \$30 billion, heavily weighted on raw materials, and growing at about 10%/year.⁵ By the year 2000 the U.S. will be dependent primarily on foreign resources for practically all of the basic raw materials crucial for its military/industrial complex—underscoring its interventionist foreign policy as a means of securing them. The absence of a "Third World contingency" in Soviet military planning is itself consistent with the conclusion that the Third World is not an exploited economic ap-

pendage to the Soviet Union—a conclusion reinforced by the U.S.S.R.'s own status as a raw material exporter.⁶ We therefore consider the thesis that the U.S.S.R. is also seeking "world domination" highly questionable.

Furthermore, because the United States has historically been allied with colonialism, and the U.S.S.R. has not, the tendency has been for liberation struggles in the Third World to turn to the East for military and material aid. These alliances are not the work of Soviet "expansionism," but rather are due to a mixture of pragmatism and ideology in the Third World movements themselves. The decline in U.S. economic/political domination in the Third World has not corresponded to a surge of Soviet "geo-political momentum." The record of Soviet diplomatic successes shows that Third World countries safeguard their own sovereignty.⁷

Finally, the U.S. counterforce nuclear targeting strategy is perceived by some U.S. military leaders as a general instrument of control over the Soviet Union—in particular in discouraging Soviet probes in the Third World that aid national liberation struggles. In this way, the arms race may become increasingly utilized by the U.S. in opposing anti-imperialist struggles in the Third World. This reason alone demonstrated the urgent need for building an even larger anti-war movement opposing the U.S. military build-up.

Palo Alto Science for the People
Palo Alto, CA

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Author's Response:

Ivan Handler's first point of substance is that the profits on military expenditures are "nothing" compared to the profits coming from the Third World. In the most recent year in which statistics are available on this issue, 1974, U.S. corporations received a total of \$18 billion in profits, royalties and fees from their overseas investments. Twenty-four percent of U.S. foreign investment was in Latin America, the Middle East, Africa (except So. Africa) and Asia (except Japan and the Middle East). I would therefore attribute roughly 25% of the profit received from foreign investment, or \$4.5 billion, as profits "from the exploitation of the Third World." [Source: "Imperialism" in *The Capitalist System 2d ed.* Edwards, et al. eds., (Prentice Hall, 1978) pp. 476, 478.]

By way of contrast the overall level of military expenditures in 1974 (including foreign arms sales) came to \$136.5 billion. While it is not possible to determine precisely how much of this went directly into profits, the rate of profit on sales to the military has been calculated at 7%. (Of course, the \$136.5 billion figure includes not only direct contract sales to the Pentagon, but also wage payments to military and civilian personnel, interest payment on the debt and veterans' benefits.) Nonetheless, a considerable portion of these remaining outlays will go into profits either directly or as interest and rent payments. Consequently it seems conservative to estimate that at a minimum of 7% of the total \$136.5 billion resulted in profits to the top 5% of income recipients (including the Fortune 500 corporations); i.e. \$9.6 billion. Thus by these admittedly crude calculations I would estimate that the returns to military expenditures generate twice the profits as those directly generated by foreign investment in the Third World. [Sources: James M. Cypher "Back to the Bomb?" in *U.S. Capitalism in Crisis*, U.R.P.E. eds. (Monthly Review Press, 1978) and

Defense Industry Profit Study of the General Accounting Office 92d Cong. 1st sess., 1974, p. 46].

This is not, of course, to argue that the two sources of profit are separable—for they are not. Rather it is to highlight the proportions between the two and to emphasize, again, why a serious analysis of the economics of military expenditures must be undertaken.

As to the U.S./U.S.S.R. issue in the post WWII period, the U.S.S.R. lost control of the following client states according to former CIA official Ray Cline: Albania, Algeria, Bangladesh, China, Egypt, Ghana, India, Indonesia, Iraq, N. Korea, Mali, Somalia, Sudan, Yemen, Yugoslavia. Together these nations comprise 47% of the world's population. Presently the U.S.S.R. has hegemony over 19 nations with 6.3% of the world's population, while the U.S. has hegemony over 42 nations with 20% of the world's population. According to Dr. Cline's study, the U.S.S.R. presently is exerting less power than the world than it was in 1948, and overall Soviet world power has been declining since it reached a high-point in 1958. [Source: *Ray Cline World Power Trends 1980*, and Rear Admiral Gene La Rocque (U.S.N. Ret.) *The Defense Monitor*, Jan., 1980].

As to the alleged Soviet military buildup, I can only request that Handler reread my article. As to the number count method (Soviet X # ships vs. U.S. Y # ships) this is totally specious because it says nothing about quality and because it implicitly assumes that all U.S. and all Soviet weaponry stands in opposition. In fact, not more than 15% of the U.S. military budget is concerned with the U.S.S.R., while the Soviets must be concerned with NATO and China as well as the U.S.A.

According to Cline, 70% of all military power in the world is pro-Western, 20% is pro-Soviet and the remainder is non-aligned. As to the strategic and tactical missile count, the U.S. has 31,200 while the Soviets (when adjusted for inferior accuracy) have 16,000 to 18,000. [Source: *Sidney Lens*, "A Bomb Almanac" *The Nation* (April 4, 1981)]. This is the only weapons count that can have any validity, and the balance of power is obvious.

Handler stridently insists that the U.S.S.R. is imperialist in its relationship with the Third World. A consider-

able amount of research on the Soviet Union does not support this position. One reasonably detailed discussion of Soviet foreign economic relations concludes that: "...an objective and empirical examination of Soviet foreign relations [shows] that [these relations] are guided by components of hegemonism and proletarian internationalism [and] that hegemonism is becoming less important..." (Source: Al Syzmanski, "Soviet Social Imperialism, Myth or Reality" *Berkeley Journal of Sociology* V. 22, 1977-78 pp. 132-166). Until Handler can refute this type of analysis I would reject the unqualified charge of similar or parallel U.S./U.S.S.R. imperial thrusts into the Third World.

I agree with Handler that we should both oppose militarism and support independence (and I might add social justice) in the Third World. Nevertheless, since I cannot accept his many previous statements, I also cannot accept his notion that WWII is imminent, although space limitations prevent further elaboration.

James M. Cypher
Fresno, CA

LASER FUSION: A CONTRADICTION IN SPENDING

Dear SftP:

The University of California Weapons Labs Conversion Project has been monitoring the Department of Energy funding for laser fusion research. The trend in government spending on the laser fusion project reveals a very interesting contradiction: the recent increase is already exorbitant spending comes at a time when there is also a wide increase in skepticism over the practicality of the project. More and more is being spent on a project that is realizing fewer and fewer returns. This contradiction suggests that funds are being appropriated for something other than what is apparent on the surface. This contradiction gives more credibility to the suspicion that the laser fusion project is a military program—not an energy program, the guise under which it is still being sold to the public.

Guess Who's Stealing Your Dinner

ROBOTS AT G.E.

by Frank Emspak

In the next five years industry expects a remarkable increase in the number of robots. Other forms of new technology are also expanding rapidly. The new technology means numerically controlled machine tools (N.C.), CAD/CAM (computer aided design, computer aided manufacturing), automatic inspection equipment, various shop monitoring devices and robots. With the introduction of robots and the increasing sophistication and flexibility of other forms of the new technology, a qualitatively different situation faces working people.

One way of illustrating this new situation is to consider the objectives of N.C. machines as opposed to robots. N.C. equipment seeks to make various parts quicker and more accurately, decrease complexity and set-up time, and replace skilled labor on the shop floor with less skilled labor. It is possible that if the economy does not expand fast enough, serious displacement within the workforce will occur. Robots, on the other hand, are designed to serve other machines, their mission is specifically to replace unskilled labor. With robots displacement of human labor is not a byproduct but an objective.

Technological advance cannot be stopped, nor do I think that even if it were possible that it would be a fruitful area to explore. Rather, the social cost and abuse of technology is my concern. Since in the U.S. the collective bargaining system is the key area for dealing with the abuse of power by the corporations, the relation of collective bargaining to the new technology will be explored in this article.

The collective bargaining system is under strain because of the complexity of the issues raised by the new technology. Yet wage rates, layoffs, transfers, maintenance of previous earnings and attrition are all bargainable issues. The problem develops because while each may be achievable in a particular plant, overall they do not solve the problem.

There is one other aspect to the collective bargaining problem that should be raised. On the surface the new technology, with its emphasis on the elimination of



the skilled worker, makes it appear as if the corporations are less vulnerable to work stoppages than in the past. This is not at all clear. In order to make use of the new technology the corporations must make a huge capital investment. Continuous production is the only way to liquidate this investment. The interest must be paid in good times and bad—the machines, unlike workers, cannot be laid off. Thus, it is possible that during this period of transition that the companies may be more vulnerable, not less, to traditional methods of collective action.

Frank Emspak works as a machinist at the General Electric Plant in Wilmington, MA. He is presently elected to the executive board of Local 201 IUE representing Wilmington.

New Technology: The Social Costs

The social costs of new technology include changes in skills, unemployment, speed-up and noise. N.C. equipment is designed to provide either greater or less access to data, or control of the machine by the workers who use them. Control of the new equipment by the people on the shop floor as opposed to programmers influences the power relations on the shop floor.

The social cost of the new technology is for the most part being borne by working people. We see it in various ways. The actual cost of investment is being offset by tax incentives and publicly sponsored research and development programs. For example, the Westinghouse Corporation is developing a robotic batch assembly process for small electric motors. The project is funded by the National Science Foundation.

Skills are another important asset of society. When skills become outmoded, the companies show great reluctance to train workers who are on the job. New workers are brought in. The cost of training is carried by the public school system and not by the private sector.

The most devastating cost is now showing up in terms of increased unemployment. It is difficult to sort the specific factors and hard to say that a specific person lost a job due to automation. However, there are some important indications that the livelihood of working people is being undermined by the misuse of new technology.

For many years technologically-related employment has been hidden. New technologies are being introduced at different rates in different industries or plants. Plants that do not have N.C. may be the ones that find themselves in trouble. These plants may claim that they are at a competitive disadvantage with foreign manufacturers. Hence the plant may close, but the actual cause of the plant closure would certainly be obscure, both statistically and to the people involved directly. The U.S. Bureau of Labor Statistics underlines this point.

The effects of these technological changes on employment, however, is very difficult to measure. The effects are indirect and diffuse since technological change does not take place in isolation. Technological changes interact with, and are modified by many other factors that affect employment, such as changes in output, demand, consumer tastes, international competition and many others. . . furthermore, the effects of technological change on employment do not necessarily occur at the plant which introduced the technological change. (Jerome Mark, Assistant Commissioner, U.S. BLS address, Sept. 1979.)

The Bureau of Labor Statistics (BLS) concludes that as long as the economy is expanding and demand increasing, steady technological advance is compatible with rising employment. But, the economy is not expanding, demand in some sectors is falling, while technological innovation is continuing. Therefore, it is also possible to conclude that technological advance is compatible with rising unemployment. To give one very limited example, General Electric Company, in introducing automatic component inserting machines for printed circuits, decreased employment in the printed circuit board department in the Wilmington, MA GE plant by seven people while maintaining production. Likewise, with the introduction of a new robot designed to grit blast parts, three people will be displaced. Perhaps these people, or those who would enter the Company, will find employment elsewhere, but it is by no means a certainty. Employment is a social issue in part determined by how technology is going to be introduced—it is not inherent in the technology.

Given that estimating direct displacement due to technology is tricky, let us look at another way of estimating the new technology's impact. Total farm and non-farm manufacturing employment has remained the same since 1950. Since 1969, "not a single person has been added to the manufacturing sector in the U.S." (Eli Ginzberg, Chairman, National Commission on Full Employment Policy). Meanwhile, as we know, there has been a tremendous increase in the productive capacity of the country—even allowing for inflation. Yet, the average wages for a working class family of four in the Boston area is about equal to what was earned in 1967. The new technology increased productivity and that increase in productivity appeared as a net loss in income for working people. Jobs that would be there in the manufacturing sector have been lost, and people have left the work force and not re-entered.

The disappearance of "white collar" jobs is particularly significant. It has been the white collar sectors, especially white collar jobs in government, that have absorbed those displaced by an increasingly productive manufacturing economy. More and more, this displacement option is no longer available. The office is being capitalized by investments made in machinery, with concomitant pressure to increase productivity and cut employment.

The elimination of jobs and skills is a **social cost**, but it is also a political issue. **Maintaining jobs or re-training those that are displaced means establishing a social policy that requires the corporations to repatriate some of their profits for the greater good. This cannot be done on a company by company level. Therefore,**

collective bargaining has begun to consider broader political issues. Employment, present and future, is the issue.

In addition to questions of employment which the new technology raises, the introduction of a new technology, at least at General Electric, has been accompanied by a decrease in earnings. This decrease has taken two forms: an absolute decrease in earnings as various jobs have been moved off piecework to N.C. machines where operators are paid a daywork rate, and a relative decrease in earnings compared to the amount the operator can produce with the new equipment. The real decrease in earnings is a traditional collective bargaining matter and illustrates the pressures being brought to bear on the collective bargaining system. If we look at large employers going from piecework to day work, there is also a net income loss to the community; in other words, another social cost.

To give an actual illustration of how earnings are cut as a shop is modernized, I will examine a larger machine shop at GE. In April of 1977 there were five conventional machines, and nine machinists, scattered over three shifts. In May, 1980 there were five machines, including two N.C. lathes; seven people were

25% to 50% above the daywork rate, we can see that the advent of new technology can result in actual earnings cuts.

The question of skills is central to the rationale for the introduction of N.C. equipment. Indeed, one explanation for the introduction of N.C. equipment was the shortage of skilled workers. Basically, in the area of skill the companies are taking from the worker and giving nothing in return. It is the machinist's skill in setting up and operating the machine that is transferred to the tape. In one sense the machine operator no longer needs those skills in order to operate the new tape machine; the job has been deskilled to the extent that the worker no longer has to use judgments in set-ups and judgment in choosing feeds and speeds. This loss of skill is a social cost.

The problem of who programs the machine raises the issue of management prerogative. A union that addresses these issues is demanding a say in the organization of production—traditionally in the U.S. exclusively a management area. Hence, again the collective bargaining process is put under pressure. There is no way to address the question of who programs the machines without taking on the question of who organizes production.

The concept of skill is central to the trade union and its ability to control events on the shop floor. As the machinist loses overall responsibility for setting up and running a job, these functions become located in the programming department—usually non-union. The ability to control the shop floor is reduced. In other words, the advent of new technology in the form it is being introduced today potentially undermines the union—by taking skilled work from the bargaining unit and by reducing the replacement costs of machine operators in cases of strikes. It would take a major challenge to traditional practices to negotiate a contract where the skills remain in the bargaining unit, and where the machine operator participates actively in the programming of the machine.

Contracts negotiated in Norway between the Norwegian Metal Workers Federation and VapenFabrike shows that programming can be done from the shop floor. In small job shops in America, the machinist often participates in the programming out of necessity. In fact, companies such as Siemens are producing N.C. controls designed to accommodate shop floor programming. Indeed, in their Karlsruhe plant, there are limited examples of machinists doing the programming on the shop floor.

The design of computer-based equipment relates to the issue of control. To take a simple example, most modern equipment from machine tools to cash registers



employed, yet production had approximately doubled. Two people were on daywork, so that the number of piece workers had been reduced from nine to five. The net result was an increase in production, decrease in the number of employees and a major reduction in piecework payments. In addition, most long running jobs, especially the least complex ones, have been transferred to the N.C. machines. The most lucrative piecework jobs are gone.

The actual labor grade of the individuals involved (R-19) is the same, but the method of payment is different. Since piecework systems are designed to pay out

can be designed to register the amount of production at the machine or terminal. Factory management systems, systems which monitor the operator, the location of parts, payroll and personnel records, can be integrated into an actual machine measuring system. The worker winds up monitored, measured, instructed, and in a sense, disciplined by such a system. This is an intolerable system.

The Introduction of the SAM System

We at GE have specific experience with such a system and our dealings with the Company illustrate the difficulties collective bargaining has with issues concerning the new technology. In December of 1979, the Company announced that a new system called SAM—Shop Activities Management—would be introduced into the Everett plant of GE. The management said that the system would eliminate pay shortages, simplify payroll and thus help the worker. In actuality, the system does the payroll, serves a production control function, monitors the location of all work in the plant, keeps a record of all time turned in for non-standard operations, and gives pieceworkers the job they are to do in a day. In addition, foremen, though not workers, have access to personnel records, including attendance and tardiness. Finally, the system will result in the loss of several payroll jobs, and as time goes on, will allow the company to standardize prices for non-standard work.

The Company attempted to sell the system as a payroll correction device, while in fact they were most interested in its other functions. This became obvious when we realized the cost of the SAM system was so great that ten payroll clerks could be added for a lifetime on the interest payments alone based on the investment in the system.

In order to introduce the system, the Company used subterfuge. It was able to do that because the Company had complete control of the information regarding SAM. They knew its capabilities and the union did not. Neither we nor most other unions have contractual protection guaranteeing that the companies must give us information regarding the capabilities of such a system before it is introduced.

Secondly, the Company used a form of blackmail—both implicit and explicit. They argued that technology could not be stopped, that they had to automate to survive and that unless the Company automated they could not remain competitive. In other words, the Company threatened the employees with their jobs.

As time went on the police function of the system became clearer and the question of access to the system, and hence its design, have come forward. Workers have limited access to the system, while management has

greater access and ability to add and delete data, and review personnel records. This is a question of power and therefore is a subject for collective bargaining, but that begs the issue. At the moment our system lacks the ability to respond and monitor such a system. We lack trained stewards who understand the system and can evaluate what is happening on the shop floor as the system is put into place.

For us in America the Factory Management systems raise two important ideas—the concept of data shop stewards and access. Data shop stewards are stewards elected and trained in the use of the systems designed to control them. Access means contractual rights to all data stored in the system concerning wage rates, employment, personnel records and production. Finally a related topic in a piecework shop (as in Everett) is the problem of measured day work. With SAM the company will have enough production data to more easily measure and demand production above the norm for the department or job.

The introduction of Factory Management systems brings to bear another pressure on the collective bargaining system. Workers must have the right of access to the systems monitoring them—much like a worker today can go with his steward to the foreman and question his actions. We must have the ability to question the data system used to track parts and ourselves and question them.

The introduction of the SAM system caused the membership of our local union to become increasingly concerned with the issue of new technology. During the late winter the membership asked the local president to form a committee to study and make recommendations about the impact of the new technology on the workplace. We wanted to avoid the “show the movie and say yes” technique that the Company employed so successfully when they introduced the SAM system.

The committee, called the “SAM” committee, met intermittently. Finally, at the end of August, 1980, the committee decided to advise the Policy Board of the local to request negotiations with the Company regarding the new technology. The committee recommended that the union ask for limitations on the Company’s right to collect data that monitors workers. In addition, the committee asked for meaningful notification of technical changes which would impact the workplace.

At approximately the same time the candidates for international office in our union raised the issue of robotics and new technologies. Each felt the union should be doing more, and in particular, both felt we needed policies that would guide the local unions in their response to company initiatives in these areas. At

(Continued on page 36)

CHIPS ARE ON LINE AT LEFT MAGS

by Frank Ackerman and Jim Flowers

Working a desk job hardly evokes images of political activism. Yet clerical activities performed by left-wing organizations are crucial to the viability of the left. The office, and effective office procedures, are essential to the political work performed by left groups.

The Nature of Left Office Work

What happens in a left organization's office? In what ways is the work process similar to that found in small offices in general?

Obviously, the style of work relations is different than that of a traditional office. Typically the hours of work and standards of dress in a left office are more flexible, decisions are reached more collectively, worker identification with the office's purpose and product is higher, work discipline is looser and more self-imposed. Such differences are, of course, of great significance in the lives of office workers.

However, left offices' financial transactions, correspondence, production and distribution of literature require the same repetitive tasks as conventional offices. This similarity of tasks leads to the use of similar equipment. A left office today looks much like a small poorly financed business operation: typewriters, calculators, perhaps photocopiers or mimeographs are the principal machines employed. The core of the small office's information technology remains—as it has in offices for almost a century—the typewriter.

Since the advent of commercial computers many left offices have computerized certain office tasks, principally mailing lists. Until now, the left's only affordable means of automating has been the use of computer service bureaus. All new names, changes of address, etc., are sent to the service bureau, which enters the data on their computer and produces mailing labels on request. There are some advantages to this arrangement: start-up costs are low and no technical support staff is necessary.

The relative lack of control over mailing list maintenance by service bureaus, however, remains a problem. Service is often inadequate; requested information

may not be delivered for weeks or months. Alienated data entry personnel tend to make many mistakes while updating mailing lists, resulting in omissions, wrong addresses and duplicate entries. Profit-hungry executives resist spending time and money improving their programs or adapting them to the changing needs of their customers. In addition, costs are directly proportional to volume, making it expensive to grow rapidly. Very few groups have been satisfied with the quality of service offered by commercial service bureaus.

Using your own Microcomputer

The revolution in microcomputer technology and pricing over the last decade has brought in-house computers within reach of many larger left organizations.¹ A microcomputer system with on-line storage capacity for approximately 40,000 name and addresses, a medium-speed printer, keyboard and video display unit (VDU) can be bought today for a little over \$10,000. An equivalent computer system would have cost over \$100,000 ten years ago. The last decade's drop in prices is likely to continue in the future.

In-house mailing list maintenance does have its drawbacks. Start-up costs are higher, periods of rapid growth require more staff time doing data entry, and some special training and office modifications are necessary. On the other hand, the greater control an organization has over in-house computer work translates into lower error rates, daily instead of monthly mailing list updates, the ability to generate mailing labels on demand, and more timely statistical reports.

In addition, once a group owns a microcomputer it is easy to automate other aspects of office work. Word processing software cuts out much retyping of manuscripts and articles by allowing minor changes to be made quickly and easily. Accounting programs provide more accurate and accessible financial record-keeping

Frank Ackerman is an economist and staff member of the Dollars and Sense magazine collective. Jim Flowers is a computer consultant and musician in the Boston area.

than is available through manual means. Both software packages are available for most microcomputers for a hundred dollars and should be adequate for all except the largest left organization.

Management's introduction of computerized systems in the office has usually meant the fragmentation, standardization and degradation of clerical workers' jobs—as has been well documented by the left.^{2,3,4} What is not so clear, however, is whether technology developed within this capitalist framework can be successfully integrated into a worker-controlled environment.⁵

Obviously, technology explicitly designed to rob skills from workers or to constrain them into oppressive roles could hardly be of use to the left. One manufacturer of office computers has designed a system with two terminals, one for the boss and one for the secretary. Built into the system is the ability for the boss to inspect the secretary's files, supervise "her" work, and keep confidential productivity records. The secretary's terminal, needless to say, lacks these capabilities.

Some forms of technological innovation, however, are more flexible, and appear adaptable to a variety of social contexts. Typewriters, for example, have been associated with the exploitation of women workers in traditional offices.⁶ But taken out of this context, typewriters are nothing more than labor-saving devices, indispensable to left office work.

Computers—at least those without such embellishments as boss/secretary terminals—are among the most adaptable tools in existence. In a worker-controlled setting such as the left office they can be used to eliminate the boring, repetitive aspects of many different jobs, to teach new skills rather than destroy old ones, to allow specialization that follows the preferences and skills of the office staff. There is nothing inherently hierarchical or degrading in the concept of high-speed data processing.

Many of the health hazards associated with VDUs also stem from the capitalist environment, rather than the technology itself. The physical problems of eye, neck and back strain and the mental strain of long periods of social isolation at the VDU can usually be alleviated quite cheaply. The use of adjustable chairs, indirect incandescent lighting, anti-glare screen filters, proper arrangement of equipment, and frequent breaks for VDU operators are the most frequently prescribed remedies.^{7,8,9} All are easy to do in a collectively run office, but almost impossible if people have no control over their work environment.

There remains concerns about VDU workers' exposure to x-rays, ultra-violet and microwave radiation. Substantial radiation levels have been reported in some workplaces using these machines.¹⁰ Fortunately, it ap-

pears that much if not all of the problem can be eliminated by proper shielding of the high-voltage power supply, VDU case with metal, something manufacturers now do on many newer models. Clearly, a poorly constructed VDU should not be purchased if an operator's health is jeopardized.

Still, both to limit possible radiation dangers and control the problems usually associated with physical and mental strain, no one should spend more than four hours per day working at a VDU, with frequent breaks. Moreover, until the medical effects of low-level radiation are better understood, operators should have regular eye exams.



Debra Chasroff

Mailing List Maintenance—A Case Study

In early 1980, *Dollars & Sense* and *Working Papers*, two Boston-area periodicals, set out to develop a microcomputer-based mailing list maintenance system. It was planned as a joint venture primarily to share the considerable programming cost, but also to allow each magazine to use the other's computer in emergencies. Since *Working Papers* only recently began using the new system, our description is based on the experiences of *Dollars & Sense*.

Commitment to the massive task of designing and implementing the system was prompted by the two magazines' growing mailing-list related workload and expense. Each had a mailing list of 7,000-8,000 subscribers; each was paying annual service bureau fees of \$5,000 or more for frustratingly inadequate service. At the same time, microcomputer costs had been dropping rapidly—an earlier investigation by *Dollars & Sense* and the Boston Science for the People computer group in 1978 had concluded that an in-house computer was not yet economically feasible.

Mailing list maintenance at *Dollars & Sense*, using a local service bureau, involved a tedious series of rigid

The Boston SftP Computer Group by Glenn Wargo

The Computer Group in the Boston Chapter of SftP was begun in 1973. The current version has been in continuous operation since Fall, 1977. It is now the largest non-magazine activity group in Boston, with ongoing activities all weekend and at least two nights per week. We put together a computer system, operate our own school, handle the SftP mailing list, and run political discussion groups and forums.

The two early versions of the group are worth mentioning as their bugs, though fatal, were instructive. The first group we formed was purely political. We discussed mostly issues of Computer Aided Repression, as in FBI data banks. The group failed to come up with a practical way to fight that dreck, and gradually petered out.

The second group, therefore, got involved in lots of practical activities. We did considerable programming for the National Jury Project to analyze jury selection data for political trials. We helped Boston area groups, e.g. Fair Share, design questionnaires amenable to electronic processing. We took on the job of processing the SftP mailing list, using donated computer time. We also began to get involved with the Children's Museum. Unfortunately, we neglected political discussion. Members

continued to work on their projects but drifted away from Science for the People, for which they had acquired little understanding or allegiance. Lacking organization, the group could not grow, and could not exist.

The current group began with a solid focus for political discussion—Ted Nelson's *Computer Lib*. We eventually wrote a critical review of it for the magazine. Collectively reading a book, however slowly, ensures a flow of new information to spark discussions.

By 1978, the falling cost of microcomputer technology made it reasonable to think about having a SftP computer. In fact, it was clear that computers like the one we had been "borrowing" for the mailing list would eventually no longer be viable. We knew that we would have to get the equipment ourselves. We had been counselling people from other groups on the pitfalls of having a computer and planned to avoid them.

Since 1978, members of the Computer Group have participated in forums and radio shows, written articles for SftP and given technical assistance to other progressive groups. Our main activity, though, continues to be our classes in computer hardware and software.

Glenn Wargo is a computer person (homo digitalus) who has been active in the Boston Chapter since 1972.

rules and details. The staff person opening the daily mail removed the checks and then separated the new subscriptions, renewals and changes of address into a dozen categories corresponding to various computer codes. The service bureau did not strictly require this degree of sorting, but it seemed important to batch similar items together to reduce their abysmally high error rate in data entry. Each item required a zip code or a service bureau identification number, or in some cases both. Without these numbers, an item would not be processed and often was lost entirely.

At the end of the month one staff member would spend an entire day going through the filed items to prepare them for the service bureau by counting the number of items being submitted in each category, checking for zip codes and identification numbers on all items, looking for filing errors by the *Dollars & Sense* staff, and writing instructions for the service bureau on groups of items.

When the printed mailing lists and labels came back from the service bureau, a similar half-day "debriefing" operation was required to check what had been produced, track down the dozen or so items which they had been unable to process (buried somewhere in the thousand items submitted), and translate their cryptic, limited reports for the magazine staff.

The service bureau's quality of data entry was terrible, as might be expected in an alienated capitalist environment. Many address changes were bungled

through confusion about street address position on a four-line label. Entry errors led to many lost subscriptions and duplicate entries. Most of the time *Dollars & Sense* staff spent straightening out "subscription hassles" was actually devoted to undoing service bureau mistakes.

These problems were specific to one particular low-priced service bureau. That a much higher-priced service would have done a better job is conceivable, though not certain, as *Working Papers* and other magazines have found. It was annoyingly clear that the capitalist organization of computer services, not the technology itself, was creating the limitations on our work.

Starting our own System

After much debate and study of available micro-computer systems, both magazines decided on a hardware configuration that could accommodate up to 10,000 subscribers at a time (see box). As difficult as the process was, it was just one of many encountered during the development of the system.

Programming took more than twice as long, and cost twice as much, as originally estimated. Some of the excess programming time was due to poor documentation of the computer's specifications and limitations. Some was due to changing demands about system performance by magazine staff while programming was underway. Other problems stemmed from assumptions

made about the machine's performance based upon experience with larger, more flexible systems. Programmers and magazine staff spent a surprising amount of time learning enough about each other's jargon to establish exactly what the system was supposed to do. These problems are typical of a software development project of this scope; cost and time overruns of two to three times the original estimates are common and should be planned for.

For this time and effort, however, the two magazines' staff designed a system that really does what they want it to do. It has numerous built-in error prevention features, some of which make sure it doesn't repeat the bureau's mistakes: our system does not allow accidental double-entry of the same name, requires that the zip code and state entered for a subscriber correspond to each other, etc. The list is continually kept in zip-code order, eliminating the need for identification numbers. The system allows print-outs of either list or of almost any conceivable subset of the list; it prints renewals and invoices on special billing forms and can analyze and crosstabulate the number of people in any set of categories present on the list. With a special high-speed printer attached, it achieves print speeds of one name per second (3600/hour).

Although hardware and software costs were the major expenses, there were several other costs which were not correctly anticipated. Contracts for full on-site maintenance were found to be absolutely essential, and are the major ongoing expense of operating a small computer system. Site preparation is also important. To run smoothly, day after day, even a microcomputer requires a relatively clean, dust-free environment with a low-static floor covering (rubber mat or special anti-static carpet), separate electric circuits for exclusive use of the computer and printer, and air conditioning.

Finally, conversion of the existing list to micro-computer-related form is a significant expense. Thanks to the wonder of private enterprise, most computers cannot read disks or tapes made on other manufacturer's computers. There are services which can convert magnetic tapes from one company's format to another, but apparently none yet can do the same for floppy disks. Both magazines concluded that it would be cheaper to re-enter their mailing lists manually, taking the opportunity to do some painful but much-needed proofreading at the same time.

Was it Worth it?

One of the authors was doing data entry on the *Dollars & Sense* computer one day when a reader called to complain that at least one of the eight Christmas gift subscriptions he had given was not being delivered.

Cost of the Computer System

Each magazine's approximate costs were as follows:

Radio Shack TRS 80 Model II computer	\$8,000
-64k memory	
-4 floppy disk drives	
-medium speed printer	
Software development	\$8,000*
- \$16,000 for both magazines	
Site preparation	\$1,000
List conversion	\$1,500
Total start-up costs, each magazine	\$18,500
Annual service contract fee	\$2,000

*The "mail" programs can be made available to other left organizations for a fraction of this figure.

Within seconds it was possible to find the subscriber record and correct the address, and then to check that the donor's other seven gift subs were all being sent to the correct addresses. It may not be a coincidence that he sent several hundred dollars in response to a *Dollars & Sense* fund appeal a few months later.

More generally, using its own computer system has transformed the way *Dollars & Sense* approaches office work. The mailing list is updated daily, instead of monthly; all *Dollars & Sense* staffers rotate doing data entry, and all have learned at least the rudiments of computer operation. The data entry error rate has fallen sharply, and subscription hassles are much easier to solve. Statistical reports and print-outs of parts of the list are available in hours instead of days or weeks; and since most of the computer costs are fixed costs, additional print-outs are essentially free. More frequent access to statistical reports has already allowed elimination of one major category of subscription record-keeping.

There are, to be sure, technical details to be memorized both about hardware and software. However, mastery of these details is a useful (and, incidentally, quite marketable) skill, and enables staff to participate in discussions of further program modifications. In contrast, memorization of details about service bureau's procedures had no value outside of the frustrating struggle to reduce their error rate.

Now that the primary task of moving mailing list maintenance operations in-house has been accomplished, both magazines are investigating other computer applications. *Dollars & Sense* has begun computerized accounting and *Working Papers* is also using their system for word processing. Both groups look forward to sharing their experiences in these areas as well as in the central tasks of automating mailing list maintenance. □

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WHERE IS AUTOMATION IN MANUFACTURING HEADED?

by Vera Ketelboeter

Over the past decade the manufacturing industry has undergone a silent revolution in automation. Ten years ago, automation meant a few individual workstations, widely dispersed over the shopfloor. By 1981, their number has grown exponentially. Especially in large manufacturing companies, much of the old machinery is already replaced by automated tools.

Less visible than the new machinery are the social changes which occur in the process of automation. Labor is now facing reductions in the workforce, layoffs, transfers and changes in job skill requirements. Each time a new piece of machinery is introduced, a few more workers are affected. Over time, these effects have accumulated. We are now confronted with an advanced stage of automation.

Manufacturing Technology

We have to understand some of the automation equipment in order to be able to judge what its impact may be. Most of the new machine tools are NC and CNC (Numerical Control and Computer Numeric Control). They are machining stations, mostly used to cut metal or a workpiece by milling, drilling, boring or lathing. NC- and CNC-equipment can be operated by a single person.

Machining complexes, in which a number of machining stations are connected into one big system are more advanced. These systems can automatically move workpieces, like heavy engine blocks or transmissions cases from one machining station to the next. These systems take a raw part at one end and spit out a perfectly finished product at the other end. Where systems like this exist, whole sections of the plant are automated. People on those machines are needed only to set the machine up before operation begins, to supervise the operation and to intervene in case something goes wrong. Compared with conventional machine tools, these complexes save up to four fifths of the workforce.

Vera Ketelboeter is working on issues of automation in the workplace. She is a member of Boston SftP.

Robots are the latest equipment in automation. Few robots are yet installed. But very soon they will be used to automate some highly skilled jobs. Robots can weld; discriminate different parts by touch or by vision; and handle parts, lift them and place them in specific positions.

With the current advances in technology, engineers are on the way towards total automation. The totally automated, "unmanned" factory is an expressed goal which manufacturing engineers are trying to achieve, and any partial automation is seen as a move in this direction. Apparently, some totally automated factories exist already, for example, one IBM plant which manufactures computer chips.

It takes more than engineering skill to convert established industries to automation. To an engineer, the plain possibility that something can be built may justify an attempt to do it. The construction of automated plants is not just a technical project, it is also a social conversion on a large scale, affecting many people's jobs. Engineers, however, are largely disconnected from the social realities of automation.

Arguments for Technological Use

The basic argument for automation is that productivity can be increased. This means that more parts can be produced in less time or for lower production costs. Yet productivity with all its cost factors is difficult if not impossible to measure. Studies have shown that increased productivity is not always a result of the use of automation equipment; in some circumstances automation seems less productive than conventional technology. In other cases, initially projected costs were overrun by more than 100%. Many uncertainties are hidden in the financial arguments about automation. In general, managerial expectations about the return of investments in automation are overly optimistic.

A second argument for the use of automation is high precision in doing the job. Already Japanese companies are praising their cars for higher quality. For example, tighter shutting doors are attributed to the use of robotics in the production. With automation there will

be no more "Monday cars," which supposedly have a lower quality because workers are less attentive on Mondays than on other days. Other products cannot even be manufactured by people alone (without the help of automated tools) because of limits in human abilities. Among such products are integrated circuits for computers, which must be manufactured with extremely fine precision and regularity.

Social Consequences

All new computerized technologies have directly or indirectly affected the nature of work and the number of workers on the job. Many jobs are eliminated, others are changed. Skills and knowledge which used to belong to workers have been absorbed by machines, such that machines do what workers used to do. Some people are still required for machine tending jobs, but far fewer than previously.

One worker may be assigned to several machines, but the operator's impact on the actual operation of the machine is generally reduced. Workers are losing the close and flexible contact with their tools and with the



products they make. One might say that human craft is being lost. It is this loss of contact and control, not the size and complexity of the machines themselves, which diminishes the jobs of machine operators.

The connection between unemployment and automation is often denied by management. Business argues that automation is creating employment by opening up new jobs for designers and builders of automated equipment. Yet those who are losing jobs and those who are gaining new jobs are two different groups—a fact which is rarely mentioned. Job changes, skill transfer, and employment shifts are treated as if they happen automatically.

These changes take place at a great social cost. People are moving around the country, forced to look for new jobs and new lives. Many people find it difficult or

impossible to make such changes. When economists promote plant closings in less profitable industries and the growth of industries in the "Sunbelt" (Southwest), they assume that mass migration is easy. A lack of concern for social realities has been created by the drive for efficiency.

Driving Forces of Automation

Given these social consequences, why is the drive toward automation proceeding so relentlessly? Why is the push for technology so strong in the face of social realities? The technical arguments are not satisfactory. Deeper answers to the above questions are to be found in the politics, the ambitions, and perceptions of the supporters of the technology.

Automation allows machines to do what people used to do. It represents a shift of control from people to machines. But this shift of control has to be reinterpreted in the organizational context.

Machining decisions and actions, as far as they are executed by machines, are never entirely autonomous, but are always under some person's responsibility. In many cases this responsibility is no longer with the worker who operates a machine. The job is not to control the machine, but to watch over limited aspects of the machine functions. Instead programmers or designers of the machine, who operate from somewhere outside the shop, are assigned responsibility over the machine based on their technical knowledge. The programming department and the process design and process control departments are likely to draw knowledge and control further away from the manufacturing environment. What kinds of skills are assigned to machine operators, whether and how those skills can be acquired, and how much control an operator has, depends on the company politics.

Technology in its advanced forms is surrounded by an air of fascination and excitement. This fascination should not be underestimated in its impact. It influences managerial decisions in the way automation decisions are arrived at. Donald Gerwin did some studies about the introduction of Flexible Manufacturing Systems, "state of the art" workstations complexes. He found that management is usually sold on the idea to use such systems by an engineer in the company who is enthusiastic about the technology. Cost justifications play a secondary role. The more sophisticated and fascinating a machine is the less management is likely to quarrel about dollars. One Flexible Manufacturing System (installation included) costs \$20 million. The technical qualities seem to warrant its right to exist. From a different perspective, this fascination, which gives the taste of the irrational, is grounded in some concrete interest

of the engineer. His/her professional existence is directly dependent on continual technological innovation. If technology were no longer advanced, the expertise of technologists would no longer be needed. Engineers, therefore, are biased towards technical solutions.

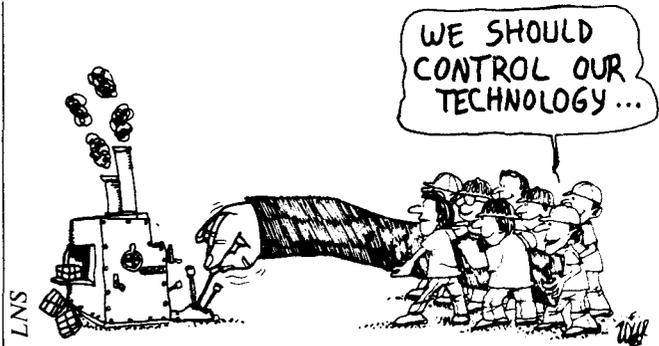
The managerial interest in gaining tighter control over the workforce and the professional bias of engineers are important forces in the automation drive. Both managerial and engineering interests have been hidden beneath the mystique of technology, the ideology of progress, and the goal of economic strength.

Two Worlds: Designers and Workers

Automation can take place only where work processes are highly routinized. A frequent assumption made by managers and designers of technology is that production processes are very regular and that it is only a matter of recognizing and formalizing the routines, after which automation can be brought into place. Not considered is the tacit knowledge of workers, which feeds into the production and without which production would frequently come to a halt. This knowledge is based on longstanding experience in the manufacturing environment.

Michael Piori wrote in an essay on training: "Jobs literally exist only as work performed." In other words, jobs are not those sequences of steps which are formulated by process designers and which set guidelines for the execution of a job, but jobs are much richer. A worker has to respond with some creativity to irregularities in the product or in the machine tool. Many of the things one does are an immediate response to the situation. S/he may feel that the casting of a part is thicker than usual and requires a different tool to work with, or that the machine vibrates in a strange way, or that a tool has gone dull sooner than expected. In many ways the worker's feel is indispensable for a smooth production. Enforced control of workers may deprive a company of a valuable and vital part of its production skills. In the future progress of automation, it will become apparent how essential the tacit knowledge of workers is for production.

Presently in the U.S., technology and production processes are exclusively defined by engineers and management in technical positions. From there technology invades the shop environment, whether it is welcome or not, and imposes new rules of work and behavior on the shopfloor people. No communication takes place between designers with their technical expertise and workers with their production experience, when technology is designed. It is only when new process technology enters the shop that design and production experience meet each other. Then, to make technology work



on the shop, workers often have to initiate modifications ranging from minor adjustments to major design changes. Yet the scientific process of design and the processes of work are strictly divided among different groups of people. While the division has political reasons, it is grounded in different values and ways of approaching the world.

Automation cuts across the two worlds of designers and workers into the realms of values, mentality, life philosophy, and ambitions. Little exchange or communication takes place between the two. The world of management and technologists proceeds with the designer attitude toward the shopfloor, designing the technical processes as well as workers' processes. In contrast, workers with their different backgrounds of thinking and hands-on experience have a different outlook on production. Production to them is an endeavour like a craft, which is based on the arts, the knowledge of which is acquired in the process of doing it on a day-to-day basis.

In our culture and in our organizations, the rational and the arts-based worlds are clashing. The rational world imposes the rules, not allowing for the development of artistic ideas, which in some other cultures is regarded as the "natural birthright of self-determination." In the same vein, human or social concerns are secondary to rational goals. The problems of rising unemployment and the loss of artistry and original knowledge are subsumed by the rationality of the designs of the new world.

Many people are trapped into thinking of automation as the necessary condition for a vaguely conceived betterment of social conditions. Personal sacrifices are too easily accepted in the name of abstract goals of automation.

We have to outgrow the childish relations we have nurtured with technology, trusting it blindly (or hating it blindly, as some do). Technology needs to be recognized as coming from the people who shape it according to their ideas. On human grounds, technology can then be questioned. The technological process, as any social process, should be taken as an invitation to participate. □

Unionized or Computerized

THE TERMINAL SECRETARY

by Renate Lehmann Hanauer

In recent years increased attention has been focused on all aspects of clerical work due, for the most part, to its rapid expansion. In 1979 18.2% of the entire workforce were clerical workers. In Boston clerical workers make up 22.8% of the total workforce, the third highest concentration in the country after Washington 23%, and New York 24%. About 85% of clerical workers are women.

Clerical work has replaced manufacturing as the single largest sector of the workforce. Consequently, managers in industries with large concentrations of clerical workers such as insurance companies, banks, publishers, as well as, non-profit organizations such as universities, have taken a hard look at the organization and productivity of clerical work.

New computer based technology applicable to office work is becoming available at continuously decreasing cost. At the same time, clerical workers have begun to organize to demand higher wages, better working conditions and more opportunities for advancement.

The Nature of New Technology

The first wave of workplace technology was the 19th century Industrial Revolution with the large-scale introduction of machines like the spinning jenny and the steam engine. In 1914, the introduction of the first assembly line by Ford revolutionized the automobile industry. By 1925 Ford was capable of producing almost as many cars in one day as had been produced in an entire year before the advent of the assembly line.¹ In the course of history technological means have been refined and their use greatly expanded in order to increase production.

Now, with the advent of computers, particularly microprocessors, a quantum leap in the development and use of workplace technology seems to be taking

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place. In contrast to earlier forms of technology, computer automation is enormously flexible. This flexibility allows automation to be extended into areas where it has never been possible before, such as skilled work in the machine shop, the engineering department, and the office.² In a recent issue, *Business Week* reports that some 38 million of the 50 million white-collar jobs in the U.S. will eventually be automated; according to estimates by experts, 45 million jobs, or 45% of all jobs, could be affected by factory and office automation.³

New Office Technology

The word processor has been the most widely introduced element of the projected "office of the future." According to James W. Driscoll of the M.I.T. Sloan School of Management, word processing merely amounts to "mechanization," the replacement of human labor by machine power. "True" office automation, in contrast, involves extensive discretion by machines. Such "true" office automation would restrict clerical work to an even greater extent and leave the clerical workforce with tasks that "do not form an integrated, purposeful whole which would engage the interest and attention of a human being."⁴ Their only determining characteristic would be that the machine was incapable of doing them. While the office of the future may still be a little ways off, word processing has definitely arrived and is growing rapidly. The unit of the word processing equipment actually used in the office is the video display terminal (VDT), sometimes also referred to as VDU (video display unit) or CRT (for cathode-ray tube), which is attached to a keyboard. This unit is connected to a computer. An estimated five to seven million workers in America now use VDTs and by 1985 there will be more than ten million VDTs in use. Word processors make storage and retrieval of information extremely efficient. The need for voluminous, cumbersome filing systems is eliminated as the information needed can be called up at the touch of a button.

Who Controls The Technology?

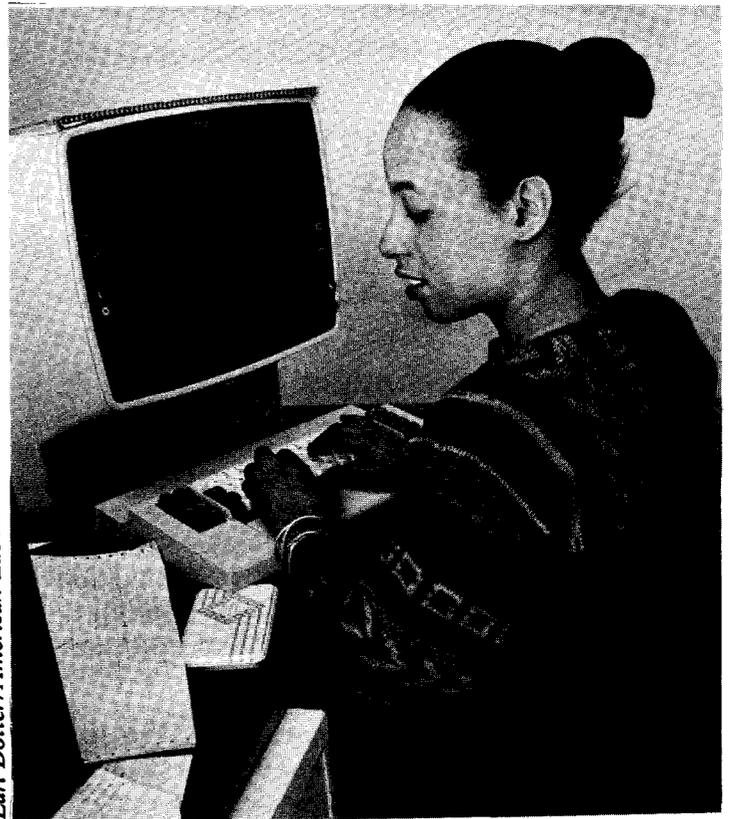
While technology sometimes seems to follow its own independent and inevitable course, it must be remembered that it is subject to human decision both in its development and use. The use of technology in the labor process is determined by the goals of industry and commerce, indeed the whole economic system. The ultimate goal of production, basically unchanged since the emergence of capitalism, is to maximize profits, not to meet human needs, whether material or psychological. These priorities must be kept in mind in evaluating the impact of technology on the individual worker.

Control and Productivity

Management is guided by theories and principles first articulated by two nineteenth century engineers: Frederick W. Taylor and Charles Babbage. Taylor, the father of "scientific management," realized that management's power was imperfect as long as the individual retained a measure of control over his/her work. In general, the degree of worker's autonomy is directly related to the degree of skill necessary for a particular job. Taylor devised ways to separate the worker from his skill and to transfer the planning functions of a job to management. Because of the reduced level of skill, the worker became more expendable, replaceable and, in the long run, paid less.

This process has increased management's control over the work process as well as the workforce by the separation of hand and brain. Management has attained a monopoly over knowledge and the control of each step of the labor process and its execution.⁵ As the worker has been robbed of skill, autonomy, and pride in his/her work, motivation is decreased and alienation has arisen. Modern management has replaced the self-motivation of the worker with external material and psychological incentives, as well as increased supervision.

Taylor's principles and methods of management, although refined, are still being applied. Modern management's main concern has always been the "man problem," which is, "nothing more nor less than the resistance of the worker to management's expropriation of his skill and fruits of his labor, and to the gradual usurpation of his traditional authority over the work process."⁶ It is management's aim to control every aspect of the worker's life on the job. The new computer technology is eminently suited to this end and often used accordingly. Harley Shaiken, technical analyst and research fellow at M.I.T., points out that management's intent in the development and use of computer technology is clear: "the elimination of skill,



Earl Dotter/American Labor

the basis for job control by workers... In the case of numerical control, the total elimination of skill is not inevitable but it is now possible."⁷ Shaiken argues further that the issue is not skill as such, but "skill as a roadblock to managerial control over production."⁸

In the office, VDTs make possible a degree of control and supervision never realized before. VDT operators are virtually tied to their machines. The number of strokes, errors, etc. can be closely monitored and the temporary absence from the machine can be recorded. In many cases, workers are not allowed to take their break when they would like to. The pace of work is set by management, and often judged by workers to be too fast. Robert Howard writes in an article on communications workers that

[c]lerical workers have been deeply affected by the dozen new computer-based administration systems introduced in the past decade. In one sense, computerization has made clerical work easier. Customer records are now at the tip of one's finger instead of buried in mammoth files. But, . . . , computerization also brings centralization and a thorough reorganization of work that isolates clerical workers and subjects them to more rigid supervision and control.⁹

The assumption is that control and productivity are directly related. Both control and productivity are fur-



ther promoted by the division of labor. The increase in productivity made possible by the division of labor was already recognized by Adam Smith. A further step in this process was pointed out by Charles Babbage in his book *On the Economy of Machinery and Manufacture* published in 1832. He shows that by dividing the work process into its components, by assigning different people to each task, thus turning people from skilled craftspeople into detail workers, and by paying workers *at a different rate* depending on the amount of skill necessary to perform each task, productivity is greatly increased.

Of course, the judgement of which jobs are skilled is highly arbitrary. "Women's work" has always been economically devalued regardless of the actual skill required. However, Babbage's principle is being applied as the secretary's job becomes fragmented. The resulting jobs demand less skill, and are more boring and even more poorly paid.

Automation: Its Impact on the Worker

The growth of clerical work and its increasing cost, despite the low wages for clerical workers, has turned management's attention to office productivity traditionally considered low. It is management's aim to raise productivity by increasing the investment per worker in

new machinery which has been low for the office as compared to factories and farms. This shift of office costs from personnel to equipment will mean that fewer people will be needed to do more work. Investment in expensive equipment may also lead to shift-work for clerical workers as companies try to get the most out of their investment. Another possibility under consideration is giving employees terminals so they can do computer work at home. This will probably mean more part-time work without benefits and security as well as piecework.

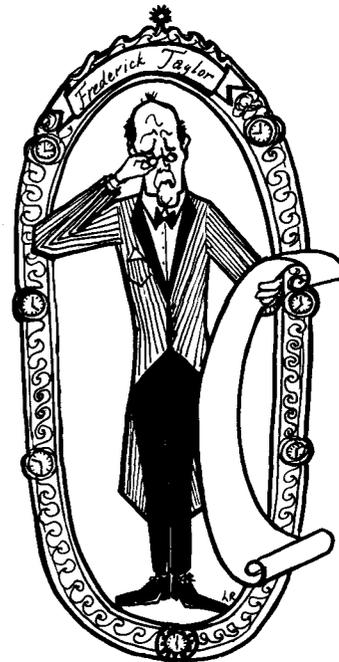
The division of labor for office workers is increasingly meaningless routine jobs. Supervision is becoming tighter and more pervasive than ever before. Clerical workers will be relegated to dead-end jobs with low pay. While automation can in some industries make working conditions safer, this is not the case with office automation.

Health and safety. There are a number of health and safety problems associated with working at VDTs including eye strain, headaches, back, neck and shoulder pains, fatigue, nausea and short-term loss of visual clarity. Although a study by the National Institute for Occupational Safety and Health (NIOSH)

concluded that VDTs do not represent a radiation hazard to the person working on or near a terminal,¹⁰ the overall long-term effects of working on VDTs for long hours are not known yet.¹¹

Unemployment. Since automation is designed to increase productivity so fewer workers can do more work, the question arises whether the new technology will displace workers. While the effects of displacement through automation are offset by the fact that clerical work will be the fastest growing occupation in the 1980's, studies in France and Britain predict enormous job losses in the future.¹² In an economy like that of the U.S. which already sustains a large unemployment rate, concerns about elimination of jobs are very real. Harley Shaiken writes, e.g., that "... microelectronics affects jobs in numerous ways . . . [it] extends to every sector of the economy. Office automation, for example, reduces the number of white-collar opportunities once available to blue-collar workers."¹³ The precise impact of the new technology is difficult to assess. Whether new technology will result only in structural changes in the workforce or, as many people here and in Europe fear, in structural unemployment is not yet clear. However, the motivation for developing and introducing this technology in a capitalist economic system is to increase productivity by reducing labor costs. Unless there are forces to counteract these dynamics, it is fair to assume that automation may have a serious impact on unemployment.

Automation and the unions. We face a situation where technology is used to serve certain ends which are not in the interest of the worker. Since much of modern management is, however, an attempt to deal with the "man problem," it follows that well-organized workers with clear goals might very well put a brake on management's "human engineering" designs. But workers have to act soon, because automation can be and is being used to weaken existing organizations. In Shaiken's opinion "new technology poses one of the most serious challenges that workers will have to face in the 1980's."¹⁴ The United Auto Workers has been under attack as automation is introduced on a large scale. The computerization of work "undermines union wages, thins the ranks of union membership, attacks the integrity of the bargaining unit and provides the techniques for the creation of a strike-proof workplace," according to Robert Howard.¹⁵ Furthermore, new technology instills in workers a sense of powerlessness and inability to shape their work lives and thus serves to divide and demobilize them. Nevertheless, if, in Shaiken's words, "labor does not find ways to control technology, then management will use technology to control labor."¹⁶



*"To achieve Perfection,
Eliminate worker's
skills, knowledge, autonomy,
motivation... and jobs!!"*

Lynn Roberson

Clerical workers are in a particularly weak position. Very few clerical workers are organized (11% overall, 6% in private industry), so office automation has met little resistance. In organizing clerical workers demands for increased pay and opportunities for advancement have been understandably paramount. Rapid automation, however, may make matters worse for clerical workers and change more difficult. The high degree of stress that affects clerical workers—results mainly from low pay, lack of respect, lack of promotions, monotonous work, lack of autonomy—is exacerbated by the introduction of office technology. Automation is likely to make a bad job worse, increase control over the worker, devalue skills and make work more boring while increasing its pace.

Change is not very likely without organization, and that means unionization. Recently Working Women, an organization of office workers with affiliates in twelve major cities has combined with Service Employees International Union (SEIU) to form Local 925 in order to make a push for organizing clerical workers. Working Women has issued an excellent report on the impact of office automation as well as a report on the hazards of office work.¹⁷

More Forceful Action is Necessary

Workers' continuing problems with new technology indicate that existing organizations, especially unions, have not been able to deal effectively with office automation. In the past, unions have not done as much as

UNIONS AND OFFICE AUTOMATION

To meet the serious challenge technology presents labor, this country has a long way to go. According to a recent survey for the AFL-CIO Professional Employees Department, fewer than 20% of all contracts had any provisions dealing with technological change and of those that did, most "centered on smoothing workers adjustment to management-initiated and management-controlled change."¹

Typical contract clauses deal with:

- Notification by the employer of impending technological changes in the workplace that might result in the displacement of workers.
- No lay-offs of workers currently employed.
- Substantial changes in an employee's job.
- Change in job classification that might result in a reduction in pay.
- Retraining programs.
- Health and safety concerns especially in the case of VDTs.

The notification clauses generally provide for a very short lead-time, so that the union will find out about impending changes only from two to six months in advance. By the time the union finds out, management's own position is in all likelihood completely finalized.

Job protection is usually secured by the demand for training programs for employees affected by technological change and by ensuring that *present* employees will not be laid off or suffer a reduction in pay as a result of changed job specifications.

In general unions do not participate in the early stages of planning nor have unions in the past done much to challenge management's traditional right to make the decisions that affect the work process, i.e., the design of jobs, the role of technological means, the hierarchy of the workplace, etc.

VDTs in Union Contracts

With regard to the technology of word processing health and safety questions are very prominent. Contract language accordingly deals with:

- The physical effects of work on VDTs, especially the effect on eyes, and the demand

for eye examinations paid for by the employer has become a standard feature.

- The ergonomic aspects of VDTs, i.e. those aspects having to do with the physical interaction between the human being and the machine. Lighting, glare, noise levels, adjustment of the machine to the user's needs, design of desks and chairs are the subject here.
- The length of time a person is expected to work a VDT. NIOSH recommends a fifteen minute break after two hours of continuous work at a VDT.
- The proper functioning of equipment. Of special concern is possible escape of radiation from the machines in poor repair.

Some of these demands have not yet been won in collective bargaining, but represent union proposals subject to negotiations. District 65, U.A.W., which represents clerical and technical workers at Boston University, has made detailed demands regarding VDTs; but university management has responded only to demands dealing with technical aspects. The university will also make "an effort" to find another position within the university for an employee whose vision may be damaged by continued VDT work. Although not always central in negotiations, issues of new technology such as VDTs have been raised in other unions. Examples include the Communications Workers of America (CWA), the Office and Professional Employees International Union (OPEIU), and the Newspaper Guild. In California, Local 3 of OPEIU staged a four and a half month strike against Blue Shield and won cathode-ray-tube workers a guarantee of "proper equipment" and a limit to speed and production quotas.² Local 925 of the Service Employees International Union (SEIU) negotiated an agreement with a Boston Legal Services office whereby individual secretaries can refuse to work at new IBM Mag Card word processors.³ In general, however, the vast majority of workers who work at VDTs have no protection whatsoever.

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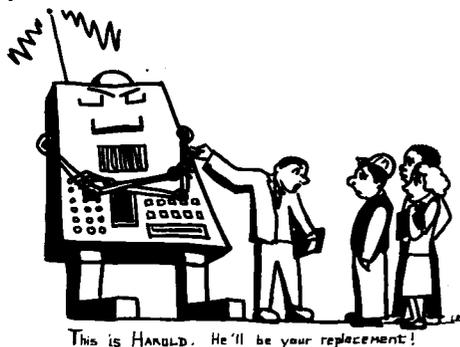
they could have in exploring ways and developing strategies for action. They have, for the most part, dealt with the easier issues like wages, benefits and health and safety where management has been more willing to bargain. Their demands have been short-term, limited and parochial and have not challenged management prerogatives. For years this may have been acceptable to the rank-and-file workers, but it is no longer enough. On the technology issue the divergent interests of manage-

ment and labor have sharpened to the point where workers are seriously affected. It is therefore necessary for labor to begin to deal with more fundamental issues. Now labor must begin to fight for participation in the decisions of how technology is used rather than merely react after all important decisions have been made. Such attempts to have input into the use of technology, however, "challenge the most sacred of sacred cows: managerial prerogatives."¹⁸

Labor must develop strategies and programs that will lead to more labor input into these decisions. Obviously, this is not merely a question of technology, but of power. Labor's limited success with regard to the effect of technology on the workforce reflects prevailing power relationships. It is necessary for labor to unite to meet this challenge and develop a joint strategy to deal with the effects of computer-based technology. In European countries where the level of organization is much higher than here important gains have been made in some areas with regard to automation. There are several things that seem to be especially important to meeting the challenge:

1. Labor needs its own experts in order to evaluate new technology and its impact. Only this will enable labor to formulate its own position rather than be reduced to reacting to accomplished facts presented by management. No single union has the necessary resources to equal management, and concerted action is necessary.

Lynn Roberson



2. Education of rank-and-file members about the present and future effects of automation on their workplaces. Unless working people understand the importance of technology issues, they will not be willing to fight for them. In this country, unions have done little in this regard.

Unions in Europe, in contrast, have realized the importance of education about automation. In England mass education, local negotiating and shop-floor organizing has been stressed. In Norway innovative union education programs brought union members together with sympathetic computer technicians from the Norwegian Computing Center, a state-supported institution. Together they studied technology in the workplace which resulted in the formulation of worker alternatives to management's plans for introducing new technologies. Both groups gained a new understanding: union members learned about computers, thus demystifying the subject, and computer professionals learned about trade unionism.¹⁹

3. Unions have to demand that workers share in the gains of productivity through:

- a shorter work week
- longer vacations
- more breaks during the work day

American unions are beginning to move in this direction. Local 600 of the U.A.W. has made far reaching demands in a 1979 contract proposal, and the TOP (Technical, Office, Professional) Department of the U.A.W. has adopted a new technology resolution that calls, among many other things, for the establishment of communications, education, and statistics covering new technology.

It is certainly very difficult for workers to deal positively with new technology when it is the very technology that threatens to take away their jobs. Unions must work for full employment. These problems demand broad political solutions. As unions realize this they can take an active part in the introduction of automation. □

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'Launch On Warning'

THE PENTAGON'S COMPUTER GAME

by Virginia Schaefer

"It's a computer problem." In response to gripes about bills and bank statements, this is becoming the standard answer. Increasing use of computers in everyday devices like cars and appliances, as well as for business transactions, means more chances for computer-related problems. And whether through ignorance, indifference, or assumption of well safeguarded design and manufacture, people are accepting computerization as worth a certain amount of risk.

But when several recent computer errors came dangerously close to triggering a chain of events leading to nuclear war, many people reacted with shock and outrage. A serious error in the design, equipment, or operation of the U.S. nuclear-attack warning system may have the effect of, for example, a heart pacemaker's total failure—multiplied by millions of lives. With publicity about the attack-warning computer errors of the past couple of years has come exposure of a rather alarming state of events. Countless lesser but potentially dangerous computer errors and ambiguities occur in the U.S. nuclear attack-warning system on a routine basis. (See box, "U.S. Military Computer Errors".)

News of these errors has renewed apprehension about a system the Defense Department has been considering for over a decade: launch on warning (LOW). This C³ (command, control, communication) system would leave the decision to launch an ICBM attack entirely to machines. The version most often considered would allow only a "yes-no" prerogative to the President or his proxy and would be targeted against cities (countervalue). The strategic rationale for launch on warning is assurance that U.S. land-based missiles can leave their silos before Soviet missiles destroy them.

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LOW and the Land-Based Missile System

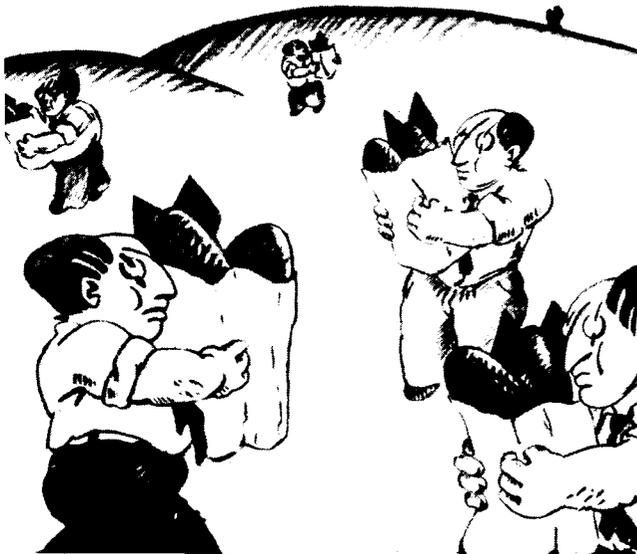
The launch on warning concept was formulated as a protection against the threat of a Soviet first strike against U.S. land-based missiles (i.e., counterforce targeting). As targeting capability has become more precise by both superpowers, the U.S. has given increasing priority to protecting against a Soviet first strike.

Of course, U.S. targeting capability is also becoming more precise, with the same option of counterforce that the U.S. military fears in the Soviets. But the growing number of U.S. counterforce-capable weapons particularly the small, tactical ones, are presented in U.S. strategic doctrine as more "humane" than countervalue targeted weapons, since counterforce targeted weapons would supposedly do less damage to humans in a "limited" nuclear war. That the U.S.S.R. could perceive a first-strike threat from precisely targeted—possibly counterforce—American ICBMs has been pointed out by critics of U.S. strategic doctrine.¹ Fears have also been raised of a Soviet LOW system in response to U.S. deployment of larger and more accurate missiles, such as those designed for any of the proposed MX systems.

Protecting all three "legs" of the U.S. nuclear weapons triad is central to U.S. declared strategic doctrine. The rationale is that the U.S. would not be able to respond effectively if the Soviets were allowed to knock out most U.S. ICBMs in a first strike. The extreme unlikelihood of an all-out Soviet preemptive first strike will be discussed later. But the possibility of Soviet missiles begin targeted against U.S. ICBMs will remain as long as the U.S. has counterforce capability itself. And as long as the U.S. pursues protection of land-based missiles against a Soviet first strike, LOW will remain on some Pentagon "back burner," still in range of possibility.

Launch on warning is one of three basic systems considered for protection of land-based missiles. One of the other methods is destroying or disarming incoming

Soviet ICBMs with non-nuclear or nuclear detonations near the targeted silos. Aside from the still operative SALT I ban on anti-ballistic missile technology, the drawbacks of ABMs are their expense and technical difficulties of deployment, the dangers to the American populace from ABM detonations, and their tendency to provoke escalatory countermeasures.²



LNS

The second means of protecting land-based missiles is a mobile basing system. Over the past several years, the MX system has been promoted by many military people and resisted, with partial success, by many opponents. In the MX system, large counterforce-capable ICBMs would be shuttled along tracks connecting numerous heavily protected shelters or launching sites. In theory, this shell game would prevent the Soviet Union from being able to target the missiles accurately enough to destroy them. The main arguments against the MX include its huge economic and environmental costs, the long time needed for construction and testing, and the possibility that by the time of completion the Soviets might simply have increased their ICBM forces sufficiently to target *all* MX launching sites.³

The remaining land-based missile protection system is launch on warning. LOW's primary purpose would be deterrence; the U.S.S.R. would not want to waste its missiles firing at silos which would be empty by the time the targets were struck. The other advantages of LOW are the preservation of U.S. missiles and the assurance of a quick and effective second strike. With the usual assumption that LOW would be triggered only by an all-out Soviet attack, there would be no point in targeting any U.S. missiles, since all Soviet missile silos would presumably be empty. In the same vein, there would be

little point in keeping some counterforce-targeted missiles from being triggered by LOW, since an all-out Soviet attack would presumably target all U.S. land-based missiles. Launch on warning would not be a weapon, thus its implementation would give its users the political advantage of appearing non-aggressive, interested only in deterrence and effective defense.

Many opponents of launch on warning focus on its technical imperfectability. It is widely assumed that technical fallibility is the main hindrance to its implementation. But the LOW issue involves a complex of political, as well as technical, forces.

Minor Technicalities?

The basic technical question about launch on warning is "Could it be made absolutely reliable?" Even for supporters of the LOW concept, the answer is "no." Former Livermore Weapons Labs director Herbert York, writing against LOW in 1969, saw launch on warning as "technically viable," yet feared the consequences under LOW of not only a small or accidental Soviet attack, but of a "false alarm" as well.⁴ Today, after years of military computer errors, no one foresees a 100% reliable launch on warning system.

Herbert Scoville, former Deputy Director of the CIA, also opposes development of launch on warning. He says that even with improvements to technical components of LOW, "...my worry would always be that they might malfunction at some point, and I don't think the fate of the world should depend on computers."⁵

Progressive science commentator Nigel Calder has pointed out that the mere appearance of interference with electronic reconnaissance or communication could precipitate a disastrous reaction. This kind of situation could arise under a LOW system. In 1975, for example, the U.S. military readily assumed that the temporary dazzling (sensory overload) of an early-warning satellite over Siberia was the result of a secret Soviet anti-satellite device. Observers waited long enough to find out that the cause of the problem was a large gas pipeline fire. Had the incident occurred during a time of high international tension, such a fluke might have triggered a nuclear war.⁶

Political-Strategic Factors

Military strategist Richard Garwin considers launch on warning a necessary deterrent to a Soviet first strike. Since under LOW none of U.S. land-based ICBMs would be targeted counterforce, implementation of the system would give the U.S. no capability to launch a preemptive first strike. Garwin admits that even with his proposed elaborate safeguards, the chance

U.S. Military Computer Errors: No End in Sight

Twenty-seven major U.S. military command posts around the world are linked by a network of satellites, radar stations, sensors, and warning systems. This network, called Wimex (World Wide Military Command and Control System) was started in 1962 following the Cuban missile crisis. Wimex was designed to provide attack warning and coordination of U.S. military activities all over the world.

Since its inception, Wimex has been plagued by malfunctions. In 1967, for example, during the Arab-Israeli war, an American warship was fired on because a computer error had kept it from receiving warning information. The 1968 seizure of the U.S.S. *Pueblo* might have been averted if a warning message to the ship hadn't been misrouted by a computer. In 1973, an alert went out to all American ICBM and Strategic Air Command bases when a computer erroneously predicted that a Soviet test missile would land in California, instead of in Siberia where it was targeted. During the 1978 Jonestown, Guyana emergency, Wimex was out of commission for over an hour due to computer problems following a brief power outage.

To eliminate the problems, the Pentagon in 1970 began a standardization project. After 10 years and \$1 billion, Wimex still suffers numerous shortcomings. In 1979, Congress cut several million dollars from the Wimex budget and ordered it slated for replacement. A top C³ official has complained that stinginess with computer funding results from C³'s lack of "glamour."

As a Navy Admiral has stated, "I'd really wonder about an officer who wanted to make a career in computers." Possible disasters arising from the frequent refusal among the armed forces branches to coordinate and share data are apparently not considered important enough to override traditional jealousies. In short, possession of nuclear weapons appears to be much more important to the U.S. military than their reliable and "safe" deployment.

Attack-Alert Near Misses

Within the Wimex network, the North American Aerospace Defense (NORAD) center in Colorado is one of the four command posts where all information transmitted by satellite and radar is routed for evaluation and further action. In November 1979, an attack-simulation program inadvertently introduced into the NORAD computer system gave indications that a mass nuclear raid was underway. This caused all ICBM bases to be put on low-level alert, ten jet fighters ordered aloft and many more planes on standby, and all air traffic control

centers over the U.S. to be notified to prepare to clear the airways. The ICBM low-level alert involves removing "attack verification codes" and missile launch keys from strong boxes and inserting the keys into their slots. If coded order to launch match the codes at the sites and if two pairs of Air Force personnel turn the key within a few seconds, an ICBM is launched toward a target in the U.S.S.R.

That particular computer error was discovered within six minutes, before any irreversible steps toward nuclear war had been taken. A similar false attack alert took place in June 1980, when a faulty integrated circuit in a NORAD computer showed missiles traveling toward the U.S. Prior to 1979, such false alerts, serious enough to necessitate a "threat assessment conference," had occurred every few years; from October 1979 to June 1980, four such incidents took place.

Following the June 1980 false alert, Senators Hart and Goldwater of the Armed Forces Committee were assigned to investigate. Among their findings were overly fragmented management of the missile-warning system, and long delays in procurement of missile-attack warning data processing equipment. Some of the needed technical changes at NORAD had been made or were underway, among them installation of an off-site test facility so that war games could not be mistaken for the real thing and a display of the information concurrently transmitted to the other command centers. Especially important was the institution of cyclic redundancy checks, an essential error-checking routine to eliminate error in transmitted and received data.

However, it is impossible to assure that false alerts will never occur. Cyclic redundancy checks, like other electronic safeguards, cannot ensure detection of 100% of data transmission errors. As Hart and Goldwater stressed, "There's no guarantee that false alerts will not happen in the future. They will occur and we must rely on the collective judgment of the people manning the system to recognize and deal correctly with false alarms."

Sources: "The Nuclear Trigger" and D. Shapley, "The Fragile System," *Life* 3:8, Aug. 1980, 22-30; W.J. Broad, "Computers and the Military Don't Mix," *Science* 207, March 14, 1980, 1183-1187; "Recent False Alerts from the Nation's Missile Attack Warning System: Report of Senator Gary Hart and Senator Barry Goldwater to the Committee on Armed Services, United States Senate, October 9, 1980," Wash.: U.S. Government Printing Office, 1980.

of LOW error would remain. But he considers launch on warning morally superior—enough to make that risk worth taking.⁷

Garwin's argument appeals to the deeply rooted U.S. military self-image as a peaceful champion of deterrence. At the same time, it supports a hair-trigger readiness to enter a nuclear conflict.

Launch on warning's implementation could only exacerbate tension between the superpowers, making a missile launch more likely. An article in *The Nation* on a recent erroneous attack alert pointed out that although disaster had been averted again, "In a climate of extreme international tension, jittery generals and a jittery President might regard erroneous signals of an attack with less skepticism and set in motion drastic and irreversible procedure."⁸

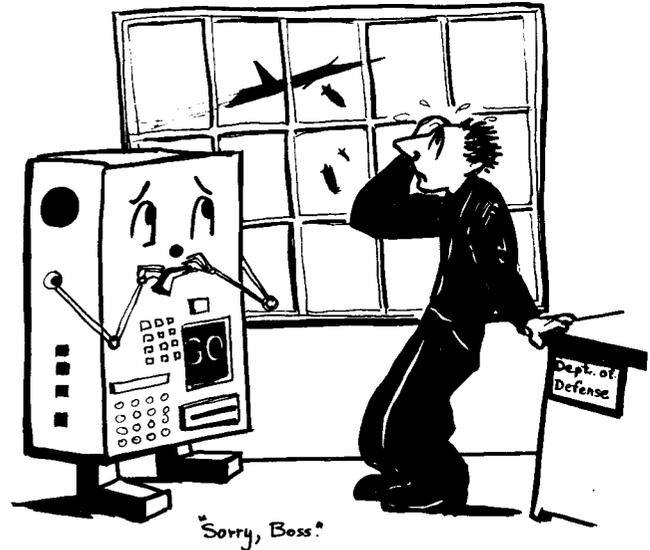
Launch on warning has also been opposed on civil-liberties grounds. Sidney Lens, progressive critic of U.S. military policy, deplores the launch on warning concept, which he envisions as giving "generals, surveying radar and computers" the power to launch an attack. This situation, he contends, would allow even less input to war-waging decisions than in recent years, when the President has been taking over Congress' previous power to declare war.⁹

Herbert York deplores the idea that under LOW only a "preprogrammed President" would have input to the decision on whether to launch U.S. ICBMs. He called it "morally and politically unacceptable" that such a terrible decision be made, on incredibly short notice.¹⁰

Launch on warning assumes the ability of an individual to act, simultaneously, with the political expertise of a national leader and with the automatic efficiency of the Air Force personnel now responsible for turning the Minuteman launch keys on command. The Presidential veto power allowed in most proposed versions of LOW is nearly useless, since there would not be enough time to make even a technically, and certainly not a politically, well-informed decision. As summarized by Nigel Calder, even if the President were presented with overwhelming electronic evidence of an oncoming missile strike, he might "...refuse to take the irreversible step into oblivion until the warheads have begun exploding; he has, after all, good reason to be inhibited."¹¹ This inhibition—human wisdom, really—would counter the entire purpose of launch on warning.

Push for the Shell Game

The Defense Department's continued quest for land-based missile protection is rooted in the assumption that the U.S.S.R. could and would launch an all-out attack against U.S. land-based missiles. That



Lynn Roberson

assumption is false. In the first place, the theoretical accuracy of Soviet missiles is greatly exaggerated, since the missiles' actual flight paths can never be tested for atmospheric, gravitational, and magnetic effects. The "fratricide effect"—disabling of incoming warheads by preceding detonations—also makes an all-out Soviet strike appear extremely unlikely to succeed.

In reality, there is little motivation for an all-out preemptive first strike, because even if the strike succeeded in destroying most U.S. land-based missiles in their silos, two-thirds of U.S. nuclear forces—submarines and bombers—would remain. Paul Warnke, former Arms Control and Disarmament Agency Director and SALT negotiator, has stated that "...no aggressor could see any advantage in an attempt against impossible odds, to destroy what would be less than a third of our strategic nuclear force."¹²

The Defense Department continues to give thumbs down to launch on warning for the wrong political reasons. A 1979 Rand Report on "launch under attack" (another term for LOW) argues for pursuing an MX system, on grounds of its greater "flexibility." Launch under attack, according to the report, would "give the Soviets control over when our ICBM force was used."¹³ The apparent objection is to LOW's limitation in response to direct attack—launch on warning is not handy for fighting a limited nuclear war, and it is certainly useless for a U.S. strike against Soviet land-based missiles.

Several critics of LOW who believe in the ICBM-protection line have raised the spectre of accidental LOW-instigated holocaust to bolster support for the MX. The *Economist*, in an editorial elicited by a recent U.S. attack-warning computer error, proclaimed that the mishap was proof that "...the idea known as

'launch on warning' is madness."¹⁴ The piece concluded that pursuit of an MX system is the best way to avert death by computer.

A recent *Aviation Week and Space Technology News* editorial made a more detailed but essentially similar argument. Decrying the continued dithering over choice of MX basing modes, it warned that "Airborne alert, as well as some of the other MX basing modes, drives U.S. nuclear strategy toward launch on warning."¹⁵ The MX shell game is promoted as a more secure alternative to the LOW computer game.

With a Bang, or . . .

Randall Forsberg, director of the Institute for Defense Disarmament Studies, maintains that a totally automated launch on warning system will never be implemented. Yet she foresees development of and response of smoothly interlocking procedures for evaluation of and response to indications of a missile launch—a more streamlined version of the present early warning network. This system would enable U.S. missiles, in some circumstances, to be launched while under attack.¹⁶

Clearly, there is ever increasing military reliance on the kind of C³ electronics that a launch on warning system would utilize. LOW may not have to be an all-or-nothing phenomenon—perhaps it is already creeping up on us. William Perry, recently retired Under Secretary of Defense for Research and Engineering, avidly supports increased nuclear weapons development and maintenance of an American lead in military electronics. Yet, regarding launch on warning, "Perry says he cannot even discuss this option 'without breaking into tears.' Fundamentally, it 'amounts to turning over the decision to start World War III.' Perry says his enthusiasm for electronics does not extend that far."¹⁷

This statement sounds a bit ludicrous, and coming from someone as highly placed in military administration as Perry, more than a little frightening. He champions the military goal of protecting land-based missiles at a high cost—he supports the MX system despite acknowledged problems. Given such a goal, it seems possible that the electronics he pushes might someday be used to develop a launch on warning system, or at least a system that approaches LOW in hair-trigger potential.

Launch on warning should be opposed by progressives in the context of the Pentagon's dangerous and wasteful doctrine of land-based missile protection. Opposition to this doctrine has become more urgent with Reagan's recent decision to deploy MX missiles in single, fixed silos, protected by either an ABM system or launch on warning. LOW's technical faults, enumerated by moderates and even militarists, can certainly lend support to progressive opposition to the launch on war-

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ning proposal. But only through a fundamental change in U.S. strategic policy will the launch on warning system, as well as the MX and the ABM, be permanently laid to rest. Effective opposition to the Pentagon's quest for a solution to the imaginary land-based missile protection "problem" must be part of the growing citizen movement against U.S. nuclear warmongering. □

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news notes

PATCO AND SAFETY

Stories about the striking air traffic controllers have pretty much disappeared from the newspapers. In the meantime, myths perpetrated by the mass media about PATCO members and the strike continue to persist.

For the most part, the media has portrayed the strikers as a spoiled and privileged group who are just greedy for more money. The "average" salary figure of \$33,000 a year has been widely quoted. The media fails to mention that it takes workers fifteen years after entering the air traffic control profession to make that much money. When they begin training, air traffic controllers make only \$10,000 a year. After five years, they make \$20,000. Their salary does not go above \$30,000 for another ten years.

But many air traffic controllers do not last long enough in their jobs to make \$30,000 a year. Eighty-nine percent of all controllers who left the profession between 1975 and 1979 did not make it to the retirement age of 55: they either retired at a reduced pension, ended up on medical disability, disqualified for psychological problems, or quit out of frustration. Controllers leave their jobs because of the incredibly stressful nature of their work.

David Bolton, 33, a striking controller, said "When I first came into the agency... I went in there with an 'I'm young, it won't happen to me' type of thing. But then once you get involved in it and you see what it does to you on a day to day basis and you watch what it does to people over the years, you say 'Doesn't anybody retire around here? What's going on?' So I get scared."

The stressful and unsafe conditions under which air traffic controllers work is the central issue of the strike—not salaries. The U.S. is the only major country where controllers work 40 hours a week. Eurocontrol workers put in an average of 29 hours per week, and in Canada, controllers work 34. In addition to the long hours the American controllers work, there has been a dramatic increase in their workload over the last decade. Air traffic has in-

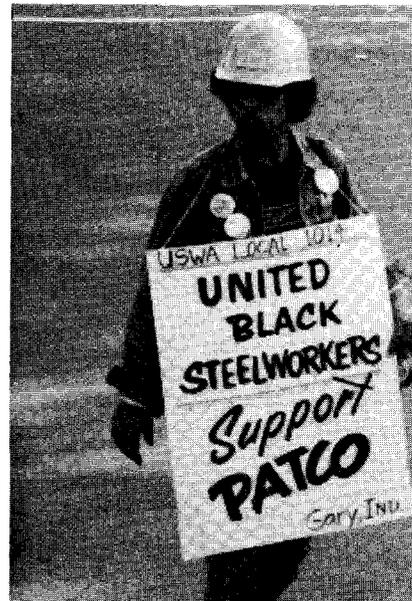
creased 20% since 1978 while the number of controllers has remained the same. In addition, workers often experience equipment failures because of the old and unreliable nature of the control machinery. Sandi Engel from PATCO local 301 said, "When I came in as a trainee, some of the equipment was left over from World War II. Some of it's still there. We need new up-to-date equipment and it's available, but the FAA won't move on it." The potential for an equipment breakdown adds to the tension of the job.

Another myth the mass media has been instrumental in perpetuating is that the strike is causing the airlines to "suffer financially." In fact, the strike has been beneficial to the troubled airline industry, particularly because Reagan has left the scheduling of flight reductions up to the airlines rather than the FAA.

For the airlines, 1980 and early 1981 were not "high flying" times. The industry lost a total of \$180 million in the first quarter of 1981 alone. The 1979-80 increase in fuel prices and deregulation of the airlines in 1978 were two factors which brought on this crunch for the established airlines. A major part of their financial dilemma was due to competition from cheaper, no-frills airlines which entered the market in late 1979 and have captured larger and larger chunks of the air traffic business ever since. Before the PATCO strike, 10 new no-frills airlines had announced plans to open.

The flight reductions imposed by established airlines to deal with the PATCO strike will just about wipe out the competitors. No-frills airlines have been so successful because they only operate at rush hours and only fly between major airports. The niche they have occupied will be hit much harder by the 50% cutback at major airports at rush hours than the rest of the industry.

Despite the cutbacks in air traffic—and the claims of the FAA—serious questions must be raised about the safety of the airways. A member of PATCO at Logan Airport in Boston commented: "I believe that there is a serious safety problem here and that the FAA and the Reagan Administration, in order to prove a point or to bust this union wide open, is jeopardizing the safety of the flying public. There are people in there who are working above and beyond the number of hours which we believe is safe—



Debra Chasnoff

they're working 10 hours a day, six days a week. There obviously aren't the number of controllers in there to provide the necessary relief."

The National Lawyers Guild is also concerned for the safety of the traveling public in "marked contrast to the efforts of the Reagan Administration to keep traffic flying no matter what the risk." But the Reagan Administration has shown little concern for the safety of American travellers. According to the Guild, "The Reagan Administration has chosen to use this strike as a showcase for its anti-labor policy. The mass firings, arrests of strikers, enormous fines and refusal of the government to negotiate, all attest to a desire by this Administration to smash the union, not to reach a fair and equitable settlement."

OSHA UNDER ATTACK

The Reagan Administration's attack on the Occupational Safety and Health Act of 1970 is enough to make any worker sick. OSHA has never made a huge dent in preventing or even minimizing workplace health and safety hazards. In fact, the number of on-the-job injuries, illnesses, and diseases reported each year keeps rising, according to the Bureau of Labor Statistics. But OSHA has been an important legal and technical tool for workers fighting for improved working conditions. It has provided unions with the leverage and resources necessary to

bring health and safety into the collective bargaining process, and into their contracts. More importantly, it has helped to develop health and safety as an issue of concern on the shop floor.

The Reagan Administration, in its crack down on the labor movement, is being particularly hard on OSHA. The Act is being torn apart while the Occupational Safety and Health Administration, which is supposed to oversee the law, is being dismantled. Already, Reagan has proposed cutting OSHA's budget by 6% more than Carter's recommended levels. These cuts would result in the loss of 300 OSHA inspectors and they would reduce the number of OSHA inspections by 15% in 1982. OSHA only inspects approximately 1-2% of all U.S. workplaces per year on its current budget.

The following are only a few of the key changes OSHA is considering. If they go into effect, OSHA's inspection and enforcement capabilities will be crippled.

- **Response to Worker Complaints:** under the new proposals, when a worker or union lodges a complaint, OSHA would contact the employer to give them an opportunity to "comply voluntarily" in cleaning up the hazard. Ten days before the scheduled day of the inspection OSHA would write to the complainant to find out if the employer had dealt with the hazard satisfactorily. If so, the inspection would be cancelled and the case closed. This proposal amounts to giving advance notice of an inspection. It is directly contrary to the intention of the Occupational Safety and Health Act.

- **Targeting Safety Inspections:** OSHA proposes to exempt manufacturing businesses from general OSHA safety inspections if their lost-workday-injury rate falls below the national average in that industry (about 5.7 lost workdays for 100 full-time workers per year). Before an inspection, OSHA personnel would consult the log of injuries and illnesses for the previous two years and stop an inspection if they found a lost workday injury rate below this average. When this proposal was first introduced, OSHA did not want to require that workers be present when the inspector conducts this log review. But under pressure from unions, OSHA has capitulated to labor's demand that employees be present at the inspection to comment on the accuracy of management records.

- **General Duty Violation:** The OSHA Act states that employers have a "general duty to provide a workplace free from recognized hazards." In the past, the use of government documents, such as studies by NIOSH and scientific articles recommending stricter standards for a substance, were considered sufficient evidence warranting OSHA to issue a general duty citation. This will not continue if the Reagan Administration's proposal becomes policy. Scientific recommendations would not be considered as evidence for a general duty violation. In addition, workers have to prove 1) that continued exposure to health hazards is foreseeable, 2) that the exposure will cause illness, and 3) that the illness will cause serious harm or death. These criteria are just to get OSHA to issue a citation, never mind propose a penalty.

In addition to the above policy recommendations, Reagan has revoked the walk-around pay regulation—which allowed workers to be compensated with their regular pay for assisting in an OSHA inspection. The Administration has also placed the standard that requires the generic labeling of hazardous materials in the plant "under policy review." The Office of Management and Budget (OMB) is now considering what the costs to industry will be if this standard is implemented.

The new proposals for OSHA are particularly dangerous because they are being introduced not as legislation, but as a series of "program directives." If they were a bill, public comment would need to be solicited through a formal hearing process. But because the proposed changes are administrative rather than legal in form, their implementation does not depend on public comment and there is no procedure for democratic review. This presents a severe threat to labor; the changes cannot be challenged in the same way the Schweiker provisions were.

"All this means" says a IUE local 201 newsletter, "is that unions and workers will have to depend much more on their own procedures and strengths to fight health and safety issues."

ELF AND OTHER HOBGOBLINS

The Reagan administration is moving full-speed ahead to construct a gigantic underground antenna grid across

northern Wisconsin and/or upper Michigan. Project ELF, formerly known as project "Sanguine" and "Seafarer," is designed to provide a communication link with submerged submarines, and would turn the earth itself into a massive transmitter of Extremely Low Frequency (ELF) electromagnetic radiation. With the administrative go-ahead, Project ELF will result in the digging up of the north woods of Wisconsin, bathing the area in hazardous nonionizing radiation and escalating the risk of nuclear war.

Until now public opposition has halted any expansion of ELF. However, President Reagan has recently ordered the Wisconsin ELF facility upgraded so that it will soon be broadcasting daily to an increasing number of missile carrying submarines. Further testing is planned, including efforts to develop a "mobile ELF system" that could be hidden in tunnels to be brought out and used *after* a nuclear war. If Project ELF works, it will be the new Trident submarine first-strike "trigger finger." For the first time the U.S. would have the capability to send a simultaneous one-way coded message to all of its submerged submarines, coordinating a general attack.

In addition to the environmental turmoil resulting from the building of this enormous antenna, and in addition to the strategic implications of this technology (it will not survive a nuclear attack and therefore has use mainly in a first-strike situation), there are also many concerns about the biological effects of the extremely low frequency electromagnetic fields emitted by the antenna. The signal would be shifted between 72 and 80 cycles a second at a rate of 16 times a second. This 16 cycles a second modulation is of particular concern because it lies in the range of natural brain frequencies, and laboratory tests have revealed effects on the brain and on primate behavior from such weak electric fields.

For more information or to help in the struggle to oppose the ELF system, contact: Stop Project ELF, 1148 Williamson Street, Madison, WI 53703, (608) 256-0870.

—Information from: John Stauber, "Project ELF: Doomsday in the North Country," Northern Sun News, July/Aug. 1981, p. 11.

book review

by Alan Epstein

Microelectronics: Capitalist Technology & The Working Class

by The Conference of Socialist Economists Microelectronics Group.

CSE Books, 55 Mount Pleasant, London, England WC1X 0AE. 1980.

What can workers do when they are faced with job deskilling, increased alienation and layoff due to introduction of computer technology in their workplace? That is the central question that the Conference of Socialist Economists (CSE) Microelectronics Group poses and illuminates through analysis of the British economy.

Microelectronics deals with the effects of the latest innovations of small computers in new machinery, commonly known as "microprocessor based technology", on a broad range of jobs and workers. While the initial impetus to developing computers was primarily military, the more recent breakthroughs have been instigated by businesses which seek to lower their costs and increase their profits. However, a simple application of the profit motive is not sufficient to explain the rise of innovation; *Microelectronics* shows how worker strength and its ability to slow the rate of profit and future profitability have been important in corporate planning.

Microelectronics provides an in-depth study of various sectors of the British economy and the part microprocessors have played in the degradation of the work. There are descriptions of the work environment which adequately portray this decreasing control by workers over their lives. In the office, for example, "Operators are... continuously plugged in with no idea of how much more work they have to do, when it will stop, and when they can maybe sneak a break." (p. 48)

Alan Epstein coordinates and teaches computer word processing training at the Somerville, MA adult education center. He has been involved with the Boston SftP Computer Group.

It is here, in relation to office work, that management policies of control are first discussed. The office is dissected and discussed both in terms of its changing machinery and working conditions, with attention to racist and sexist practices. The book includes speak-outs by office workers who attest to the racist and sexist divisions in the office:

Racism is clearly visible to anyone who walks through a big office company. Pretty young white women work as private secretaries in the carpeted offices of the new downtown buildings. Black clericals are mainly reserved for the keypunch room, the typing pool, or the data processing centre across town—the routine, pressurized, low-paid jobs. (p.49)

Heavier industry is also discussed in terms of the changing production techniques, the upheaval of the labor force, and the corporate reasoning for such changes. With Numerical Control equipment (see Peter Downs' article, "Technology and Productivity," *SftP*, Jan./Feb., 1981), much of the precision skill is removed from the machinists' domain, and placed under the control of the computer programmer. Skills become concentrated in a few highly paid professionals who stay aloof from the production floor, while the few shop workers who remain become merely monitors of the equipment and need few skills. The intent is obvious: pay fewer workers less.

Microelectronics continues with a look at other basic industries, including automobile production and mining. The dangers to industrial workers of robots and of microprocessors in small batch production (in which industrial machinery is produced in small numbers by multi-purpose producing machines) are

explained in sufficient detail to inform those without extensive technological training. The corporate tendency toward the completely automated production shop is exposed, but the arguments are balanced well between the Luddite* approach of refusing to work the new technology, and the more conservative approach of allowing the new technology to replace workers in boring and dangerous jobs.

On the one hand, *Microelectronics* points out that militant resistance to new technology introduction will win workers little in the long run. On the other hand, it is in no way assured that workers who are removed from dangerous jobs by robots and other machines will be retrained, transferred or upgraded in position. "The myth of technological upgrading has been... used by civil servants, politicians and media experts as part of an ideological offensive to sell microelectronics to the working class... The industrial worker will have the opportunity to acquire new skills and the freedom associated with white-collar work." Since labor costs tend to be so high, any move toward higher capital investment (investment in machinery) carries the obvious implication that labor costs be lowered. Of course corporate planners do not specify how this will happen, nor who is responsible, and certainly the barriers to social upward mobility which exist are never challenged. It reminds me of the "anyone can become President" story.

Speed-up is another result of automation introduction. The thought of working on an assembly line alongside a robot that has been programmed to set a par-

*Luddites were bands of working people in England between 1811-16, organized to destroy manufacturing machinery, believing that its use reduced employment.

ticular pace is frightening, especially where that pace only marginally corresponds to an assembler's ability to perform the task in the allotted time. In the office, too, management's control tool—computer terminal monitoring—is used to push workers to higher speeds of work while intimidating them with the threat of replacement.

Other chapters outline the effect of computer technology on the state (for repression and paper work), on education and training programs supported by the state, and on banking. Attention to union response is noted throughout. There are also three chapters dealing with the computer itself and how it operates. I was disappointed with the brevity and confusing complexity of the treatment of basic computer principles, however, and would expect a person unschooled in computer use to fully understand only part of it. They have their facts straight, but a year course in hardware and software cannot be given in three short chapters.

Perhaps the most interesting section of the book presents alternative designs. As *Microelectronics* examines primarily the British economy, the effect of workers successfully "resisting the harmful effects of new technologies" is shown in the context of the refusal of multinational corporations to invest in British industries. This could have serious implications for other industrialized and developing countries whose trade union movements are strong.

Microelectronics does not embrace the simple solution of dropping resistance to new technologies; instead it outlines other ways workers can preserved integrity. Aside from demanding higher wages and refusing job loss and job force shrinkage, workers can demand input into the design process itself when new technologies are introduced. Technology is not inherently negative or bad; rather the use to which it is put defines its politics, and the designers define the use. Workers can also demand training to assist them in preparing to make these design decisions.

The Scandinavian successes (and failures) presented serve as good examples of how organized trade unions have dealt with these issues. In addition, the discussion of the Lucas Aerospace

Shop Stewards Combine in Great Britain, which has designed and implemented socially useful machinery at Lucas, and other union successes, gives the reader the sense that movement is occurring, with union strength increasing despite the management trends.

Microelectronics does not draw conclusions from their arguments; neither does it look at those losing their jobs and the prospects for shorter work weeks and increased leisure time, but these omissions are stated in the Preface. The *Microelectronics* Group apparently in-

tends to continue their discussions internally and publish further on the subject. The book does serve well as a discussion focus and an informed first step toward understanding and solving the problems that arise between employers and workers over new technologies. The radical economic approach is refreshing, a foil for the plethora of pro-business technical literature which exists. CSE has done extensive research and has produced an informed guide on the subject. □

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● LOCAL ● NATIONAL ● INTERNATIONAL ●

Letters

(Continued from page 6)

In the recent past, during the Carter Administration, due to increased controversy over the project's failure to meet with expectations, some of the funds for laser fusion were cut, and some of the funding was delayed. However, the House Armed Services Committee restored deleted funds and added a cost-of-living increase for fiscal 1982 bringing the funding to \$236 million. There was some concern in the present administration—currently all funding for laser fusion is budgeted through the Department of Energy Assistant Secretary for Defense Programs—to tighten up the budget. Consequently in May of this year the Lawrence Livermore National Laboratory in California was complaining about a cut of 11.5% from \$54 million to \$48 million. Livermore Lab Director Roger Batzel said at that time, "It's my personal belief it's a temporary thing."

Thus, the University of California Weapons Labs Conversion Project was not surprised to learn that on July 24, the U.S. House of Representatives voted to appropriate twice as much funding as requested by the Department of Energy for the NOVA laser fusion program at the Livermore Labs. The Senate has since approved the package. Estimates of between \$104 million and \$137 million have already been committed to the first stage of NOVA, a \$200 million to \$250 million project.

This incline in spending matched with the decline in the success of the project looks very suspicious. In the seventies, the laser fusion community circulated stories about the possibility of commercial, small, flexible, laser power reactors. However, this garage-size reactor has now grown to a 15-story, 20-beam, \$200 million plus laser factory that would barely compete with the output of an average nuclear power plant. In fact, as *Science for the People* reported, the Livermore SHIVA/NOVA complex is now known to be technologically infeasible as the basis for commercial energy production.

The fact is that all the rosy promises to the public about cheap, inexhaustible, clean civilian energy have been broken. Over \$2 billion has already been spent in the U.S. on laser fusion research and none of the experiments have attained a "breakeven"—a "breakeven," a reaction that produces as much energy

from a nuclear fusion reaction as is needed to kindle it by other means, is not even expected for three or four more years. And this is only one of many steps necessary before laser fusion can be applied to civilian use. Meanwhile, in order to maintain these projects it will cost taxpayers about \$250 million per year.

What makes all this even more suspicious is that this year, contrary to previous years, the Congressional Budget Hearings for laser fusion were closed-door, classified briefings with no part open to the public.

Why this secrecy? What is the meaning of this contradiction?

What the laser fusion community at the weapons labs does not want the public to know is that the immediate application of laser fusion experiments are all military. And most important of all, these military applications involve yet another giant step in the arms race that will go more smoothly if the public is not informed. This kind of militarism flourishes best when it bypasses the democratic process.

The laser fusion program needs to be reassessed:

- The public must be told the truth about the laser fusion program: it is a military, not an energy program. The promise of unlimited, cheap, and clean energy simply does not meet with the facts.
- Democracy and the public's right to information must come before the politics of science and the politics of militarism. The most recent classified briefings at the Congressional Budget Hearings must be declassified. In the interest of safety, the public needs to be informed. The public must be involved in important decisions, that is the principle of democracy.
- Rather than increasing funding for laser fusion, the project should be eliminated. Laser fusion is a solution in search of a problem. Until the taxpayers are better informed, the Department of Energy and the Department of Defense should stop spending our money behind closed doors. It is quite possible that an informed public would choose to invest more in public services and less on these destabilizing, futuristic, weapons development projects.

Kenneth Nightingale
University of California Weapons Labs
Conversion Project
San Francisco, CA

EUROPEAN NUCLEAR DISARMAMENT

Dear SftP:

Thank you for the July/August 1981 issue on militarism and science. It will be particularly useful in helping to develop the campaign for a nuclear-free Europe, which the Irish Campaign for Nuclear Disarmament is actively supporting. Indeed, the Irish Republic, thanks to its long-standing policy of neutrality, constitutes an embryonic nuclear-free zone on the Western fringe, supplementing that which also exists on the Northern fringe of Europe.

I welcome also the recognition by Jim Heaphy of the pioneering role of J.D. Bernal in this field. May I point out, however, that although he spent his working life in Britain, he was not British but Irish and always considered himself so, being an early example of the "brain-drain" phenomenon (flow of key intellectuals from colonial to imperial countries) that he was among the first to recognize. He was also in sympathy with the Irish national-revolutionary struggle in 1919-1921, though not actively involved.

Bernal's key "science and society" books are, *The Social Function of Science, Science and History, and World Without War*. His philosophical work is enshrined in *Freedom of Necessity*. It is likely that these works, which mostly were published at the height of the "Cold War," are little known in the United States. Perhaps this can be remedied, and a "Bernal revival" initiated?

I am anxious to trace any residues of Bernal influence in the U.S., particularly among people who might currently be influential in helping to determine research priorities, with a view to examining the feasibility of generating appropriately significant events with the aid of an informal network.

Anyone for whom the above points are meaningful is invited to write to the undersigned, particularly if they have concrete ideas under the general headings "division of military R&D," "possible role of small neutral states in moderating East-West conflict," "role of fashion-leaders in scientific research," "military R&D and the North-South problem" etc.

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Robots at G.E.

(Continued from page 10)

the international convention a wide ranging position was adopted emphasizing research, notification and job enrichment.

Before our local committee could react to the emphasis on the new technology shown by the international union, the Company brought the technology issue to a new stage.

Robots Come to GE-Lynn

On October 30 at 11:15 a.m., the General Electric Company management announced to the union that a robot would be installed in the Everett location on Monday, November 3rd. The Company indicated that three piece workers would be transferred to similar grit blast jobs in other parts of the plant.

The Company planned well for the announcement. They gave only two days notice, hoping that the union would not have time to assimilate the information and react. The announcement coincided with the holiday season and the winter heating season, making a strike or other direct action extremely difficult. The lack of notification was deliberate, as it takes at least eight months to order and take delivery of the robots. Furthermore, the Company indicated that the placement of robots followed a one-year study. The Company was well aware of what they wanted to do months ago. It continued its historic labor relations policy deliberately refusing to acknowledge the union's right to be informed in a timely manner of matters affecting the work situation or wage rates. In addition, Company planning extended to the location of the robot in the shop for maximum public relations effect. In their view the robot would be placed in the middle of the shop where all could see it. A "team" of hourly and salary people would be allowed to familiarize themselves with it and explain it to the other workers. Finally, the operators would be given a trip to Toledo, Ohio to learn about the machine.

The introduction of robotics in the Lynn facility is part of a company-wide program to modernize as rapidly as possible. Corporate level management also indicated another purpose in introducing robots into Lynn. They believed that if Lynn could be convinced not to resist, then all locations would follow the lead of the Lynn local. From their point of view the Company had good experience with Lynn. When the management announced the introduction of the Shop Activities Management system in December of 1979, the union did not place demands on the Company. It took many months

before the local understood the system, and it was only in August of 1980 that the first steps were taken towards developing a negotiating position.

GE used the SAM technique again. The union was asked to be present at a film about robots. We were informed that the robot on the film was the type to be introduced in GE. Then as the film progressed the Company, without ever making a formal written announcement to the union, told us that the robot was on the way. In the future four other areas of the plant would be affected. This time the audience saw clearly the Company's view of the future—job losses, cuts in piecework earnings, the weakening of the union and insecurity. When the Company asked if the union was satisfied, the spokesperson was surprised to hear the union request time for review.

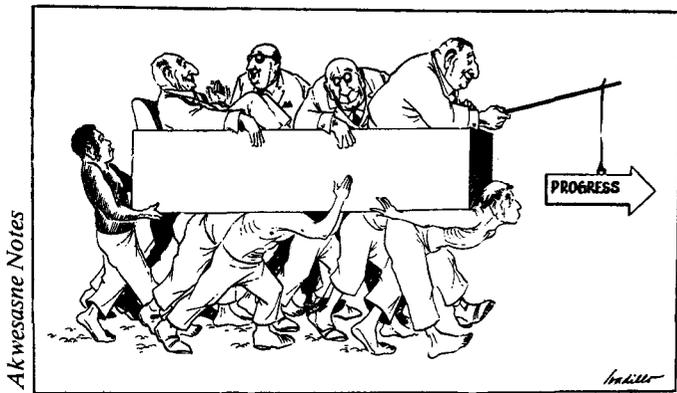
Following the request for review, the President immediately called into session the SAM committee. Along with committee members, all concerned officers were invited to attend. The committee members realized that the jobs of our co-workers and the livelihood of our children were at stake. In addition, the Company's attitude of "no notice"—brought home GE's arrogant notion that progress was inevitable and unchanging with the Company the only beneficiary.

The committee voted unanimously that the "Company delay the placement of the robot in the Everett plant until such time as the negotiating committee and the Company meet and agree on guidelines for the placement of such machines." The committee also discussed what kind of guidelines were appropriate—without getting into too much detail. Central to the concerns were; 1) no layoffs (i.e. removal from the GE payroll), 2) those displaced from their jobs enjoy average earnings while they are being retrained for jobs with equal or higher earnings potential, 3) repair and/or maintenance of the equipment be kept within the bargaining unit, and 4) "in general, monetary gains due to increased productivity be shared with the employees." The committee felt strongly that serious and meaningful notification to the union of the arrival and impact of new equipment was a necessary first step on the part of the Company.

The president then directed the business agent to notify the Company that the union wanted a delay in implementation of the robot until the union could sit down with the Company. The Company, without being told what the precise nature of our demands were, agreed to a meeting the following week and a delay until the meeting.

The SAM committee's actions were significant in two respects: First, the committee, in cooperation with the officers, acted to try to stop the company from im-

posing the robot on us before we agreed on the terms. Second, the members of the committee, in the discussion of what to do, challenged the notion of "progress" being some kind of neutral force. The committee, by seeking guidelines to regulate the robot recognized the question—"Progress at whose expense?" In defining the guidelines the committee answered it—that working people should not be forced to suffer due to "progress." The discussion challenged the Company view as set forth earlier in the movie that "Progress is inevitable and boundless." Inherent in the committee's position is a challenge to management prerogatives. We are saying to GE that it cannot run the business at the cost of our employment.



Ak-wesaste Notes

Rebirth of the Trade Union Movement?

The contrast in the union's response to the Company's initiative illustrate the great change in our understanding in the last year. Instead of confusion and delay, we were able to make use of our knowledge and agree, unanimously, on a response to the impending application of the robot to production. One reason we were able to respond is a greater sophistication in our understanding of the idea of "progress"—more and more of us want to define "progress" in our own interests.

The robot has focused all the unease that the leadership felt concerning the method the company has used to introduce the new technology. The Company has used subterfuge, partial information and immediate implementation in order to avoid any negative response from the union. This time many people felt the union had been insulted, since the Company refused to give adequate notice and simply assumed there would be no substantive questions. The robot also symbolized the question of jobs. The gradual increase in numerically controlled equipment has had a subtle impact on jobs.

It is difficult to say a specific employee lost his or her job due to the increased productivity associated with N.C. The robot, however, means the immediate displacement of three people to a department that may

in turn have the next robot GE buys. Thus the issue of jobs and our future was underlined. Nonetheless, the committee discussion reveals that the members, stewards and officers of the local have a detailed and sophisticated knowledge of the meaning of the new technology for ourselves and for GE.

It is possible, even likely, that our local will not succeed in forcing GE to accept our guidelines before they install the robot. There is good reason to believe, based on GE's past labor relations policy, that they might accept considerable financial loss in order to make the point—that the company will be the sole determinant of what constitutes progress. It is conceivable that GE chose Lynn to implement the robotics project because of the long tradition of militancy associated with this local. On the other hand, attrition is a concept often accepted by the Company. Only the future will determine what will happen with our initiative. But we are asking the questions—and sooner or later the labor movement will formulate and put into practice the answers.

At the plant level prior notification and protections against the use of monitoring systems can be negotiated. At the National level agreements can be reached concerning the size and extent of the bargaining unit and who controls the machines. The overall issue of job displacement, investment and training are national issues; they cannot be settled on a company by company basis. It will require a national labor policy to deal with such issues. In order to deal with working conditions, especially the availability of employment, the collective bargaining process must become politicized and take on the fundamental issue of management prerogatives.

It is my belief that qualitative changes in the workplace will bring about qualitative changes in the issues dealt with by the American trade union movement. If that happens, we will see the birth of a new and vibrant trade union movement. □

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resources

TECHNOLOGY AND THE LABOR PROCESS

Architect or Bee? The Human/Technology Relationship, Mike Cooley, Langley Technical Services (95 Sussex Place; Slough SL1 1NN England), 1980, 104 pp., \$6.50.

Case Studies on the Labor Process, Andrew Zimblast, Editor, Monthly Review Press (62 West 14th St., New York, N.Y. 10011), 1979, 314 pp., \$7.50.

This book relates technological changes in the workplace to social, political and economic developments.

In the Name of Efficiency: Management Theory and Shopfloor Practice in Data-Processing Work, Joan Greenbaum, Temple University Press (Philadelphia, PA 19122), 1979, 210 pp., \$12.50.

Technology and Toil in Nineteenth Century Britain: Documents, Maxine Berg, editor, CSE Bookclub (55 Mount Pleasant, London WC1X 0AE England), 1979, 246 pp., \$9.00.

This book contains fifty accounts of the organization of work. It brings together materials showing the dialectic between technology and the labor process.

Living Thinkwork, Mike Hales, CSE Bookclub (55 Mount Pleasant; London WC1X 0AE England), 1980, 192 pp., \$9.00

This book explores ways in which Marxist theory might be extended and enriched in a world of science-based multinationals and "mental" labor.

Science, Technology and the Labour Process: Marxist Studies #1, Les Levidow and Ron Young, Editors, CSE Bookclub, (55 Mt. Pleasant; London WC1X 0AE England), 1980, \$10.00.

This book is the first in a series of collections which attempts to integrate the analysis of science and technology with Marxist critiques of the capitalist mode of production.

Office Workers' Survival Manual: A Guide to Fighting Health Hazards in the Office, Women and Work Hazards

Group, British Society for Social Responsibility in Science (9 Poland St., London W1V 3DG England), 1981, 200 pp. \$6.00.

Office Hazards, How Your Job Can Make You Sick, Joel Makower, Tilden Press (1737 De Sales St., N.W. Washington D.C. 20036), 1981, 233 pp., \$6.95.

POLITICAL CONTROL VIA TECHNOLOGY

Technology of Political Control, Carol Ackroyd, Karen Margolis, Jonathan Rosenhead, and Tim Shallice, Pluto Press (Unit 10 Spencer Court; 7 Chalcott Road, London NW1 8LH England). Distributed in the U.S. by Flatiron Book Distributors (Suite 814; 175 Fifth Avenue; New York, N.Y. 10010), 1980 (new edition), 336 pp., \$6.50.

The government no longer reaches for the machine gun when threatened at home. It has plastic bullets which kill only occasionally, depth interrogation which tortures without leaving physical scars. This is the technology of political control.

When first published in 1977, **Technology of Political Control** anticipated that the deployment of these new weapons in Northern Ireland, where they were being tried out, would spread to mainland Britain. Little by little they have been doing so. In this new expanded edition, the authors review these developments.

WOMEN AND COMPUTERS

National Women's Mailing List. Women's Information Exchange (1195 Valencia St., San Francisco, CA 94110). The goal of this organization is to use computer technology to support the efforts of women's projects throughout the country. Write to them for more information.

TECHNOLOGY AND IMPERIALISM

The Tools of the Empire: Technology and European Imperialism in the Nineteenth Century, Daniel R. Headrick, Oxford University Press (200 Madison Ave., New York, N.Y. 10016), 1981, 221 pp., \$6.95 (paper).

Women Workers in Multinational Corporations: The Case of the Electronics Industry in Malaysia and Singapore, Linda Y.C. Lim, Michigan Papers in Women's Studies (Women's Studies Program; University of Michigan; 354 Lorch Hall; Ann Arbor, MI 48109), 1978, 60 pp., \$2.50.

Electronic Colonialism: The Future of International Broadcasting and Communication, Thomas McPhail, Sage Publications (P.O. Box 5024; Beverly Hills, CA 90210), 1981, 144 pp., \$6.95.

ENERGY

Nuclear Energy: The Unforgiving Technology, Fred H. Knelman, Hurtig Publishers (10560 105th Street; Edmonton, Alberta T5H 2W7 CANADA), 1976, 259 pp., \$4.95 (paper). This title, and the following title relate to Canada's energy battles.

The Tar Sands: Syncrude and the Politics of Oil, Larry Pratt, Hurtig Publishers (10560 105th Street; Edmonton, Alberta, T5H 2W7 CANADA), 1976, 197 pp., \$3.95 (paper).

The Killing of Karen Silkwood: The Story Behind the Kerr-McGee Plutonium Case, Richard Rashke, Houghton Mifflin (Two Park Street; Boston, MA 02107), 1981, \$11.95.

Science, Politics, and Controversy: Civilian Nuclear Power in the United States, 1946-1974, Steven L. Del Sesto, Westview Press (5500 Central Avenue; Boulder, CO 80301), 1979, 260 pp., \$24.25.

Energy Catalog, Food for Thought Books (325 Main Street; Amherst, MA 01002), 1980, 32 pp., \$.50. A catalog of social ecology resources, including a listing of 300 publications.

Nuclear Power and Political Surveillance, Center for National Security Studies (122 Maryland Avenue, N.E.; Washington, D.C. 20002), 1980, \$3.50.

CORRECTION

The photograph on the cover of the September/October 1981 *SftP* was by Roberta Norin.

CHAPTERS AND CONTACTS

Science for the People is an organization of people involved or interested in science and technology-related issues, whose activities are directed at: 1) exposing the class control of science and technology, 2) organizing campaigns which criticize, challenge and propose alternatives to the present uses of science and technology, and 3) developing a political strategy by which people can ally with other progressive forces in society. SftP opposes the ideologies of sexism, racism, elitism and their practice, and holds an anti-imperialist worldview. Membership in SftP is defined as subscribing to the magazine and/or actively participating in local SftP activities.

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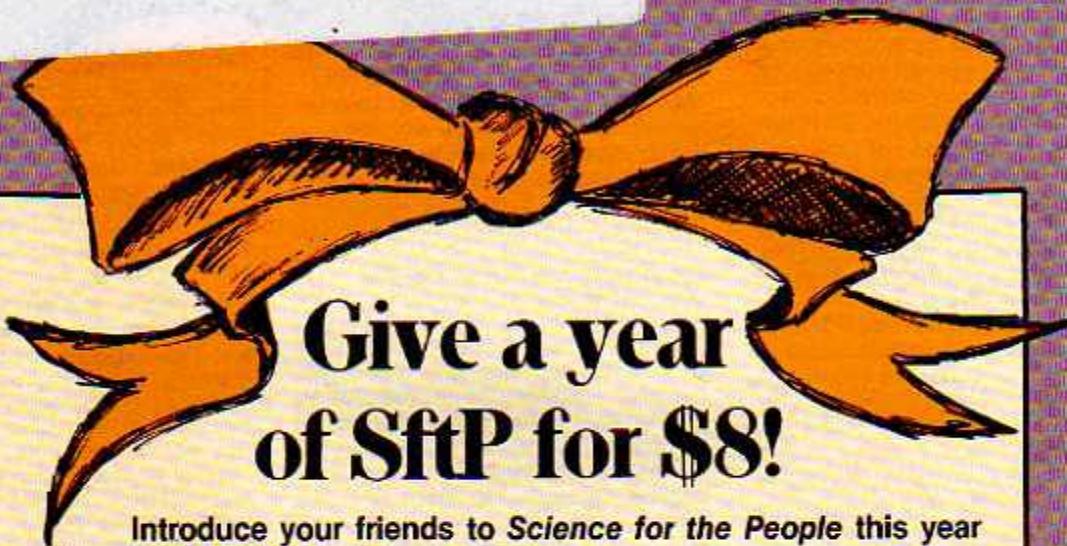
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