To: LOHP Staff
From: Laura
Re: VDT File

Here is a list of the information currently available in the VDT File:

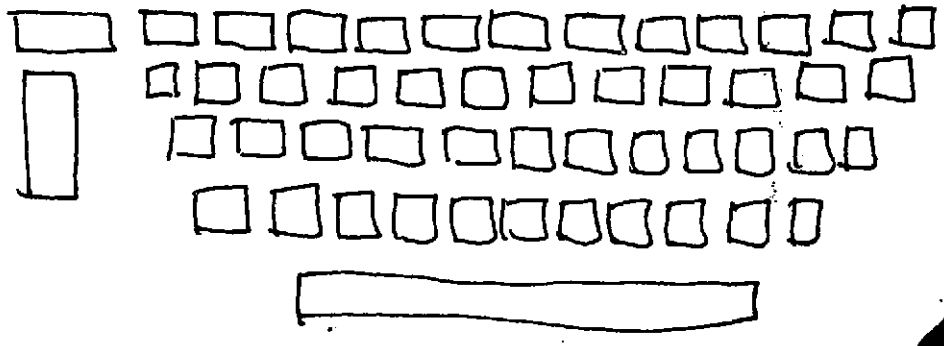
File Folders:

1. General information regarding VDT Hazards
2. Fact Sheets
3. Visual Strain
4. Cataracts
5. Work Station Design/Ergonomics
6. NIOSH VDT Studies
7. NIOSH Study Comments
8. Radiation
9. Birth Defects
10. Contract Language
11. Legislation, Regulations, Proposals
12. Court Cases: Arbitrations; Workers' Comp
13. VDT Surveys
14. Buying VDT Equipment (machines, chairs)
15. Filters/Anti-glare Screens
16. Lighting
17. OSHA Standards Board Hearing re: microwave and radiofrequency radiation
18. ~~VDT Radiation Testing~~
19. Testimony re: VDTs
20. Medical Surveillance
21. VDT Coalition
22. Bibliographies
23. Union Action
24. International Info

Publications; Reports; Information Packets:

1. VDTs Can Be Hazardous to Your Health. LOHP, 1981
2. Health Protection for Operators of VDTs/CRTs, NYCOSH, 1980
3. The Hazards of VDTs, Ontario Public Service Union, 10/80.
4. Guide to Visual Display Units, UAW, 1982
5. "Tomorrow's Technology, Today's Headcache", Slide Show Script, Shop Talk Productions, NYCOSH, 1980.
6. Health, Safety and Economic Consideration of Visual Display Units, Conference Report, American Industrial Hygiene Association, April 13, 14, 1981.
7. Select Research Reports on Health Issues in Video Display Terminal Operations, NIOSH, 1981.
8. "Potential Health Effects of VDTs", Committee Hearings of U.S. House of Representatives, Subcommittee on Investigations and Oversight, Committee on Science and Technology, Washington, D.C., 5/12/81.
9. "AControlled Survey of Working Conditions and Health Problems of VDT Operators at the 'New York Times'", conducted for the Newspaper Guild.
10. Journalists and New Technology, National Union of Journalists, England.
11. "Effects of Work at Visual Display Computer Terminals on Vision, Mood, Fatique Symptoms", Peter Crane, Phd, University of Pittsburg.
12. An Edited Transcript of the One Day Meeting on Eyestrain and VDU's, Ergonomics Society, Loughborough University of Technology, England.
13. A Report on Electromagnetic Radiation Surveys of VDTs, NIOSH, 1977.
14. VDT Packet, LOHP, 1979.
15. Guide to Health Hazards of Visual Display Units, Association of Scientific Technical and Managerial Staffs, London.

VDTs
CAN BE HAZARDOUS TO YOUR HEALTH



COMPILED BY SHARON SMEK

LABOR OCCUPATIONAL HEALTH PROGRAM
2521 CHANNING WAY
BERKELEY, CA 94720

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good review of literature + case studies

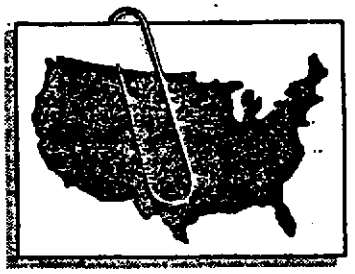
good on standards

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Sponsored by LOHP, with the assistance of Joanne Molloy.

Special Thanks to Janet Bertinuson, Helen Palter, Alexis Rankin, and the LOHP Staff.

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RACE AGAINST TIME: An Overview of Office Automation

Published by WORKING WOMEN, National Association of Office Workers, 1224 Huron Road, Cleveland, Ohio 44115

A race against time...

The American workforce is undergoing enormous changes as clerical work replaces manufacturing employment as the base of the economy. Now clerical work is being transformed by automation of the office. What is the effect of automation on the job itself, on the American economy, and on the office worker? Office workers are in a race against time trying to answer these questions before irreparable harm is done.

There are 10,000 Times as many Computers in Use Today as there were 25 Years Ago.

In the early 1950's, there were barely 1,000 computers in the United States; by the end of 1980, industry experts estimate that 10 million minicomputers will be at work across the country.

The widespread use of the computer has been made possible by the introduction of microprocessors in the 1970's. A single "computer-on-a-chip" in 1985 may have 25 times the capacity of a computer which filled an entire room 15 years ago.

In addition, microprocessors have reduced computation costs 100,000 fold since 1960. In fact, if computers are compared to cars in terms of cost and technology, M.I.T. estimates that the production of a Rolls Royce would cost $2.50 and the car would run for 312,500 miles on a half gallon of gasoline.[1]

Already extensively used in the offices of the federal government; multinationals and financial institutions, mini-computers, with their low cost, high power, and small size, make it possible for medium and small businesses to introduce office automation. According to *Technology Review*, sales of small business computers are expected to triple by 1984, creating a $10 billion market.

If total computer sales continue at their present annual growth rate of 12%, the computer industry predicts that its revenues will be the largest in the world by 1990, outstripping both auto and oil giants.[2]

As the U.S. Continues the Historic Transition to an "Information Economy", Clerical Workers will be More Affected by Widespread Office Automation than Other Sectors of the White Collar Workforce.

By the end of 1979, clerical workers numbered 18 million, accounting for 18% of all employment. Since women hold 80% of all clerical jobs, clerical employment accounts for 35% of the country's 42 million working women, according to the Bureau of Labor Statistics.

Over 50% of the 20 million new jobs projected by 1990 will be in white collar work: managerial, professional, technical, sales, and clerical. The U.S. Department of Labor estimates there will be 4.8 million new jobs for clerical workers—such as bank tellers, secretaries, typists, and computer/peripheral equipment operators—making clerical work the fastest-growing occupation in the 1980's.

Of the estimated 3.5 million offices in the U.S., about 1.5 million are considered large enough for some form of office automation.[3] IBM estimates that, by 1985, 40% of the total workforce will be employed in jobs primarily involved in information processing.

A report by Siemans, the West German high technology firm, estimates that 40% of the work done in the office today is suitable for automation by 1990.

Occupations which are targeted for automation —file clerks, bookkeepers, secretaries and typists, and bank tellers—are all at least 90% female.

Management's Idea of the Office of the Future is a Recreation of the Factory of the Past.

To move to electronics is "a way to enforce discipline and standardization in the office," says one business expert.[4] "Business can finally monitor and measure the clerical function," adds another.[5]

Future office workers could become as physically restricted as their blue-collar counterparts on the assembly line with the introduction of conveyor belts to move documents and files, and modular "cockpitlike" workstations, predicted by *U.S. News & World Report* (9/18/78). White collar shift work is increasing to get the most out of the new machines, and piecework—pay-per-line-of-information processed—is beginning to appear.

2

Automation in the office means the majority of women office workers will be paid less for doing more work, in jobs which are more monotonous, and which offer fewer opportunities for advancement.

Across the country, clericals working at video-display-terminals (VDT's) averaged only $7 a week more than conventional typists in 1979; in many Sunbelt cities, they earn even less than typists.[6] But numerous studies show that typing speed increases from 50% to 150% when word-processing equipment is used;[7] computer vendors claim that document production can be increased by as much as 500%.[8]

Contrary to business assertions that automation will upgrade most jobs, successful automation means that large numbers of employees perform the tedious, quick but accurate work of data entry. A Federal study in the 1960's found that 70% of the new automated jobs in a large bank were low-rated, and that one bank reduced the average pay for certain clerks by 22% after automation.[9]

Interchangeable data entry operators are already absorbing the jobs of many file clerks, keypunch operators, bookkeepers and bank tellers. While such semi-skilled clerical jobs abound, skilled clerical jobs are being eliminated. The Word Processing Plan of IBM calls for the elimination of the personal secretary, who performs the most varied tasks in clerical work, and is highest paid.

IBM claims that "soaring clerical wages" are a major incentive for office automation and cites the 68% increase in the average secretary's pay from 1965 to 1975. However, the cost of living between 1967 and 1977 increased 86%! In banking and insurance, among the most automated industries, wages for clericals are 8% to 19% below the national averages by occupation, according to the Department of Labor.

Sex discrimination in employment continues within the newly emerging computer occupations.

The very first operational computer, the ENIAC used to perform the calculations for the atomic bomb in 1944-45, was successfully programmed by 100 women who were hired to do what was mistakenly identified as "clerical" (and thus "women's") work.

As computer programming occupations were defined as technical and professional, they became overwhelmingly male. Although women re-entered programming in the 1970's, they remain only 19% of all computer specialists and are concentrated in the lowest-skilled and lowest-paid computer jobs as applications programmers and coders.

The majority of computer-related clerical positions are held by women: 95.6% of key punch and key entry operators; 62% of computer/peripheral equipment operators; and 75% of all office machine operators are women.[10]

A sociological study of five large employers in 1977 found that when computerization was introduced, the proportion of low-level clerical jobs remained the same, and that clericals were rarely upgraded to fill new skilled jobs. The study found that the automated clerical jobs were more mechanical and narrow, and that "the main avenues for clerical workers are either horizontal or downward."[11]

Even though it takes fewer people to do more work, office automation has not reduced the need for clerical workers—at least not yet.

In the 1960's the U.S. Department of Labor found that banks could handle the same volume of work with reductions in labor requirements of 40 to 50%.[12] In 1976, the Bureau of Labor Statistics found that employment growth in banking had slowed in relation to increased volume of transactions.

From 1960 to 1973, banking transactions increased 8.3% a year, and employment grew at an annual rate of 4.5%. But from 1973 to 1976, employment growth slowed to 3.2% a year while banking transactions continued to rise sharply at a 7.2% annual rate.

Although employment in certain occupations—such as bookkeepers, stenographers, and many types of clerks—will level off or decline, the overall need for clerical workers is apparently absorbing the potential employment displacement effects of automation in clerical-intensive industries such as banking and insurance.

However, the design of technology at this point is mainly being determined by what management wants—and it is already clear computers are sold by promises of reduced labor. "What can't be automated will be done by executives and by part-time employees," predicts Larry Wells of Creative Strategies International, a California consulting firm.

Studies in France and Great Britain predict enormous employment displacement in the future. A report prepared for the French Ministry of Industry by advisor Simon Nora predicts 30% displacement in the banking and insurance workforce; British economists believe office automation could lead to

permanent unemployment levels of up to 20%.[13]

Ten other countries have initiated major studies on the effects of office automation. *However, the U.S. Department of Labor currently has no method for calculating the impact of automation on employment projections.*

Office automation may be hazardous to your health.

Clerical workers rank second-highest victims of stress-related diseases, including coronary heart disease (CHD), according to a 1977 NIOSH study of 130 occupations. According to recently released findings of the Framingham Heart Study, women clerical workers with children and blue collar husbands are almost twice as likely to develop CHD than men.[14]

An estimated seven to 10 million people work on VDT's, the key units of office automation. Recent studies link VDT's to eyestrain, migraine headaches, nausea, lower and upper back pain and occupational stress. Studies in Austria and Sweden indicate that adequate break time and redesign of jobs are essential if health risks are to be reduced for VDT operators.[15]

Unless occupational safety and health findings are taken into account, office automation will integrate stress-causing factors directly and permanently into clerical jobs. The health of clerical workers will be severely threatened by rapid pacing of work enforced by computerized monitoring, increased job dissatisfaction due to less varied work and lack of advancement opportunities, and eye- and muscle-strain from VDT's in poorly designed jobs.

"People will adapt nicely to office systems if their arms are broken," an IBM official told *Business Week* in 1975. "And we're in the twisting stage now."[16]

The resistance to office automation by secretaries and managers alike is widely recognized as a factor that has slowed the rate of penetration by automated office systems. Despite rapid advances, office technology is still incomplete. Fierce competition between the major computer companies will spur the drive for new innovations. IBM and Xerox sink annual sums of $1.5 billion or more into research and development efforts.

Although the pace of technological innovation seems overwhelming, office workers and managers will continue to have an impact on the penetration of automation into the office. IBM's Vice President William F. Laughlin (cited above) makes it clear that his company does not have endless patience with those who might resist the office of the future.

Office workers must organize to protect their futures.

Women office workers are engaged in a race against time. Unless clericals organize to influence automation in the 1980's—while the technology is still being developed—the health, well-being and employment of women office workers will be sacrificed for the sake of management's constant quest for "corporate progress."

FOOTNOTES

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4 *Computer Decisions*, July-August 1979: A roundtable on the "office of the future" for vendors, users and consultants.
5 Donald C. Vadnais of 3M in *Nation's Business*, Feb., 1979.
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16 *Business Week*, June 30, 1975: special issue on "The Office of the Future."

Working Women, National Association of Office Workers, is a membership organization with affiliates in twelve major cities across the country and members in 45 states, working to win rights and respect.

$5/year membership dues entitle you to the bi-monthly newsletter and reduced rates on Working Women publications. Please mail to Working Women, 1224 Huron Road, Cleveland, OH 44115.

For a copy of the full report, *Race Against Time: Automation of Office Work*, send $4 ($3 for members) to Working Women.

THE ELECTRO

Scanning The Office Of The Future

BY BARBARA GARSON

My mother felt that a young lady should work in an office, not a factory. So for the past ten years, m part-time, temporary and summer jobs have been on Wall Street. During that very decade, the office of t future arrived. But how will I ever describe it to my mother? In fact, how can I tell anyone what I actua did at night in the sub-subbasement of the Clearing House Bank?

PART 1

Back-Office Blues

MONDAY, 10:00 P.M.: It's the largest room I've ever seen. On the far side people count piles of negotiables. (That's what I guess they are by the gold edges and the fact that we all have to exchange our purses for see-through plastic bags, so we can't slip anything out.)

On my side of the room, scores of women, mostly foreign, work their shifts at numerical keyboards—all using only three fingers of their keying hands.

Unlike the other windowless back offices where I've worked, there don't seem to be any supervisors down here. Just one young man who tends the computer and changes the tapes. Yet the women work nonstop, their fingers flying in a blur. They're all so much faster than I am that I'm afraid to take a break, even to go to the bathroom.

TUESDAY, 10:30 P.M.: The lone computer operator comes over to my console and says in a friendly way, "If you're going to stay here, you'll have to get your productivity up."

"Oh," I say, "what is my speed and what should it be?"

"It's been scientifically set," he tells me, "at 50,000 keystrokes an hour."

Then he sits down, plays a couple of chords on his control panel and up come my figures. The figures show when I started—to the nearest tenth of a second—when I took a break and exactly how many keystrokes I'd done all evening. (I am very far below the 50,000 keystrokes an hour.) The real supervisor is inside the machine.

To me as a clerk, advances in data entry always seemed to mean bigger rooms, longer rows, speedier machines. And the jobs were divided into smaller and simpler "modules," while the timing and controlling systems became more complex and encompassing.

But now I read that the minicomputer is reversing this trend. Centralized operations sections are no longer necessary or desirable. With the new video display terminals (VDTs) attached to minicomputers, data entry can be handled in each department. For the managers this will mean less waiting, better control. For the clerks it's heralded as bringing a new era of diversified, comprehensible tasks. I decide to try it.

Kelly Services gets me the kind of job I want—decentralized data entry—in a department at Bankers Trust.

1980 At 16 Wall

TUESDAY, 10:00 A.M.: Once again I'm led into a windowless room. Once again my job is to transcribe little bits of data from little slips of paper. Nevertheless, dispersed data entry is different.

For one thing, a jumble of desks, tables and VDT work stations has replaced the traditional long rows machines. The space is divided by pr fab metal walls or by high stacks paper and cartons, which seem to ha accumulated without plan.

Here, I enter my data onto fill-in-th blank forms programmed into t VDTs. As a pleasant change, I get work with both numbers and letters.

Florine, one of five VDT operato takes time to show me how to reco SPCs (whatever they are). They cor to me as tissuey slips of paper with formation about security transactions

We call up the first form on the vid screen by pressing the F-1 button. T form reads SELECT ONE OF THE FOLLO ING. And it lists nine items includi such mysteries as 5. TRUST BAC; 7. BO SPM; 8. BOND SPC; 9. REFERRAL. Such list is called a "menu."

"SPCs are always 8," Florine says.

I hit *8* on the keyboard and the figu appears on the video screen. Then blinking light, called the "cursor jumps to a blank space that has roo for a six-digit figure, called a "CUSIP So I search the SPC paper for a CUS number. When I've filled that in w the correct number of digits, the curs moves like the old-fashioned bounci ball to my next assignment.

To complete just one SPC, that is, record one security transaction, work through six forms that appear o after another on the screen, filling blanks with menu choices, dates, doll amounts and yeses and noes.

NIC SWEATSHOP

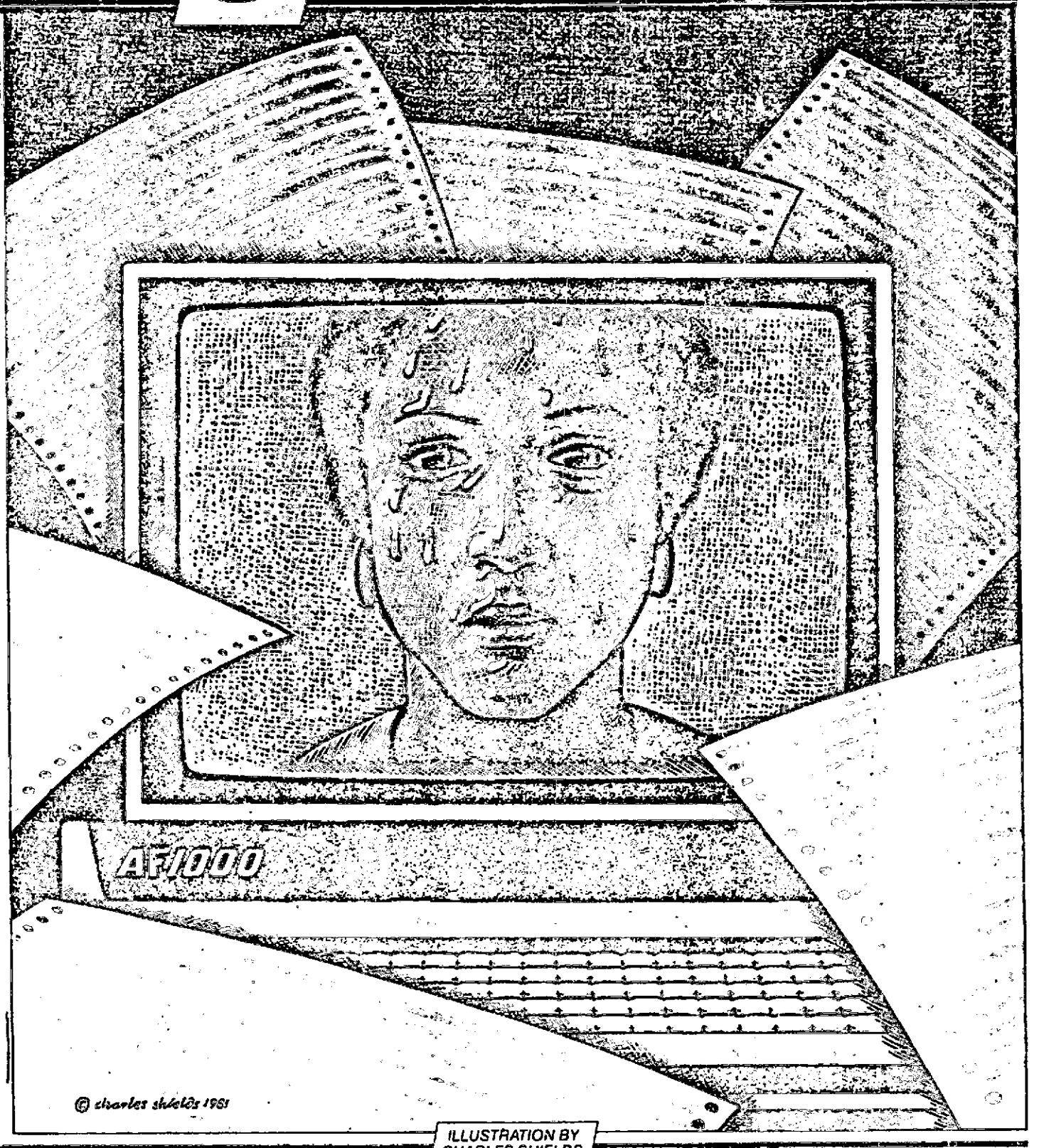


ILLUSTRATION BY CHARLES SHIELDS

"Don't worry," Florine consoles me. "Some people even cry on the first day, but you'll get the hang of it. The cursor always tells you where to go next."

Florine is very patient, but her own work is piling up. So she turns me over to Felicia, a long-time temp.

Felicia watches me read the screens. BROKERS NUMBER CORRECT ENTER YES Y OR NO N. "Let's see, that's yes, right? So I tab over to . . ."

"You're not supposed to read them," she snaps impatiently. "This screen is always Yes-tab-No. Didn't Florine explain? And the last one is always 3-N-EOM." (3 is a menu selection; N is no; EOM is a special button for "End of Message.")

I balk at Felicia's system. I want to read the screens. I want to know what it's about.

I struggle along, reading through my first SPCs. Now I'm left alone. After the first dozen, looking down at the paper and up at the screen, I begin to get a neckache. After the first half-hour my eyes blur. I memorize my way through the screens. CUSIP number . . . Y-N . . . and, at long last, 3-N-EOM. It feels like an accomplishment to turn the slip crisply and start on a new SPC.

WEDNESDAY, 2:30 P.M.: Though I enjoy keying along briskly without looking or thinking, my favorite form in the SPC series is Sub Account. Once in every half-dozen or so SPCs there's a real human name on the slip of paper. In those cases you must call up an optional form with a free line onto the screen. Because the line is open, Mr. George and/or Martha Hayward I/T/F Tim Hayward can be entered as *G.* or *George.* I can write *Mr.* or spell out *Mister.* I can even call Tim, *Timmy* (which I do, assuming he's their little boy). On Sub Accounts the machine will accept any number of digits without blinking ERR, ERR, ERR (for error).

Even though Sub Accounts take time, I enjoy typing the names and thinking about the people who own the securities. (I guess that's why the higher-ups usually try to reduce the information to straight numerical data entry. Any whiff of reality slows you down.)

Although my eyes and neck ache a little, I don't really mind my second day. At six o'clock I punch out. But Florine and the two other black operators, Sharon and Elayne, don't budge. (All the names in this article but Elayne's have been changed, for reasons yet to come.)

"Goodbye," I say. "How long are you going to stay?"

Florine: Till this is finished [riffling through her stack].

Elayne: If you see us in the same clothes tomorrow, you'll know we stayed here all night.

(Sharon says nothing. I've never seen her stop work.)

Me: What do you do about your kids?

Elayne: Pay the babysitter extra.

Florine: Worry.

Elayne: You got no choice when you're slaves.



Illustrations by Jim Ludtke

Unlike us temps, the staff workers have no regular hours. They have to stay until all the day's transactions are entered. In the modern world, it's the moment of electrical transfer that makes the money yours. Leaving early for a sick child might mean $100,000 in interest lost overnight.

THURSDAY, 10:00 A.M.: When I arrive, Florine and Elayne are already at work—in different clothes. An assistant (the only other white woman I've seen among about 30 women) hands me a stack of SPCs and seats me at a machine around the corner, facing the wall.

The morning goes very slowly. By eleven I'm a contestant on a game show. It's a little like *Let's Make a Deal.* By the rules of my game I get to keep the dollar amount on one of the next three SPCs. But I've got to choose in advance, Prize No. 1, No. 2 or No. 3. There's a lot of suspense because the amounts vary from $10,000 (the most common) all the way up to $400,000. By my own restrictions I can play only once each morning.

But it comes up $10,000 (how can I retire on that?). So I find myself playing again a few minutes later. This cheating definitely diminishes the thrill. Still, the game gets me through three more SPCs—18 forms. That makes it almost five full minutes later when I look up. Elayne is stretching like a modern dancer. Florine is sipping a Coke.

"Hey, when do we get a break?" I ask suddenly.

"You just got to take it here," says Elayne, inviting me with a generous flourish. "Just take it." (I wonder how Elayne manages to stay so alive all day. I don't suppose she's playing *Let's Make a Deal.*) Just then Kurt, the white supervisor, passes behind us, and the self-declared break peters out.

FRIDAY, 3:28 P.M.: Oh, my neck! Why do I have to sit here rolling these numbers across my eyeballs and out through my fingers? If these machines are so smart, why can't they do the whole thing? (Oh, dear, I've caught myself blithely wishing away half the jobs. And I'm not the only one in the bank thinking that way.)

FRIDAY, 3:34 P.M.: Still on SPCs. Even a Sub Account wouldn't cheer me up now. Where is the heralded diversification? Neither Elayne, Florine, Sharon

nor I ever get off these screens.

(In Sweden the union at the phone company has restricted a certain tedious VDT operation to one-and-three-quarter-hour shifts, and only two such shifts per day. For the rest of the time the workers must be assigned to different jobs.

(In the United States, unions confine themselves to more defensive and limited health suggestions. Room lighting should be dimmed; screens and desks, properly aligned. Machines should be checked out for radiation leaks. In no country has any union successfully challenged the basic job design, which needlessly breaks the work down into the simplest unskilled tasks. Anyway, at this bank there's no union at all.)

MONDAY MORNING: I've rested all weekend, but after five minutes my neckache is back. Stress, they'd say, and prescribe exercise or analysis (depending on my income).

MONDAY, 3:30 P.M.: The neckache is unbearable. And I don't believe I'm going to learn much more on this diversified, humanized data entry. So I go to the supervisor.

"Kurt, I don't like to tell you this, but something came up at lunch. I'm going to have to . . ."

He sighs. It happens a lot.

"Nobody white ever stays," a woman whispers as I punch out.

The Big Plantation

Perhaps I didn't give dispersed data entry a fair chance. But for some reason it was the worst job I had ever had. Maybe it's the video display terminals.

When I question managers and systems planners they generally tell me that my responses are not representative. Not everybody is that anxious for variety or responsibility (or sunlight). Not everybody is so sensitive to fluorescent lights or video screens.

"Mrs. Garson, these people are different from you and me."

I decided to interview Elayne. She was the least furrowed and, in a lively complaining way, the most cheerful of the women I met at Bankers Trust.

I felt embarrassed calling and introducing myself as a kind of spy ("I copied your last name off the time card"). But yes, sure I could come visit. She was living with her mother till she could get her own apartment. Why didn't I come over Sunday, after church?

Elayne insisted on meeting me at the subway station. "This neighborhood [the outskirts of New York's Bedford Stuyvesant] isn't safe for you. Matter of fact, it isn't safe for me either when I leave the bank nine, ten o'clock at night, and by the time I pick up the kids and get home it's after eleven."

On the way up we talked about time. How to get time for the kids, time for yourself, maybe even time for a romance. Elayne had seen a listing for a three-day-a-week, 12-hour night-shift job at the bank. She was wondering if this would really give her more time.

"How long have you worked in that department?" I asked, as she seated me in the kitchen.

"Eleven months and 18 days."

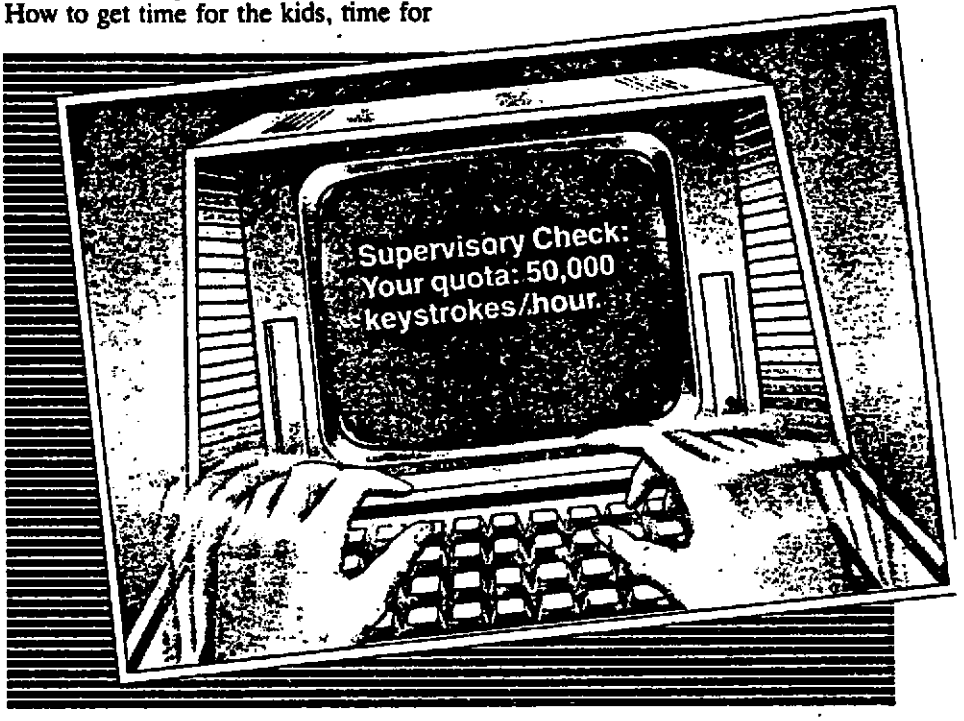
"You know to the day?"

"Yes, because I hate it! See, I came from an area that got dissolved. But it was on the same floor, so I knew Kurt for three years. He's a decent guy. Used to do my taxes for me. So I said O.K., I'd come over.

"In my other area I did a variety of jobs. Like going upstairs to keypunching and putting in bank changes. I even got to make up my own codes sometimes for new banks." Proudly she confided, "Some of those codes I showed you, I made them up myself." Then shrugging. "Big deal, making up bank codes, but at least I got out the door.

"Here when you leave out the door you have to yell 'I'm going to the bathroom' or 'I'm going to the bank.' Me, I just say 'I'm going!'"

I asked Elayne if she had a favorite screen. At first she made a quizzical face. "Favorite screen?" Then, as though confessing to some secret perversity: "They never taught you 'Ginnie Maes,' did they?



Well, on Ginnie Maes there's no CUSIP number, so you press zero, EOM. Then you get another screen. It's blank, like Sub Accounts. So you can arrange it any way you want. What you're supposed to type are the words *Ginnie Mae, Pool Number,* the interest rate and the due date. Well, sometimes I spell out *Pool Number,* other times I write *pl #*. Interest rate, I might go *9.50 percent* or *9½%*." She leans in close across the table. "I'll tell you what I'm really trying to do. I try to figure it out so all the information will fit on one line but take up as much of the line as possible without going over. If I can get it to fill out the entire line, exactly, then I feel terrific."

With a shrug at her own eccentricity, "I guess you do anything for a little change. Something to *do* in your head.

"Look, on this job you just sit there in one position. Your neck hurts; your back hurts. If you don't stretch your arms every so often you'll get cramps.

But every time I do, Kurt just happens to be passing behind me and he says, 'What are you stopping for?' [Kurt had given us a lecture one day on productivity. "My productivity," he explained with his characteristic directness, "is how much work I get out of you for the hours I have to pay." And he laid down new rules for getting coffee in the morning: bring it with you.]

"You know Kurt designed all these screens. That's what he likes, not supervising. He started out a decent, mannerly young man. He wouldn't take any money for my taxes. I couldn't even buy him lunch. But he's changed here.

"Kurt has a brother, you know. I once asked him, 'What does your brother think, you supervising a department with all black people?' And he says—'My brother pities me.'

"A few more things I hear about this brother and I can see he's a regular racist. Now if that's Kurt's family, where do you think he's likely to stand? I mean, he's not a KKKer but he doesn't think we're the same kind of people he is.

"Like, he's got two kids and a wife in the suburbs and he goes to the PTA, drives them to the Scouts. Me, I got three kids, but he wants me to stay till 10 p.m. With all the late nights, I haven't helped them with their homework once this year. I don't even know what's in their notebooks."

I asked Elayne what she earned with all the overtime. "Well, once we stayed late so many nights that I came home with $250."

"Two hundred and fifty a week take home," I nodded. "That's not bad. Is that time and a half or . . ."

"Barbara, you know we get paid by the *two* weeks."

A hundred and twenty-five dollars a week including overtime. My jaw dropped.

"And I need that overtime if I'm gonna move out to a place of my own. But I *gotta* spend more time with my kids.

"Once I asked Kurt if I could go to a fitting for graduation. I got two graduations in June, one from elementary school, one from junior high school. He says, 'O.K., but you be here by noon.' Noon?! Just for once I wanted to do something with my kids that was not so rushed.

"I never used to have headaches be-

SOME TRUTHS ABOUT TOMORROW'S TECHNOLOGY

In the early 1950s there were about a thousand computers in the United States. Today, there are more than ten million microprocessors in use. These computers-on-a-chip (smaller than your fingernail) will, by 1985, have 25 times the capacity of a computer that would ha e n led an entire room 15 years ago.

Meanwhile, the cost per computation has been diminished by almost 100,000 times since 1960. In fact, the Massachusetts Institute of Technology calculates that if cars had been improved at the same rate, a Rolls Royce would cost $2.50 and would run for 312,500 miles on a liter of gas.

In 1980 at least ten million Americans worked on video display terminals (VDTs). These desktop video screens are rapidly replacing both typewriters and file cabinets. Memos, letters, reports and raw data are composed on or entered into the machine. The resulting documents or computations can be transmitted at a rate of more than three pages per minute from terminal to terminal all around the world.

Because of a shortage of secretaries (and the growth in sophisticated equipment), the Continental Illinois National Bank and Trust Company of Chicago is experimenting with a new kind of typing pool. Some of its typists work at home. The letters they type are transmitted over phone lines and printed out automatically onto an executive's letterhead in the bank.

The new Sony Typecorder, a modified word-processor, weighs three pounds and is nowhere thicker than an inch and a half. An executive traveler can carry it aboard a plane in a briefcase and type en route. At the other end, the Typecorder can be linked to any pay phone, and the report can be transmitted back into the paperless computer system at the office. Or, if the executive is dependent enough upon what equipment vendors refer to as "the paper security blanket," the report can be phoned into a printing unit or a modified electric typewriter, at home or office.

With the use of VDTs mushrooming, the issue of their safety is getting increased attention. According to a report recently published by the National Institute for Occupational Safety and Health (NIOSH), "The VDT used in word-processing applications is very similar in operation to a black-and-white television set. It contains a source of electrons and a phosphor-coated screen within a specially designed picture tube (cathode ray tube). The cathode, or electron gun, releases a narrow beam of electrons that is accelerated by high voltage to the anode, or phosphorescent screen. The beam scans the screen horizontally and vertically at fixed, predetermined rates. The interaction of the electron with the phosphor changes the electron's kinetic energy into light. The viewed image is produced by modulating the number of electrons in the electron beam in response to an incoming electrical signal."

VDTs can produce several types of electromagnetic radiation. Low-energy X-rays can be generated by the cathode ray tube (CRT) and electric damper circuits, according to NIOSH. Depending on the phosphor used, ultraviolet, visible and infrared radiation can be emitted from the screen face. Certain electronic components and circuits can produce radio-frequency radiation.

People using VDTs and CRTs often complain of backaches, neckaches, eye strain and more. Loss of color vision has been reported by some VDT operators. NIOSH found, for example, that 64 percent of VDT users said they suffered backaches, only 48 percent of nonusers complained of the same problem. A full 75 percent of those using the computers said they noticed they became easily irritable.

One basic goal of all this office automation, as proclaimed in trade journals and sales brochures, has been to create the paperless and, as far as possible, peopleless workplace, where human service is considered a premium.

At the American Banking Association's 1980 convention, a film narrated by John Fisher, senior vice president of Bank One in Ohio, predicted that by 1990, half of all banking transactions would be handled by automatic tellers, as opposed to human tellers. Because public resistance is the main impediment to this plan, the film suggested that customers be charged extra for using expensive human services during peak hours.

Walter Anderson, who is an associate director of the government's General Accounting Office, is so impressed with the many uses of computers that he has predicted that by 2038 computers will be functioning with IQs equivalent to those required for construction workers or bank tellers.

—Barbara Garson and David Ogul
(with research assistance by Judith Gregory)

fore. My friends say, 'You're in such a bad mood these days. You're always angry.' Sometimes I catch myself in the mirror. I'm not angry. Just my face is always set.

"I hate this job. It's a big plantation. You write that in black letters. And please, use my real name. You can change the date; you can change the place. But use my name and spell it with a *y*, *Elayne*."

Elayne subsides as her little girl comes to ask for a hairbrush and incidentally to remind her mommy that she's been sitting in the kitchen all Sunday afternoon with a strange lady.

"I tell you, I got to get out of there soon or I swear when I die, you know what my last word's gonna be? 3-N-EOM."

So these people are different from you and me? Well, it's true that Elayne gets headaches instead of neckaches. But who would have guessed that even our little games—mine with Sub Accounts, hers with Ginnie Maes—would have been so much the same. Both of us finding the tiniest little crevices for real work on the bank's marbleized fill-in-the-blank façade.

The truth is, most people are very little different from you or me. Some people just have to stay there anyway.

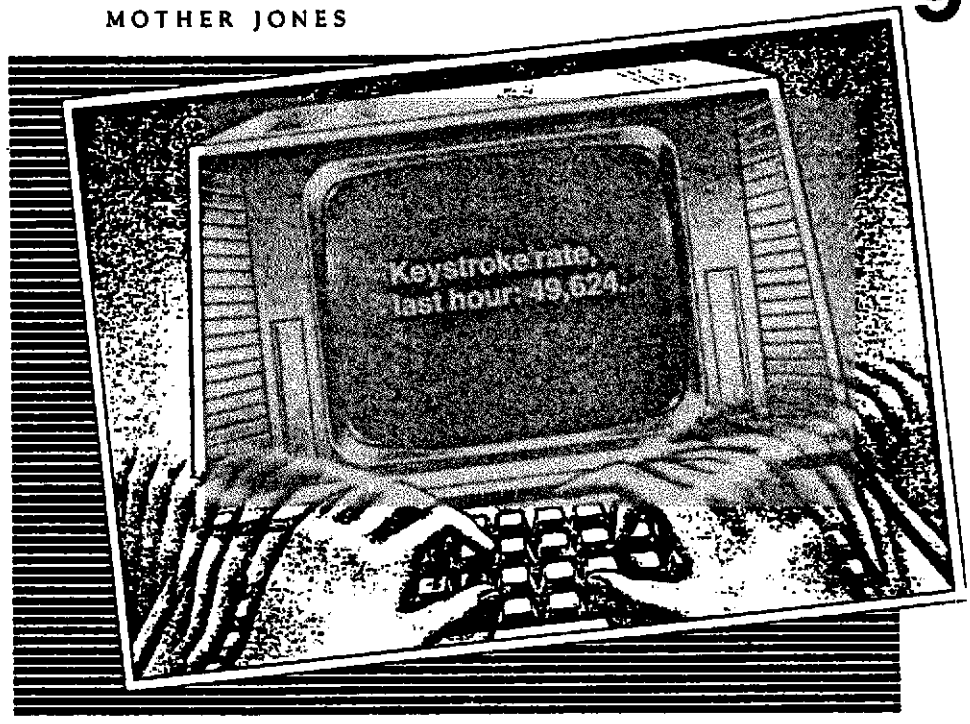
Since then I've been keeping my ears open for a better job for Elayne. Typist, secretary, "front-office gal." Something nearer the windows, nearer the bosses. The real executives are kept farther away from the grimmer aspects of office automation—or at least they used to be.

PART 2

Executive Privilege

It happened to me once, a long time ago—love at first sight. I was working for a six-man sales team at one of the world's largest insurance brokerage firms. But it wasn't one of the brokers I fell for.

The men of the team (word-originators) dictated their letters onto tapes, which I would ferry over to the typing pool (not yet known as the Word Processing Center). There, women plugged into earphones made rough drafts on yellow paper. At the same time they produced a copy on a magnetic card, which stayed with the machine.



WEDNESDAY, 4:45 P.M.: This morning on the way to the pool, I peeked at a corrected yellow that began "Dear Al." It reminded Al that legislation pending in Albany might require his company to pay maternity benefits. (My six brokers all sell big corporate insurance packages.) My boss was urging Al to protest at once.

Along with the letter I carried a long floppy list of executive names and addresses.

When I went back for our final copy a little while ago, our work was just being passed to the typist. (It seems to take about two days to get correspondence out of the pool.) So I waited there and watched.

First, the typist slid the magnetic card into a slot. Keying up only the lines with errors, she made deletions and additions by typing right over—just a few keystrokes in all. Then she pressed a button. Somewhere inside the machine the print was reshuffled. Then all by itself the typewriter printed out a perfectly spaced, beautifully justified, personal letter. But that wasn't all.

The typist inserted a second card with the extra names. Before my eyes, dozens of personal letters, one after another, "Dear John," "Dear Pete," "Dear Art," "Dear Hal," came flipping out of the machine, each one reminding an influential businessman to mobilize himself against maternity benefits.

My reaction was schizophrenic. I wanted it. I needed it. With that machine I could present editors with 17 different versions of each paragraph. Yet look what that magic typewriter is doing to my job, my life, my maternity benefits. No wonder the deepest love is mixed with the deepest hate.

Actually, I had only a limited sense of what I was seeing back then. I hardly imagined that this cumbersome console with the one-line screen would evolve into the magnificent Wang and Harris word-processing terminals on which you can add, delete and reformat an entire article while onlookers hooked up anywhere in the world can read and edit right over your shoulder.

Just as I didn't know what was coming, I didn't think to ask what had gone. Where were the secretaries? How was it that all the correspondence of so many units could be handled by half a dozen highly supervised typists, assisted by me, a $2.70-an-hour Kelly Girl?

No, I didn't ask these questions back then. But I did note in my diary some funny things already happening to the executives.

THURSDAY, 9:00 A.M.: Mary Gallagher from Personnel phones to take attendance. "Is the entire team there?" These men are selling millions of dollars of insurance, yet I'm supposed to check them off. "Joe here, Mike here, George here." Some kind of misplaced solidarity makes it impossible for me to tattle. "I don't know the names," I answer. "I'm just a Kelly."

FRIDAY, 2:20 P.M.: My bosses are also checked up on via a Monthly Activity Report. I couldn't get to see the form, but little Phil, the newest member of the team, has been running around like a chicken without a head trying to come up with contacts, leads, first visits and follow-up phone calls to report. Nevertheless, he assures me that he is sitting pretty. "This company," he says, "has a bonus plan by which they put aside 15 percent of your salary each year, plus with profit sharing, there's no reason a person can't retire with a quarter of a million dollars."

"Does the typing pool have a bonus plan too?" I asked.

"Yes, of course they do; it's company-wide policy."

FRIDAY, 3:40 P.M.: I ask a blond girl at the pool about the bonus plan. "Oh, yeah," she answers. "I heard something about it, but you gotta be over 25 and you gotta be here over a year and I just came, so . . ."

I look at the recent high school grads, each one typing so many lines per half-hour, none of them having to learn much about the insurance business. I don't think many of them are going to collect a pension from this company. And something tells me those brokers reporting all their leads and follow-ups will be pretty replaceable too.

Recently I went back to the brokerage, hoping to make more sense out of what I'd seen. Skirting several receptionists, I popped in on Lillian MacNeil, the gracious gray-haired executive who supervised the clericals in my old section. Ordinarily I think she would have sent me up to public relations, but she had just come back from inspecting the new IBM Displaywriter, with the built-in, 50,000-word, self-correcting spelling dictionary. So she was happy to speak to a layman who shared her enthusiasm for word-processors.

"Oh yes, yes, yes," I said, growing excited with her. "I haven't seen it, but they sent me their promotion package."

"Human Factors: A Key in Design" was the advertisement's headline. "Operator's comfort, job satisfaction, motivation and a sense of accomplishment—pivotal elements that can lead to improved productivity."

Of course that phrase is only P.R., but I pay attention to the advertising slogans. Like "Coke, it's the real thing," they may not tell you what the product is, but they do tell you what people yearn for.

"This new equipment," MacNeil explained, "has many prompts. It will tell the operator, in English, which button to press next. That way we won't have such problems in getting temporary replacements."

Lillian MacNeil could remember when the pool was first set up (17 years ago), using ordinary office typewriters. I asked how the executives took to the system back then.

"At first, of course, they all wanted their own secretaries. Having been a secretary myself, I know that the dictator relied on her to prepare perfect copy. She had to use the dictionary, address book, company files. She had to check the grammar, the spelling and the facts.

"Now they must rely on their own resources. The girl in the typing pool can't help them much.

"In fact, we often hear guffaws from the men when they see their yellow drafts. 'Just look what she typed!'

"It's true that high school graduates are perhaps not as educated as they once were. But the men forget that the word-processor, unlike the secretary, doesn't sit in on conferences or handle calls or see anything that will help her

HOW TO ORGANIZE YOUR OFFICE

A nationwide drive to unionize more than 20 million office workers in the United States is being coordinated by Working Women and the Service Employees International Union (SEIU).

Working Women, a national organization with 10,000 members nationwide and affiliates in 13 cities, is calling for a moratorium on the use of all video display terminals (VDTs) until their effects are known. The group's central office is located at 1224 Huron Road, Cleveland, Ohio 44115. The **SEIU** is funding this drive and has formed a national. District 925, with a toll-free number, (800) 424-2936. For information, write to SEIU at 2020 K Street N.W., Washington D.C. 20006.

The **Office and Professional Employees International Union** (OPEIU) has headquarters at 265 West 14th Street, Suite 610, New York, New York 10011. In California, Local 3 of the 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.

Other groups working on the rights of office employees include: the **Women's Legal Defense Fund**, 2000 P Street N.W., Washington, D.C. 20036; the **National Pay Equity Committee**, c/o the Marguerite Rawalt Resource Center, 2012 Massachusetts Avenue N.W., Washington, D.C. 20036; and **Women Employed Advocates**, Lobby for Economic Equality, Five South Wabash, Suite 415, Chicago, Illinois 60603.

Many booklets and pamphlets on the subject of office work are available. Write to Working Women at the group's Cleveland, Ohio, address for the following: *Warning: Health Hazards for Office Workers*, 1981 annual report, $4 (six-page abstract available free); *Race Against Time: An Overview of Office Automation*, 1980 annual report, $4; *Why Unionize and How to Do It*, $1.50; *Starting a Group in Your City*, $1; *Workshop Guide on Office Automation*, 25 cents; *Bill of Rights for Office Workers*, free.

Films, slide shows and books on the subject of workers are also available:

9 to 5—a documentary about the Boston office of Working Women that was used as a resource for the commercial motion picture. Rental, $35. Nine to Five, 140 Clarendon Street, Boston, Massachusetts 02116.

The Willmar 8—the story of how sex discrimination on the job drove eight small-town, church-going women to begin the first bank strike in Minnesota history. Rental, $75. California Newsreel, 630 Natoma Street, San Francisco, California 94103.

Working for Your Life—a documentary that shows the dangers faced by women in nontraditional as well as traditional jobs and what can be done. Rental, $65. Labor and Occupational Health Program, University of California at Berkeley, 2521 Channing Way, Berkeley, California 94720.

60 Words a Minute and What Do You Get?—a slide show on the history and current status of women clerical workers. Rental, $35. Ellen Kaiper, 4108 Emerald Street, Oakland, California 94609.

Tomorrow's Technology, Today's Headache—a short slide show on the effects of VDT work, with comments by operators. Rental, $25. Shop Talk Productions, 155 West 72nd Street, Rm. 402, New York, New York 10023.

Labor and Monopoly Capital, by Harry Braverman (1974). Chapter 15 is on clerical workers. Monthly Review Press, $6.50.

—*Mary Moffit*

guess what this might be about."

"What are the productivity standards for typists?" I asked. She took out a chart with each girl's name: Christina, Terry, Lenore. It indicated how many letters, how many pages, how many lines of hard copy or dictation.

"Each girl should be able to do about five pages of rough draft per half-hour. At 25 lines a page that should be . . . that's right, about 125 lines per half-hour."

"Whhhew," I whistled. "I'm a fast typist but I never would have guessed."

"Well," she explained, "with pools we have ways of measuring productivity that we didn't have available with the secretaries."

"Perhaps," I suggested, "when you've worked out your standard procedures for the administrative secretaries, then you can develop productivity measures for them too."

"Perhaps," she said with a sigh that I couldn't interpret. Was it the sigh of a bureaucrat who knows you never get it completely controlled? Or was it the sigh of a former secretary who sensed the demise of her craft?

Different Tomatoes

Somewhere between the individuality of the secretary and the economy of the pool is a formation called the "cluster." (The incidents in this section are taken from two separate offices that are using the cluster system.)

A systems planner, swearing me to protect his identity, showed me around the corporate banking floor he had just automated. The outer walls—an entire city block—were lined with the one- and two-window cubicles of bright young loan officers.

The inner space was dotted with the new clusters, consisting of one or two word-processing typewriters operated by women in their 20s. Each cluster was administered by an older woman, usually a former personal secretary who had elected to stay on with the firm. "We never fire anyone due to automation," my guide explained. "Everything is done by attrition."

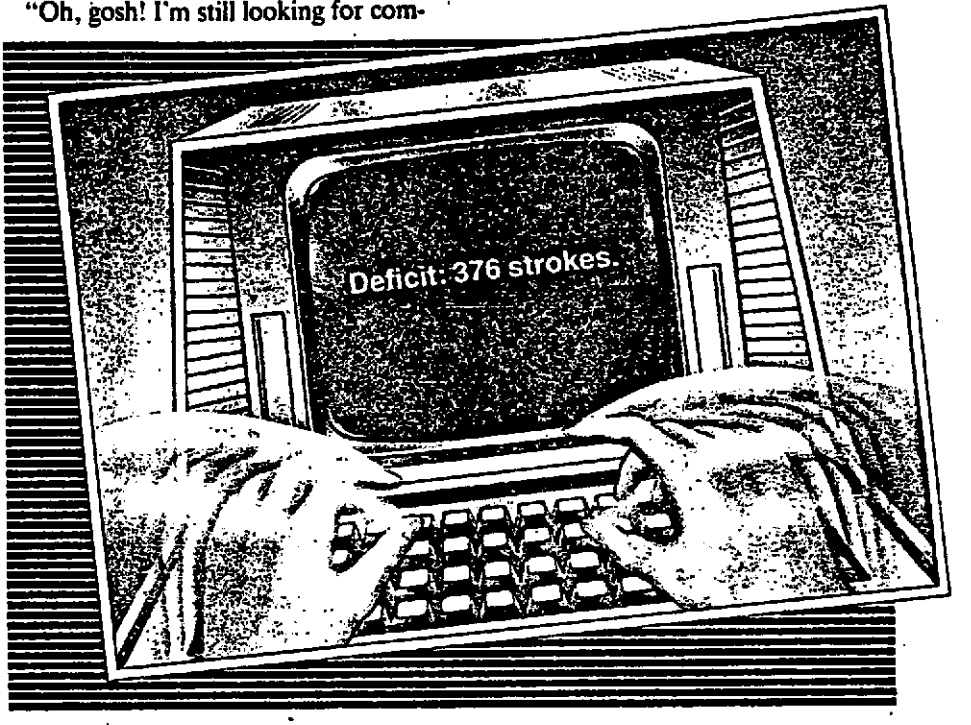
In one particular cluster I noticed an older woman sitting at one of the new word-processors. She was bright-eyed, gray-haired and primly dressed except for a pair of ear muffs.

After work I caught her at the elevator and asked if she'd mind being interviewed for this article.

"You picked me out because I was the only old lady on the new typewriters," she guessed.

"Well, yes," I said, "and the ear muffs too."

"Oh, gosh! I'm still looking for comfortable ear plugs. Not that it's so noisy, but the typing back is so steady. It gets to you worse than a whole room of old-fashioned typewriters."



She agreed to be interviewed at home, if I didn't mind making a few quick stops with her—the cleaners and a stationery store for ink ("My hobby is calligraphy").

Elizabeth Anderson has worked in offices for more than 30 years, 18 with the bank, 12 with her last boss.

"I started in office work right out of high school, and after a couple of short jobs the first thing I learned to say was 'No straight typing.' So you might say my life has been one big circle, since I'm back at straight typing.

"But it's what I chose. I chose to learn the word-processor and I love it.

"Before this new system, I would say I had a pretty cozy relationship with my boss. He might send me uptown to return a blouse that didn't fit his wife. So he couldn't very well tell me not to make personal calls. Not that I stayed on the phone all day. My job was to get his work out, which included staying late if I had to. He appreciated me. And I expected to stay with him till I retired.

"Then the consultants started coming around. First a lot of talking, then a lot of measuring. But 'nothing to worry about,' they said. Then one day I was given my two choices. I could learn the word-processor or I could stay on as an administrative assistant in a cluster. Sounds real sweet, doesn't it?—like a chocolate peanut cluster.

"Actually, there was a third choice. I could quit. Which is what quite a few wound up doing, one way or another.

"How did I decide on the word-processor? Well, for the first time in my entire working life, I actually sat down and thought about my career goals. And I realized that I had exactly one career goal: to last out four years and collect my pension. Believe me, I saw quite a few forced out with much less than four years—attrition.

"Since they kept adding new men to each administrative group, I saw which way the wind was blowing. In the end there probably won't be any secretaries. 'But typists ye have always with you.'

"And I'm very glad I learned this word-processor. If only I could have had it while I was a secretary. Ah," she said, with longing and regret, "when I think of those years of correction tapes, white-off, retyping. Yes, I love this

typewriter and I want you to take this down: I love my Wang. It's not the machine that gave me the shaft."

"Why the shaft?" I asked.

"Straight typing, seven hours a day. That's the shaft. The worst thing is when things come by me with wrong spelling, wrong information. Sometimes I think I should correct it. I did at first. But that's not how they judge me. You know the first screen on all the documents, don't you?"

I certainly did. Each document had an identifying screen, which included the name of the typist, the time spent and the total number of keystrokes. The information was automatically recalculated for each draft.

"Then you know what I'm judged by. The number of keystrokes. So why should I take time to correct their work? And why should I stay two minutes past lunch if they're timing me that way?" she asked.

"Exactly," I agreed. "Why should you?"

"Well, the worst part of the thing is that I *do*. Oh, sometimes I just let mistakes go by and I feel so stupid. Sometimes I correct them and I feel even stupider. I don't know what to do!"

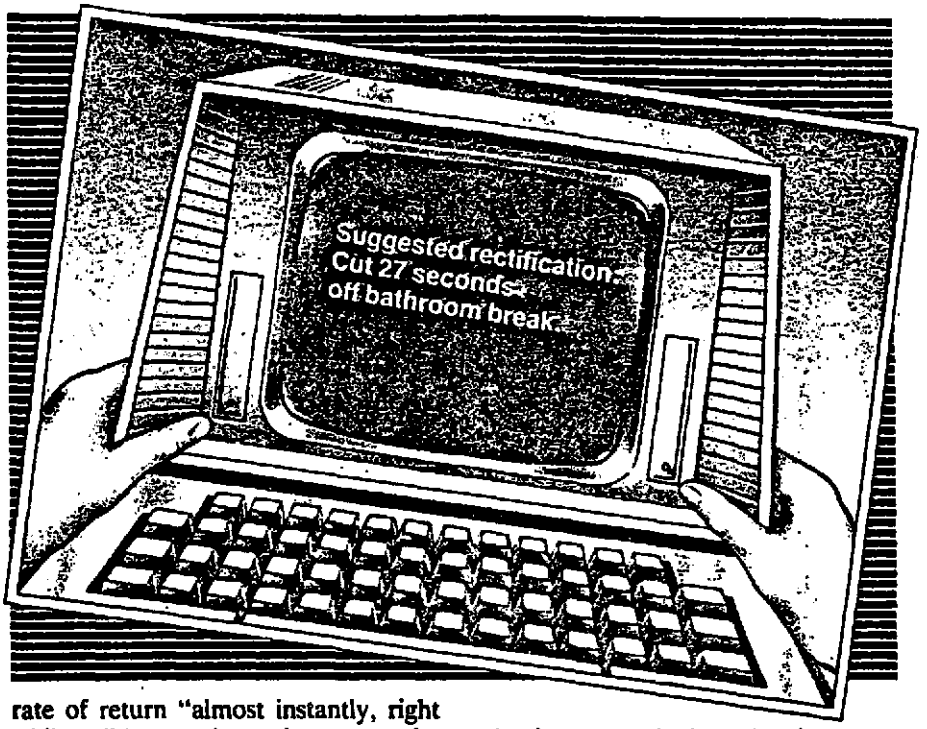
Then calming down. "But maybe you shouldn't talk to me. Go back to the office, look around. Those young women don't complain. They're working on a new machine. It pays much better than regular typist. They think they've made it up to secretary. They don't know what a secretary was.

"Oh, gosh. Now I'm really sounding like an old lady. [Imitating herself as a codger.] In my day we had real snowstorms. In my day we had real tomatoes. In my day a secretary was a real secretary; a job was a real job."

Then leaning over to me confidentially. "But tell me the truth. Didn't the tomatoes used to taste different?"

Without Secretaries

I went to look into the little offices that lined the outer wall of the bank. Each of the young loan officers had a spanking new video screen on his desk. My guide, the systems planner, explained enthusiastically that with the management information system he had designed, the men could compute the yield on a loan or the rate of return "almost instantly, right while talking to the customer on the phone—*if* they would only use it."



Recently there has been a spate of articles in the business journals about management resistance to the new machines. Typical is a *Wall Street Journal* headline, "Computer Choler: Many Managers Resist Technology for Themselves," and the analytical subhead, "Will I Look Like a Jerk?" According to the common explanation, resistance is due to the fact that the machines are new and that the act of typing is associated with lower-status workers and women employees.

My systems planner feels that the fears are more substantial. "All their M.B.A. expertise consists of manipulating these formulas they've got in their heads. If the machines can do it instantly, aren't they reduced from executives to glorified clerks?"

A secure and well-established investment counselor told me that he now prefers to meet clients in his office instead of in a restaurant because of all the instant information he can bring up on his screen. But this is a man whose time and clients are his own.

In some companies middle-level executives, like the loan officers, are now asked to enter their appointment calendars into the management information system. Higher officers can call the data up onto the terminals in their own offices, the better to coordinate use of executive time. (Naturally the young executives now keep two appointment calendars as routinely as they keep two expense accounts.)

I attempted to speak to a few of the loan officers at the bank about the new system. I found that they were all happy, secure and absolutely terrified to speak to anyone without permission. So I was shuffled upstairs to the public relations office, where I learned that there were no problems at all (except that a few of the young men were shy about their typing).

More Than 300 Codes

Screwing up my courage to be kicked out again, I went back to my old brokerage firm late on a Friday afternoon. Almost everyone was gone except for one team leader who agreed to speak to me, provided I didn't mention his name.

I asked _____ about the company's centralized filing system, which I had found more complicated to use than the 42nd Street library.

"Company-wide filing standardizes methods so there's continuity of service to our customers if the primary individual is not available."

_____ is the brightest and most charming man I'd seen at that huge firm (I hope that doesn't identify him), so I decided to lay my cards on the table.

"Doesn't it rob a salesman of his only source of confidence, the only tool of

his craft, if a company systematically collects every bit of information about his methods and contacts?"

"I'll show you something," he said. "Are you absolutely sure that this will be confidential?"

He pulled out a great sheaf of papers from his desk. It was a coded list of more than 300 executive tasks. Like: H721—Write a Report; S503—Prepare a Training Program; S102—Talk on Phone after a Meeting. (At his request, I didn't copy the true numbers.) "Using these codes we report all our activities in half-hour intervals. Then, at the end of the month the computer breakdown tells us how we spent our time."

"Is this used to rationalize work and set norms?" I asked.

"The individual uses it for his own self-discipline, and the team leader uses it to evaluate the best use of the men's time," he said.

He saw I was unconvinced.

"As a reporter," he suggested, "wouldn't you like to know how you waste your time?"

"Yes," I allowed, "I might want to know, but I wouldn't want the paper to know how short a time some stories take me, or for that matter, how many bad starts I make on others."

"Well," he assured me, "our information is never used competitively." (In the corner of his office I noticed a beautifully lettered chart listing the team members, with columns for "productivity" by month and year-to-date.)

"Say," I asked, "how are you going to code this conversation?"

"I guess I'll just have to take a 69," he smiled. "Personal interview."

I'm glad I worked for the brokerage firm exactly when I did. Had I come when all the computerized systems were in place, I might have been confused by the streamlined look and the 300 codes. The procedures might have seemed to emanate from the machines. But I had known the Monthly Activity Report when it was just a piece of paper. And I had learned that the pool, with all its line counting, had been set up back in the days of the ordinary office typewriter.

So it had been with 19th-century factory rationalization.

Frederick Taylor, the founder of Scientific Management, made his original time and motion studies on men carrying blocks of pig iron by hand (and shoulder).

The installation of computerized office equipment is often the occasion for instituting new procedures to count, control and fragment jobs. But the drive to reduce skills to tasks and to control every motion is independent of technology. It is even independent of the drive for greater productivity. The skilled secretary may have typed faster than the pool typist, but her varied tasks did not easily yield to Tayloristic timing and a predictable lines-per-half-hour quota. Counting lines or keystrokes, feeding your calendar into the system, or recording your activities by code number is no more inherent in electronic communication than bugging is inherent in the telephone. (Though the machines, as designed, do make it frighteningly easy to do!)

At this particular moment in the history of white-collar rationalization, it seems that the squeeze is on the middle. As one executive was quoted as explaining, "We are moving from the pyramid shape to the Mae West. The employment chart of the future will still show those swellings on the top, and we'll never completely get rid of those big bulges of clerks on the bottom. What we're trying to do right now is pull in that waistline [expensive middle management and skilled secretaries]."

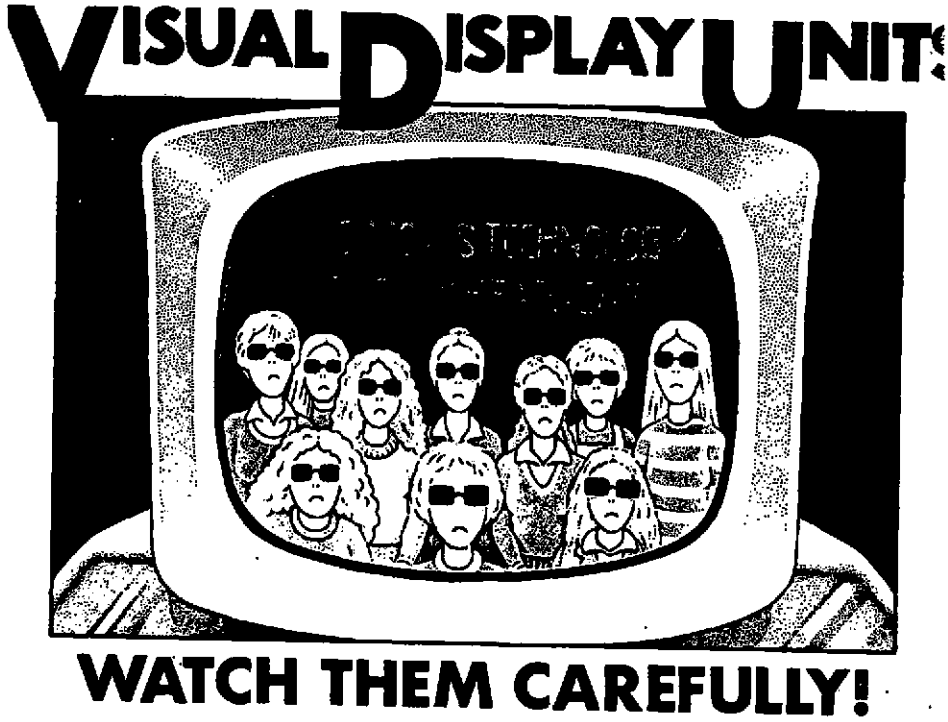
In the past few years, several Western governments have published in-depth studies predicting massive white-collar unemployment. However, the same predictions have been made for the past 30 years, while absolute numbers remained the same or increased. It seems logical that office automation will reduce the total number of clerks. But only logical. One trend, though, is absolutely clear. The movement toward control and standardization is reaching deeper and higher into office and professional work. The drive at all levels—clerks through executives—is for cheaper, more replaceable workers.

A microchip may be a minimiracle.

A VDT may look like the control panel of a spaceship.

But for those of us who have to work there, the office of the future is the factory of the past.

Barbara Garson is the author of MacBird *and, most recently,* All The Livelong Day: The Meaning and Demeaning of Routine Work *(Penguin). Her last article for* Mother Jones *was "The Bottle Baby Scandal" (Dec. '77).*



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VDTs: The overlooked story right in the newsroom

If you want to learn about a health and safety controversy affecting thousands of journalists — and millions of other U.S. workers — don't rush out and buy a major daily

by JEFF SORENSEN and JON SWAN

According to the International Data Corporation, more than 1.6 million video display terminals, or VDTs, were in use throughout the country in 1979; by 1984, the Waltham, Massachusetts, research firm predicts, the number will have jumped to about 5.3 million. Newspaper offices account for only a small percentage of the current figure. The American Newspaper Publishers Association's research institute puts the count at at least 23,000, the number reported by its members. According to the ANPA, newspaper use of VDTs has increased by about 50 percent annually since the new technology was introduced to offices of all kinds in the late 1960s. So this number, too, will rise until, at last, the clack of the typewriter is silenced in the computerized world of journalism.

The advantages of VDTs — each, essentially, a combination keyboard and TV-like screen hooked up to a central computer — are manifold: they afford reporters and editors instant access to stored information; they speed the editing process; they produce copy that can be set in cold type immediately or held for future use. The newspaper industry has been willing to invest a lot of money to switch over to these time- and labor-saving devices. According to the ANPA, a paper must invest about $200,000 to install a "fully automated system" that includes twenty VDTs in the classified ad and editorial departments. Mike Clurman, assistant to the vice president of operations for *The Washington Post*, says that that paper will spend about $8 million to convert to cold type and VDTs.

Whether a device that is perceived as a boon by industry is as hazard-free as it is cost-effective is a question that has recently become a source of controversy. Considering how closely this controversy affects journalists, not to mention the estimated five to seven million Americans who daily use VDTs at such places as banks, airline and insurance offices, and government agencies, it is ironic that, by and large, the nation's major dailies are the last place to look for information regarding the health and safety aspects of this basic element of the new technology.

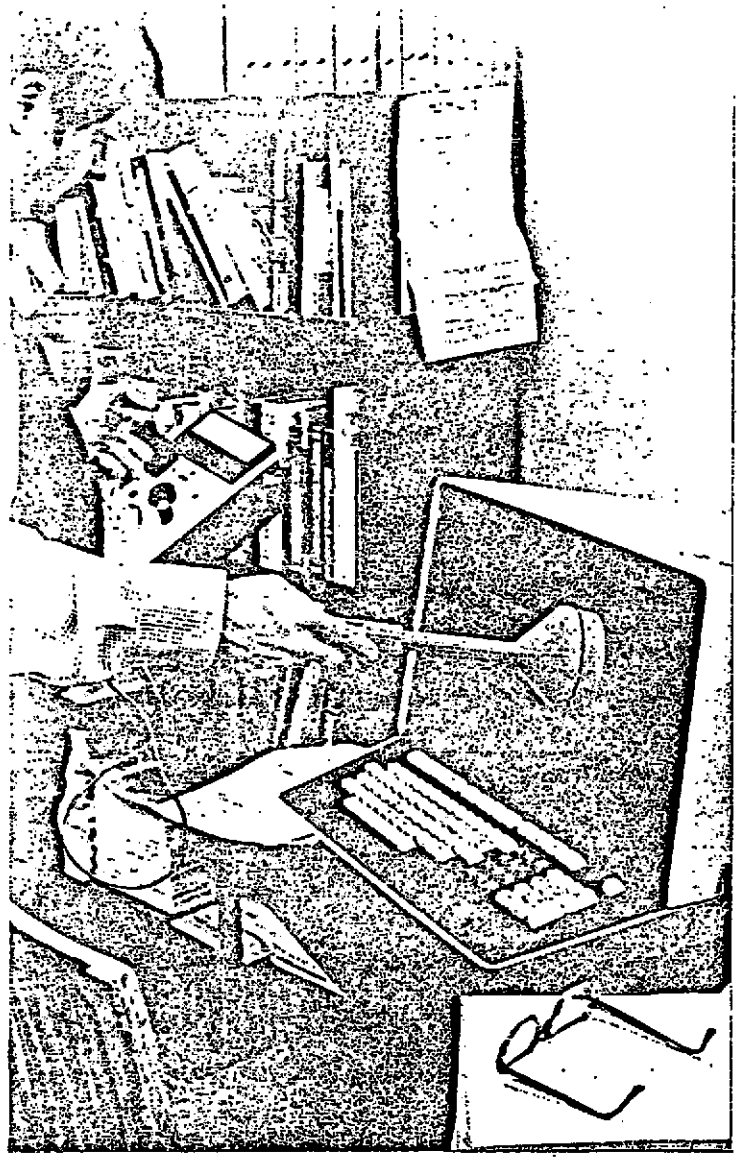
A VDT works on much the same principle as a television set. Electrons beamed from a cathode ray tube onto the dark display screen interact with phosphors on the screen to produce light in the form of letters and numbers. In the process, the machines emit low levels of both ionizing and nonionizing radiation. (Ionizing radiation, such as X-rays, is so named because it can alter the atomic structure of cells and create dangerous, unstable ions.) Whether exposure to radiation at these levels is harmless, potentially harmful, or demonstrably so remains a matter of scientific dispute. Federal health officials, among many others, have already made up their mind on this matter; on the basis of tests conducted at several newspapers, they have concluded that properly functioning VDTs pose no radiation threat whatsoever. Other causes for concern have been documented in a study carried out by the National Institute for Occupational Safety and Health at the *San Francisco Chronicle*, the *San Francisco Examiner*, and *The Oakland Tribune*, as well as at Blue Shield's Bay Area headquarters, which found that VDT-users developed visual, muscular, and psychological symptoms, including depression and anxiety, not reported among non-users. On the basis of this study, whose preliminary findings were released last June, Michael J. Smith, chief of motivation and stress research for NIOSH, concluded that "If VDT use is continued over a long period of time, it appears that there may be some possible long-term chronic eye damage." Another NIOSH study, to be undertaken later this year, should provide more information about long-term damage.

The question of eye damage arose in 1977, shortly after the devices were introduced at *The New York Times*, when it was discovered that two *Times* copy editors were developing cataracts. Since then, two other journalists — both at the Baltimore *Sun*, which converted to the new machines in 1975 — have been diagnosed as having cataracts or incipient cataracts. A fifth case involving a VDT-using journalist was recently noted in the Chicago alternative weekly *Reader*. In all instances, the journalists were well under the age at which cataracts ordinarily occur. The new NIOSH study will attempt to put these figures in perspective by conducting an ophthalmological study involving journalists at the Baltimore *Sun* and a control group of people who have not been occupationally exposed to VDTs.

The piece of journalism that opened the way for what little press coverage of VDTs there has been was Paul Brodeur's two-part *New Yorker* series called "Microwaves," which

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Jeff Sorensen runs The Nation*'s news syndication service; Jon Swan is the* Review*'s senior editor.*



Floyd Tucker/Oakland Tribune

Testing for danger: *NIOSH officials have tested VDTs at many newspaper offices, including that of* The Oakland Tribune, *shown here. On the basis of these tests, NIOSH has concluded that VDTs present no radiation hazard. Anomalous high readings — at the* Tribune, *at* Newsday, *and at* The New York Times — *are attributed to "capacitive coupling," in which the VDT reacts to the testing device. Questions have been raised about the adequacy of these tests — and about the validity of the current radiation safety standard, soon to be made much stricter.*

appeared in December 1976. (In the vernacular, "microwaves" is a collective term for all forms of nonionizing radiation, including radio frequency radiation.) Brodeur's articles explained, among other things, why it was that the standard for occupational exposure to microwave radiation in the United States had been set at 10 milliwatts per square centimeter — a thousand times higher than the Soviet Union's 10 microwatts per square centimeter standard. The reason was that in the U.S. only the thermal effects of radiation were regarded as hazardous, while in the Soviet Union researchers had, early on, recognized that radiation at levels too low to heat sensitive parts of the human body could affect the central nervous system. In part, these findings reflected a greater readiness on the part of the Soviets to pay attention to the complaints of radar workers than was the case in the U.S. As Brodeur explained:

> During the Second World War, Soviet scientists had taken complaints of headache, eye pain, and fatigue on the part of Russian radar workers seriously enough to conduct full-scale investigations of them, whereas in the United States similar complaints had been dismissed as "subjective symptoms". . . . Accordingly, by the middle of the nineteen-sixties Soviet scientists had amassed a vast amount of information concerning the neurological and physiological effects of low-intensity microwave radiation on human beings, whereas their American counterparts . . . had for the most part contented themselves with demonstrating the heating effects of high-level microwaves on fur-bearing test animals.

Brodeur's articles also introduced readers to a researcher who is a central figure in the current dispute over VDTs: Dr. Milton M. Zaret. An ophthalmologist who practices in Scarsdale, New York, and who is also a clinical associate professor of ophthalmology at the New York University-Bellevue Medical Center, Dr. Zaret has been studying the effects of microwave radiation on the human eye since 1959, undertaking eye-study programs in the 1960s for the Air Force and the Defense Department, for example. Brodeur's 1976 description of him — "one of the most controversial figures to emerge from the tangle of controversy surrounding the biological effects of microwaves over the last decade" — remains apt.

In July 1977, half a year after Brodeur's pioneering articles appeared in *The New Yorker*, *The Washington Post* ran a two-part series headlined MICROWAVE RADIATION HEALTH HAZARD WORRIES SCIENTISTS. "Microwave radiation has long been believed to cause injuries such as cataracts and internal burns at exposures of high, or acute, intensities," wrote staff writer Stephen J. Lynton. "What researchers are now seeking to determine is whether harmful effects may also occur at low levels." Among the scientists interviewed was Russell L. Carpenter, a research biologist for the Food and Drug Administration's Bureau of Radiological Health. His experiments, Lynton reported, had demonstrated that cataracts will form in rabbits' eyes only after exposure to relatively high levels of radiation. However, Lynton continued: "His experiments [also] indicated that microwave radiation may have a cumulative effect — an effect caused by repeated, short doses of radiation rather than a single long dose." Another scientist heard from was Dr. Zaret; he said that he had examined more than 100 patients suffering from cataracts and several hundred patients with eye injuries, all of which he was able to attribute to exposure to microwave radiation and several of which he attributed to radiation at intensities well below the recommended, but not enforced, 10-milliwatt safety standard.

In December 1977, *The New York Times* covered much of the same ground in a long article by science reporter Malcolm W. Browne headlined EXPERTS DEBATE THE AMOUNT OF MICROWAVE RADIATION THAT CAN CAUSE DANGER TO HEALTH. Like Lynton, Browne focused on microwave radiation "in the form of television and communications signals, radar, microwave ovens and other uses that most Americans take . . . for granted." Unlike Lynton, Browne touched on VDTs — which had been phased in at the *Times* over the last two years and were soon to become a matter of internal concern — in a reference to Paul Brodeur's recently

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published book, *The Zapping of America*. The book, Browne wrote, "charges that the Defense Department and microwave equipment manufacturers have conspired to conceal the dangers of low-level microwave radiation, including leakage from microwave ovens, radar and radio antennas, video display terminals and other devices." (A survey we made of coverage of this subject during the late 1970s brought to light two articles that more directly linked the microwave story to the newsroom. One, in *The Providence Sunday Journal* of January 22, 1978, simply included newspapers in a list of institutions "turning to computerized video display terminals . . . that emit low levels of microwave radiation"; the other, in the weekly *Hartford Advocate* of February 1, 1978, noted: "This article . . . could not have been written without microwave hook-ups to Washington, and the words had to be typed out on the *Advocate*'s video-display terminal. Such are the ironies of a modern predicament — how we learned to stop worrying and started to love microwaves.")

A tale of two weeklies: from reassurance to concern

Two U.S. weeklies have paid some attention to the VDT health and safety controversy in recent years. In its "We've Been Asked" department, the June 12, 1978, *U.S. News & World Report* raised the question: How serious is the concern about the safety of computer terminals? The answer, in full, was:

> Long-term exposure to microwave radiation from video-display terminals has been suspected as a cause of premature cataracts in writers and editors who work long hours in front of television-like devices used in writing and editing copy. The linkage, however, remains very much in doubt at present.

The June 30, 1980, issue of *Business Week* contained a closer look at the subject: "Uncovering Health Dangers in VDTs." Referring to a recently completed NIOSH study conducted in newsrooms and other offices in the San Francisco area, the two-page article stated: "The just-completed surveys pretty much debunked the radiation myth, but they have uncovered other health dangers that have the potential to cause long-term injury to regular VDT users." The article was accompanied by the following sidebar, apparently addressed to employers:

How to avoid mistakes in operating video terminals

- ☐ Give employees rest breaks, particularly heavy users
- ☐ Buy movable keyboards and adjustable chairs
- ☐ Add coatings, hoods, and other aids to reduce glare on the screen
- ☐ Upgrade training programs to insure the proper use of equipment
- ☐ Listen to employee complaints about working on the equipment
- ☐ Don't place terminals adjacent to one another
- ☐ Don't put a terminal next to a window or under high-intensity lighting
- ☐ Require operators with bifocal glasses to have eye tests before working on VDTs.

The *Times* began its conversion to VDTs in the fall of 1975, and the first terminals were "on line" in February of the following year. Among the first users was News Service copy editor Samuel Weiss, then twenty-eight. Intermittently, his eyes hurt and became inflamed. In January 1977, Weiss recalls, "I had severe eyestrain and I thought I just needed new glasses." He consulted a New York ophthalmologist, who found small opacities in the lenses of both eyes — the precursors of cataracts. Later that month he was discussing his eye problem at the office; another copy editor, John Woodford, thirty-five, was sitting nearby. As Weiss recalls, "He looked up and said, '*You* have cataracts? I just found out that *I* have cataracts' — and we both knew something was going on."

Woodford, too, had recently consulted an ophthalmologist who had detected incipient cataracts. Then, having read about Dr. Zaret in *The New Yorker*, he had consulted the Scarsdale clinician. Dr. Zaret had diagnosed his cataracts as "bilateral incipient radiant-energy cataracts," whose signature, he says, is that they start on the capsular surface of the lens rather than within the lens. After his conversation at the office with Woodford, Weiss, too, visited Dr. Zaret, who, after ascertaining that Weiss had no history of diabetes and checking for other possible causes of cataracts, diagnosed the cause as radiant energy.

Weiss and Woodford asked to be taken off the terminals, and for a time they were. The Newspaper Guild of New York subsequently charged that the terminals posed a threat to the health and safety of employees who used them. The issue was submitted to arbitration in June 1977. The decision was handed down in February of the following year. Arbitrator Maurice C. Benewitz, after reviewing NIOSH tests and the findings of a panel of medical consultants, found that electromagnetic radiation from the terminals did not constitute "an ocular cataract hazard" and that "the vast majority of all employees may work in safety upon the VDT machines at the *Times*." (Several ophthalmologists have since gone on record as saying that VDTs cannot possibly cause cataracts.)

Woodford had hoped that he and Weiss would not be put back on the terminals, "that they would give us another assignment — but they wouldn't." He left the paper and now works in public relations with the Ford Motor Company in Detroit. "The VDTs were the main reason I left," says Woodford. "I think there is enough doubt [about their safety] that I don't want to be the guinea pig. Now that I'm not around VDTs, I haven't had the visual problems." Weiss remained at the *Times*. He still uses VDTs. His vision, he says, has not deteriorated.

The decision in the Weiss-Woodford case seemed, on the face of it, to vindicate the machines. Yet the arbitrator's "Opinion and Award" raised questions even as it settled the particular dispute. A recurrent theme in the opinion is that, yes, the cataracts are "compatible with those reported from exposure to radiant energy," in the words of a NIOSH report cited by Benewitz, "but they also are compatible with those seen congenitally, or those associated with other etiologies." The NIOSH report continues: "Since the en-



The controversial Dr. Zaret: *While NIOSH insists VDTs are safe, Dr. Zaret says they can cause cataracts*

vironmental investigation did not disclose any significant radiant energy emanating from the VDT units, the etiology of the cataracts remains undetermined." Thus, the chief evidence that the two journalists' cataracts were not caused by the VDTs was the failure of repeated tests of the equipment to show "significant" amounts of radiation. This begged the question of whether a reputedly insignificant amount of radiation, either by itself or in combination with fatigue caused by image flicker and screen glare, might induce the formation of cataracts; at the same time, it assumed the adequacy of the NIOSH tests carried out at the *Times*. In a paper delivered at an international symposium on electromagnetic waves and biology, held in a Paris suburb last summer, Dr. Zaret, who had served as a consultant to the Guild, sharply criticized the NIOSH tests. His paper read, in part: "Not only did NIOSH use instruments that were inadequate for measuring a large segment of the suspect portion of the electromagnetic spectrum, but it also found [when the terminals were shut off] a dangerous level of hertzian radiation, 1 milliwatt per square centimeter, in the Times building without ever even attempting to identify its source!" He further pointed out that the tests did not replicate the "intermittent spurious emissions" resulting from equipment malfunctions in the past. And he asserted that the testing of individual machines was inadequate; to ascertain the cumulative radiation within the workplace, "the entire integrated system network" must be investigated.

The *Times* did not report on this internal dispute, which might well have been of interest to many members of the general public; nor did any other of the major dailies included in our survey: *The Washington Post*, *The Washington Star*, the *Los Angeles Times*, the *Chicago Tribune*, the *Chicago Sun-Times*, and the Baltimore *Sun*. (*The Boston Globe* could not provide clips because its computer data bank was being repaired and modified.) Nor did any of these papers cover an event that grew out of an increasing concern over microwaves. This was a three-week-long work stoppage at the United Nations typing pool in January 1979, just as the General Assembly reconvened. French, British, and Spanish members of the pool organized the walkout to protest their being required to use machines whose risks, they believed, had yet to be determined. Two hundred and fifty typists and translators, of various nationalities, joined the protest. According to Lowell Flanders, president of the U.N. staff union, about 100 typists still refuse to use the terminals. (*Ms.* magazine picked up on the story in its December 1979 issue.)

Several months earlier, a similar peg had been provided when seven copy and page editors at the *International Herald Tribune* left the paper over the introduction of the new technology. In an article in the April 12, 1978, issue of the now defunct *Paris Metro*, co-editor Craig Unger (now a senior editor at *New York* magazine), wrote:

> At the focal point of the problems between the editorial staff and management has been the replacement of typewriters with visual display terminals (VDTs). "It's not so much that we're against the VDTs," says one staffer still on the Trib, "as that we want to be protected against any dangers from them. . . . If you are working with a new technology, you want to know what you are getting into. . . ."

Like the other papers in our sample, *The New York Times* and *The Washington Post*, which jointly control a majority share of the *Herald Tribune*, ignored this exodus of editors.

The *Post* has run two articles that mention VDTs — the most recent of which was a September 15, 1980, story headlined POST'S APPEARANCE IS CHANGING AS IT MOVES TO COMPUTER AGE. Neither article mentioned the health and safety controversy. A check with the *Times* index and calls to the libraries of the other papers indicate that since 1975 no articles either on VDTs generally or on the various questions that have been raised about them have appeared in *The New York Times*, *The Washington Star*, or the *Los Angeles Times*. *The New York Times* scored a recent near miss with its publication on October 21, 1980, of 'BENIGN' RADIATION INCREASINGLY CITED AS DANGEROUS. Written by science reporter Browne, it announced that the American National Standards Institute was considering reducing allowable exposure to nonionizing radiation to one-tenth of the present standard — from 10 milliwatts to 1 milliwatt — as a result, in part, of new research suggesting that even extremely low doses of nonionizing radiation may have far-reaching biological consequences. Television, radio, telephone, radar, and electric power transmission lines were enumerated as sources of low level radiation; this time, no mention was made of VDTs. The stricter-standard story, meanwhile, was hardly new; it had been discussed in the trade publication *Computerworld*, for example, back in April in a story entitled " 'Newsday' [VDTs] Found Leaking Radiation; Metal Shields Installed to Protect Workers."

In Chicago, the papers have been slightly less reticent about VDTs. Last year, the *Tribune* ran six wire-service stories that mentioned the devices and one useful contribution by a staff writer: science editor Ronald Kotulak's April

20 story, SURVEYS FIND ELECTRONIC AGE A STRAIN ON WORKERS. (Two June wire-service pieces emphasized that while stress was a real problem, radiation was not). The *Tribune*, incidentally, started changing over to VDTs six years ago: the changeover will soon be completed.

The *Sun-Times*, which completed its conversion to VDTs two years ago, has published a single article on VDTs — and a funny thing happened to it on its way out to readers on March 11, 1980. Written by William Hines, the paper's Washington bureau science writer, the article bore the headline VDTs CAN HURT VISION: EXPERT. The expert was Dr. Zaret, who was quoted as saying, among other things, that microwave radiation can develop when VDTs are not maintained in tip-top condition. Dr. Zaret also mentioned that four out of six cases of eye damage he had observed in patients who work at VDTs involved editors or reporters on large daily papers. Hines's story was yanked after appearing in the earliest of the *Sun-Times*'s five daily editions.

The March 21 Chicago *Reader* ran an interesting article about the "all-too-brief" appearance of the Hines story. Neil Tesser, a frequent *Reader* contributor, called Stuart Loory, then-managing editor for news at the *Sun-Times* (he is now vice president and managing editor of Cable News Network, in Washington, D.C.), to ask why the piece had been yanked. "It's an internal affair," Loory replied. "But it's important to realize that over two years ago the NIOSH study at *The New York Times* discredited Zaret's findings" — a conclusion which Dr. Zaret was given space to contest; he asserted that "the NIOSH study itself has been discredited." The May 2 *Reader* contained a long letter from the *Sun-Times*'s executive vice president and general manager, Joe B. McAdams, challenging the credibility of Dr. Zaret's research ("The fact is that Dr. Zaret's views on the health hazards of VDTs are not held in high regard by recognized experts in the field"), and a detailed reply by Tesser. Returning to the subject in a May 30 VDT UPDATE, Tesser mentioned a thirty-three-year-old nonjournalist who had worked at a VDT for a year and was about to undergo surgery for the removal of a cataract, and cited another cataract sufferer (mentioned earlier in this article), whom Tesser described as "a 30-ish chap" who spent most of his day at "a Chicago daily" in front of a VDT.

Like the *Sun-Times*, the Baltimore *Sun* has run only a single article on VDTs, a five-inch wire-service story that appeared last June. Given the fact that two *Sun* journalists have been diagnosed as having cataracts, this seemed very short shrift. We called the *Sun*'s medical writer, Mary Knudson, to ask if she knew of any further coverage of the

Bargaining for health and safety

Ever since VDTs were introduced into offices, many employees have reported suffering from tired eyes, headaches, backaches, mental stress, and other discomforts. Now, some unions are endorsing measures — such as rest breaks and company-paid eye examinations — aimed at protecting employees. The case for such measures is strong.

"Because everyone gets sore eyes sometimes, people often think of eyestrain as a minor problem," says Tobi Bergman, a member of the New York Committee for Occupational Safety and Health, an organization many of whose members belong to union locals. "But when it is an almost daily occurrence, eyestrain is a serious health problem, which may cause temporary deterioration of vision."

Wendi Fox, who used a VDT for eight hours per day last year as an employee of the City of New York, reports that her screen "had an orange display on a green background. Plus, the lights were very bright in the room, so there was a great deal of glare on the screen. . . . I felt like I was walking in a fog much of the time. Everything was sort of surrealistic. Everything looked pale blue. That was a good deal of the reason I quit my job." Many people in her office seemed to be unusually short-tempered, Fox recalls. "Everybody has a headache, everybody's back aches, so there's a great deal of frustration and a lot of arguing."

A copy editor for *The New York Times*, who has used the terminals for five or six hours per day for two years, says, "I feel the effects most when I wake up. The eyestrain is the most severe then. You usually have bloodshot, tired eyes in the morning." He argues that VDTs should be segregated in separate rooms where lights can be turned low to cut down on glare.

In Europe, researchers have for years been publishing studies that link VDT use to eyestrain. Professor Etienne Grandjean of the Swiss Federal Institute of Technology, for example, has been studying the effects of VDT use on vision for more than a decade. In a 1978 study, he reported that "continuous work on [VDT] displays may produce visual fatigue indicated by a decrease of accommodation power [the ability of the lens of the eye to focus on objects at various distances]. Painful reactions in the eyes and headaches can be associated with the visual fatigue." Two other important researchers in this field are Professors Olov Östberg and Ewa Gunnarsson, of Sweden's National Board of Occupational Safety and Health. In one study, released in 1977, they reported that 85 percent of a sample group of Scandinavian Airlines System employees who used VDTs complained of a variety of eye problems, such as strain, pain, and itching. Forty-six percent of the sampled ticketing employees termed the problems "great" or "very great." Östberg and Gunnarsson recommended that workers, after using the screens for an hour, should be assigned for an hour to another job.

David Eisen, director of research and information for The Newspaper Guild, says that, partly as a result of such research and of the warier attitude toward VDTs that prevails in Europe, unions in Sweden, West Germany, and Britain have been able to win contracts which largely provide what unions in the U.S. are only now starting to push for. The

subject in her paper. "To my knowledge," she said, "that's all we've done, and I think that's wrong, because the *Sun* newsroom is aware that VDTs are controversial and especially because we at the *Sun* are about to become involved in a federal study by NIOSH to see if there is a higher rate of cataracts among VDT users than among non-VDT users." Knudson went on to say that last February she had offered to write a comprehensive account of the VDT controversy, but her editor told her this would be a conflict of interest since Knudson is chairperson of the health and new technology committee of the Sun Papers' Guild. "He said he would assign it to another reporter," Knudson said, "and that's the last I heard about it. The story hasn't been written."

The best coverage of the VDT controversy, in our judgment, appeared in two publications we had not included in our survey but which we sampled unsystematically: the Bergen County, New Jersey, *Record*, and *Maclean's*, the Canadian newsweekly.

The Record's contribution, which appeared on March 11, 1980, must surely qualify as the most comprehensive examination of the subject to appear in the U.S. press to date. Nearly a hundred column-inches long, it began on page 1 and took up almost all of page 11, and in the course of his eighty-eight-paragraph article staff writer Elliot Pinsley cites an impressive array of conflicting sources and touches every conceivable base. The headline, AUTOMATING THE PRINTED WORD, together with the jump head, VDTs — STARS OF THE OFFICE AND NEWSROOM, seems to reflect an editorial yen to present the new devices as attractive, high-tech gadgets; the subheads — such as "Others less pleased," "Fear of radiation," "Metal shields installed," "Complaints repeatedly raised," and "Some people more vulnerable?" — show that Pinsley discovered and went after a less simple story. The peg was that *The Record* was scheduled to begin computerized production in June. The impetus for investigating the health and safety aspects of the new technology was a recent conference on computer terminal safety which had been cosponsored by two unions representing clerical and communications workers and which was held in Manhattan. "The conference, attended largely by workers with daily and daylong exposure to VDTs, produced a deluge of damning testimony," Pinsley wrote. "Most users complained about stinging, burning eyes, vision fatigue, headaches, and related symptoms."

To check on the validity of these complaints, Pinsley contacted Michael Smith, the industrial psychologist who heads NIOSH's section for motivation and stress research. Smith assured Pinsley that prolonged exposure to VDTs could lead to temporarily blurred vision; that eye fatigue is a genuine reaction to such exposure; that people who are partially color blind may have trouble distinguishing letters on some models; and that the flicker effect, which is produced as images on the screen are electronically "refreshed" dozens of times each second, causes stress. Pinsley noted that some manufacturers "tend to blame mainly the workers for the problems. . . ."

His treatment of the radiation issue began with a deft introduction:

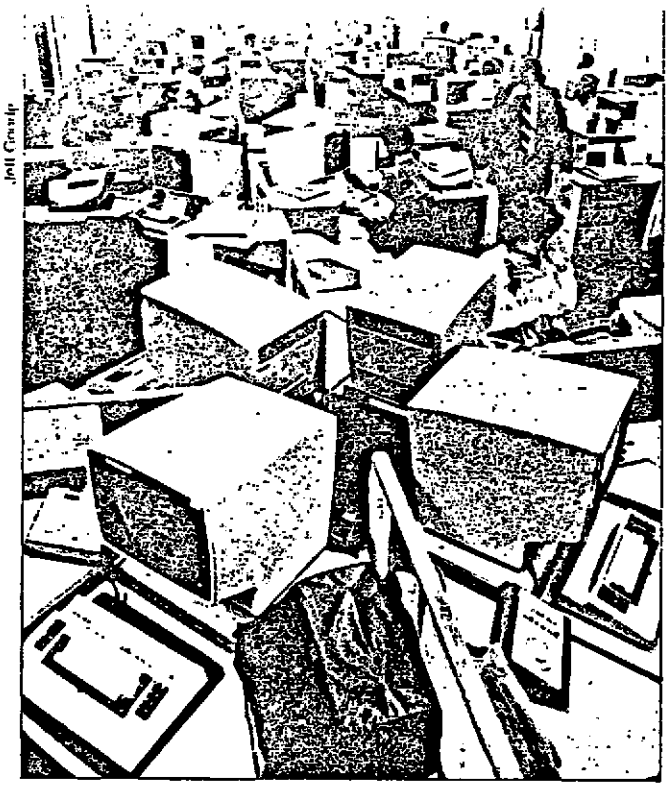
> The issue of radiation is at once thornier and more vague. It is clouded by emotionalism, a shaky federal standard, a lack of authoritative research on low level RF emissions, a lack of faith in the radiation monitoring devices currently in use, and a varying degree of public concern and candor among manufacturers.

Pinsley elicited several interesting quotes. Wordie Parr, a NIOSH radiation specialist, commented, for example: "We just don't think there's a radiation problem," but then went on to say, "To be quite honest, nobody knows a damn thing about that low a frequency." William Murray, chief of the NIOSH radiation section in Cincinnati, said: "I really can't tell you at what level RF radiation is dangerous." A spokesman for the Harris Corporation, a major producer of video display terminals, explained that while Harris tests its product for X-ray emissions (and has never obtained a positive reading), the firm does not test for radiation at the radio frequency level because it is convinced that this presents no hazard; and the spokesman added, "The VDT is an inherently safe product." Dr. Zaret's contrasting views on the subject were also set forth.

Pinsley concluded his prodigious roundup with a quote from Betsy Wade, president of Local 3 of The Newspaper Guild and assistant travel editor at *The New York Times*:

Guild, for its part, advocates that employees not be required to work on the terminals for more than two hours without a break and that employers pay for periodic eye exams and for corrective lenses for employees who find they need glasses or stronger lenses for their work on VDTs. While no U.S. newspaper has agreed to all these provisions, says Eisen, some progress has been made. Employers now pay for eye exams at about twenty newspapers, including *The Washington Post*, the Cleveland *Plain Dealer*, and the Baltimore *Sun*. Eight newspapers, including the *San Francisco Chronicle* and *The Oakland Tribune*, pay for eye-glasses. Limited rest breaks have been instituted at *The Minneapolis Tribune* and *Star*, the *St. Paul Pioneer Press* and *Dispatch*, the *Akron Beacon Journal*, and the Lynn, Massachusetts, *Item*. However, these breaks are scheduled at company discretion and so that they will not interfere with the work load.

The U.S. press has, by and large, kept mum about these developments. A notable exception is *The Wall Street Journal*. Joann S. Lublin's October 27, 1980, article headlined HEALTH FEARS ON VDTs SPUR UNION ACTION provided an intelligent roundup of worker complaints, federal studies, and union moves. The twenty-column-inch story received prominent play. Starting on page 1 of the *Journal*'s second section, it was accompanied by a drawing showing three pickets walking around a VDT. A sign carried by one of the pickets reads: "Warning! Health Hazard." Though the print was large, editors at other papers still don't seem to have gotten the message. *Jeff Sorensen*



Toronto scare: *After four former* Toronto Star *employees, who had worked in this room, bore children with serious birth defects, the VDTs were checked — and termed safe*

"We don't know what we ought to know. The people who are buying these pieces of equipment don't know that much, either. What concerns me is that, whether we like it or not, we are becoming guinea pigs in a long-term experiment."

Asked whether his piece had been altered in any important way by editing, Pinsley replied, "There wasn't a great deal of enthusiasm for examining the safety and health issue at that depth, but not a single word of substance, certainly none relating to the health and safety question, was altered or removed. The story that went into the paper was just about precisely the story I handed in, and I was pretty pleased with that."

The special value of the *Maclean's* article, which appeared on July 28, 1980, lay not so much in its comprehensiveness as in its thoughtful analysis of the various effects the new computerized technology was having, and might be expected to have, on workers and society. The two-page article, entitled "A Worrying Case of the VDTs," was written by Larry Black, a labor reporter for The Canadian Press, Canada's leading wire service agency. It was "just luck," says Black, that a piece he had submitted in early July appeared in the newsweekly just as VDTs were making headlines in Toronto's dailies. Four former employees of the *Toronto Star* who had been working with VDTs during their pregnancies had given birth to children with birth defects; typical late-July headlines read: VDT OPERATORS WORRY AS EXPERTS POOH-POOH FEARS, and VDTs DIDN'T CAUSE ABNORMALITIES, TORONTO REPORT SAYS.

Black's article begins with the observation that, while "the magical little green or black screens have been treated as just one of the more nifty byproducts of the computer revolution," questions were now being asked about "what the tubes are doing to offices and the people who work with them." He cites the complaint of a Vancouver copy editor — "My brain sort of blacks out for an instant. I'm forced to abruptly look away from the screen to prevent passing out" — and then spells out findings, presented at an international conference of medical and industrial psychologists held in Milan last March, showing that 50 percent of a studied group of VDT users had reported eyestrain, 29 percent headaches, 43 percent anxiety, and 40 percent depression. After slipping through the radiation tangle, Black examines the effects on workers of the new technology. Particularly in the case of people employed by telephone companies and airlines, Black notes, the new machines are creating a sense of loss of control, of alienation from their work (a union organizer compares using a VDT to "sitting in front of a TV and reading credits seven-and-a-half hours a day"), and of isolation from their colleagues.

Another, perhaps larger, concern brought out in the article is that the new technology may cause "large-scale white collar unemployment and underemployment" — a point Black substantiates by referring to European studies indicating that "at least 25 percent of office workers . . . could be out of a job in a decade or so because of the tubes and their technological relatives." The impact, Black writes, may be "even more awesome for women, who are still heavily concentrated in clerical tasks in industries already permeated by microprocessor technology — banks, telecommunications and insurance companies, for example."

Returning to the health and safety issue at the end of his article, Black quotes an airline union organizer as predicting that "cathode-tube operators are going to be the asbestos workers of the future" — a concern voiced three months later at the conclusion of a more narrowly focused *Wall Street Journal* article on VDTs. (Staff writer Joann S. Lublin quotes a former *Toronto Star* employee who worked at VDTs during her pregnancy and who gave birth to a son with a nearly fatal heart defect as saying: "Any [one] of those machines doesn't give off enough radiation at a time to harm, but I wonder about the cumulative effects of radiation. . . . It just seems like we're going to be the asbestosis people of the future.")

If the U.S. press were doing its job, one would not have to look to Canada for reporting that combines a succinct survey of the VDT health controversy with a broader look at the impact on society of the new computerized technology. What has happened here? The nation's newspapers are involved in a technological revolution; so, too, of course, are many other and much larger industries. This revolution is affecting the lives — and possibly adversely affecting the health — of thousands of journalists and millions of nonjournalists. At least some reporters are eager to cover various aspects of this large event, presumably in the same professional manner in which they would cover any other story. Meanwhile, there is a dearth of coverage. In some cases this may be because reporters genuinely do not see a story in VDTs. But it would not seem too farfetched to conclude that at the management level another factor is at work — that in their concern to protect a vast investment, editors and publishers are subordinating the public interest to a private one. ■

Health effects of video display terminals

Stress is a central element in the VDT health problem. Every error in design of the machine, workplace and job adds directly or indirectly to the total job stress.

In the advertising department of a major daily newspaper, sunlight pours through large windows, adding to the brightness of flourescent lighting. House plants thrive where they have been placed by operators of the video display terminal (VDT) work stations.

This recently installed workplace is clean, spacious and apparently modern—a far cry from the clutter of typewriters and filing cabinets that it replaced. The noisy conveyer that once carried ad copy to the typesetting department on the floor below is gone. Gone, too, is the entire typesetting department with its noise, hot lead, ink, solvents and risks of serious injury.

The work stations are grouped in 10 "clusters" of four and divided by sound-absorbing partitions. Each station includes a small stand with an incoming-only telephone and a VDT, the keyboard/TV-screen combination through which ad-taker and computer communicate. There is no writing space and no copy stand. Nothing is being written or copied. Ad text is received on the phone—each operator wears a headset—and "keyboarded" into the computer. The visitor thinks it must be a good environment for work.

Willard Cooper looks up at the visitor and then to the clock on the wall. He guesses that he has another two hours "on the tube" before quitting time: it's always around 3 p.m. when he begins to have difficulty reading the time. The hands are blurred and the dots that mark the hours have disappeared, as they do on busy days. As always when this happens, he begins to worry about the long drive to his New Jersey home. He swallows two aspirins with the last of his carton of juice. The worry makes it hard to concentrate and seems to cause him to have to strain to read the information displayed on the VDT, and he wants to cut off the headache that is on its way. He knows he will be unable to read or watch TV when he gets home. His eyes are too tired.

COMPLAINTS The National Institute for Occupational Safety and Health (NIOSH) estimates about seven million workers in the U.S. operate VDTs. NIOSH surveys confirm European studies that associate a variety of frequent VDT-operator complaints with equipment, workplace and job design. The problems include visual strain, irritated eyes, headaches, dizziness, irritability and musculoskeletal pain.

Dr. Michael Smith of the Behavior and Motivational Factors Branch has been coordinating the NIOSH investigations into VDT-related health effects. As a result of preliminary studies, he says that NIOSH is "convinced that there are acute visual problems and high stress levels and is moving ahead with research into possible chronic effects." He says that NIOSH is looking into the variety of factors that relate to operator health. "All of these, including the design of the machines, the work environment and the jobs, must be intergrated to deal with the problem." On the basis of its investigations NIOSH has recommended guidelines (see Figure 1).

As part of its continuing efforts,

NIOSH estimates about seven million workers in the U.S. operate VDTs.

NIOSH is funding a study into visual effects and stress by Dr. Steven Sauter at the Department of Preventive Medicine at the University of Wisconsin. NIOSH has also agreed to sponser a Blue Ribbon Committee through the National Academy of Sciences to review the problem and plans a conference on the subject in 1981.

The issue of VDTs and health initially focused on possible radiation

By Tobi Bergman, director, VDT Project, New York Committee for Occupational Safety and Health, Inc.

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Is There a Radiation Hazard?

(Note: The following is reprinted with permission from the booklet "Health Protection for Operators of VDTs/CRTs.")

VDTs may emit low, but potentially dangerous levels of radiation, including X-rays, microwaves and/or ultra violet (UV) and infrared (IR) light.

In theory, machine parts that produce radiation are shielded and radiation does not escape at levels which endanger the operator or others working nearby.

This does not mean that there is no cause for concern. Very limited testing by government and industry has been done and the conclusions of tests have been challenged by unions and independent health specialists. Some radiation frequencies were not tested for and most machines have not been tested at all. Manufacturing defects of poor maintenance could cause higher levels of radiation to be emitted. In addition, very low doses of radiation can be hazardous and there is no known safe level of exposure.

Workers have a right to know what hazards they face, and in the case of the possible radiation hazard of VDTs more research is needed.

Some of the controls useful in protection against eye strain, such as alternating periods on the machine and periods doing other work, would also reduce possible exposures to radiation. Machines should be spaced so operators are not sitting near other machines since whatever radiation exposure there is will be multiplied by the number of nearby machines. Exposure decreases when the source is farther away.

Suggestions that lead aprons should be provided to operators who request them have been made. Such personal protective equipment is probably not necessary. It would be of dubious value, since the eyes would remain unprotected, and the apron could cause discomfort and postural problems. What is needed is extensive testing, manufacturing quality controls and standards for machine maintenance.

NIOSH-Recommended Guidelines

As a result of its own surveys and a search of the literature, NIOSH has proposed the following recommendations.

1. VDT work stations and devices should be made as flexible as possible to allow for individual operator control of keyboard height, screen height, screen brightness and contrast, leg room, viewing distance (should be within 450 millimeters and 700 millimeters), work station illumination levels (if indirect lighting at the work station is provided), chair adjustments (of seat height, backrest height and tension) and operator choice of armrests or no armrests.

2. The VDT screen should be positioned so that the viewing angle is 10 to 20 degrees below the horizontal plane at eye level.

3. Illumination levels should be within 500 to 700 lux, with individual work station lighting provided for jobs requiring higher levels due to visual demands.

4. Screen glare should be controlled through the use of any one or all of the following means: windows should be covered with drapes or blinds to limit direct sunlight; VDTs should be positioned properly with respect to overhead lighting and high-luminance sources in the work area; hoods should be installed over screens to shield from direct or reflected light; a glare shield should be installed on the screen; and recess lighting and special fixture covers should be used.

5. There should be mandatory work-rest breaks at least 15 minutes every two hours for VDT operators under moderate visual demands and 10 minutes every hour for operators under high visual demands.

6. Visual testing of VDT operators should include an initial complete ophthalmologic examination, including refraction, acuity and accomodation testing, tests for color vision function and examination of the cornea for lens opacity and retina for detachment, and annual refraction and accomodation testing.

hazards, but during the past year has turned to the hazards that are less feared but more deeply felt by VDT operators. In January, a conference was held in New York City, jointly sponsored by the New York Committee for Occupational Safety and Health, Inc. (NYCOSH) and several labor unions. Hundreds of VDTs operators among the 350 participants spoke about the severe impact of their work on their health. It was an unusual demonstration of concern about occupational health from workers whose jobs are generally considered to be among the safest. The conference had opened with the question: "Is there a hazard?" but closed with: "What can people do about it?"

UNION ACTIVITY Some unions are working actively on the problem: keeping informed of new studies, educating their representatives and members, pressing for government involvement and negotiating for specific contract language on all factors related to operator health. Among these unions are The Newspaper Guild, the Communications Workers of America, the Office and Professional Employees International Union, and unions representing municipal workers.

David Eisen, Director of Research and Information at The Newspaper Guild, is devoting much of his time to the problem, which affects many of the union's members. "The appearance of VDTs in our work environment has made health and safety a prime preoccupation for our union for the first time," he says.

VDTs enable companies to provide better service at lower costs.

"No other factor in the work environment—not indeed, all others combined—has ever created such a

torrent of health complaints and problems as have VDTs, We have developed a comprehensive package of hargaining proposals to deal with all aspects of the problem, and our locals will be presenting them insistently and persistently until they are accepted," Eisen said. "We have already negotiated several in more than a dozen contracts and we have just begun to gear up."

VALUE OF THE VDT The video display terminal is here to stay. It is a powerful tool with a broad and rapidly expanding range of applications. VDTs are used by government and private industry; in publishing, communications, banking, and insurance; by computer operators and airline reservations clerks; and in offices of all kinds, large and small. It is even being used in grade school educational programs, and experimental use of VDTs for information access in the home has begun.

The VDT enables many companies to provide better services at lower costs. It can be a time saver and it can open whole new areas of business. And it has changed the character of work for millions of workers.

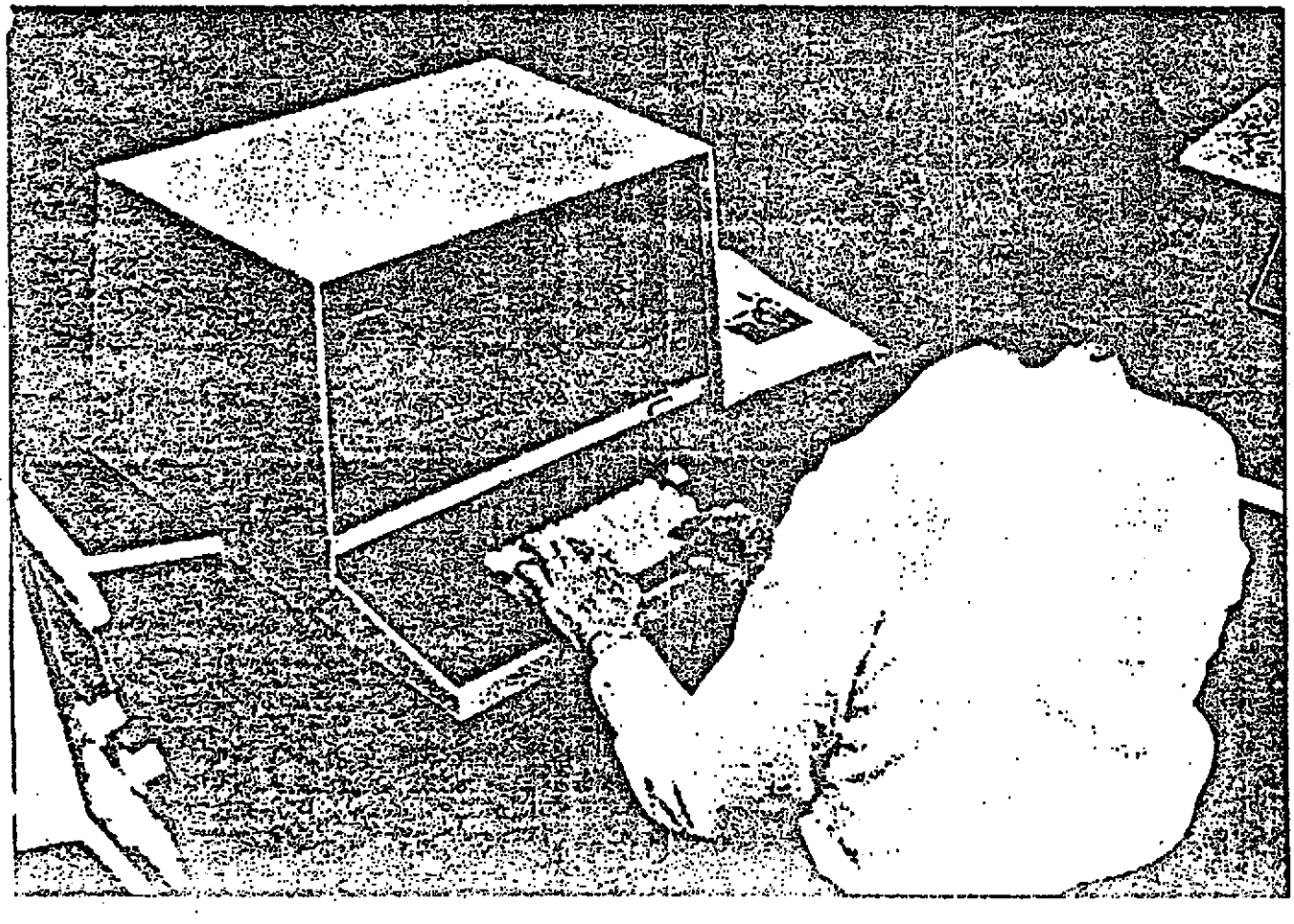
For most of these workers, the change has been a mixed blessing.

Stress reduction through job rotation provides visual strain control.

Reporters and researchers have easy access to information. Secretaries can edit and change letters without retyping. Typesetters have left the dirty and noisy linotype shop. The new technology holds the potential for major improvement of working conditions. But the emphasis in the design of equipment, environment and the work process, is on increasing productivity and management control, with insufficient attention paid to worker comfort and health. The result is the exposure of millions of workers to new hazards. Tomorrow's technology has become today's headache.

Stress is a central element in the VDT health problem. Every error in design of the machine, workplace and job adds directly or indirectly to the total stress of the job. Since stress increases with the interaction of combined effects, attention must be paid to all factors which can cause discomfort and strain, however insignificant each may seem individually.

In the workplace which is about to be automated, stress begins before the machines are unpacked. Introduction of the new system represents to the operator the age-old threat of being replaced by a



machine. It will in any case require the learning of new skills, which may be an exciting challenge—or an unnerving one. Worse, it will make old skills which are sources of personal pride and job security obsolete.

In the telecommunications industry "shooting trouble" on a line was once done with a variety of testing equipment, screwdrivers, wrenches and other tools. The skilled craftsperson who learned the tricks of this trade is now sitting at a monitor that tells him what is wrong with which piece of equipment (the workings of which he or she may no longer fully understand) and who to tell.

Job sharing or rotation involves each worker in a greater part of the whole process and the work becomes more interesting and less degrading than when operators work full time at simple task performance that may not even require a full understanding of the purpose of the task.

Stress reduction through job rotation also provides the single most important control for visual strain for VDT operators: it reduces the total time spent at the machine and enables them to rest their eyes by doing other kinds of work away from the machines.

DISCOMFORT Because everyone gets tired eyes sometimes, it is a kind of pain that is thought of as mere "discomfort." But as an almost daily occurrence it is a serious health problem which can prevent a person from being able to read a newspaper, go to a movie, watch TV or drive a car. People suffering severe visual strain are limited in their means of enjoyment, relaxation, edification and sometimes even transportation.

Eye exams should be used to monitor possible deterioration of vision.

The physiological causes of visual strain are not well understood. It may be related to fatigue of the various muscles that control the position, focus and light adaptation of the eye. It is also not know what chronic effects may be caused be severe and repeated strain. Ophthalmologic theory suggests that permanent deterioration is not caused by close visual work. Many operators of VDTs, however, insist that they have required frequent refitting of corrective lenses.

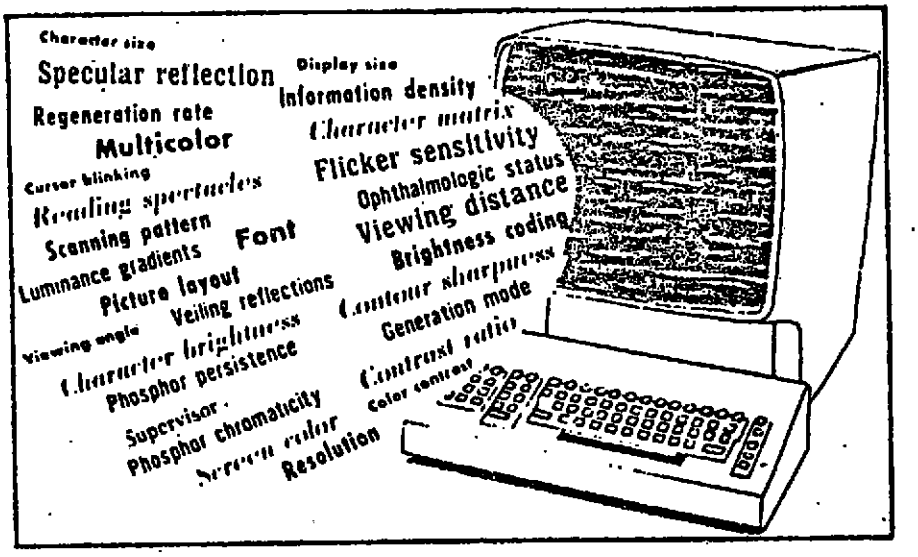
The VDT is a powerful tool with a rapidly expanding range of applications.

Visual strain is also not easily measured. Recently, researchers at the Swedish National Board of Occupational Safety and Health have attempted to find ways to quantify visual strain and to measure the strain caused by various intensities and durations of VDT work. Ewa Gunnarsson and Inger Soderberg reported in April on their measurements of near points of accommodation and convergence, and on comparison of these measurements to responses of operators in surveys and interviews.

In this study they found that complaints of eye fatigue, sore eyes and headaches were more frequent among operators working for longer periods at the VDT and that greater changes in the near points of accommodation and convergence were also associated with longer durations and more intense work at the machines. At a recent presentation of these findings to a group in New York City, Gunnarsson warned that whole quantification of visual strain has its value in the study of the impact of various factors on VDT operators; the most sensitive indicator of strain remains the body

(Continued on page 5-h

(Continued from page 28)



itself. The experience of the operator is what should be the greatest concern of occupational health specialists and company managers.

PROBLEMS A major problem in dealing with the health problems associated with VDT work is that most of the health effects are of a kind generally considered "minor" and far from disabling: tired and sore eyes, headaches, sore muscles and irritability. But the combined impact of these problems on a repeated basis can be serious, and by its cumulative stress-producing effect it may be disabling. In any case, the extreme discomfort takes it toll, if not on life itself, then on the quality of life.

Management attitudes toward operator complaints are sometimes the opposite of helpful. Female workers in particular are often subjected to having their discomfort made light of or being attributed to other than work-related causes. As stated in a booklet published by NYCOSH called *"Health Protection for Operators of VDTs/CRTs,"* the workers who raise complaints are not "gripers" but leaders in a movement for office worker dignity. They are raising their voices so that the opportunity for improved working conditions which new technology offers is not lost. And the goal they seek is achievable with existing technology.

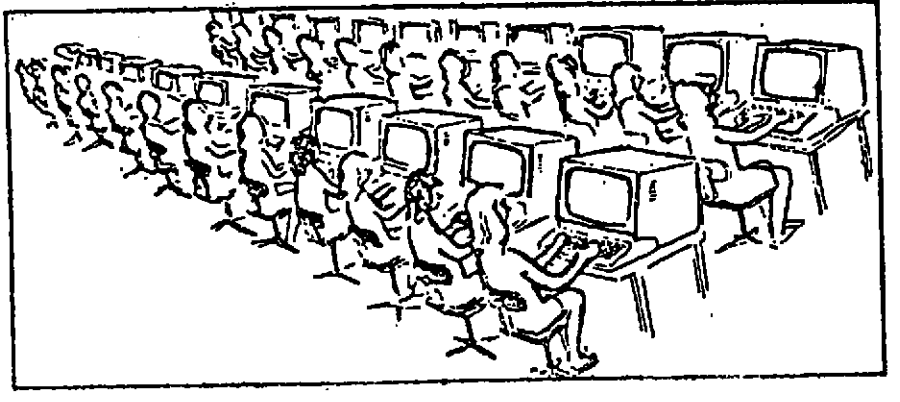
Glare is one of the major causes of health problems for VDT operators. Reflected glare makes the images of the screen difficult to read and causes increased visual strain. This kind of glare may often be stopped at the source using "egg-crate" or other diffusers over flourescent tubes to direct light downward and away from the screens. Rows of work stations should run parallel to rows of overhead light fixtures so that the machines can be positioned to avoid reflected glare. Screens that have visors or that can be tilted may be helpful.

Another source of visual strain is a character size that is too small.

Glare from windows can be controlled by use of curtains or blinds. (Vertical blinds may provide more possibility of directing light away from the screens than horizontal blinds.) Some screens are designed with a glare-reducing surface. In addition, clip-on screens of various kinds are available. Some success has been reported with both mesh screens and polarized glass, but it is important that such screens do not decrease the intensity or sharpness of the image.

Background or contrast glare is an even more signficant problem in most locations. The operator has to read a lighted image from a dark screen. If the general lighting is overly bright or the screen is located in front of a window or a white wall, the iris decreases the size of the pupils to limit the light reaching the retinas. The result is to cause the image to appear less bright and to create difficulty for operators who are working at the screen intensely for long durations. General lighting should be decreased, but if operators must work from paper copy they should be provided lamps for that purpose. If possible, paper copy should be provided on other-than-white paper so that the strain caused by frequent adjustment from the dark screen to the bright paper and back is avoided or reduced.

Neutral-toned wall colors and office furniture also help to reduce contrast glare. But if the lights are dimmed, the windows shaded and the walls darkened, the office at-



mosphere may become depressing, and perhaps more stressful in other ways unless individual preferences and tastes are considered. Before changes are made in the working environment, proposals should be discussed and agreed to by those affected, and they should understand the reasons for the changes. In general, it is preferable for work stations to be operator-adjustable. If overhead lights can be individually dimmed, blinds adjusted, and the brightness of the image easily altered, lighting levels can be determined individually on the basis of operator comfort.

VISUAL STRAIN Another source of visual strain is a character size that is too small. Less expensive equipment is often designed with a small screen. In order to maintain the amount of information on the display the character size is decreased, causing severe strain, particularly for operators wearing corrective lenses. Small screens should be avoided unless the quantity of information that is displayed is reduced, and the inconvenience of limiting the amount of information displayed may create new difficulties for the operator.

Sharpness of image depends on the "matrix," or number of dots or lines along the height and width of each character. The matrix should generally be seven units wide by nine units high for a sharp image; less may be acceptable for smaller characters. If individual dots are visible to the operator there may be "small-area flicker" causing the light to appear to dance within the letters and therefore result in annoyance and stress.

Management attitudes about operator complaints are sometimes not helpful.

Poor machine maintenance can be a cause of visual strain. Even a dirty screen makes the information displayed more difficult to read. Screens should be cleaned daily by the maintenance crew using proper solutions and cloths. Equipment should be kept on a six-month full-maintenance schedule. Since the sharpness of the image may be lost gradually, waiting for this to happen before making repairs places an unfair burden on the operator to report the problem, which he or she may experience as discomfort without knowing its cause. The cathode ray tube (CRT) which produces the image should be replaced as suggested by the manufacturer. Machine malfunctions may also cause unnecessary agitation to operators, as when work is lost or "garbled" by the computer. A maintenance log should be kept on each machine, and if radiation checks are made they should be done after each maintenance check.

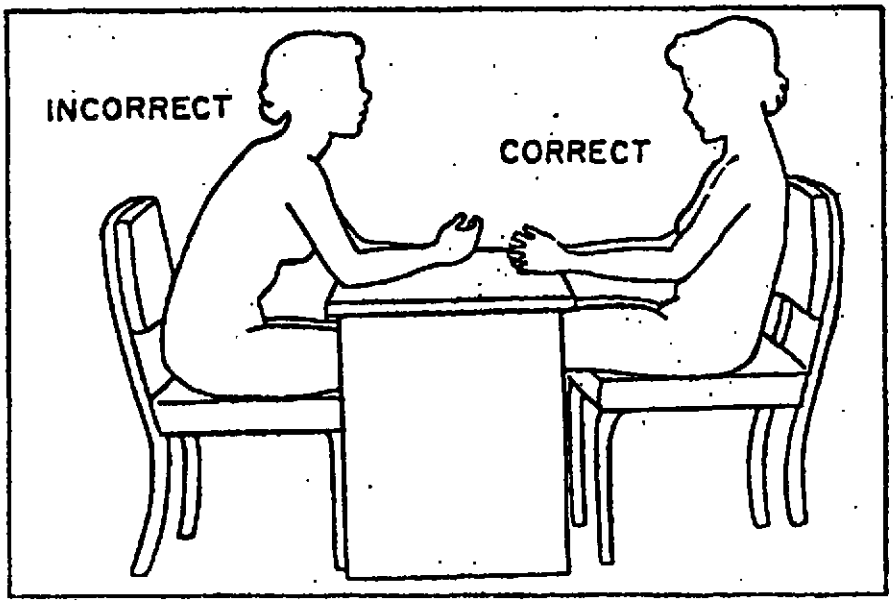
ERGONOMICS Many of the health problems associated with VDT operation are caused by machines which are not well designed from a standpoint of ergonomics. They force the operator into uncomfortable and even painful and harmful body positions.

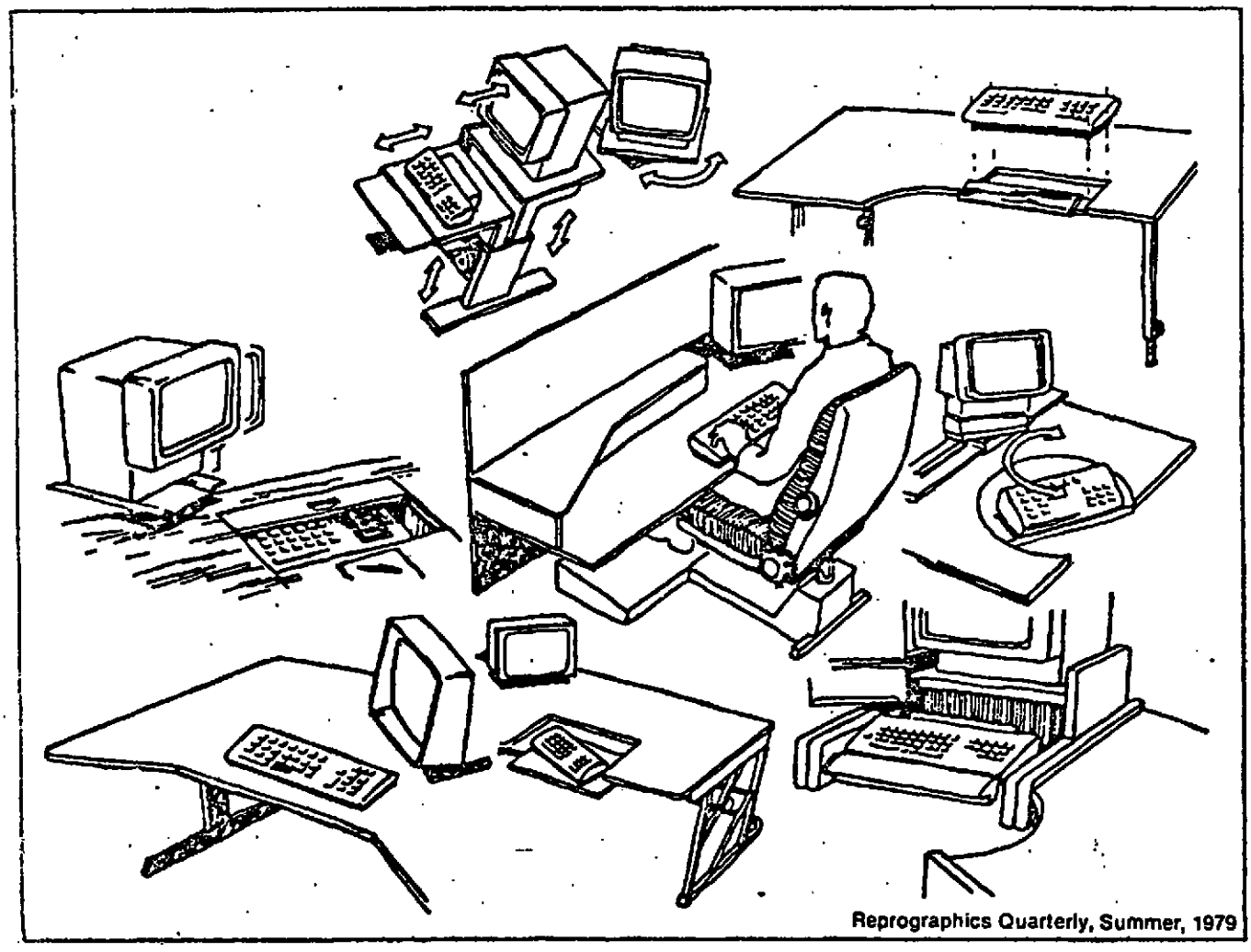
Older persons have greater difficulty bringing objects that are outside their focal range into focus. If an operator has been fitted with reading glasses designed for normal use (reading at approximately 13 inches) he may be forced to lean forward in order to bring the image on the screen into focus, his eyes being unable to accomodate for a reading distance of perhaps 28 inches.

Wearers of bifocals may have to lean forward while tilting their heads back in order to view through the bottom lenses, placing painful and potentially harmful pressure on their backs and necks. The problem is that the position of the screen cannot be changed.

All VDTs should have detachable keyboards so the screen can be raised or lowered and moved laterally while the keyboard remains low and directly in front of the operator. But detachable keyboards provide limited adjustability if the VDT is placed on a small stand. A good VDT stand provides independent vertical and lateral adjustments for both keyboard and screen which can be easily performed by the operator without the need for tools.

If the adjustable work station





Reprographics Quarterly, Summer, 1979

Drawings of several ergonomically designed work stations made in Sweden feature a high degree of adjustability. They are available on the international market.

still does not enable some operators to bring the image into focus while sitting comfortably, they can be fitted with special working glasses with a reading distance suitable to the equipment. Because of the intensity of the visual work involved, regular eye examinations are advisable. The ophthalmologist performing the exams should be made aware of the kind of work being done and invited to visit and measure the work station if necessary. Since there is some concern about the potential for VDT's to emit low level of microwave radiation, eye exams should included checks for [illegible]racts that may be caused by such radiation.*

Eye exams should be used to monitor possible deterioratation of vision and to provide special working glasses when required. They should not be used for screening.

It is the responsibility of the employer to provide safe and healthful work for all employees, not to refuse work to those whose eyes are harmed in the work process. If an examining ophthalmologist suggests the operator not work at the VDTs, he should be provided other work on the same pay scale.

Tests which have been recommended for VDT operators are: unaided visual acuity, refractive findings, corrected visual acuity, amplitude of accomodation, suppression, distant muscle balance and close muscle balance.

**Information about cataracts that may have been caused by VDT operation should be reported to Dr. Milton Zaret at New York University Medical Center, who has reported on several possible cases.*

The New York Committee for Occupational Safety and Health, Inc. has published a 16-page booklet designed primarily for operators of VDTs. It is called "Health Protection for Operators of VDTs/CRTs" and is available for $3 per copy from NYCOSH; 32 Union Square-Room 404; New York, NY 10003; (212)674-1595. Individual VDT operators ordering the booklet for their own use may purchase the booklet at a special price of $1 per copy.

A comprehensive volume, The VDT Manual, is available from John Wiley & Sons, Inc.; 605 Third Ave.; New York, NY; (212)867-9800. Both books include bibliographies. OH&S

VDTs: HOW THEY ARE USED IS IMPORTANT !!

When VDTs and other types of automated equipment are introduced into the office, productivity quotas generally go up. This means less people can do more work in a given time period. So workers are naturally concerned over being "phased out" as more VDTs enter their workplace. While VDTs are hailed as equipment that will make jobs easier and more interesting it is the nature of the job performed on VDTs, that determines whether the equipment is a job enricher or merely a tool to get less people to work faster. There are 5 primary tasks in which VDTs are used, but the variety of specific tasks in each of these categories is almost endless.

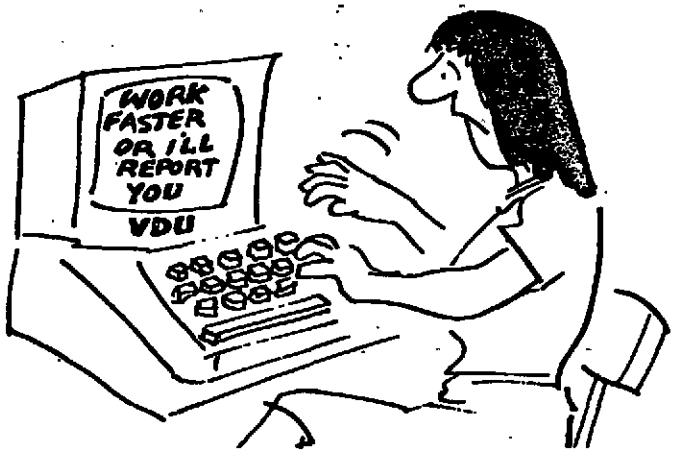
1. Data Entry: These jobs are characterized by a high work speed with the number of strokes per minute often kept track of automatically. The operator generally has no control over work speed as productivity quotas are in effect. There is very little decision making option.

2. Acquisition: Data is called up from files at remote location, or from a local data base. This is a "terminal-intensive" job, with the operator almost always looking at the screen. Calling up data may also require "talking" to the computer.

3. Interactive Communication: Information is keyed into a computer terminal which may involve asking/answering questions("talking" to computer). There is generally a lag time while waiting for a response which most operators consider stressful. This is a visually intensive job with almost constant screen viewing. There is often more freedom and individual decision making in such jobs.

4. Word Processing: This involves many tasks including document production, layout, formating, and proofing. It involves searching the screen, making corrections(back and forth from hard copy to screen), keying in corrections and new documents. While there is more allowance for independent decision making on the operator's part which limits screen time, job design and description will determine how true this actually is.

5. Computer programming involves work at VDTs, but the operator generally has a great deal of control over how much time is spent at the terminal, and what type of work will be done. This type of work often involves the above four tasks.



Excerpt from an article in:
The GUILD REPORTER, July 25, 1980

FOUR AT TORONTO STAR

Birth defects bring new VDT tests

Toronto — After importuning by the Guild, radiation testing of the VDTs in the Toronto Star's classified telephone sales department began July 22 as part of an investigation into possible causes of birth defects in four children born to as many phone room employees late last year.

All four of the employees involved had worked on the machines during their pregnancies.

None of the VDTs tested through July 24 was found to be emitting either X-rays or microwaves in excess of Canadian standards for ionizing or non-ionizing emissions.

As a result of the spread of the news of the birth defects in Toronto, radiation testing of VDTs at the Montreal Gazette was begun July 24 and, at least pending the outcome of the tests, pregnant employees and others there concerned about their reproductive well being were given the option of not working on VDTs. The actions were taken at the request of the Montreal Guild.

As part of the investigation at the Toronto Star, requested by the Southern Ontario Guild in consultation with TNG, the Guild has asked the Star for a list of all the VDT model numbers that have been used in the paper's classified department. The Star has used only IBM machines in the department and it was known that at least one other model—the 3270—had previously been used there.

In response to inquiries by TNG to Dr. Bruce Dickerson, IBM's director of health and safety, it was learned that as of July 22 the Star had not communicated with IBM about the birth defects.

In a letter to all local Guild presidents and administrative officers on July 24, TNG President Charles A. Perlik, Jr., suggested they "acquaint managements where our members are working on VDTs" with the Toronto occurrences, "especially managements where IBM VDTs are in use."

IBM's Dickerson told TNG that he considered the matter of birth defects to be "totally new and without scientific predictability," Perlik reported.

Dickerson said he saw emissions from VDTs causing or contributing to birth defects as contrary to all the science developed to date. He said he saw no cause for alarm pending the outcome of the labor ministry's tests on the Star machines.

Even then, he said, the "whole environment of the workplace" should be examined to determine whether there is any link between working in the Star's classified phone room and the birth defects.

Dr. Frank Rosenthal of the New York University Medical Center's Institute of Environmental Medicine, told TNG that scientific literature is "void" on the subject of the possible effect of any emissions from VDTs on birth defects.

While saying he could not speak definitely on the question of whether VDT emissions could cause birth defects, Rosenthal told TNG that his "guess" is "probably not, because the energy of the X-rays is so low and there is such a small chance of penetration into the uterus."

The Southern Ontario Guild's first hint of the birth defects among the four inside classified employees at the Star came through an anonymous telephone call some weeks ago to John Bryant, the local's administrative officer.

After investigating, Bryant took the statistical evidence to the Ontario Federation of Labour. The OFL told him that the incidence far exceeded the Canadian norm and, on July 15, Bryant contacted TNG.

Two of the Star employees who gave birth to the children had worked on VDTs for nearly three years, one for about two years and one for an undetermined time. All had worked on the machines during the early months of their pregnancies. Rosenthal said the most susceptible period for fetal deformation is in the first three months of a pregnancy.

The four mothers, who range in age from the early 20s to mid-30s, told Toronto newspapers that they took no drugs, watched what they ate and had quit smoking during their pregnancies.

According to the Star, 14 of the 160 women employed in inside classified sales had babies between May 1979 and May 1980. Seven of the 14 worked on VDTs. Three of the seven had babies with no birth defects. None of the women who had not worked on VDTs had babies with birth defects.

The four babies with the defects, all boys, were born between October and December. Three of their mothers said there was no family history of defects of the type their children have. The fourth mother, whose son has a cleft palate, said such abnormalities have occurred previously in her family.

One of the other babies has an underdeveloped and blind eye, one a club foot and the other complex heart defects. The mother of the first had worked part-time, two days a week, sometimes as many as 10 hours a day.

Only one of the four mothers has returned to her job at the paper.

Before testing of the Star's classified VDTs began July 22, employees were invited to attend one of three meetings conducted by a gynecologist, a physician-physicist and a radiologist from the provincial labor ministry.

The two doctors gave their assurance that nothing known to date about the operation of VDTs demonstrates that working on one can cause birth defects.

First machines tested were those used by three currently pregnant inside-classified employees. After the radiologist assured them that emissions were within the Canadian standards, all three voluntarily returned to work on the machine, the Guild reported.

While testing of the Star's VDTs for emissions was continuing, the Southern Ontario Guild was pressing the Star for a full investigation of factors that might have contributed to the four children's birth defects, including an independent medical examination of the children's mothers.

Don't Sit Too Close To The TV

Video Display Terminals (VDTs) are the TV-like screens and accompanying keyboards used for entering and displaying information stored in computers. While VDTs (also known as Cathode Ray Tube terminals or CRTs) were virtually unknown ten years ago, there are now an estimated five million of them in the United States. On daily newspapers alone, according to The Newspaper Guild, the number of VDTs in use jumped from 155 in 1971 to 15,800 in 1978. In addition to journalists, such diverse groups of workers as reservation clerks, bank tellers, telephone workers, programmers, word processors and typesetters use the terminals.

The spread of VDT technology has been accompanied by questions and fears among workers about possible health hazards from the machines. Some of these fears involve the now well-documented problems of eye strain, unhealthy posture, and stress which may result from regular use of VDTs.[1] Others have focused on the possibility of exposure to low levels of radio waves, microwaves, ultraviolet and X-rays. (See box opposite for description of terms.)

Cataracts At The New York *Times*

Concern about exposure to non-ionizing radiation, especially radio waves and microwaves, became widespread in 1977 when two workers at the New York *Times*, aged 29 and 35, developed an unusual form of cataract after working on VDTs for six and twelve months respectively. They were examined by Dr. Milton M. Zaret, Associate Clinical Professor of Ophthalmology at NYU, who had been studying the effects of radiations on the eyes for twenty-five years. Dr. Zaret reported that the cataracts were similar to those he had found in radar operators, where they were apparently the result of microwave exposure.

The cataracts that Dr. Zaret identified are formed on the surface of the lens of the eye, on a membrane that encloses the lens itself. These cataracts frequently occur initially in only one eye and can affect young people. Typical cataracts, on the other hand, involve the substance of the lens, which is surrounded by and distinct from the capsular membrane. They usually occur in both eyes at the same time and are associated with aging.

The Newspaper Guild charged that the cataracts of the two *Times* workers were caused by working on the VDTs, and took the case to arbitration. Tests were performed on the VDTs involved: a Telco Model 40, a Harris Model 1500A, and an Incoterm SPF 10/20. Eventually the arbitrator found that the machines fell within "reasonable standards of industrial safety" and that the *Times* could not be held liable for the cataracts.[2]

The arbitrator found, however, that the VDTs did emit extremely low levels of radiofrequency waves. He urged workers to have the fact that they work on VDTs entered in their medical records. While he found that the levels emitted were safe for "normal" eyes, according to present standards, he said that workers with "biologic susceptibilities which are to some significant degree different from the norm may still suffer difficulties." He ordered that the machines be tested regularly to ensure that the radiation levels didn't rise.

There was one important area of potential problems that the arbitrator did not explore. Dr. Zaret, advising the Guild, said that non-ionizing radiation was most likely to be a hazard when the VDTs were malfunctioning. The arbitrator noted that "the Guild concern about these occurrences arose from the fact that malfunctions were frequent. The Publisher provided reports of 200 incidents which had occurred on the Harris machine alone in the period [between January 1 and June 13, 1977]." However, because of the *Times'* objections to deliberately creating malfunctions, no tests were made on machines which were not in good operating condition.

The arbitrator's decision was printed in February, 1978. Two years later, in March, 1980, in an interview with William Hines of the Chicago *Sun-Times*,[3] Dr. Zaret reported the conclusions to which his own further research, and that of others, had brought him during those two years. In the interview, and in a subsequent paper presented at the International Symposium of Electromagnetic Waves and Biology in June-July, 1980,[4] Dr. Zaret discussed six further cases of cataracts which he believed to be related to non-ionizing radiation from VDTs.

More Cases of Cataracts

One patient was a reporter who previously had had no history of cataract problems. She had been working on VDTs for 15-25 hours per week over a six-month period, and, Dr. Zaret found, she had developed the first signs of lens injury associated with the development of cataracts. A second patient was a former radar technician who had previously been exposed to microwaves before transferring to office work. In his case, exposure to VDTs had apparently reactivated formation of a cataract which had stopped de-

veloping since his transfer to office work. A third patient had been exposed to X-ray therapy of her face in 1942 (then an accepted form of therapy for acne). Dr. Zaret's conclusion was that the X-radiation had sensitized her lens, that VDT radiation was a contributing factor, and that "the cataract was due to the additive effect of the two different types of radiation."

The fourth patient developed an incipient radiant energy cataract in her left eye and the earliest signs of a possible cataract in her right eye after three years of full- and part-time work on VDTs. This patient also showed symptoms of ear injury which were similar, Dr. Zaret said, to those which have been found following exposure to non-ionizing radiation. Dr. Zaret noted, "...[T]here is much in the literature which indicates that injury can occur to neurological function and special sense organs, like the ear, following exposure to non-ionizing radiation." The fifth patient had only one eye and a long history of eye problems. Because of extreme nearsightedness he had been viewing the VDT screen from three to four inches away. The sixth patient was an air traffic controller who had been working on a CRT radarscope for 24 years, but who, according to the Federal Aviation Administration, had not been significantly exposed to the other, high-power sources of non-ionizing radiation to which traffic controllers are frequently exposed.

In addition to describing the apparently VDT/CRT related cases of cataracts, Dr. Zaret stated that analysis of two new studies of ultraviolet led him to conclude that normally-functioning VDTs may emit a level of ultraviolet which can cause cataracts. One study, by Dr. Sidney Lerman, measured the levels of ultraviolet exposure which had caused cataracts in three people.[5] The other, a Bell Labs study by M.M. Weiss and R.C. Petersen, included data on ultraviolet given off by VDTs.[6] Zaret said that Weiss and Petersen had found emissions of approximately 0.1 microwatt per square centimeter (0.1 μw/cm^2). Interpreting the data in the two reports, Zaret found that the 0.1 μw/cm^2 level is above that which can cause cataracts.

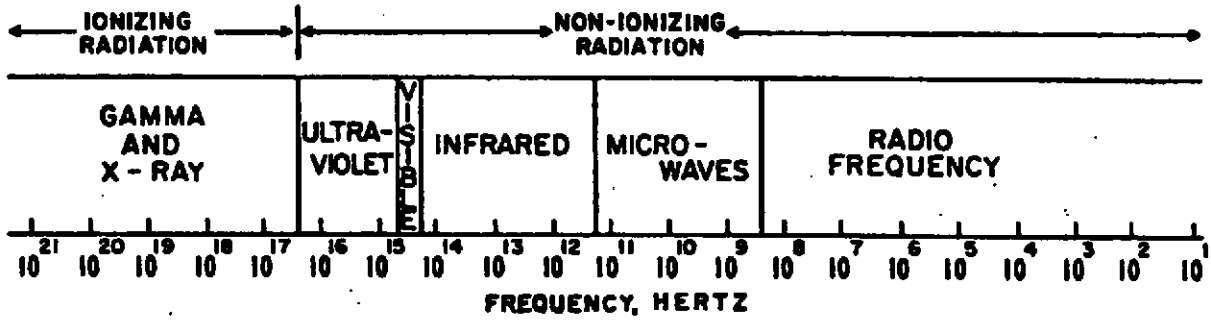
Ultraviolet had not been tested by the arbitrator at the *Times*. Dr. Zaret and the Guild had asked that it be included for completeness, but, when the *Times* objected, they had agreed to drop it because they did not believe "that [it goes] to the matter of causation of cataracts." In July, 1979, Dr. Zaret wrote to the arbitrator reporting the new information and his new conclusions.

Radio Waves At *Newsday*

At about the time Dr. Zaret was writing to the *Times* arbitrator about the ultraviolet studies, an unrelated study at Long Island's *Newsday* found that two Teleram 2277s were giving off 15 mw/cm^2 of radiofrequency waves.[7] This is 1½ times greater than the U.S. standard for radio waves of 10 milliwatts per square centimeter. It is 1500 times greater than the strictest standard in the world, the U.S.S.R. and Czechoslovak level of 10 *microwatts* per square centimeter. Subsequent tests found a reading of 4.5 mw/cm^2 from a Hazeltine 1510. Other tests at *Newsday* had found possible emissions of .6 mw/cm^2 from other VDTs. The findings were, of course, much higher than those registered at the *Times*. They also showed that VDTs vary widely in how much radiation they give off.

Government Denies Hazard

Dr. Zaret and others who conclude that VDTs pose a potential radiation hazard to workers find themselves in sharp opposition to industry spokespeople and to military and civilian government agencies who say there is no hazard. The National Institute of Occupational Safety and



Regions of the electromagnetic spectrum as a function of frequency in Hertz. The divisions between regions are approximations as an exact division can not be defined.

—NIOSH, *A Report on Electromagnetic Radiation Surveys of Video Display Terminals*

Health (NIOSH) has maintained this latter position strongly, and a 1977 NIOSH paper, *A Report on Electromagnetic Radiation Surveys of Video Display Terminals,*[8] is frequently cited by those who say that VDTs are safe. At a conference on VDTs in January, 1980, a NIOSH spokesperson, Michael Smith, stated that NIOSH believes there to be no scientific basis for concern about VDT radiation, and that the persistent requests for investigations are essentially a waste of its time.[9]

The requests have not gone away. Moreover, increasingly unions, rank-and-file groups and independent occupational health and safety analysts have questioned the quality and objectivity of NIOSH's research. The 1977 NIOSH report was issued as part of the *Times* dispute, and it was rejected by the Guild at the time. Dr. Zaret wrote later:

> Not only did NIOSH use instruments that were inadequate for measuring a large segment of the suspect portion of the electromagnetic spectrum, but also it found a dangerous level of hertzian radiation, 1 mW per sq. cm., in the *Times* building without ever even identifying its source! In addition, it became evident that NIOSH had no meaningful knowledge about non-ionizing radiation cataracts in humans although suitable information was available. Nor did it exhibit any awareness of the significance attached to capsular opacification at the posterior surface of the lens as this relates to hertzian radiation exposure.[10]

NIOSH's finding of 1 mw/cm² of hertzian (non-ionizing) radiation in the *Times* building is noted in the NIOSH report in the following passage:

> ...In making measurements on a VDT on another floor, a reading of 1 x 10^{-3} W/cm² was obtained with the Narda 8607. The reading still persisted when the terminals were de-energized. From this it was concluded that the source of radiation was not VDT related. Since readings of the same magnitude were obtained in the adjoining computer area, and at nearby windows, it was postulated that signals from nearby TV and radio stations were directly exciting the detectors.[11]

The magnitude of the emissions, for comparative purposes, was five times that of the emissions from TV transmitters on the World Trade Center which merited coverage in the *Times* and front page coverage in the February 25, 1980 *Daily News.*[12] Yet, beyond noting the finding in the VDT report, NIOSH apparently found the exposure of large numbers of workers in a midtown office to this level of radiation unworthy of further notice.

A feature of the NIOSH report which has raised questions about NIOSH's interpretation and presentation of data was its application to VDT workers, without comment, of the 5000 millirem per year (mR/yr) standard of X-ray exposure. (See box, p.2.) NIOSH may have been strictly accurate in comparing its findings to the 5000 mR/yr "occupational health standard" rather than to the 500 mR/yr standard for exposure by the general population, since VDT's are located in the workplace. However, VDT workers are a much larger group than was originally conceived of being covered by the occupational standard. Furthermore, VDT workers receive no special health monitoring, and have no idea that they may be "occupationally exposed" to X-rays. Thus, in giving VDTs a clean bill of health on the basis of this standard, NIOSH was not being straightforward.

Another X-ray exposure standard which has been applied to VDTs is the 0.5 mR/hour standard for allowable emissions by TVs. This figure was designed to apply to recreational TV viewing. It was not intended for a work situation of 8 hours a day at an approximate distance of 18 inches. In a standard workyear (50 weeks of 40 hours each), the 0.5 mR/hr figure comes to 1000 mR/yr, or twice the 500 mR/year standard for exposure by the general population.

Nevertheless, the 0.5 mR/hr standard is used in many studies as the measure of VDT X-ray safety. In the Weiss and Petersen study, for example, the actual figures for X-ray emissions are not given: it is simply noted that they are less than the 0.5 mR/hr standard. If this standard is meaningless, then this assurance is also meaningless.

In fact, the range of X-ray emissions from VDTs is unclear. A 1979 International Atomic Energy Association Study in Vienna, using a very precise calcium fluoride dosemeter, found no emissions from the machines tested beyond natural background levels of .02 mR/hr.[13] Weiss and Petersen reported that in their study and in previous studies at Bell Labs, "isolated instances" of X-ray emissions from CRTs have been caused by faulty high voltage power supplies. Poor experimental practices by NIOSH and other investigators have resulted in high "background" levels being reported in several studies.[14] These "background" levels may result from electronic fluctuations and drift of the measuring devices, and make the measurements from the VDTs meaningless. The result, coupled with the practice of simply reporting findings as being within the allowable standard, has been a lack of reliable data.

A Radiation-Free Workplace

Where do all the conflicting reports and conflicting standards leave VDT workers? What can workers do to try to ensure themselves a safe, radiation-free work environment?

One thing that has emerged clearly over the past few

years is that no one really knows the long-term effects of exposure to low-level radiation, ionizing or non-ionizing. New effects are constantly being discovered, and levels which were considered to be safe a few years ago are now acknowledged to be unsafe.

Therefore, it is legitimate for VDT workers simply to insist that their machines give off no radiation of any type. It turns out that this is well within the capability of existing technology. Apparently, it is not even particularly expensive. In many cases, shielding the high voltage power supply with metal, replacing plastic or foam cases with metal, and using filters would eliminate or very sharply reduce X-ray, microwave/radiofrequency, and ultra-violet emissions.[15]

It appears that VDT workers have been the victims of a cycle of cheap construction and cheap testing, the common element being a lack of concern for the workers' health. Machines have frequently been made as cheaply as possible. In the absence of pressure, little attention has been given to making them radiation-free. Tests, by and large, have been designed to note compliance with existing standards, which are themselves inadequate. Frequently the tests have been run with cheap, imprecise equipment, reports have been sloppy, and those conducting the tests have had strong vested interests in the results.[16]

Self-Education and Organization

This cycle can be broken only through self-education and organization. It is important for workers to learn as much as possible about VDTs and about radiation, and to be able to ask the right questions and to insist that they be answered.

The specific means by which to fight for safe machines will vary. Some VDT workers are in unions where the membership and the leadership are alert to the VDT radiation threat. Many more unionized VDT workers are in situations where they will have to educate their co-workers and their leadership, and will have to fight for their union to take an aggressive position on VDT radiation safety.

Unorganized workers who are unionizing can make VDT safety an important part of their demands and their organizing drives. Workers, both organized and unorganized, can bring requests for support to such bodies as committees for occupational safety and health, anti-nuclear organizations, and rank and file groups.

Where unions do make VDT radiation safety a priority, there is a lot they can do. They can demand from employers that only radiation-free equipment be purchased, thus building pressure on the manufacturers. They can organize a campaign for stricter radiation standards and enforcement, and they can fight for health and safety protection on the job.

For example, it is important that machines be tested on a regular and frequent basis, as was ordered by the arbitrator in the *Times* case. *Newsday* and several other newspapers now also have their machines tested regularly, although problems remain with the interpretation of the data.

It is particularly important that machines be tested when they are malfunctioning and after repairs have been made.

It is also important that workers receive regular eye exams, including the tests for radiation-induced cataracts. Workers should be tested before beginning work, and at six-month or one-year intervals thereafter. The tests should be conducted by ophthalmologists familiar with radiation effects.

VDT workers have a right to be informed of the possible emissions and hazards. They should have the right to refuse to work on VDTs and to be given other work at equal pay.

The VDT radiation problem cannot be isolated from the much larger problem of which it is a part: the electronic pollution of the environment. In *The Zapping of America*, Paul Brodeur has outlined the dimensions of the "electronic smog" problem, especially as it results from non-ionizing radiation. Brodeur quotes a 1971 White House report:

> The electromagnetic radiations emanating from radar, television, communications systems, microwave ovens, industrial heat-treatment systems, medical diathermy units, and many other sources permeate the modern environment, both civilian and military....This type of man-made radiation exposure has no counterpart in man's evolutionary background; it was relatively negligible prior to World War II....Power levels in and around American cities, airports, military installations and tracking centers, ships and pleasure craft, industry and homes may already be biologically significant....The population at risk is not really known; it may be special groups; it may well be the entire population....The consequences of under-valuing or misjudging the biological effects of long-term, low-level exposure could become a critical problem, especially if genetic effects are involved.[17]

****

Electronic pollution may present hazards to the population similar in scale to those of atomic energy and chemical wastes. Workers who use electronic equipment such as VDTs are even more exposed to potential dangers than the general public. It is our responsibility to lead the fight for our own health and to help build a movement for a safe technology that serves, rather than endangers, us.

Arrangement of the work station

The size and shape of the desk and, particularly, the way in which it is arranged vary widely depending on the type of work being done. As a result of the introduction of data terminals a number of new factors have become important in the arrangement of the work station.

A number of different devices and working materials must be coordinated on the desk-top. These include telephones, typewriters, calculators and many other items. The way in which they are coordinated will depend on a number of factors such as the amount of time consumed by different phases of the work. The pattern of movements is of major importance. One general rule is that the items that are used most often should be located as close to the operator as possible and made as easily accessible as possible. Preferably, they shall be within convenient reach with the elbow resting on the desk-top. This area encompasses the sector of a circle having a radius equal to the length of the foreamn. Stretching the arm results in a greater reach, but the muscle load is also greater. To reach outside this larger circle sector, the entire body has to be moved. This involves a disproportionate amount of muscular work and should therefore be avoided as far as possible.

A detailed analysis of all significant factors affecting the adaptation of the work to the individual work station is often necessary. Fully ideal conditions can not always be acheved. Compromises must sometimes be accepted.

Consideration must also be given to the individual's capacities vis-a-vis the task at hand. Here too, analysis is desirable. For example, a test of vision is very important when the job involves work with data display units that impose stringent requirements with regard to vision.

Viewing distances at the work station should be given special attention. Uniform distances should be the objective. Constant readjustment of visual focus tires the eye and is troublesome, particularly for older people who must depend on their glasses. Viewing distances may be different from reading distances. In such case ordinary reading glasses are not suitable. Instead, special work glasses that have been selected for the viewing distance in question should be used.

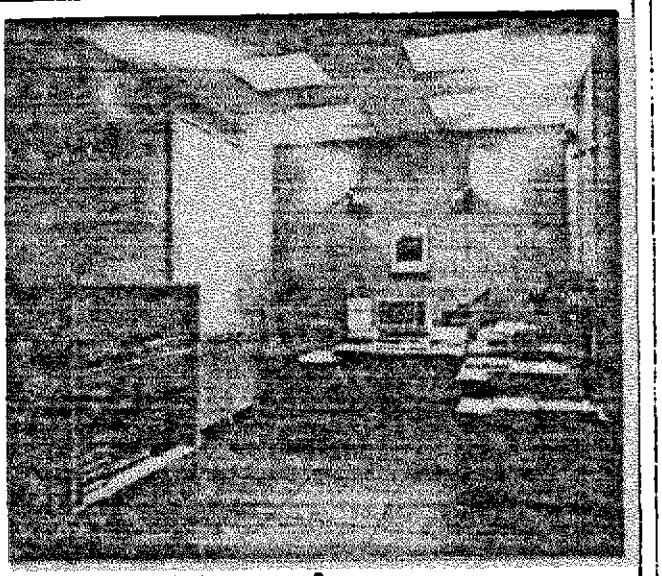
One often sees data operators who use bifocal lenses. In such lenses, a small portion of the glass has been ground for close-up work, and it is located in the lower half of the lense. When the user looks up toward the screen, he must lift his head – a simple eye movement will not suffice. This movement takes place in the top part of the cervical vertebral column, and the neck must assume a strained position. Experience has shown that bifocal glasses often cause neck trouble in those engaged in this type of work, and they should therefore be avoided. Glasses of the varilux type are an alternative. Such glasses make possible a continuous transition between the different fields.

If the operator spends most of his time at the terminal, the screen should be located directly in front of him at a suitable viewing distance. The keyboard should be located at a suitable height (about 65 cm) and be of easy access. If the terminal is used only occasionally, it can be placed further to one side. A sound decision will require analysis of the various phases of the work done in each individual situation. Evidence indicates that flexible arrangements often provide a rational solution. It is sometimes advisable to design special desks for data terminals. Experiements are in progress in a number of places. Attempts have been made to design special furniture for terminals in which the keyboard is recessed into the desktop, placed on a pull-shelf beneath the desktop or provided with other special arrangements. Experience gained from these experimental arrangements has been both favourable and unfavourable.

One acceptable solution is to place the terminal on a side table in the same way as a typewriter. This requires a swivel chair.



What's wrong with this picture?



What's right with this picture?

THE GOOD, THE BAD, AND THE UGLY

An office environment must be carefully designed to make sure that the maximum benefits result from the use of computer systems. British Telecom was trying to make this exact point when its human factors division recently created contrasting office scenes for an exhibition to show the right and wrong ways to set up an office.

The poorly designed office (left) is proof of what happens when human factors are ignored. A close look shows that the video display terminal (VDT) screen is attached to a thick keyboard which is raised to the right height with the help of a book. All of this makes it difficult to position the VDT comfortably.

Some more no-no's: the screen is fixed in a vertical position and is shiny. The artificial lights are also too strong, and variable lighting is coming through the window. Such bad lighting causes glare and screen reflections, which in turn could cause eye strain. To make matters worse, the characters displayed on the screen are blurred at the edges and difficult to read.

The keyboard itself (which cannot be seen) has a nonstandard layout, with no differentiation between control keys and the alphabetic and numeric keys. This leads to inaccurate and inefficient keying. There are other problems with the printer, which is illogically located on the far right side of the room—a situation which means the operator either has to turn around or stand up to check the output. You have to hear it to believe it, but the printer is also extremely noisy.

The operator's chair, which may look modern, cannot be adjusted. Input documents must be placed flat on the desktop, forcing the operator to sit in an uncomfortable position when keying in the input.

What looks like a trip wire running across the floor is actually—you guessed it—a cable. Besides being unsightly, it's also dangerous. You'll also notice there's scant work space or storage room for computer media, documents, or books.

All in all, the whole environment exhibits a total lack of concern for the operator. It's unhealthy, uncomfortable, inefficient, and plain ugly.

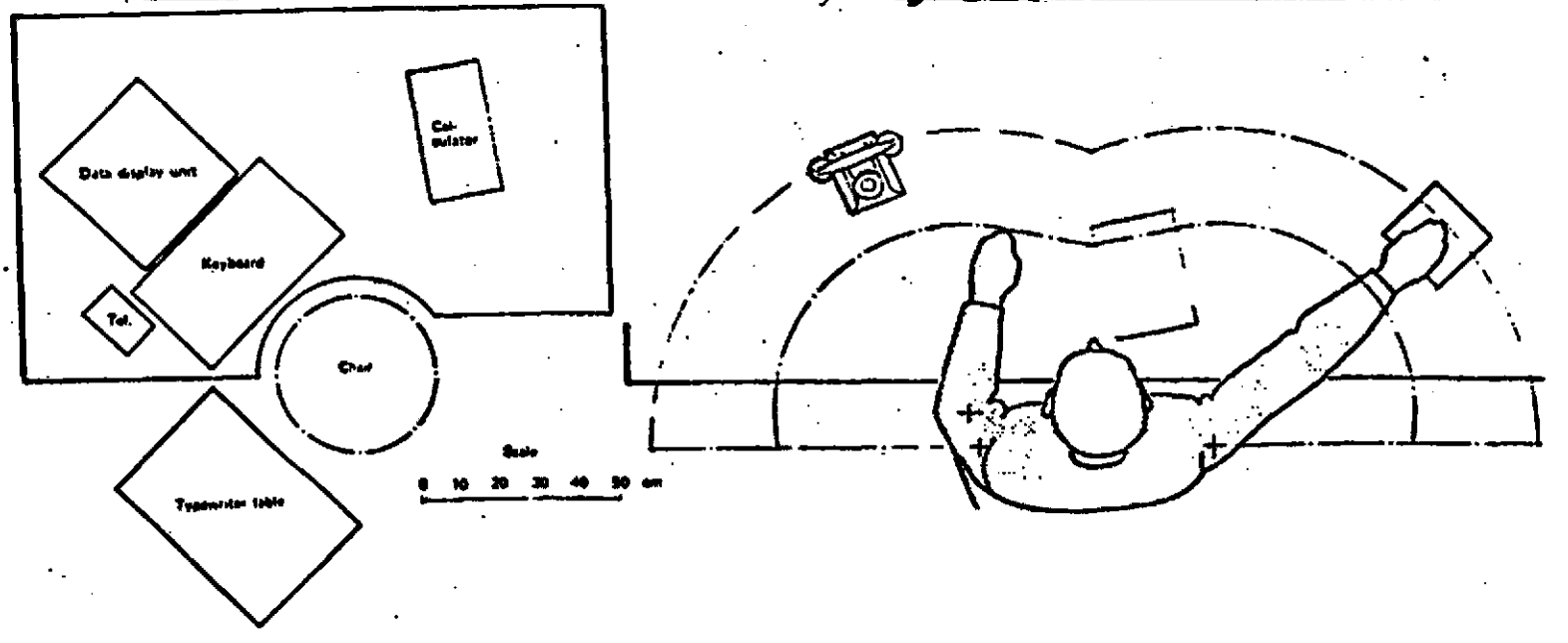
The opposite picture is presented by the model of the optimum office (right). There the detachable VDT screen can be tilted and has a nonglare surface. The keyboard also scores points for its streamlined design and standard layout which features separate, easily identifiable control keys.

The document holder to the left of the screen helps ease eye movement during the input process. The quiet printer is also conveniently located to the right of the screen, enabling the operator to take quick looks at the output.

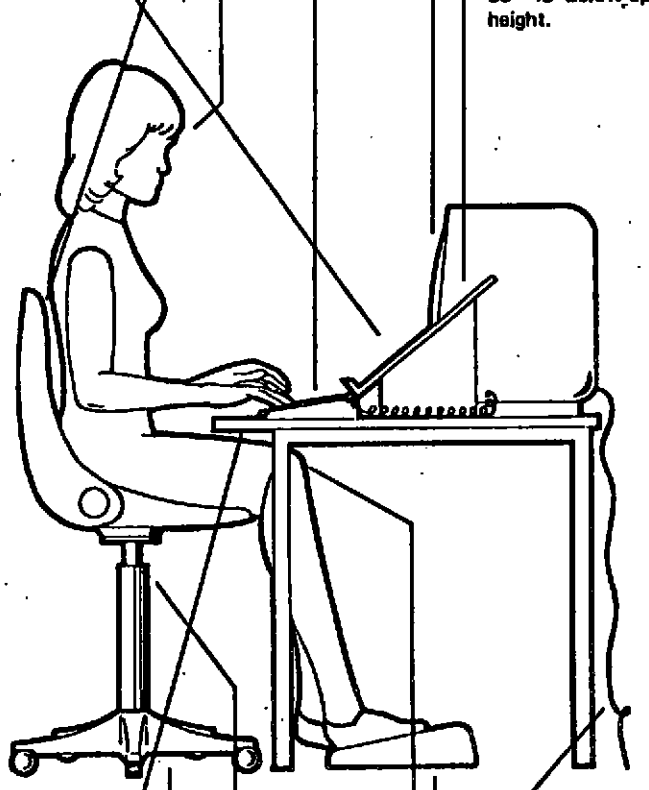
Another ergonomic plus is the operator's chair, which has a height adjustment and caster for easy movement. You won't see any cables either, because they are hidden under a false floor. But what you should be able to see is the lighting, which is carefully positioned and controlled to avoid eye trouble. There's sufficient work space and storage.

The systems in this setting have been designed to provide the most efficient and effective, as well as humane environment. In an environment like this, the operator is made to feel comfortable. The likelihood of illness is minimized, while the opportunity for job satisfaction is maximized. It may not be home, but it could be heaven to a terminal operator.

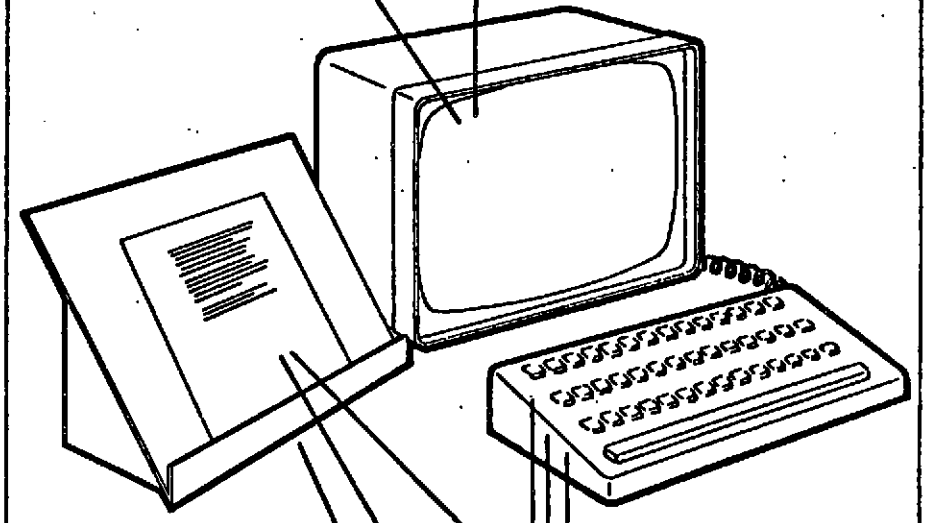
—M.P.



Good Workstation Principles



Good Keyboard and Screen Characteristics



The following was prepared by the Association of Professional, Executive, Clerical, and Computer Staff; a trade union in England. While specifically designed to assist unions in developing Health & Safety contract language, the checklist contains valuable information for all VDT operators.

General

—Full discussion should take place between union and management prior to the application of word processing equipment. This is necessary to ensure that full consideration is given to the potential health problems. In these deliberations, the machine and the operator should not be considered in isolation;

—The introduction of new technology should not be allowed to impose an increased workload on employees. The workload should correspond to the individual operator's capabilities;

—Agreements on rest periods should be flexible, to allow for the varying impact of the factors involved. Short breaks taken fairly often are better than long breaks every two or three hours;

—A good system of communication should exist between operators and supervisors to enable grievances to be expressed;

—Systems should have adequate feedback and should be suitable for the job which is required of them;

—Adequate training should be given to operators, in the use of the system and in methods of avoiding health problems, e.g. lighting, contrast adjustments, proper chair and desk height, and so on.

Eyesight

—Appropriate eyesight correction should be prescribed where necessary. This may involve special prescriptions for the use of screen based systems given the different nature of the visual tasks involved.

—Regular eye tests should be applied to all operators.

Equipment

—Equipment should be adequately maintained;

—Frequent checks should be made for possible radiation emission;

—Implosion shields should be built into VDUs;

—Keyboards should have audible and tactile feedback;

—Keys should be within easy reach of the 'home' row, with special function keys placed so as to avoid inadvertent use;

—Keyboard equipment should conform to the following standards:

Key force	25–150 grammes
Key travel	1–4 mm.
Key shape	square and dished
Key size	12.5 mm.
Key spacing	3–6 mm.
Centre spacing	16–19 mm.

—Screen colour should preferably be dark green, with lighter green or yellow characters, or black, with white characters;

—Screen luminance should be approximately half the level of luminance in a normal office, e.g. for an office luminance level of 150 cd/m², screen luminance should be approximately 75 cd/m². It should be possible to adjust this level;

—a 5 by 7 or 7 by 9 dot matrix should be regarded as a minimum;

—A refresh rate of 60Hz for a low to medium persistence phosphor, should be seen as a minimum;

Environmental

—Glare should be reduced to a minimum, with a maximum glare index of no more than 16;

—Source documents should be well positioned preferably on a stand, to give equal distance between the eye and the screen, and the eye and the source document. Source documents should be clear and legible;

—The workplace should be large enough to avoid excessive heat from equipment. Adequate draught-free ventilation should be provided;

—Relative humidity should be between 65 and 70 per cent.;

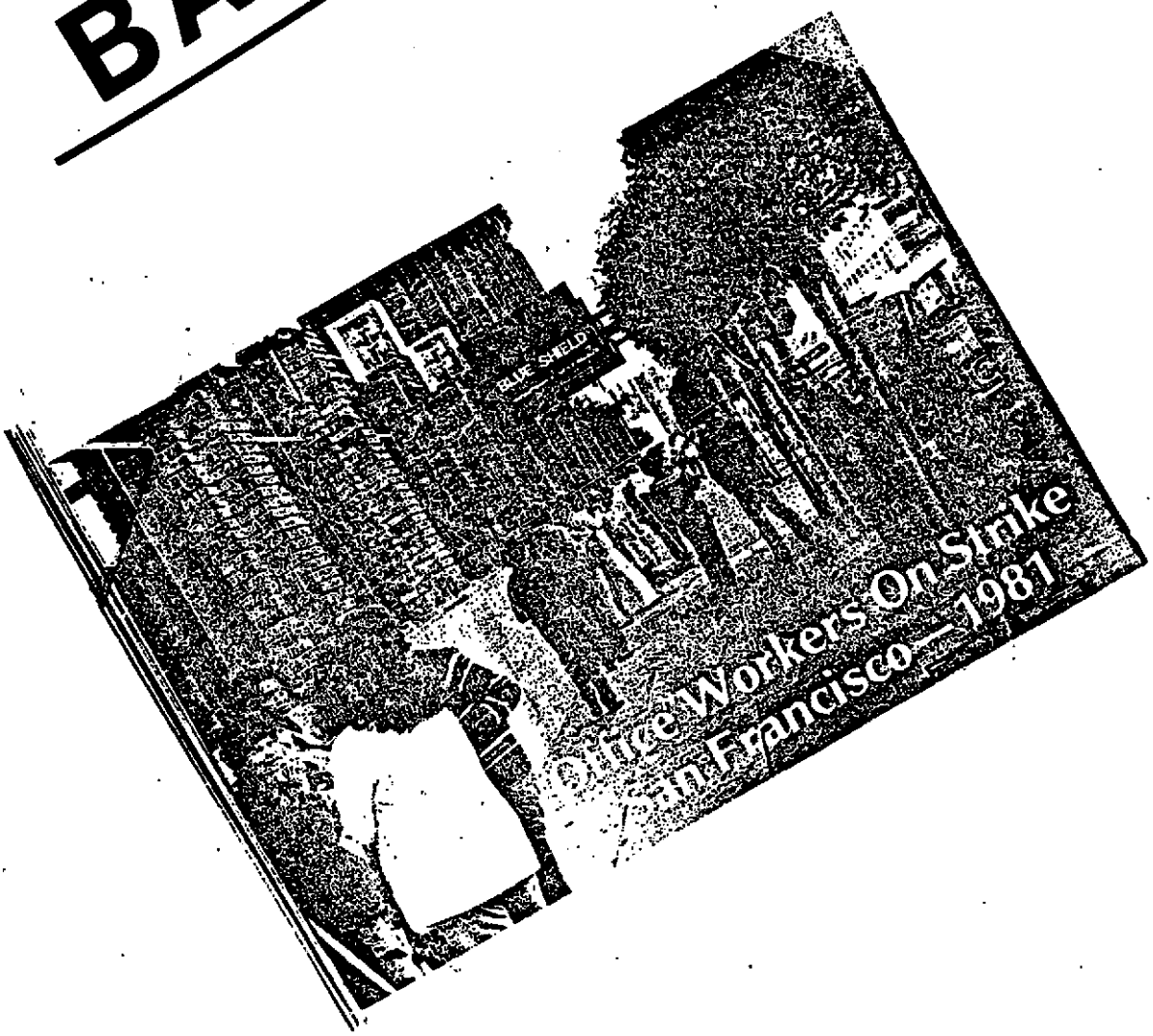
—Noise level must be no more than 65 dba, but a lower level should be aimed for. Background noise should be minimal;

—Chair and desk height should be matched to the individual characteristics of the operator, and should be adjustable while remaining seated. Screens should be adjustable in angle;

—Sufficient storage space should be provided at the work station for personal belongings, office equipment and source documents.

"People will adapt nicely to office systems if their arms are broken," an IBM official told *Business Week* in 1975. "And we're in the twisting stage now."

FIGHTING BACK!



VDT OPERATOR EXPECTED TO PROCESS OVER 350 CLAIMS A DAY

The following article is based on an interview with Barbara Pottgen, Claims Examiner for Blue Shield/Blue Cross, Chief Steward of the Office and Professional Employees International Union, local 3.

Q: When and how did you learn that VDTs would be coming into your office?

A: A little over three years ago VDTs were placed in the initial claims department. Gradually, they were introduced into other offices until the computer processing of insurance claims completely replaced paper processing. Not only wasn't the union involved or consulted in the equipment purchasing decision, but we weren't even notified that such changes were to take place.

Q: How has your job changed since working with a VDT?

A: Work is more dangerous than ever before. Tasks such as filing, that used to take me away from my desk have been eliminated. Now, any work that I do is on the VDT. There is no room for creativity in my job performance. Opportunities to talk with other people in the office have been virtually eliminated. I am tied to my desk eight hour hours a day. The office was rearranged so that our desks are now in long rows, one behind the other rather than next to or across from each other. The underlying assumption being that if we cannot see each other while we work, we won't talk to each other while we work. This also makes it much easier for my boss to look down the row of desks and keep an eye on what each one of us is doing every minute of the day. This has increased the amount of control that management has over my work routine. They can easily hook into the computer to monitor when I'm working and how much I'm getting done. When I first started this job five years ago I had to process 116 claims a day. Now, using the VDT I am expected to process over 350 claims a day. The pressure can really get out of hand.

Q: You say your workload has increased from 116 claims a day to over 350 claims a day. How do you explain that?

A: After the VDTs had been in use for a while the company had a time motion study done. They never talked to the VDT operators about job duties. They only spoke to supervisors. Then they analyzed the computer capabilities and workload. After counting up the number of keystrokes required for an individual claim, they calculated the time required for that number of key strokes to be made. From this they calculated the number of claims that could be processed by one person within an eight hour day. That's how they came up with a standard of over 350 claims per operator a day. But merely counting key strokes to determine standards is obviously insufficient. Thinking time before striking the key should be included, but was totally ignored in their calculations.

Q: Has staff size been affected?

A: There haven't been any direct layoffs, but positions have been eliminated by attrition. Probably over the past five years staff size has stayed about the same, but each employee is now handling a much greater volume of work, and no one is receiving additional compensation for it.

Q: Has there been much resistance from the staff?

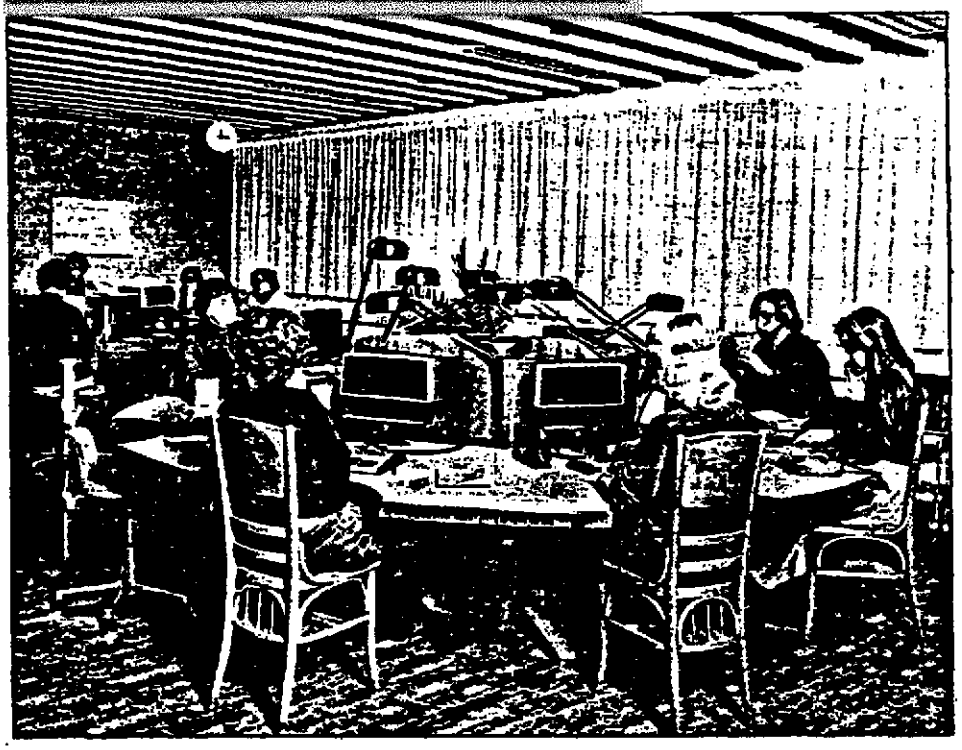
A: Initially, there was no resistance. None of us realized how much these machines would change our jobs and our lives. It was only after the first year with the speed up, (the new production standards), that we began to feel the affects. Long term employees were getting warning notices for not meeting production standards. Some were terminated while others were demoted and forced to take a cut in pay. Many people-those who've never had eye problems and those who wear corrective lenses, especially bifocals-are complaining of eyestrain and fatigue. Many people are complaining of stiff necks and shoulders not to mention the increased stress that everyone is feeling. We, in OPEIU local 3, along with 19 other union locals in the Bay Area have formed a VDT coalition to investigate the problems brought on by VDT usage. With the endorsement of five international unions including the Communications Workers, the Newspaper Guild, the Graphic Arts and Transport Workers, and the Typographical Workers Union, the VDT coalition called for an in-depth federal study of the health questions raised by using VDTs. As a result, NIOSH, the National Institute for Occupational Health and Safety conducted an evaluation of health risks associated with VDT usage and we are awaiting their final report which should include recommendations for standards, lighting, glare control, and frequency of rest breaks. We are now determined to incorporate health and safety clauses for VDT operators into our new contract which will be negotiated in November.

Q: Do you hav any suggestions for clericals in offices not yet automated?

A: Clerical workers need some kind of weapon or tool to use over management to protect ourselves from losing our jobs and our health. We must force management to open their doors, listen to our needs, our complaints, and acknowledge the value of clerical work. We need something to fight with. Unionization is the key.

VDTs: Enough To Make You Want A Union!





WORK ORGANIZATION: Below: Information operators at Sweden's publicly-owned phone company have insisted that video display screens be arranged in circles rather than rows or cubicles so they can have more social contact. Left: U.S. operators at work.

"VDTs" are making working conditions and health and safety important organizing issues among white-collar workers.

These electronic keyboards and screens, called Video Display Terminals (VDT), Video Display Units (VDU), or Cathode Ray Tubes (CRT), are now being used by an estimated 5-7 million American workers. By 1985, there will be more than ten million VDTs in use.

As a result of VDT operators' complaints about headaches, backaches, eye strain, stress, dizziness, and other health problems, unions have begun to bargain for contract protections and to publicize their gains among non-union workers.

VDT clauses recently negotiated by unions such as CWA, UAW, OPEIU, and the Newspaper Guild require management to pay for operators' eye exams and glasses and to allow them to take more time off from the screens.

Under Guild contracts at four newspapers in Minneapolis and St. Paul, workers can take one or two extra rest breaks of up to 30 minutes each day.

In Norway, Sweden, and many local unions in England, the maximum time an operator can be required to do steady VDT work is four hours per day—scheduled in a two-hours-on, two-hours-off rotation. This forces employers in both the private and public sector to arrange a variety of work assignments for clericals who would otherwise be restricted to their terminals all day long.

Unions have also forced European office equipment suppliers to incorporate proper design features into their newer VDT equipment. Employers are now expected to provide special lighting, adjustable tables and chairs, detachable keyboards, glare-proof screens, better contrast between text and screen, and low-noise printers.

Health problems only one concern

But even if the physical working conditions can be improved, many European VDT operators are asking unions to help solve other serious problems.

"VDTs eliminate social contact among workers," says Norwegian trade union computer consultant Jostein Fjalestad. "They take away the variety in your job. They can keep track of your work more carefully so that an office worker begins to face the same pressure to keep up with machine-paced quotas that an assembly line worker does."

ASTMS, the British scientific and technical workers union, has shown workers it can deal with these concerns by negotiating technology agreements before VDTs are installed.

During a recent visit by staff of *American Labor* and a number of American unions to a laboratory and office run by a subsidiary of Tenneco Corp. near London, the ASTMS local was locked in a dispute over word processing equipment which management wanted to install without negotiating with the union.

Terminals, keyboards, mini-computers, and printers were still in crates, not yet unpacked or plugged in. The secretaries, who belong to the union, were refusing to work with the equipment until the company came to terms with the local's five-member new technology committee. Tony Curtis, a scientist and committee member, explained the union's position this way:

"Being put on a terminal completely changes the nature of a clerk-typist's or secretary's job. We are very concerned about the pay grades that result and the social isolation of terminal operators in the small cubicles created for VDUs. We want to expand the scope of secretarial skills, not fragment them.

"Our members want us to win changes that go beyond what color desks the VDUs will be placed on or that sort of thing."



THROUGH A GLASS, DIMLY

WHY 75 SECRETARIES AT THE UN WALKED OFF THEIR ULTRA-MODERN JOBS

Job Safety:

IS YOUR WORD PROCESSOR RADIOACTIVE?

Are word processors, those nifty computerized typewriters, an unnecessary health hazard in the office? A stubborn band of typists at the United Nations have been carrying on a guerrilla war for more than a year to prevent a costly conversion to the machines.

The processors (text-editing typewriters with video display screens) were leased from Wang Laboratories and installed to increase productivity—but the plan has backfired as the typists, about 100 of them, have walked out twice so far in an effort to have the machines replaced with equipment that does not use a cathode ray tube, a source of low-level radiation emissions.

The typists, from the English, Spanish, and French typing pools, signed a resolution in June, 1978, refusing to operate the machines, claiming that they had not been consulted on the original decision and that they felt their work schedule—which requires typing translated documents under pressure for up to 16 hours a day, sometimes six days a week—was not suited to the use of video screens. (Frequent breaks are necessary to prevent eyestrain.)

Soon afterward, each typist was sent a warning that refusal to learn the new technology would be noted in their files. Twenty-six volunteered to operate the machines, but the rest remained firm.

The administration had tests conducted by the National Institute of Occupational Safety and Health, which concluded that the machines do not emit any "detectable" X rays and only "negligible" amounts of other radiations, far below acceptable standards set by the U.S. government for nuclear industry workers.

The typists, however, have collected many scientific articles and reports on the hazards of low-level radiation—including cataracts, eyestrain, dizziness, and nausea—and have been in touch with researchers such as Dr. Milton Zarat, a professor of ophthalmology at New York University, who reports on treating many cases of cataracts caused by low-level emissions.

The International Court of Justice, asked to investigate their complaints, recommended arbitration on the health question. A study commissioned by the typists—using an outside consultant—came up with two alternative machines that would meet the necessary work specifications without using a cathode-ray tube. The administration study concluded that no alternative machine was possible. Both studies are now up for consideration by the joint Advisory Committee, composed of both representatives of the staff union and the administration.

The typists are now back at work on their old IBMs, a handful of volunteers is still operating the controversial word processors, and no one is certain how it will all turn out. But the typists hope that their fight will encourage other women to research the safety of their office equipment and refuse to be exposed to unnecessary health hazards. —*Jan Andrew*

SF-OAKLAND NEWSPAPER GUILD

(1) EYE CARE. i. Each employee required to use VDTs or CRTs shall be given eye examinations at the beginning of employment or of assignment to VDTs or CRTs, and annually thereafter. For employees already using VDTs when this Agreement is executed, the first such examination shall be within one month of execution date. Such examination shall be made by an ophthalmologist and shall include, in addition to routine optical testing, tests for central and peripheral visual acuity, for color vision (using pseudo-isochromatic test plates) for cataracts, for glaucoma, and for accomodation. In addition, dilation shall be used if the results of the preliminary procedures show its desirability. Such examinations shall be paid for by the Employer.

ii. The Employer shall keep records on each employee for the duration of his or her employment plus 25 years thereafter. Such records shall include information on test results, as specified in paragraph i. above. Access to such records shall be limited to the individual employee, the Employer, the union representing that employee, and bona fide health researchers.

iii. If an employee's request for new corrective eyeglasses for use in VDT work is supported by a recommendation of an ophthalmologist and/or optometrist, the Employer shall pay for such new glasses and the examination(s) involved.

(2) BREAKS. i. No employee shall spend more than 50 minutes accumulatively of any 60-minute period on VDT work.

ii. Operators' work on VDTs or CRTs shall end one-half hour before the ends of their shifts in order to give their eyes time to readjust. Such employees may be assigned to other work not on the tubes.

(3) PHYSICAL PLANT. i. Effective glare shields shall be affixed to the front of each machine.

ii. Adjustable chairs, footrests and tables to allow for adjustment of individual machines to suit each operator shall be available to provide optimum comfort and the minimum amount of physical stress for each operator.

iii. Lead aprons shall be available for any operator who wishes to wear one.

iv. The Employer shall provide optimal lighting conditions adapted to accomodate the types of tubes in use at each worksite.

v. Machines shall be individually adjustable for brightness, contrast, focus and the angles of screen and keyboards.

what they tried for and ...

(4) [illegible] the union with results of tests, which shall be conducted at least once every three months, such test to be for the purpose of (a) determining whether VDTs or other devices are emitting harmful radiation, and (b) determining whether VDTs are improperly "tuned" or "focused" to a degree causing undue employee eye strain or fatigue. Such tests shall be conducted and reported, as well, after a machine has been moved or maintained in place.

ii. A union representative may accompany each inspector making such inspections.

. . . what they got

THE GUILD REPORTER

OFFICIAL PUBLICATION OF THE NEWSPAPER GUILD (AFL-CIO, CLC)

(9) **Video Display Terminals** — This will confirm the understanding reached in the 1980 negotiations by the San Francisco-Oakland Newspaper Guild and the San Francisco Newspaper Publishers' Association on behalf of the San Francisco Chronicle, San Francisco Examiner and the San Francisco Newspaper Agency (hereinafter referred to as the "Employer"), regarding the working conditions covering the use of Video Display Terminals (VDTs) in the various departments of the named Employer. The Employer committed themselves in said negotiations to study the proposals made by the Guild and to make the necessary changes as required in said working conditions. The Employer specifically agrees to implement as required the following changes in working conditions:

1. **Adjustable Chairs** — The Employer will provide chairs adjustable for persons required to use VDTs on a regular basis. Where needed, the Employer shall also provide footrests and devices for height adjustment of VDT equipment.
2. **Room Lighting** — The Employer will provide lighting conditions to accommodate the VDTs in use.
3. **960 Brightness Control** — The Employer will

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provide a brightness control on each 960 VDT in use.

4. **Glare Shields** — The Employer will furnish glare shields, upon request, to employees required to use VDTs on a regular basis.
5. **Eye Glasses** — If an employee is required by his/her doctor to wear special glasses, for the sole purpose of working on a VDT, the Employer shall provide such glasses.

(c) Video Display Terminals. The Employer shall provide the Guild with results of tests, which shall be conducted at least once every six months, such tests to be for the purpose of (a) determining whether video display terminals or other devices are emitting harmful radiation, and (b) determining

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whether video display terminals are improperly "tuned" or "focused" to a degree causing undue employee eye strain or fatigue. Such tests shall be conducted and reported after a VDT has been moved or maintained in place.

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FOR IMMEDIATE RELEASE

July 18, 1979

CONTACT: Fred D. Fletcher
or
Doug Cuthbertson
(415) 421-6833

UNIONS CALL FOR VDT STUDY

A coalition of unions wants an in-depth government study of health questions raised by workers using video display terminals -- computer terminals built around cathode ray tubes.

The research would be conducted by the National Institute for Occupational Health and Safety (NIOSH). It was requested today by a San Francisco Bay Area group endorsed by five international unions and numerous local labor groups, mostly in the West.

"We believe that standards are urgently needed to insure safe usage" of VDTs (CRTs), the group said in a letter to NIOSH Director Dr. Anthony Robbins, whose headquarters are in Rockville, Maryland.

An estimated 5 to 10-million VDTs are in use in this country, the group said, and unions get worker complaints of headaches, tension, malaise, neck and shoulder pain, eye strain, distortion of visual focus, and color identification aberrations. Some concern also has been expressed as to possible radiation effects, the letter said.

To set usage standards, the unions said they need answers to basic questions involving the length and frequency of rest breaks needed to prevent fatigue and eye strain; lighting, keyboard and screen angle, glare control, and the advisability of periodic ophthalmalogic examinations.

The request for the NIOSH research was endorsed by five international unions -- Communication Workers of America, The Newspaper Guild, Office and Professional Employees International Union, Graphic Arts International Union, and Transport Workers Union of America -- and by 19 local unions and two regional councils.

Signers of the letter were Helen S. Palter, Barbara Pottgen and Barbara Gray, who are officers or safety representatives of the Newspaper Guild, Office and Professional Employees and Typographical Union locals in San Francisco.

#

WomenWorking

Little Radiation, Many Other Health Hazards

NIOSH Releases VDT Reports

by Sharon Samek

Yes, video display terminals (VDTs) can be dangerous to your health! That's the latest word from NIOSH (the National Institute for Occupational Safety and Health) as documented in three recently released reports on the hazards of VDTs in San Francisco Bay Area workplaces.

A VDT is usually part of a computer system: an electronic keyboard is attached to a TV-like screen which displays letters and characters as you type them into the machine. As these machines began to show up in offices across the country, typists who were operating VDTs found themselves suffering from blurred vision, burning and sore eyes, neck and shoulder pains, migraine headaches, and dizziness. The increasing number of complaints prompted a coalition of about 20 California local unions and five International Unions (Communications Workers of America, the Newspaper Guild, Office and Professional Employees, Graphic Arts, and Transport Workers) to call for a government study (a NIOSH Health Hazard Evaluation) of health questions raised around the use of VDTs.

The investigation began in November, 1979, with walk-through surveys at three worksites: the Oakland Tribune, the San Francisco Newspaper Agency (which publishes the San Francisco Chronicle and Examiner), and Blue Shield of California. These surveys were followed by a more in-depth study which included radiation emission checks, analysis of workroom air samples, a questionnaire survey of employees, and an evaluation of work station areas.

A separate NIOSH Health Hazard Evaluation report was issued for each of the three Bay Area employers in early 1981. The reports, entitled "Potential Health Hazards of Video Display Terminals," may be consulted at the LOHP library and should be available soon directly from NIOSH.



Hazards associated with video display terminals, which are used by 7 million Americans in offices, are addressed by several new studies.
(Photo: Tom Tuthill, LNS.)

Key findings of the study include the following:

- **Radiation.** The VDTs examined recorded low levels of radiation emission. Given the low levels, and considering the complexity of performing and interpreting the results of radiation surveys, NIOSH determined that further tests for radiation were unnecessary.

- **Work station design.** It was also recommended that work station areas be designed with maximum flexibility so that they can be adapted to each individual operator. This would include adjustable seats and backrests; detached and adjustable screens; and contrast and brightness controls.

- **Illumination.** Recommended illumination levels were harder to determine since different tasks performed in the same work area often required different levels of illumination. Reading from a "hard" or white paper copy places different demands on your eyes than reading from a dark VDT

continued on p.6

NIOSH ON VDTS

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screen. To assure comfortable reading, illumination levels between 500 and 700 lux were recommended for VDT areas, provided that hard copy used by operators has a sufficiently high print/background contrast.

A number of methods for limiting direct or reflected glare were also suggested. Drapes, shades, and blinds should be closed to block the direct sunlight; terminals should be properly positioned with respect to all windows and lighting fixtures; screen hoods and antiglare filters should be installed; and lighting fixtures should either be recessed or covered in such a way that the light is directed downward rather than spreading out and casting a glare on VDT screens.

- **Rest breaks.** It was clear that the VDT operators surveyed were not happy with their jobs. Many complained of blurred vision, burning and sore eyes, color distortion, and neck and back aches due to muscle tension. Operators also suffered from high levels of stress, creating anxiety, irritability, and depression. Taking all these factors into consideration, NIOSH recommended:

  1. *15-minute rest breaks after two hours of continuous VDT work for operators under moderate visual demands and/or workload; and*

  2. *15-minute rest breaks after one hour of continuous VDT work for operators under high visual demands, high workload, and/or those engaged in repetitive work tasks.*

  While there is no evidence that this proposed work/rest schedule is sufficient, NIOSH recommends that these measures be tried before implementing "more disruptive" remedies such as job redesign or job rotation.

- **Vision testing.** The final set of recommendations, based on the overwhelming evidence of serious eye problems, called for mandatory preemployment and periodic vision testing. The American Optometric Association can be contacted for a list of procedures that should be followed when eye exams are conducted.

WHAT NEXT?

The VDT coalition needed answers to the basic questions involving equipment design, length and frequency of rest breaks, eye exams, illumination levels, and glare control before they could petition OSHA to set VDT usage standards. Now that the NIOSH reports have been issued, the coalition can proceed with its work. In addition to pressing for standards, the coalition is putting out a monthly newsletter which covers the latest developments in research, health and safety contract language for VDT operators, and other union approaches to fighting office automation. If you, your union, or your organization are interested in joining forces with the VDT coalition, call Helen Palter, S.F.-Oakland Newspaper Guild, at (415) 777-7334.

Green phosphors? Why not white?

The recognition that yellow-green corresponds to the peak spectral response of the human eye has been responsible for a number of changes in society, including the shift to this highly visible color for use on emergency vehicles. Many terminal manufacturers have also taken note of this fact. Thus, although green and white phosphors are currently equally popular, a trend might be developing toward the increased usage of green.

Because the eye responds most effectively to yellow-green, a CRT with yellow-green or green phosphor provides greater apparent contrast at lower beam current. In turn, this lower current produces less beam diffusion, resulting in better resolution and focus. And because a display with yellow-green or green phosphor can operate comfortably at lower brightness levels, the use of these colors also helps alleviate operator eye strain.

Mt. Sinai and Newspaper Guild

New VDT Study Planned

On February 3, 1981, The Newspaper Guild, AFL-CIO, and Mt. Sinai School of Medicine in New York City announced plans for a wide-ranging epidemiological study into the health effects of operating video display terminals.

The study will include ophthalmological examinations, radiation tests, a survey questionnaire for VDT operators and, if the questionnaire results appear to justify it, full scale medical examinations. The study will cover some 2,000 employees, both VDT users and nonusers, in four to six Guild locals in the U.S. and Canada.

Measuring the responses, symptoms, and physical condition of VDT operators against those of nonusers in the same offices, the study will investigate both radiation and other health effects. The radiation phase will be coordinated with a broad investigation now being conducted by Mt. Sinai and the Workers' Institute for Safety and Health (WISH) into the effects of nonionizing radiation in the workplace.

Excerpted from, Select Research Reports on Health Issues in Video Display Terminal Operations, by the U.S. Department of Health and Human Services April,1981

*Table 7. Percentage of VDT Operators and Controls Reporting Frequent Levels of Particular Stressors Showing Significant Differences[1]

Stressors	Clerical VDT	Professional VDT	Control
Interesting work	24	76	53
Bored with work	48	15	23
Work is dull	42	13	27
Increased concentration required	45	26	34
Able to chose own work	4	28	18
Dislike workload	45	15	21
Unhappy with workload	36	17	21
Have to work too hard	76	53	61
Behind in work by at least one week -	27	10	8
Heavy workload	82	70	73
Dissatisfied with workpace	41	17	18
Have to work too fast	82	65	65
Can et own workpace	41	61	73
Certain in career future	14	37	44
Promotion opportunities	13	37	31
Worry about reprimands	24	3	8

[1]Significant at the 95 percent confidence level or greater using a Chi Square test for homogeneity.

* Data collected from:

Workplaces: The investigation was carried out at five workplaces, four newspapers or related operations and one insurance company. The VDT operators at these workplaces engaged in various jobs including data entry and retrieval, word processing, writing, editing and telephone sales. The control subjects at these workplaces were engaged in data entry and retrieval, word processing, and telephone sales, but did not use VDT equipment in carrying-out their work activities. For example, the control subjects doing word processing tasks were using standard electric typewriters, while those doing data retrieval tasks were using card index equipment.

Table 9a. Percentage of Clerical VDT Operators and Control Subjects with Selected Health Complaints Showing a Significant[1] Effect

Health Complaints	PERCENTAGE	
	Clerical VDT	Control Subjects
Skin rash	57	31
Irritability	80	63
Fainting	36	17
Nervous	50	31
Fatigue	74	57
Pain down arm	37	20
Stomach pains	51	35
Change in color perception	40	9
Irritated eyes	74	47
Burning eyes	80	44
Blurred vision	71	35
Eye strain	91	60
Swollen muscles and joints	50	25
Back pain	78	56
Painful or stiff arms or legs	62	35
Painful or stiff neck or shoulders	81	55
Numbness	47	18
Neck Pressure	57	34
Difficulty with feet from standing long periods	49	35
Sore shoulder	70	38
Loss of feeling in wrists or fingers	33	11
Neck pain into shoulder	56	19
Hand cramps	49	16
Loss of strength in arms or hands	36	14
Stiff or sore wrists	47	7

[1]At 95 percent level of confidence or greater using a Chi Square test for homogeneity.

APEX model agreement on new technology -Association of Professional, Executive, Clerical and Computer Staff- a British Trade Union

Preamble

1. Both parties recognise that the introduction of computer based systems can be to their mutual advantage by improving efficiency.

2. Computer based systems here refer to (specify name of system, number of devices such as VDUs, word processors etc) hereafter referred to as "the system".

3. No further systems or individual units nor any change in their functions and operation will be introduced without prior negotiation and agreement with the union.

The degree of detail in 2 depends upon the coverage of the agreement. In a national, group or company level agreement this should include a comprehensive description of the technology referred to: eg "all computer based systems and their associated attachments, including VDUs, keyboards, printers, computer aided design, word processors". These general agreements provide only a framework within which local agreements are to be negotiated. In departmental and site agreements, the system should be carefully specified, together with the number of individual devices such as VDUs and printers which are to be introduced, and the departments covered by the agreement: eg "Computer based systems here refer to the MDs 21/40 system with a maximum of 4 mini-computers and 16 VDUs and printers in the wages booking department, site x, only..." This is designed to ensure that any change in the system or new system requires union agreement as in 3.

Monitoring

4. The management agrees to provide sufficient information to the union to: monitor developments, changes in work flow, changes in working methods and the effect on jobs; control any proposed introduction or extension of computer based systems; analyse health and safety effects and general working environment. This information to include the management's long term plans on the introduction of new technology. This information will be provided (quarterly, six-monthly, annually) on a regular basis and as requested by the union where specific proposals are under consideration.

All staff representatives need to be aware of the issues involved in the introduction and extension of new systems in order to monitor any changes in the area they represent. In larger sites and companies there may need to be developed an effective system of reporting between departmental, site, company and/or group levels. Some staff representatives may undertake to take a special interest in new technology to advise other representatives. It is suggested that all local/departmental agreements be collected together within a site/company, as appropriate, for information in subsequent negotiations.

The monitoring group may be union side only, or a joint management/union committee.

Employment

5. There will be no loss as a result of the introduction of the system. Any supernumary situations to be subject to full consultation and agreement with the union on re-deployment and retraining.

6. In the light of the increased productivity anticipated from the use of new systems, the company agrees to negotiate with APEX on a reduction in the working week towards the goal of a 30 hour, 4 day week, without loss of pay; improvements in holiday entitlement; and a lowering of retirement age on full pension.

No job loss is a very difficult clause to win but it is crucial. As a first stage it is essential to know the current manning levels obtained both from management and inquiries with staff representatives.

Representatives may use the opportunity of the introduction of new technology to collect detailed information of job numbers (including those not filled) and grades for all departments covered by APEX procedure. The appropriate date at which manning levels are measured is important – management may be running down sections by natural wastage well in advance of implementation of a new system.

The claim for reduced working hours as a result of new technology may be most effectively pursued at local level, especially where working hours of the staff involved are long compared to others in the same site or company (eg 40 or 38 hour staff).

7. Full analysis, through joint union/management committees, will take place in respect of the effects of new systems on job content and job satisfaction. Jobs will be carefully designed to ensure that routine and monotony are minimised.

8. Staff operating the new systems will not be given additional tasks or added responsibility without prior agreement with the union.

9. Shift working will not be required of staff not originally employed on that basis. All new shift proposals to be subject to full union consultation and agreement.

10. All jobs affected by the new system will be appraised through the joint/union management job evaluation machinery. If it is found that the job evaluation scheme does not make sufficient allowance for new experience and skills, appropriate modifications to the scheme will be negotiated and agreed. No jobs will be downgraded as a result of the introduction of the systems.

11. No work will be supplied to outside agencies without full consultation and agreement with the union.

12. Work performance will not be measured by computer based systems.

Training

13. Full training will be given to APEX members in the user departments. The selection of those to receive training will be the subject of union agreement.

14. The training syllabus to be agreed by the union and to include:

a) an appreciation of the principles of new computer based systems.

b) APEX policies on new technology.

APEX representatives will usually argue for the maximum number of members to undergo at least general training to ensure that all members in the affected departments understand the changes.

Health and safety

15. Both parties recognise that health and safety aspects of computer based systems is a subject of continuing research and therefore improvements will be introduced at any appropriate time, subject to union agreement.

16. Every care will be taken to avoid hazards in both the siting and operation of the systems, and, in particular, due notice will be taken of the APEX guidelines on their introduction and use.

17. Employees suffering from persistent stress and headaches, migraine, epilepsy or nervous complaints, will not be required to operate or continue to operate screen based systems and will not suffer in terms of employment as a result.

18. Eye tests by a qualified oculist will be carried out on all staff working with screen based systems prior to commencing work on the system and thereafter at six monthly intervals. Employees with unsuitable eyesight will not be asked to use screens more than incidentally, and will not suffer in terms of employment as a result.

19. Working methods and jobs will be so organised that no employee will work at a screen for more than 40 minutes in each hour.

20. A maintenance programme is to be laid down and strictly adhered to.

(The details of minimum standards with respect to technical aspects of VDUs, keyboards, siting etc to be included in agreements are contained in this issue of HSIB.) Representatives dealing with new technology need to liaise with safety representatives, who should be briefed on all health and safety aspects associated with new systems.

NIOSH

read 10/11

vision
Test questionnaire
vision recommendations

GENERAL RECOMMENDATIONS

Radiation Testing

Based on the radiation survey data from this investigation at the three sites and previous NIOSH investigations, it can be concluded that the VDT does not present a radiation hazard to the employees working at or near a terminal.

There is considerable technical difficulty in performing radiation surveys of VDTs since such surveys require considerable technical knowledge and skill in conducting the survey and interpreting the results. Considering this and the low radiation levels emitted by the VDTs examined to date, routine surveys of video display terminals are not warranted.

Workstation Design Features

It should be noted that the approaches to one aspect of the design may impact other aspects as well; thus careful consideration of the task demands and the total workstation is essential. As a matter of preference, it is recommended that the maximum possible flexibility be designed into the workstation so that it can be adapted to the individual operator. Specifically, it would be desirable for the chair to have adjustable seat pan height, backrest height and tension. Similarly, the keyboard height, and screen height and position should be independently adjustable. The operator should also be able to adjust screen brightness and contrast.

Bearing in mind that designing for adjustability of critical workstation parameters is the preferable method for assuring operator comfort, there are basic recommendations which can be used as guides to proper workstation design. These recommendations are generally levels or ranges which are acceptable for most operators; but, values outside these ranges may be necessary based on the needs of individual operators.

Consistent with evidence in the literature, one recommendation is that the workstation be designed so that viewing distance can be maintained between 450 and 500 mm with exceptions based on individual operator needs. Alternatively, Whycer (1978) suggests the location of the viewing distance be individualized such that 2/3 or less of the operator's range of accommodation be used. Further, it is recommended that viewing angle be in the range of 10-20°, with the top edge of the screen no higher than operator eye level and the bottom edge of screen no lower than 40° below eye level. Keyboard height should be between 740 and 790 mm (at home row). Where possible, provisions should be made for detachable keyboards and furniture which allows adjustment of various dimensions for individual operators.

Operator chairs should have adjustable heights and backrests. Backrest should adjust to the lumbar region (mid-back) to provide adequate support.

Illumination

The available literature suggests that lighting levels be set up at approximately 500-700 lux depending upon the visual demands of other tasks performed in the same work area.

Glare Control

Direct and reflected glare should be limited through one or more of the following methods:

1. Drapes, shades, and/or blinds over windows should be closed, especially during direct sunlight conditions.

2. The terminals should be properly positioned with respect to windows and overhead lighting.

3. Screen hoods may be installed.

4. Anti-glare filters may be installed on the VDT screen.

5. Direct lighting fixtures may need to be recessed; and baffles may be used to cover fluorescent fixtures to prevent the luminaires from acting as a glare source, or special covers on light fixtures may be used to direct the light downward rather than allowing the light to diffuse.

6. Properly installed indirect lighting systems will limit the luminaires' potential as glare sources, although some reflected glare may still be present.

Work-Rest Regimens

There are a number of factors to be considered when determining an appropriate work-rest regimen for VDT operators. These would include fatigue, visual effects and psychological impact. Fatigue of the major postural musculature as well as the manipulative muscles has been demonstrated in VDT operators. Hunting et al. (1980) showed that data-entry VDT operators reported significantly more muscular complaints than interactive VDT operators or secretarial/clerical workers using standard electric typewriters. This effect could have been due to the increased postural and keying demands of these VDT operators or visual requirements that induced improper posture. Smith et al. (1980) also found that VDT operators reported more muscular complaints than nonoperators. However, the nonoperators were not performing the same level of keying tasks as the VDT operators and therefore it is not certain if the effect was due to the keying requirements of the task or VDT characteristics.

There are two areas of interest regarding the vision of VDT operators and work-rest health determinations. The first concerns the visual system in terms of the muscles used in accommodation and convergence. Hollar et al. (1975), Haider et al. (1980) and Gunnarsson and Soderberg (1980) have demonstrated changes in

visual function, presumably related to video display terminal viewing. These changes were all of a minor nature and transient but illustrate the potential for chronic effects given long term VDT use. The second concerns other visual symptoms observed in VDT operators that have been generally referred to as visual fatigue and/or eyestrain. These have included heavy eyes, burning eyes, itching eyes, tearing eyes, eyestrain, or eye soreness. These effects have been reported by large numbers of VDT operators (Hultgren & Knave, 1973 - 47 percent; Gunnarsson and Ostberg, 1977 - 76 percent; Cakir et al., 1978 - 68 percent to 85 percent; Laubli et al., 1980 - 65 percent; Dainoff et al., 1980 - 45 percent; Gunnarsson and Soderberg, 1980 - 62 percent; and Smith et al., 1980 - 67 percent to 93 percent). While these symptoms are difficult to relate to specific visual processes, they demonstrate that the visual system is under stress which is reflected by reports of visual strain. These symptoms refer mainly to acute conditions whose relationship to chronic visual problems is not clear and has to be established by further research. Yet the high percentage of operators reporting such acute visual complaints is evidence of a potential problem, and given the repeated use of the VDT over many years may produce a cumulative trauma. Therefore remedial action to reduce these acute complaints is in order.

Finally, high levels of psychological distress have been reported by VDT operators (Smith et al., 1980; Gunnarsson and Ostberg, 1977; and Cakir et al., 1978). In particular, jobs that require heavy work loads and time pressures seem to be most prone to psychological distress such as anxiety, depression, irritability, monotony, fatigue and lack of inner security.

Based on our concerns about potential chronic effects on the visual system and musculature and prolonged psychological distress, we recommend the following work-rest breaks for VDT operators:

1. A 15-minute work-rest break should be taken after two hours of continuous VDT work for operators under moderate visual demands and/or moderate work load.

2. A 15-minute work-rest break should be taken after one hour of continuous VDT work for operators under high visual demands, high workload and/or those engaged in repetitive work tasks.

The work-rest break schedule that has been recommended in this report is designed to minimize the visual and muscular problems of VDT operators. Haider et al. (1980) and Holler et al. (1975) found that a break of 15 minutes after two hours of VDT work was sufficient for recovery from temporary myopia for most individuals studied. However, the data from the current investigation suggest that a 15-minute break after two hours of VDT work may not be adequate for other problems such as asthenopia or for muscular problems. Therefore, for highly demanding VDT tasks a 15-minute break after one hour is suggested. While there is no research evidence that this work/rest schedule will be sufficient to deal with all of the reported problems, it is felt that this schedule should be tried before more disruptive schedules (such as the job rotation suggested by Holler et al., 1975) are implemented.

Asshole!

Visual Testing

The American Optometric Association (AOA)(1980) has conducted a review of rules promulgated by the States regarding standards for minimum optometric testing. They indicate that the following procedures are among those usually mandated as minimum optometric testing:

1. Complete case history (ocular, physical, occupational and other pertinent information).

2. Naked visual acuity/or visual acuity of each eye uncorrected and with best correction.

3. Detailed report of external findings (lids, cornea, sclera, etc.)

4. Ophthalmoscopic examination (media, fundus, blood vessels, disc).

5. Corneal curvature measurement (dioptric)/keratometer (ophthalmometer) readings.

6. Static retinoscopy/objective refraction of each eye.

7. Amplitude of convergence and accommodation.

8. Phoria and duction findings; horizontal and vertical, distance and near.

9. Subjective findings/subjective refraction of each eye for distance and near vision with phoropter or adequate trail case and trail frame.

10. Fusion and stereopsis.

11. Color vision.

12. Visual fields and/or tonometry.

In terms of pre-placement visual testing, Hirschfelder (1980) of the National Society for the Prevention of Blindness states:

> "Although the majority of industrial jobs require more extensive test of eyesight, especially where machining, measuring, and assembling to very close tolerances are concerned, the following primary visual skills, at the very least, should be checked:
>
> "Central visual acuity (sharpness of vision) at distance (ability to see test targets well at 20 feet).
>
> "Central visual acuity (sharpness of vision) at near point (ability to see test targets well at 13 to 16 inches).
>
> "Muscle balance and eye coordination (ability to keep eyes in balance, to prevent one eye from deviating vertically or horizontally; ability of eyes to relay images from various distances which brain can fuse without difficulty).

"Depth perception (ability of eyes to judge relationships of objects in space).

"Color discrimination (ability of eyes to judge colors correctly).

"Note: Employees or job candidates who wear corrective lenses, including those of the contact type, should be tested both with and without them."

Hirschfelder (1980) goes on to say "In all cases, however, the key purpose of testing is to measure individual visual skills in relation to individual seeing demands of specific jobs."

Based on evidence of acute vision problems in VDT operators (Haider et al., 1975, 1980; Gunnarsson et al., 1977, 1980; Laubli et al., 1980; Dainoff et al., 1980; and Smith et al., 1980), we feel that there is a need for mandatory vision testing for VDT operators. In addition, the high visual demands of VDT work tasks define a requirement for properly corrected vision for adequate performance and reduced visual strain. The suggested vision testing programs of the National Society for the Prevention of Blindness (Hirschfelder, 1980) and those reviewed by the AOA are a logical basis for vision testing requirements for VDT operators. The proposed visual testing program is primarily for the purpose of ensuring that operators have the appropriate corrected vision for performing their VDT work tasks. In some cases the job tasks will require a different correction factor than is needed for daily living activities such as reading the newspaper or driving a car. Determinations of the proper corrected vision have to be made with the viewing requirements of the job tasks in mind.

It is recommended that given the mounting anecdotal evidence of ophthalmologic complaints associated with VDT use and the paucity of research pertaining to the incidence, etiology, or pathophysiology of these events, that at the very least VDT workers should have a comprehensive pre-placement vision examination. Either the AOA or Hirschfelder's recommendations could serve as a basis for the exam. We also recommend that those individuals who become symptomatic even after the initial exam should receive appropriate medical care and that a general exam should be repeated periodically. The periodicity of these repeat exams should depend on the natural history of VDT ophthalmic pathology (information that is not yet available). Current NIOSH and other investigative research should clarify this issue.

UNION PROPOSAL-

VIDEO DISPLAY TERMINAL EMPLOYEES

(a) EYE CARE

(i) Each employee required to use VDT's or CRT's shall be given eye examinations at the time of beginning of employment or of assignment to VDT's or CRT's, and annually thereafter. Such examinations will be made by an Opthalmologist and shall include, in addition to routine optical testing, additional tests regarding visual fiel acuity, color vision testing using pseudoisochromatic test plates, a slit lens lamp exam (to test for cataracts) and a test for accomodation; in addition, dilation shall be used if the results of the preliminary procedures show its desirability. Such examinations shall be paid for by the Employer.

(ii) The Employer is required to keep records of each employee working on Video Display Terminals for the duration of his or her employment plus 24 years thereafter. Such records shall include information on test results, as specified in paragraph one above. Access to such records shall be limited to the individual employee, the Union representing that employee, and bona fide health researchers.

(iii) The Employer shall pay for all eye examinations and all corrective lenses. Such payment shall be over and above the coverage provided for in the existing health plans provided for elsewhere in this Agreement and by the Employer. Payment for corrective lenses shall be provided every time an employee's prescription changes.

(b) BREAKS

(i) Every employee working on a VDT or CRT shall be required to take a rest break away from his or her tube; such breaks shall be for fifteen (15) minutes, and shall occur after every hour of work on the tubes. Such breaks shall be in addition to any regularly scheduled breaks.

(ii) No employeee shall work more than three consecutive days exclusively on VDT's or CRT's. This provision affect the provision located elsewhere in the contract on consecutive days off.

(iii) Operators' working on VDT's or CRT's shall be relieved one-half hour before the end of their shifts in order to give their eyes time to readjust. Such employees may be assigned to other work.

(c) PHYSICAL PLANT

(i) Effective glare shields shall be affixed to the front of each machine.

(ii) Adjustable chairs, footrests and tables to allow for adjustment of individual machines to suit each operator shall be available to provide optimum comfort and the minimum amount of physical stress for each operator.

(iii) Lead aprons shall be available for any operator who wishes to wear one.

(iv) The Employer shall provide optimal lighting conditions adapted to accommodate the types of tubes in use at each worksite. Specifications on the level and quality of lighting will be set by a panel of five persons, including three lighting experts to be mutually agreed upon by the Employer and the Union, plus one representative each of the Union and the Employer.

(d) INSPECTION OF MACHINES

(i) Each VDT or CRT tube in use shall be inspected monthly for radiation and for focus and clarity of image. Such inspections shall be made in addition to maintenance work performed on individual machines as requested by operation. In addition to monthly inspections, each machine shall be inspected each time it is moved or maintenance is performed in place.

(ii) Tests for radiation shall be conducted using a testing mechanism such as an ionizing chamber to test for ionizing radiation or some other device that is mutually agreeable to the Employer and the Union. Each testing device shall be calibrated for accuracy before each monthly test. A sticker bearing the inspector's name, the date and the radiation reading of each machine shall be affixed to each machine upon testing.

(iii) A Union representative shall accompany each inspector making the monthly inspections.

(iv) Test results shall be forwarded to the respective Union offices no later than the 15th of each month following the testing. In addition, all test results at each work site shall be posted at that work site.

(v) The Employer shall abide by laws and regulations applicable to equipment, machines, apparatus or processes, and shall monitor regularly and inspect the operations thereof to assure continuous compliance with such laws and regulations. The results of such monitoring and inspections shall be made available to the Union.

MEMORANDUM of UNDERSTANDING
between
BAY AREA TYPOGRAPHICAL UNION NO. 21
and
SAN FRANCISCO NEWSPAPER AGENCY

RE: VIDEO DISPLAY TERMINALS

This will confirm the understanding reached in the 1980 negotiations by BAY AREA TYPOGRAPHICAL UNION NO. 21 (hereinafter referred to as the "Union") and the SAN FRANCISCO NEWSPAPER AGENCY (hereinafter referred to as the "Employer") regarding the working conditions covering the use of Video Display Terminals (VDT's) in the composing room of the Employer. The Employer was committed in said negotiations to study the proposals made by the Union and to make the necessary changes as required in said working conditions. The Employer specifically agrees to implement as required the following changes in working conditions:

1. ADJUSTABLE CHAIRS — The Employer will provide chairs adjustable for persons required to use VDT's on a regular basis. Where needed, the Employer shall also provide foot rests and devices for height adjustment of VDT equipment.

2. ROOM LIGHTING — The Employer will provide lighting conditions to accommodate the VDT's in use.

3. 960 BRIGHTNESS CONTROL — The Employer will provide a brightness control on each 960 VDT in use.

4. GLARE SHIELDS — The Employer will furnish glare shields, upon request, to employees required to use VDT's on a regular basis.

5. EYE GLASSES — If an employee is required by his/her doctor to wear special glasses, for the sole purpose of working on a VDT, the Employer shall provide such glasses.

IN WITNESS WHEREOF, the parties by their representatives duly authorized to act have hereunto set their hand and seals this 5th day of September, 1980.

SAN FRANCISCO NEWSPAPER AGENCY

By: J. F. Kolder

BAY AREA TYPOGRAPHICAL UNION NO. 21

BY: Leon Olson, President

All Three Newspapers

VIDEO DISPLAY TERMINALS

SECTION 24. The Employer shall provide the Union with results of tests, which shall be conducted at least once every six months, such tests to be for the purpose of (a) determining whether video display terminals or other devices are emitting harmful radiation, and (b) determining whether video display terminals are improperly "tuned" or "focused" to a degree causing undue employee eye strain or fatigue. Such tests shall be conducted and reported after a VDT has been moved or maintained in place.

good explanation of eye muscles + how cathode ray operates.



Copies of this pamphlet are available from NYCOSH.
32 Union Square, Room 404; New York, N.Y. 10003
(212) 674-1595

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Written by Tobi Bergman with the assistance of the NYCOSH VDT/WORK GROUP.

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NEW TECHNOLOGY: DANGER AND OPPORTUNITY FOR WORKERS

Office workers are taking a hard look at the health effects of their jobs.

There are severe physical and psychological stresses of office work. The new office of the computer age could bring major improvements to working conditions. But the emphasis in the design of equipment, environment, and work process, is on increasing productivity, with little or no attention paid to work comfort and health. The result is the exposure of millions of workers to new hazards. Tomorrow's technology has become today's headache.

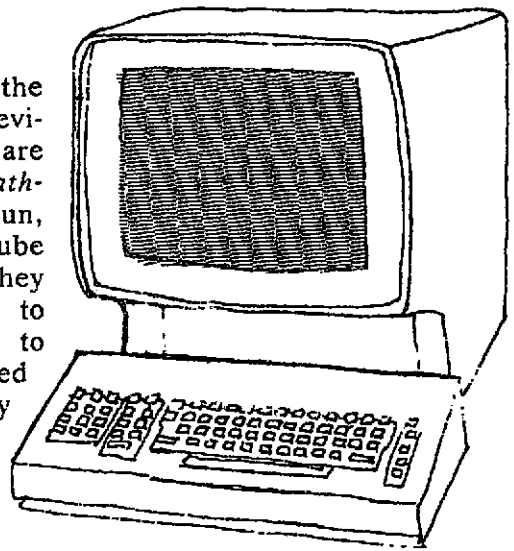
The piece of equipment that is changing office work more than any other is the *video display terminal,* or *V.D.T.* V.D.T.s are the television-type screens that display information to keyboard operators. They are widely used by government and private industry; in publishing, communications, banking, and insurance; by computer operators and airline reservations clerks; and in thousands of offices, large and small. They are often called *cathode ray tubes,* or *C.R.T.s.*

More than three million machines are in use in this country; four million more will come on line by 1984. Unless the companies that manufacture and use the machines begin to pay more attention to worker complaints, more than ten million workers will soon be unnecessarily exposed to serious hazards. Thus, workers who raise complaints about the machines are not "gripers". They are leaders in a movement for office worker dignity. They are raising their voices so that an opportunity to improve working conditions is not lost.

Some V.D.T. manufacturers are beginning to pay more attention to design considerations that affect operator health. The National Institute for Occupational Safety and Health (NIOSH) has begun research that may eventually lead to much-needed government standards for machine manufacture, maintenance, and operation. But as the people at risk, V.D.T. operators have the most important role to play in protecting their jobs and their health. The purpose of this pamphlet is to help V.D.T. operators to learn about the potential dangers of their jobs, and what they can do to protect themselves.

The Machine

V.D.T.s operate the same way as televisions. Electrons are beamed from a *cathode*, or electron gun, at an *anode*, the tube screen, where they cause *phosphors* to emit colored light to produce the required images. This is why V.D.T.s are also called *cathode ray tubes*.



The Symptoms

"You get home and you feel tired and tense and irritable. Everybody complains about headaches, and waking up in the morning with puffy eyes."

Does it sound familiar? To many V.D.T. operators, it does. And there is a wide range of other problems, one or more experienced by most operators. Here are some common complaints:

- Soreness, redness, stinging, itching, irritation, and general discomfort of the eyes;
- Pains in the neck and back;
- Dull headaches, sometimes above the eyes, sometimes difficult to locate precisely;

- Loss of visual acuity (seeing blurred or double images and fuzzy, colored fringes);
- Dizziness and nausea;
- Problems with eyeglasses and contact lenses.

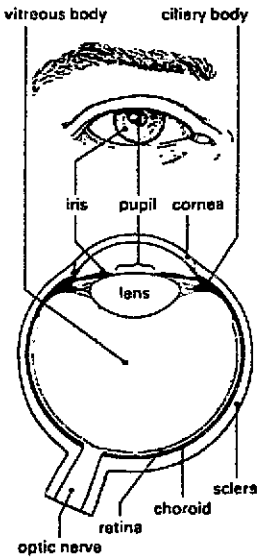
The health problems of working with V.D.T.s are often the combined effects of several stress-causing factors caused by poor machine design and maintenance, incorrect office layout and lighting, and too much time at the machine.

It may not always be possible to locate one specific cause of a given symptom. But by recognizing and eliminating stress-causing factors, conditions can be substantially improved and symptoms relieved.

Eye Strain

Because everyone gets sore eyes sometimes, people often think of eye strain as a minor problem. But when it is an almost daily occurrence (chronic eye strain) or in severe cases, eye strain is a serious health problem, which may cause temporary deterioration of vision. People suffering from eye problems have difficulty reading and doing other things they enjoy.

Eye strain may be caused by fatigue of the muscles in the eye. The *oculomotor muscles* move the eyes from side to side and up and down. The two *iris muscles* in each eye adjust the size of the pupil to varying light intensity. The *ciliary muscles* change the shape of the lens of the eye to bring the objects being viewed into focus.



eye
Anterior view and cross section of the human eye

When the eyes focus at close range, the ciliary muscles must compress the lenses. Viewing at close range for long periods is therefore very tiring to these muscles. One good job design feature (work rule) for V.D.T. operators provides a fifteen minute break every hour (or a half-hour every two hours) so that operators have a chance to rest their eyes by viewing at greater distances. Rest periods should be taken in open areas, away from the machines. This method of preventing eye strain is an example of an *administrative control* of a health hazard. Doing simple body and eye exercises during rest breaks can be very helpful.

Another good administrative control of the eye strain hazard of V.D.T. operation is for workers to alternate, one hour working on the machines, one hour doing another kind of work involving viewing at greater distances and more body movement. The key element of good work rules for V.D.T. operators is substantial time away from the machine. Two hours is the maximum time that should be spent doing continuous screen work.

But job design alone cannot protect operators from eye strain. Attention must be paid to other important factors.

Glare

A significant cause of eye strain is glare on the V.D.T. screen produced by light from windows, from shiny work surfaces, keyboards, and lighting that is too bright or incorrectly positioned in relation to the machines. This *reflected* light makes it difficult to see the characters on the screen. This may also be a cause of neck and back pains as the operator contorts body posture to minimize the glare.

V.D.T. machines should be equipped with non-reflective glass screens to minimize this kind of glare. Special clip-on glass screens are available for some machines. Plastic covers that reduce glare are also available, but they are not a good solution because they reduce the clarity of the image.

Various measures can be taken to prevent glare that is caused by direct light being reflected on the screen.

- Blinds or awnings installed on nearby windows;
- Relocation of machines or lighting fixtures;
- Installation of *indirect lighting*, correctly designed for screen viewing.
- Reduction of general lighting, without making printed copy difficult to read.

- Installing dimmers on overhead lighting so that operators can adjust lighting to the most comfortable brightness.

Some operators have invented successful home-made solutions to the glare problem. These include installing cardboard visors above the screen and removing tubes from the overhead fluorescent fixtures. While there is often nothing wrong with self-help measures, it is better to persuade the employer of the importance of correct equipment and workplace design, and to insist on changes to benefit the health and comfort of all the workers.

Contrast Glare

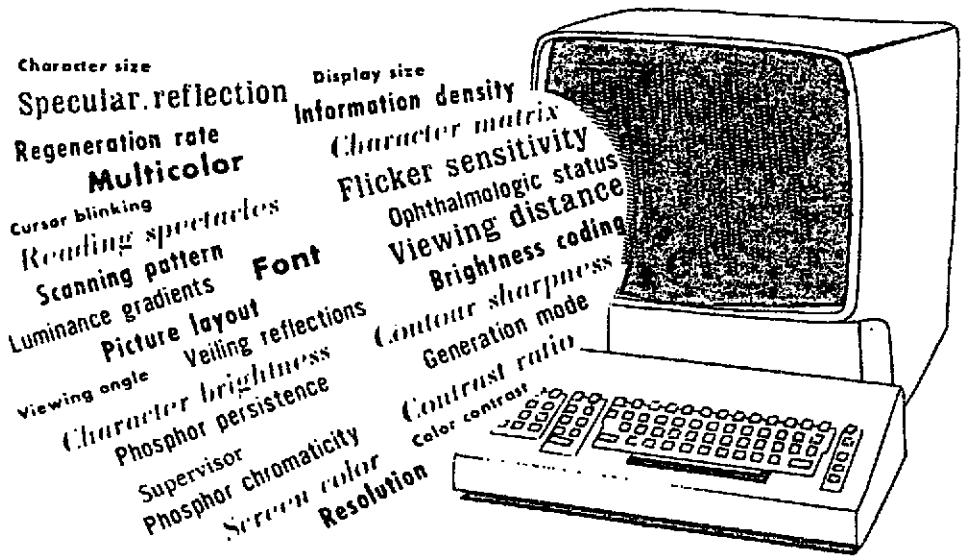
Another kind of glare that causes eye strain is the result of a background that is too bright, such as a window or a white wall. The pupils adjust to the total light entering the eyes and the images on the screen become difficult to see. The result can be severe eye strain. To compensate, operators sometimes put their heads down to block the light and raise their eyes in order to look at the screen. This can cause back and neck problems.

Another bad solution tried by some operators is the use of ordinary sunglasses. While these may improve viewing, they may pose a greater long-term hazard to the eyes. Good solutions include dimming the lights, changing the location of the machine, painting or covering the facing wall in a color and texture that reflects less light, and installing a simple partition or screen behind the machine.

But if the lights are dimmed, the windows shaded, and the walls darkened, the office atmosphere may become depressing, and perhaps more stressful in other ways, unless people's preferences and tastes are considered. Before changes are made in the working environment proposals should be discussed and agreed to by everyone who will be affected. Remember that a good solution must take individual preferences into consideration.

Dimming lights may also make printed copy difficult to read. If direct lighting is then focused on the copy, contrast glare results when operators look back and forth between the different brightnesses of the copy and the screen. If the lighting and the screen are both equipped with controls to adjust brightness, the operator can find the balance that causes the least strain.

Brightness controls are important, and if the machines don't have them, the employer should be advised of their availability and requested to buy properly designed equipment in the future. It may also be worthwhile to ask the employer to find out whether controls can be installed on existing machines. However, turning the brightness all the way up is not a good way to control the glare problems, since too much brightness can itself be a cause of eye strain. The best thing to do is to eliminate the source of the glare.



The "Flicker Effect"

Another important reason for brightness controls is to be able to control the *flicker effect.*

Light emitted by the phosphors on the inside surface of the screen fades rapidly and must be constantly refreshed. If the refresh rate is less than 60 times per second—called 60 hertz (Hz.)—as it is on many machines, a flicker, or jumping of images, may sometimes be seen.

Increasing the brightness increases the flicker effect. While increasing the brightness may improve viewing, flicker is a cause of annoyance, stress and eye strain. The best balance can only be achieved if the operator can adjust the machine. There is no brightness that is best for all operators and all situations.

Screen and Character Size and Color

To save money and space, many machines have small screens. In order to squeeze more information on the screen, character size is often reduced. At normal viewing distances, these small characters are difficult to read, sometimes causing eye strain, and often requiring the operator to lean forward.

The correct character size depends on viewing distance. It is better to have a large screen, a viewing distance of more than two feet, and character height of at least 3/16 of an inch. A screen which is not attached to the keyboard allows the operator to adjust the viewing distance, an important feature.

Images on the screen are made up of dots. The *matrix* of dots should generally be 7 wide by 9 high for each character, for a sharp image. The matrix is also related to character size, and for smaller characters a matrix of 5 x 7 may be sufficient. If the individual dots are visible to the operator, there may be *small area flicker,* which makes the light appear to "dance" within the letters causing annoyance and stress.

Screen color should be dark green with lighter green or yellow characters, or black with white characters. As with all screen characteristics, there is a great need for research on the effects of different colors on eye strain.

Machine Maintenance

It is essential that V.D.T.s be regularly maintained, generally at least twice a year. Periodic replacement of the tube is also necessary. A poorly maintained machine may form a blurred image, causing strain as the eyes try to bring the image into focus.

A full record of repairs for each machine should be kept and workers should have access to this maintenance log.



Eyeglasses and Contact Lenses

Workers who wear corrective lenses often experience special eye problems. It is important that they inform their eye doctors that they work on V.D.T.s. If necessary they should be fitted with special lenses, designed to focus at the normal viewing distance from eyes to screen. Eye exams and glasses should be paid for by the employer.

Operators who use bifocal lenses often experience postural problems. The lower lenses of the bifocal are designed for reading at a distance of about 12 inches. An operator wearing ordinary bifocals can only focus on the images on the screen by leaning forward and tilting the head back. This posture permits close viewing through the bottom lenses, but can result in muscle strain in the back and the neck and even pinched nerves in the upper spine.

Union contract language may call for full eye exams when workers are first assigned to V.D.T. work and every six months thereafter. However, the contract should also state that such exams not be used for personnel screening. It is the employer's responsibility to provide healthful working conditions for all workers. Selection of workers is an unacceptable alternative to correcting job conditions and can result in unfair discrimination against older workers. Good union contract language will state that if at any time the eye doctor recommends that an employee stop working on the machines, he or she will be given other work at equal pay and with no loss of senority or privileges. This is called "rate retention." Under no circumstances should a worker be penalized for health conditions such as poor vision which may well have been caused by work.

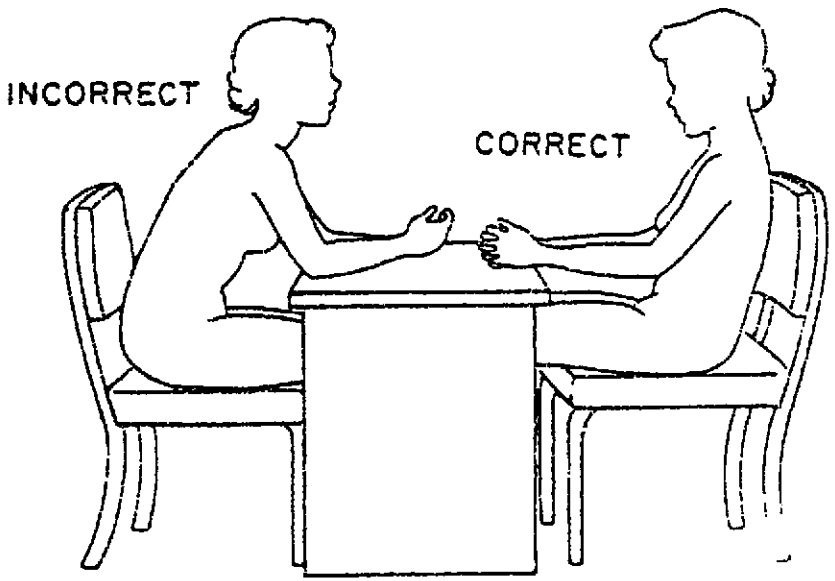
Posture

In the case of bifocal wearers, unhealthy posture is caused by lenses incorrectly fitted for work. More often, it is caused by other factors, including poorly designed machines or office furniture.

Holding any set of muscles in a fixed position for a long time is tiring, and may cause serious problems of muscle strain. This is particularly true when head and neck as well as eye position must be constant. But some positions are less fatiguing than others.

The most comfortable viewing position is with the eyes looking slightly downward. Screen height and angle should

therefore be adjustable to operator preferences and to accommodate operators of different body size. Some machines are manufactured with a detached keyboard, a great advantage. Together with a fully adjustable machine stand, this is an ideal set-up. In any case, the detached keyboard enables the operator to move the screen, or even to raise or tilt it without changing the keyboard position.



Sitting for long periods, especially on poorly designed seats and without adequate periods for rest and body movement may cause health problems beyond muscle strain. Examples are potentially debilitating back problems, varicose veins, and hemmorhoids. Care should be taken to avoid sitting with the spine curved backward (*see drawing*).

Designing equipment for worker health and comfort is called ergonomics. Many health problems in the office are caused by furniture and equipment that are poorly designed from the standpoint of ergonomics. But well designed furniture is available. Unfortunately, many companies are still selling badly designed equipment, and others are still buying it. What is needed is knowledge about equipment design and its health effects, concern on the part of employers and willingness on the part of workers to stick up for their right to a healthful workplace and to stick together to get it.

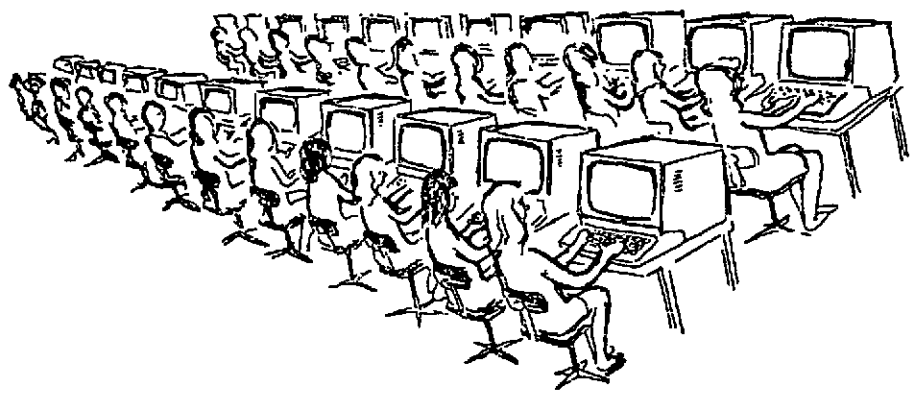
Exercise Programs

An exercise program can be an important part of health protection for operators. Workers can request that facilities for exercising during breaks and before and after work be provided and that instruction be provided so that workers can learn exercises that will benefit them most. Smaller companies may be able to find conveniently located outside facilities and arrange employee access to them.

Stress

Eye strain and postural problems also add to overall stress. Numerous other stress-causing conditions are common in office work. Among these are noise, job pressures, uninteresting work, over-crowded space, and bad treatment by supervisors.

Machines produce noise and heat, both adding to overall stress, especially in overcrowded offices and when the machines are badly positioned. One arrangement of machines that should always be avoided is with one operator's back near the back of another machine. Heat from the machine can be very uncomfortable and increases the possibility of the operator getting hemmorhoids. Machine arrangement is often production oriented rather than human being oriented. Workers should insist that their needs and preferences not be ignored. One arrangement that workers often find very stressful is the "cluster," where operators face each other in groups.



Working with V.D.T.s is demanding; it often requires intense concentration; and it is psychologically taxing. Computer terminal operators often find the periods of watching the screen while anticipating the appearance of information particularly stressful. Operators who must provide information from the machine to sometimes irate customers often find themselves in a squeeze between the customer and the machine, both unsympathetic to the problem. Some machines are set up so that supervisors can directly monitor operator productivity, a source of anger and stress to the worker.

All of these factors, and many others, multiply each other's effects. Physical fatigue makes people tired and irritable, which in turn makes stresses more difficult to tolerate.

Each problem can be solved. You can find solutions; but not if you work alone. The solutions can only come as the result of discussions with your co-workers, formulating common demands, and working together to insist that the employer recognize the problems and agree to improve working conditions. A significant cause of stress is simply the feeling of lack of control, of inability to change uncomfortable conditions. Organizing for job safety and health is thus the best way to stop stress on the job.

Controlling the Hazards

The first step toward a safe and healthful workplace is taken when workers decide to learn how to recognize and evaluate hazards, and how to decide what kinds of controls would be suitable. V.D.T.s are not the only potential office hazards, and its important to look at the whole workplace for all kinds of hazards.

Many hazards can be recognized by using common sense. Others, such as chemical hazards, may require additional reading, or help from experts. But as a group, the workers in an office usually know a lot about their workplace, once they start thinking about it. The most important thing is to get as many workers as possible involved.

Workers who are interested in improving working conditions can work together in a union health and safety committee. The committee should meet regularly to discuss health and safety problems and what can be done to correct

them. Committee members should work closely with other workers and keep them informed of all developments.

The first thing to do is to learn more about the problem. Then the employer can be informed about the problem and the committee can suggest ways to correct it. After that, the course to follow varies from one office to the next. Different employers will respond in different ways, and the members of the committee have to work out a strategy accordingly.

There is no standard in the Occupational Safety and Health Act that applies to the hazards of working with V.D.T.s But there are other ways of getting an employer to respond to demands for safety and health on the job.

- Discuss in your union the need for contract language to protect members from potential hazards. Clauses can be written to provide for adequate rest breaks, eye exams at the employer's expense, and specific improvements of the work environment. Contract language can also assure union participation in equipment purchasing decisions and a special grievance procedure for health and safety.
- Provide training sessions and educational materials on occupational safety and health for all employees.
- Keep records—Build your case:
  —Number each machine and draw a floor plan of their locations; then keep records of problems and try to ascertain exactly what is causing them. It is very important to find out if some machines are causing more problems than others.
  —Keep a complete record of all operator complaints and consider doing a survey of all the workers to find out more about their health concerns. (A sample questionnaire for V.D.T. operators is on the last page of this pamphlet.)

• • •

IS THERE A RADIATION HAZARD?

V.D.T.s may emit low, but potentially dangerous levels or radiation, including X-rays, microwaves, and/or ultra violet [UV] and infrared [IR] light.

In theory, machine parts that produce radiation are shielded and radiation does not escape at levels that endanger the operator, or others working nearby.

This does not mean that there is no cause for concern. Very limited testing by government and industry has been done and the conclusions of tests have been challenged by unions and independent health specialists. Some radiation frequencies were not tested for and most machines have not been tested at all. Manufacturing defects or poor maintenance could cause higher levels of radiation to be emitted. In addition, very low doses of radiation can be hazardous and there is no known safe level of exposure.

Workers have a right to know what hazards they face, and in the case of the possible radiation hazard of V.D.T.s, more research is needed.

Some of the controls useful in protecting against eye strain, such as alternating periods on the machine and periods doing other work, would also reduce possible exposure to radiation. Machines should be spaced so that operators are not sitting near other machines since whatever radiation exposure there is will be multiplied by the number of nearby machines. Exposure decreases when the machine is farther away.

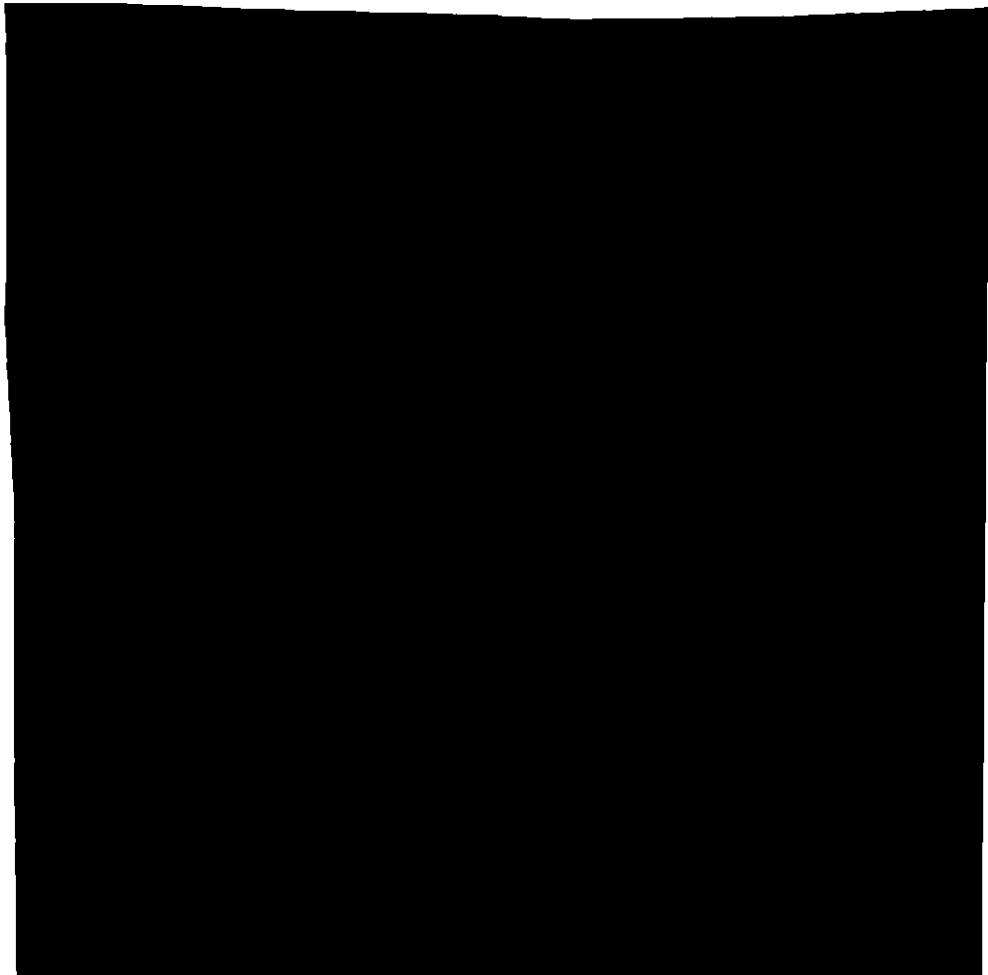
Suggestions have been made that lead aprons should be provided to operators who request them. Such personal protective equipment is probably not called for. It would be of dubious value, since the eyes would remain unprotected, and the apron could cause discomfort and postural problems. What is needed is extensive testing, manufacturing quality controls, and standards for machine maintenance.

NYCOSH

You need your job, and you need your health, too. The New York Committee for Occupational Safety and Health is dedicated to the right of all workers to a safe and healthful workplace. NYCOSH has useful resources for people working to improve job conditions. It also has experts you can talk to and speakers who can come to union meetings. Training sessions are available for groups of health and safety committee members, shop stewards and delegates, and others.

NYCOSH is an organization of workers, unions, and health and legal professionals in the New York City area. It is part of a network of similar groups around the country. A first step to a safer job is to join NYCOSH.

The following books and articles provide more information about V.D.T.s



Here are some questions that you may want to include in your questionnaire. Some may not be relevant where you work. You may think of other questions to add.

Name Job title:
Work location: Machine no.:
Kind of machine:
Do reflections on the screen make it difficult to read?
Is the keyboard a separate unit or attached to the machine?
What color is the screen? What color are the characters?
Is the brightness adjustable? Does the machine have an anti-glare surface?
What color is the wall behind the machine? Are there blinds on nearby windows?
Are the characters on the screen blurred? Do they flicker?
Are they too small? Do you have to strain to read it?
Do you wear glasses while using the machine? Are they bifocals?
How often do you go to an eye doctor?
Have you recently had new lenses prescribed?
How many hours per day do you work at the machine?
Do you do continuous or interrupted work at the machine?
Do you also do other work? What kind?
How often do you take a break away from the machine?
For how long? Are you required to do a certain amount of work per hour or per day?
How much?
Do you get headaches? When?
Do your eyes get irritated, red, or itchy?
Do you ever experience dizziness or nausea while working or afterwards?
Since working with V.D.T.s, do you find yourself to be more irritable? nervous?
Describe any other health symptoms or discomfort?

What improvements would you like to see?

What complaints do you have about your job?

What do you like about it?

information

WORKERS ASK

VDUs AND RADIATION

Q: *Is radiation from visual display units a hazard ?*

A: The cathode ray tube (television-type) VDUs can emit X-rays, infra-red radiation, ultra-violet rays and microwave radiation. X-rays should be emitted only in very small amounts in a properly functioning VDU. There is more concern that older models of VDU or malfunctioning ones may pose problems. In general, VDUs should be routinely monitored and maintained to check for and prevent possible exposure to X-rays.

As with most dangerous substances, what may be considered a " safe level " by one authority one day may be considered dangerous another day by someone else; there are many examples of this among industrial chemicals. It has also been the case with ionising radiation. There has been increasing concern that low level radiation may be dangerous, particularly when exposure is prolonged as could be the case with continuous work at a VDU. In general, to minimise the risk from radiation, VDUs should be frequently serviced by qualified engineers. The front of the VDU should be covered by a thick glass panel and the set enclosed in a metal case to give maximum protection in the case of implosion or explosion.

The risk of exposure to microwave radiation from VDUs is not well accepted, as some authorities argue that there is no technical basis for believing that VDU's could produce this sort of radiation. However, emission of microwaves from VDU's has been conclusively demonstrated in the United States by Dr. Milton Zaret, from New York State University. Dr. Zaret is concerned that malfunctioning VDUs, in particular, may produce levels of microwave radiation capable of causing a rare kind of eye cataract. The amount of microwave radiation emitted is believed to be small. However, there has been no study on the long-term implications of operators being exposed to such low-level radiation. Nor do we know of any studies on the possible fertility risks with this radiation. It is essential that VDUs are regularly monitored for this sort of radiation and that there is routine maintenance to minimise risk of exposure to radiation.

Infra-red radiation. A single VDU can produce 4000 watts of heat, the power of a small electric fire. If several units are placed close together they may produce "hot spots" due to problems of overheating, particularly if air conditioning is not adequate. Heat may aggrevate the discomfort which VDU work tends to cause anyway (through eye strain from continuous close eye work) and operators may complain of discomfort, headaches, tiredness. Once again, regular maintenance is necessary to reduce heat production by malfunctioning VDUs. It may also be necessary to improve air-conditioning and general ventilation for temperature control.

PUBLICATIONS

OCCUPATIONAL HEALTH GUIDELINES FOR CHEMICAL HAZARDS (NIOSH/OSHA, 1981)

Issued by the two government bodies responsible for occupational health in the U.S., this publication is for a limited period FREE on application. It is in a 3-volume loose-leaf format, and covers the health hazards of over 400 chemicals in detailed referenced articles.

Send orders to:
Publications Dissemination, DTS
NIOSH
4676 Columbia Parkway,
CINCINATTI, OHIO 45226 USA

quoting publication number (NIOSH)81-123, and enclosing a self-addressed mailing slip.

Highly recommended; we use it every day.

WORLD NEWS...

EQUAL OPPORTUNITIES?

A British drug manufacturer has been exempted from equal opportunity employment requirements. Following the discovery that male workers were developing breasts, the company was given permission to exclude men from the workplace.
(At The Source. Ontario Federation of Labour. March/April 1980)

Women of childbearing age are to be excluded from vinyl chloride areas at a Canadian polyvinyl chloride resin plant. The company's general manager stated that "we just decided we would err on the side of safety." An official from the union covering the plant (OCAW) has pointed out this admission of overall risk and the injustice of the approach. The OCAW is planning an organising drive for the plant. In some Canadian provinces the standard for exposure to vinyl chloride is 5 parts per million. In Australia the National Health & Medical Research Council also recommends an upper limit of 5 ppm. This is 5 times higher than the current U.S.A. standard. Vinyl chloride causes cancer in several parts of the body, and no safe level of exposure is known.
(At The Source. Ontario Federation of Labour. March/April 1980)

STRESS

The combination of working conditions and family responsibilities produce a higher rate of heart disease in working women than in women who work at home or working men. Noting that clerical workers had the highest rate of heart disease, a report published in The American Journal of Public Health commented "women clerical workers may experience several forms of occupational stress including lack of autonomy and control over the work environment, under-utilization of skills and lack of recognition of accomplishments.

About one-third of women working in Australia are clerical workers.
(At The Source. Ontario Federation of Labour. May/June 1980)

VDUs AND CATARACTS

A Canadian VDU worker with cataracts is currently claiming compensation. She worked with VDUs an average of 4 hours per day over a 2 year period. She has been examined by Dr, Milton Zaret, a U.S. ophthalmologist (eye specialist) who has been studying the effects of microwave radiation on the human eye since 1959. He concluded that exposure to radiant energy from VDUs caused her cataracts. The case is still in progress.
(At The Source. Ontario Federation of Labour. March/April 1981)



245T CAUSES CANCER

Exposure to phenoxy acids (eg. 24D, 245T, MCPA) and the closely related chlorophenols (eg. TCP & PCP) increases the risk of contracting a certain type of tumour (soft-tissue carcinoma) 6-fold.

A team of Swedish doctors carried out an investigation into the life histories of 110 patients suffering from the disease. They asked each person detailed questions about work, living environment, smoking and exposure to these chemicals. While difficult to establish how much exposure there had been, there was a dramatic correlation of the disease with these chemicals, when compared to people without the disease. This finding is significant for two reasons. It confirms that this group of chemicals causes cancer. That isn't surprising, but it is something the regulatory authorities don't want to admit. Secondly it shows that, despite low levels of the contaminants (dioxins) these substances are still dangerous.
(Hazards Bulletin. BSSRS. June 1981)

Video death

By Rachel Sherban

WHEN they come home from work their eyes are red, sore and swollen; they have headaches and their backs hurt. They complain about dizziness, nausea, tiredness they can't shake. Many have symptoms of deteriorating eyesight, increasing shortsightedness and blurred vision. They worry about getting cataracts in their eyes; they're afraid of becoming infertile, or giving birth to children with birth defects.

Most of these workers are women. They work in offices in almost every industrialized country in the world. They operate a sophisticated product of microelectronic technology called, variously, a word processor, video display terminal (VDT), video display unit (VDU) or cathode ray tube (CRT).

VDTs are used widely in travel, insurance, banking, newspapers and printing, telecommunication industries—any industry that sends, receives or transforms information. Introduced about 5 years ago, today there are millions of the machines in operation even in small businesses where they're used for account-keeping or stock inventory.

A VDT consists of a keyboard, a visual display unit, a memory, a computer which contains complex electronic circuitry on a silicon chip about the size of a thumbnail, and a printer. The image of what is keyed into the memory is displayed on the screen; corrections and additions are made by further keyboarding. The text may be printed onto paper at the worker's station or somewhere else altogether so that she never sees the finished product. In some workplaces, such as the telephone company, information is stored and referred to again and again.

This handy piece of technology performs amazing feats—who has not experienced the speed with which a train clerk can check through several schedules or a bank clerk assess an account? But the price of space-age efficiency is turning out to be the health of the workers who operate it.

Increased Production

INFORMATION about the hazards of VDTs has been compiled by workers' health groups in North America, Great Britain and Europe. The Leeds Trade Union and Community Resource and Information (TUCRIC) Bulletin recently published a supplement which describes how VDTs damage workers' eyes: glare on the screen from reflected light and too-bright overhead lighting, the screen's noticeable flicker, small characters and above all, continuous use without breaks, add up to serious eyestrain and eye injury. TUCRIC's findings were echoed in November 1980, by a study conducted at the insistence of the Newspaper Guild by the National Institute of Safety and Health (NIOSH) in California.

These reports and others recommend regular breaks for users—e.g. 10 minutes off the machine each hour—and limited daily use. Journalists in West Germany and Switzerland have negotiated a four hour daily maximum; a bank workers' union in France has settled for five hours.

Demands for limited use of the machine cut into its biggest selling point—increased production. While office costs have doubled over the past decade, office productivity has remained almost stagnant compared to other industries. Some VDT manufacturers promise increases of 400%. Once purchased, the capacity of the machine determines work patterns which generally consist of solid eight hour shifts, often two shifts a day.

To ensure maximum productivity, machines can be programmed to monitor everything a worker does—when she starts; when she stops to talk to a neighbour, go to the bathroom or make a personal phone call; how often she makes a mistake; how her work compares with others or with her own last week. The flow of work can also be completely controlled by the supervisor: a new operator at a telephone company in Winnipeg describing her aggravation at the continual flow of calls directed at her at 30-second intervals says that, at this point, simply answering a call on her own would be a relief.

Damage to Fetuses

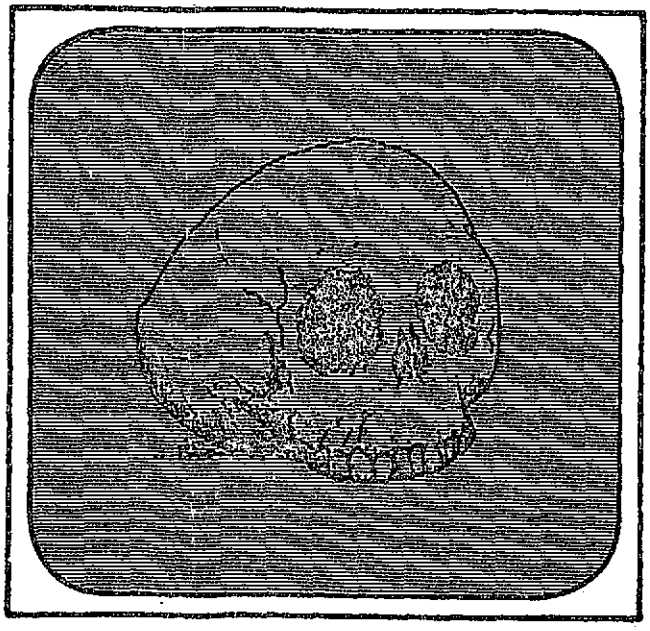
BECAUSE workers are virtually glued to the machine for hours at a time, they are vulnerable not only to the stress and demoralization of such close supervision, but also to the hazards of the machine. Along with eyestrain, fatigue, neck and back pain, the hazards include exposure to low levels of non-ionizing radiation in the form of microwaves. While leakage from the machines is often below the legal limits, the standards are being seriously challenged by workers in the U.S. and Canada. The allowable exposure levels in North America are far higher than in other countries.

Exposure to non-ionizing radiation at very low levels has been known to cause a particular kind of cataract in radar technicians. Now there are VDT workers who have developed the same kind of cataracts which greatly diminish eyesight.

In the spring of 1980, two young copy editors at the New York Times who sued for compensation when they developed microwave cataracts ran into the traditional obstacle course: manufacturers minimize or deny the dangers of radiation leakage; government standards are based on manufacturers' recommendations. The editors' machines were leaking all right, but not above the "allowable level." They lost the case.

Early in January 1981 a woman in Thunder Bay, Ontario who had worked on a VDT for a year and a half developed microwave cataracts, filed for compensation. If she wins, it will be a significant victory for workers, forcing a change in standards for occupational exposure to microwaves in Canada.

Studies done in Eastern Europe and in Sweden suggest that exposure to microwaves causes damage to fetuses. Again in Ontario, of seven pregnant VDT workers at the *Toronto Sun* who gave birth during a three-month period last year, four gave birth to children with abnormalities. The women's machines were tested for leakage at the current standards and given "a clean bill of health." In fact, the full extent of biological damage to human beings by low levels of microwaves is not yet known. It may be that no level is safe.



WORKERS are demanding changes. Two years ago 75 typists at the United Nations in New York walked off their jobs, refusing to use VDTs because of the physical stress and exposure to radiation. When 500 other workers joined them, the General Assembly was forced to continue a week longer than planned. It was big news at the U.N. though not at the New York Times which printed only a paragraph about the incident.

In many places where VDTs have been introduced, informal groups have formed for workers to compare experiences and share strategies. They are learning to challenge the charge that they are "hysterical women afraid of a new technology." Often different workplaces, unionized or not, support each other in generating a more informed position to deal with the health problems associated with VDTs.

They have learned that some machines are easier to work with than others. For example, those with larger screens are easier on the eyes, and detachable keyboards allow for adjustments in position which lessen back, neck and eyestrain. Workers can be protected from exposure to microwaves if the machines are shielded to prevent leakage and if the machines are separated to prevent multiplying the effects of radiation. Rigid maintenance of the machines is another essential protective measure.

As the evidence mounts, workers are conducting their own surveys, documenting changes in vision, and in general health. Some unions are employing their own eye specialists to monitor eye health. Recognition of the hazards of VDTs by employers will mean that some workers will need to be protected for their "vulnerability"—older workers, workers with less than perfect eyesight, and pregnant workers will be especially in danger, not only because their workplace is hazardous to their health, but because their employers will want to "protect" them right out of their jobs. Unions are already demanding transfers for these workers with no loss in privileges, seniority or pay.

THE struggle of VDT workers for a safe workplace is tied in with the fight against automation. Manufacturers boast that one machine equals three secretaries. In Europe the machines are called job-killers. In West Germany it's been estimated that 40% of all office work is suitable for automation. This means that millions of jobs will be eliminated. And since the majority of clerical workers are women, it is their jobs that are in danger. As yet largely unorganized, these workers are not in line to benefit from union demands for job security.

Besides eliminating jobs, the introduction of new technology by management has a more invidious role. It puts more power into management's hands leaving the majority of workers, other than a small group of elite technicians, out of touch with the technology of the workplace. Furthermore, it de-skills clerical work taking even more information away from workers and opening the way for lower pay.

But the fight is not against the technology. The fight is to make the machines work for us, not for our employers. VDTs have the potential to make clerical jobs more interesting and less repetitive. Our work could be completed sooner, giving us more leisure time. The possibilities for information-sharing and communication are exciting.

The solution to the problems currently presented by the VDTs clearly lies in worker control. Workers who decide how to use the machines and for what purpose, workers who set their own work-pace and who choose machines with the best health and safety features will benefit from the technology. To make this vision a reality, we have to work together now to protect our health and our jobs.

Solutions

PROPER LIGHTING

Most offices are equipped with bright fluorescent lighting which is necessary for typing and filing. VDT's require softer light to prevent eyestrain. Redesign conventional lighting: lighting should be recessed; baffles may be used to prevent glare. Adjustable lighting with individually controlled lamps for maximum flexibility may be used.

REDUCE GLARE

* Windows should be shaded
* Screens, keyboard and room decor should be in matte subdued colors
* Anti-glare devices should be installed
  Too often screen hoods and anti-glare filters are optional.
  Make sure they are purchased.
* Machines must be properly serviced twice a year

IMPROVE WORK STATION DESIGN

* VDT screens should be detached from keyboards so they are adjustable
* Screens should allow individual operators to adjust angle, brightness, and focus for viewing comfort.
* Chairs should have adjustable back as well as seat height
* Operator should sit 20-27 inches away from screen
  This reduces eyestrain and radiation exposure.
* Screens should be high resolution, have proper size, color and clarity of characters
* Replace plastic casings with metal casings
  Nearly all VDT radiation can be blocked by use of metal casings.

FREQUENT REST BREAKS

Eye muscles become strained from focusing on a point at close range It is important to rest eyes by exercising them and looking up or at long distances.

* Breaks should be taken away from work area in an open space
* Breaks should be taken 15 minutes for every hour of VDT use or
* 30 minute breaks for every two hours

BETTER JOB DESIGN

* Job should be more varied
* Two hours of VDT time should alternate with two hours of non-VDT operations
* Constant monitoring of VDT operators should be prohibited
* Jobs should be designed with more content to prevent alienation
* Many European countries limit maximum VDT time to four hours per day

Organize for Health & Safety

In order to make the office a healthful environment for VDT users, some major changes in office layout, equipment or job design may be necessary. To achieve this you have to organize, so your demands can be made in a united and forceful way. Hold meetings to discuss your problems and to educate your co-workers about these hazards and how to avoid them. For assistance, contact MaryCOSH at 837-0414 or Baltimore Working Women at 837-3830.

MaryCOSH Fact Sheet

Video Display Terminals

By 1985 more than 10 million people in the U.S. will use video-display terminals (VDT's) at work. VDT's, also known as cathode ray tubes or CRT's are changing the face of the modern office. They have the potential for improving the processing of data tremendously. They have also brought new health problems to the workers who use them.

VDT HEALTH HAZARDS

Most problems caused by VDT use can be totally prevented by the use of proper lighting, equipment which is adjustable for individual needs, and a system of scheduling that provides more variety and rest breaks.

Eye Problems

Eye strain
Loss of visual acuity (sharpness)
Changes in color perception
Blurred vision
Burning or irritated eyes
Glasses needed for first time.

Stress

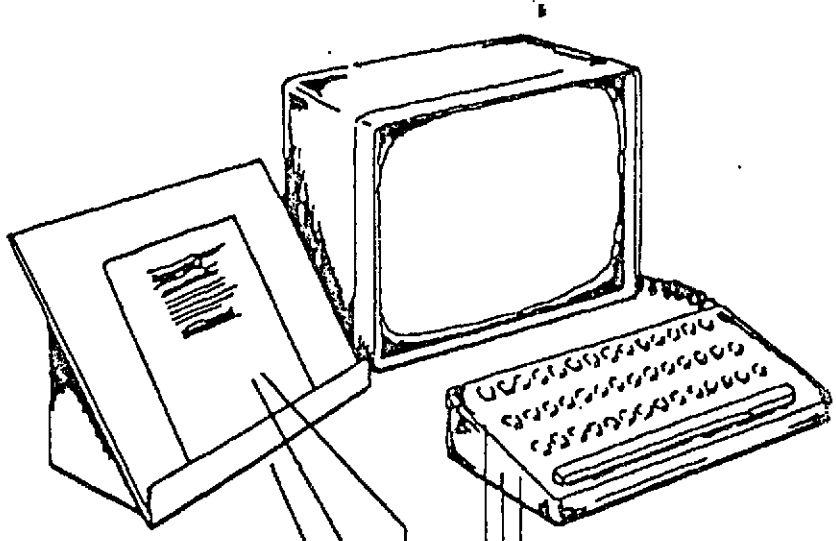
In a study conducted by NIOSH in California, VDT operators in strictly clerical-type operations showed higher rates of job stress than had ever been observed on factroy assembly lines.

Physical Problems

Back and neck pain
Sore shoulders
Stiff and sore wrists
Skin rash
Swollen muscles and joints
Hand cramps
Stomach aches
Numbness in limbs

Radiation

VDT's emit low levels of radiation similar to a TV set, which can be stopped by a few layers of clothing. Little is known about this, but it may be harmful to eyes. NIOSH is conducting a study at the Baltimore Sun to see if there is an increase in cataracts among VDT users.



Simple document holder to improve source/screen relationship

Illumination should be 300-500 lux — excessive illumination causes glare from white paper; poses a difficult adaptation problem for the eye moving between source and screen.

Legible documents. Illegible source documents are even more fatiguing and difficult to read when used as a source for a VDU.

Avoid black keyboards — they accentuate reflection problems.

Keytops. Suitable surface treatment and keytop shape minimize reflections.

Detachable keyboards. Fixed keyboards result in the wrong posture being adopted for typing (with the keyboard too high and causing fatigue) or for viewing (with the screen too low to read).

Source: Automation and the Office Worker

MaryCOSH is an organization of workers, unions, and health and legal professionals.
Address: 305 W. Monument St. #210
Balt., Md. 21201 837-0414

Federal Task Force: Five hour daily maximum

Changes to VDTs and VDT workplaces long recommended by workers and their unions have been endorsed by the Federal Government Task Force on Microelectronics. Among the proposals from the Task Force are a maximum five hours per day at a terminal, rest breaks every hour, initial and annual eye tests as well as corrective lenses, when necessary, all paid for by the employer.

The report also recommends a ban on close electronic monitoring. Task Force members suggest that such monitoring is not consistent with human rights.

The Task Force supports the right of pregnant operators to work away from the terminal with no loss of pay, seniority or benefits. It also calls for more research into the effects of VDTs and, resulting from such research, the establishment of standards relating to all aspects of VDTs and VDT work organization.

Additional guidelines concern women working at home at VDTs, who, according to the Task Force, should enjoy proper work conditions as well as full benefits. Appropriate legislation should be enacted to protect these workers.

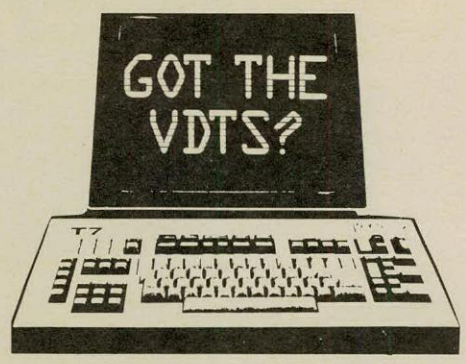
An amendment to the Canada Labour Code has been suggested. This would require joint Health and Safety Committees in all workplaces of 50 or more employees, including offices, which are presently exempted.

The proposals made by the Task Force are not new; what is new is that for the first time in Canada, the recommendations are not coming from workers or unions. Rather, they are part of a report commissioned by Charles Caccia, Federal Minister of Labour. The five member group included representatives from the academic community.

For VDT workers, the key question now becomes what will the government do with this report. Certainly the Labour Minister, when releasing it, made no commitment to act. VDT workers cannot allow the health and safety recommendations to be filed away and gather dust. Employers and government officials must know that such inaction is unacceptable.

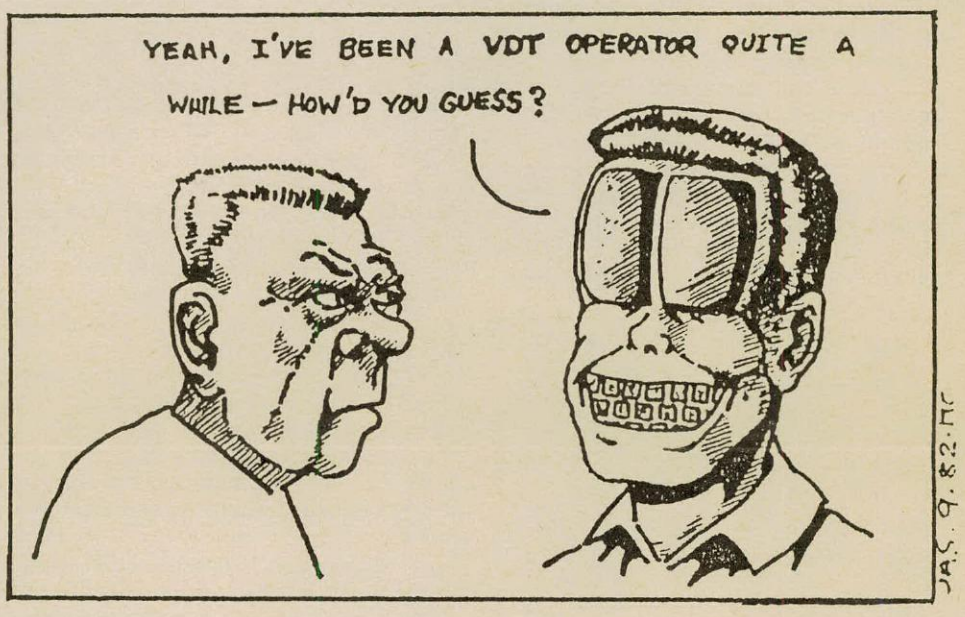
Many of the proposals, like the ban on electronic monitoring, can be introduced immediately. Other proposals might require some time for employers to rearrange schedules, but no reason exists to prevent full implementation of these proposals within a few months. No reason except employer and government resistance. That must be overcome.

While a Task Force can suggest guidelines, the realization of such recommendations must be achieved at each individual workplace.



NEWSLETTER

Vol. 1, No. 3 Toronto, Ontario Winter 1982/83



Shielding VDTs protects workers

Recent testing of video display terminals in several Ontario workplaces has measured extremely high levels of low frequency radiation. Dr. Hari Sharma, professor of nuclear chemistry at the University of Waterloo, has recommended that shields costing about $20 each would help contain these emissions and protect VDT operators.

Although Sharma would not say if these emissions could cause reproductive problems, he believes pregnant operators should not work at terminals since the long-range effects are at present unknown.

Testing of terminals was carried out at the *Brantford Expositor* after Southern Ontario Newspaper Guild members there negotiated such analysis in their last contract. Sharma measured the high power densities in the 14-17 kilohertz (kH) range near the fly-back transformer which controls the sweep circuitry and is located usually at the rear and side of a terminal.

Similar findings were reported after Sharma examined terminals used in the Ontario legislative library. Measurements were taken because the library employed two pregnant VDT operators. The Radiation Protection Service of the Ontario government's Ministry of Labour had refused to do the testing because it has "concluded that VDTs do not emit hazardous levels of radiation."

The ad hoc committee on VDTs has learned that testing of video display terminals used in Toronto schools has produced similar results. The measurements were undertaken at the request of Dr. John Sullivan of the University of Western Ontario for the Toronto Board of Education.

Power densities as high as 400 milliwatts per square centimetre (mW/cm^2) were registered. The level which the Radiation Protection Bureau of Health & Welfare Canada considers safe is 100 mW/cm^2.

Once again, the fly-back transformer seems to be the source of the radiation in the 17 kH range. In his presentation to the school board, Sullivan agreed that such high levels might not be advisable. Shielding would be a simple, inexpensive solution.

Now it is up to VDT operators and their unions to press for installation of shields in all VDTs being used. Shielding should be mandatory at production for all new terminals.

VDTs impose conditions for strenuous visual work

By Luc Desnoyers

The invasion of VDTs in the workplace has raised three major areas of concern. VDTs are a potential source of different types of radiation which could cause health problems. VDTs are also instrumental to a major re-organization of work in the services sector of the economy. My area of concern is that VDTs impose new conditions for visual work, and are responsible for eye strain, fatigue and potential chronic visual problems.

It is important to analyse visual work with respect to the capacities and limits of human vision, and thus ensure that work demands on the eyes are not too great.

Visual work is first of all **ocular work,** that is, muscular work performed within and around the eye. For example, the iris muscle changes the aperture of the pupils every time the eyes shift from the dark screen of the VDT to a lighter sheet of paper. Or the ciliary muscle inside the eye changes the shape of the lens, enabling the eye to focus alternately on the screen, the keyboard and the source documents. The external muscles of the eye (six per eye) are responsible for moving the eyeballs.

Either continuous adjustments or a fixed muscular position of the eyes, as imposed by VDT work, triggers fatigue in all of these muscles.

Visual work is also **sensory work.** Reading is performed primarily by the retina which consists of nervous tissue. Poor reading conditions (blurred characters, too much or too little brightness and/or contrast, glare, reflection, etc.) will make visual work difficult and tiring.

Visual work consists of **mental work** as well. When the mental load is too great, fatigue results, particularly when much coding/decoding is performed, when the pace of reading/writing is too fast, or when the tasks are repetitive and monotonous.

Finally, visual work is **postural work.** To read and work at VDTs, the head and neck, or arms and hands are moved in stereotyped and repetitive fashion. Some parts of the body are maintained in rigidly fixed positions: the neck and back bent, the legs almost immobilized. Either such motions or posture is the incorrect functioning of muscles and joints.

This analysis of the physiological load imposed by VDTs suggests solutions to many of the problems. Ocular work is facilitated by lowering ambient light (less iris adjustment) and by properly positioning the screen, keyboard and documents (less burden on external eye muscles and ciliary muscle). In addition, adequate work/rest schedules, such as 15 minute breaks after one hour of work, will help.

Sensory work becomes easier at ergonomically correct screens (size and shape of characters, refresh rate, etc.) Selecting appropriate grids and diffusers for fluorescent lamps, and placing VDTs correctly in relation to lighting and windows helps as well.

Mental work is less stressful when job content is varied and when the work pace is self-determined; it is a question of workers' control of the workplace.

Lastly, postural work is easier when done at adjustable furniture (tables and chairs), which allow each user to design the work station according to his/her own body and comfort. Such equipment is currently available from many manufacturers and importers.

VDT workers' health is related both to proper control of environmental factors (lighting, design of work station, selection of appropriate equipment) and to organizational factors (job content, work pace, control of work, etc.). Both factors must be considered to ensure the health of VDT operators. And health, as the World Health Organization defines it, is not only the absence of disease, but also a state of physical, mental and social well-being.

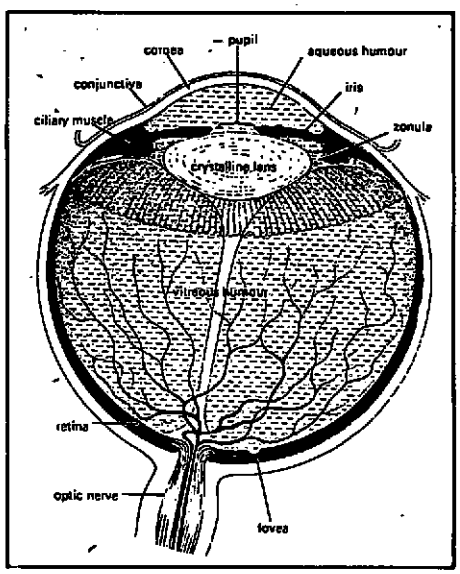
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NEWSLETTER

VDT newsletter is published four times a year by the ad hoc committee on VDTs of the Labour Council of Metropolitan Toronto. Subscription cost: $5 per year. Bulk rate: $2.50 per year. To subscribe, send name, address and five dollars to:

VDT Committee
Labour Council of Metropolitan Toronto
Room 407
15 Gervais Drive
Don Mills, Ont.

Staff: Gary Cwitco, Susan Meurer. Thanks this issue to: Jane Armstrong, Luc Desnoyers, Linda Lore-Iversen, National Association for Working Women, NCOSH, Orangeville Banner and to Toronto Typographical Union for the volunteer labour which produced this issue.



Letters . . .

The following letter was received from an airline passenger agent who works full-time at a video display terminal.

I had been experiencing some problems relating to work on the CRTs. I had earaches, so I started switching my headset from ear to ear. Still did not cure my earaches. I would go home from work some days with my head just pounding. Then the headaces got worse and more frequent. My back started hurting slightly, but nothing too severe.

I reported all of this to my supervisor a few times. He seemed to think that the problems must be related to something other than work.

I then developed a strange rash on my arms, which spread to different parts of my body. I went to three doctors, (one a skin specialist), who were unable to tell me what it was.

In the last month, my back problems have gotten progressively worse. I was advised to go to the Chiropractic Clinic where a number of other employees (15) have been going for treatment. I also have a knee problem which has been bothering me to a great extent.

After being checked out by an intern at the clinic I found out that I have a terrible posture problem, which has resulted from the chairs I sit on at work, with relation to the type of work we do.

My back was so tensed up and stiff from stress and from sitting on these chairs, the chiropractor had to crack all kinds of joints and the joints of my upper back. My knee joint problem is also related to my back problems, as I am trying to compensate for poor posture and I am putting a lot of pressure on the knee.

I'm not an inactive person at all. I swim three to four times a week, but once I come into the office — the inactivity and poor chair facilities make me feel sometimes like I'm 70 years old!

(Name withheld at the request of the individual.)

Resources

The Ontario Federation of Labour Occupational Health and Safety Training Centre has available a number of new audio visual and resource materials. **Office and Clerical Hazards,** 52-page module covering stress, air quality ventilation, office and equipment design, office safety and VDTs. **VDTs (NYCOSH),** an 8 minute slide/tape show dealing with health effects and ergonomic design of VDTs.

A 30-hour **Health and Safety Certificate Course for clericals and VDT operators** will be held every Tuesday night from 7-10 p.m. beginning Feb. 15, 1983, at OPSEU, 18 Grenville St., Toronto. For information and/or registration contact Patty Clancy at Metro Toronto Labour Council, 441-3663.

9 to 5, National Association of Working Women has developed **The Human Factor** to provide potential buyers and users of word processors with comparative information about safety and user comfort features of automated office equipment.

The study focused primarily on manufacturers located in the Boston area. For each model evaluated, an on-site visit was conducted with a company representative available to show the equipment and answer questions. In some cases, the study reports, the representatives were well informed, but many were unaware of the health and safety concerns of users. Only one model per manufacturer was studied. The evaluation is of this model only, not of the manufacturer in general. In some cases, the manufacturer's most current model, not necessarily the equipment most often used by office workers, was shown.

Various ergonomic and design aspects of the following models are compared: Digital's Model VT278 Decmate; Honeywell's Model 17803; IBM Displaywriter; Lexitron's model VT1303; Phillips Model 2001 or 2002; Prime model PT65; Savin model IS2000; Syntrex AQII; T.I. Model 940; and Wang's Wangwriter.

The Study *The Human Factor,* 9 to 5's Consumer Guide to Word Processors, is available from 9 to 5, National Association of Working Women, 1224 Huron Rd., Cleveland, Ohio 44115, USA.

On June 4, 1982, at the University of Ottawa, 11 experts, predominantly researchers into low-level electromagnetic radiation effects, spoke on the interactive processes between low-level radiation and biological systems.

A 5-hour proceedings videotape (¾") is now available for groups that might wish to buy or rent it. There is also a ½ hour information program (also ¾") available for rent or purchase. Published proceedings may be available later in the year. Contact: William Kuhns, University of Ottawa, Faculty of Arts, Communication, Ottawa, Ont. K1N 6N5

Health and Safety Contract Language for Operators of VDTs/CRTs. This 21-point outline of recommended contract provisions is available from:

Mass Cosh
134 Chestnut St.
Springfield, Mass. 01103 USA

Guide to Visual Display Units is a 13-page pamphlet which concentrates on ergonomic aspects and includes an extensive bibliography. Available from:

UAW Health & Safety Department
800 E. Jefferson Ave.
Detroit, Michigan 48214 USA

VDT committee introduced

When four women at the *Toronto Star* bore children with birth defects after working on VDTs, a general alarm was raised. Unions, whose members worked on VDTs, realized how little they knew about this new technology. They shared a concern about the potential hazard of these innocent-looking machines.

Under the umbrella of the Labour Council of Metropolitan Toronto, an ad hoc committee was formed to share information, seek out the available research material and search for ways of dealing with the hazards of VDTs. Anyone who was interested was welcome, and the committee met every month to learn more about the subject. At each meeting, committee members heard reports of yet more problems — another cataract case, another cluster of reproductive problems, facial rashes and so on.

Some of the committee's activities since its inception have been: a conference — Health, Safety and VDTs — attended by more than 300 participants; submissions to various committees, bodies and task forces; information clearing house; educationals and seminars given by various members of the committee; informal speakers' bureau; this *VDT newsletter;* liason with groups throughout Canada involved with VDTs.

All of the members of the ad hoc committee on VDTs work at other jobs full-time; some work at terminals a full eight hours, others are involved professionally with worker health and safety.

The committee remains an ad hoc one — non-permanent in nature, in hopes that future developments in the health and safety of VDT operators will make its presence unnecessary. The goal of the committee is its own obsolenscence!

Government inaction seen on PCB issue

The hazard which polychlorinated biphenyls (PCBs) may represent to VDT users is being ignored by government officials. Dr. L.M. Black, until recently an Assistant Deputy Minister at Health & Welfare Canada, indicated that "we do not feel justified in investigating this matter further at the present time."

He outlined three reasons for refusing to pursue the matter. First, PCB use was banned in this kind of equipment in July, 1980; second, if a capacitor containing PCBs fails, so will the entire unit; and finally, there are other sources of PCBs in offices.

Union health and safety representatives have rejected these arguments. Gary Cwitco, of the Communication Workers of Canada, reminded Dr. Black that there are significant numbers of machines manufactured before 1980 still in use. VDT manufacturers were permitted to exhaust their supply of PCB capacitors; they might still be used today.

As to the other points mentioned by Dr. Black, Cwitco asked what happened to the PCBs after the capacitor leaked. He also stated that workers didn't really care if the PCBs came from the terminal or from other sources in the office — there should be no PCB exposure.

In another development, IBM informed the ad hoc committee on VDTs that the company stopped using PCB bearing equipment in July, 1976.

Communication workers plan VDT strategy

North Carolina's Communications Workers voiced two major health concerns in recent meetings.

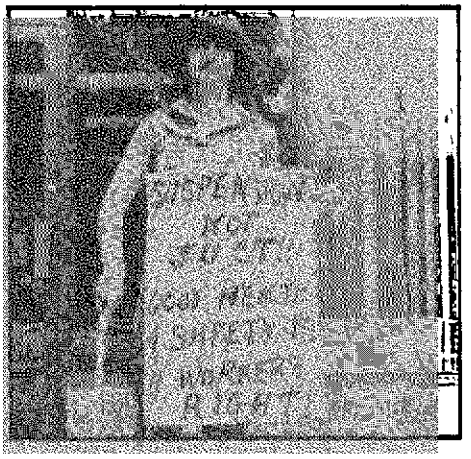
First, stress and job pressures dominated discussions at the CWA Women's Conference. Job pressures right now are at their greatest. The biggest problem is the unreasonable objectives . . .

. . . In Asheville (North Carolina) . . . we set up a committee on Stress that will report (survey) results . . . to bargain something in our next contract and do something about these ridiculous objectives . . .

Second, and obviously related to job stress, is the strong concern about the telephone companies' extensive use of Visual Display Terminals (VDTs, CRTs). Eye and back strain, insufficient break time (away from the machines), lack of health testing/monitoring, and, yes, stress, were key complaints coming from quite a few CWS safety reps.

While contract bargaining (getting key health concerns translated into contract protections) may offer long-run hope, it seems clear that many CWA locals want improvements in their job conditions/situations A.S.A.P.

Reprinted from NCOSH Safety and Health News



VDT legislation proposed in B.C.

Karen Sanford (NDP, MLA Comox) introduced a private member's bill to the British Columbia Legislature which would protect VDT workers.

Some highlights of the bill:

The terminal shall be located on an adjustable table and be provided with a chair that is adjustable for seat and backrest heights, angle and backrest tension.

The terminal shall be equipped with brightness and contrast controls, and with an anti-reflection filter.

Every employer of a terminal operator shall provide information to the operator about the hazards and symptoms associated with terminal use, and provide instruction on the precautions the operator may take.

Every employer of an operator shall permit an opthalmological examination during working hours without loss of pay once in each six-month period.

Every employer of an operator shall allow a ten-minute rest period every hour.

An operator who believes she may be pregnant may request alternative work without loss of pay, seniority or other benefits.

Government employee pickets for healthy workplace

By Linda Lore-Iversen

The federal government has used VDTs in the Orangeville, Ontario, Canada Employment Centre for approximately two years.

March of 1982, security screens were installed over the "bare" screens to ensure the security of "sensitive information". This 3M security screen fits directly over the "bare" screen and provides a 60° viewing angle. Anyone viewing the terminal from slightly off-centre would see what appears to be a blank screen.

After two years of operating the "bare" screen, I experienced the common side effects of eye fatigue and eyestrain. Immediately after installation of the security screen, I experienced side effects that left my eyes feeling burned and bruised. This pain was serious enough for me to question the health hazards of the security screens.

> "Neighbors have abandoned chatting over the back fence in favor of a more meaningful relationship with a financial planning module."
>
> *Anne Bodnarchuk, Vice President, Computers & Systems Services, explaining the popularity of computer courses offered to Air Canada employees.*

In the company of my shop steward, I withdrew my services under the Treasury Board Directive 055-1 which grants a worker the right to withdraw from work when an individual perceives an imminent danger. About the same time, an overwhelming number of my co-workers submitted written complaints to the local manager, expressing similar health concerns.

Within two weeks, the security screens were removed, pending an investigation to be conducted by our national headquarters in Ottawa.

June of 1982, without prior notice, the security screens were reinstalled.

Again I withdrew my services under the directive. This time, a Labour Affairs Officer from Labour Canada came to conduct an on-site investigation. The verdict, with no right of appeal, was that no imminent danger existed. Consequently, I was expected to return to my duties using the VDT with the security screen.

Had I been covered by the Canada Labour Code, I would have been able to appeal the Officer's decision to the Canada Labour Relations Board.

This situation remained unresolved over a one month period while management worked through the appropriate steps towards my suspension. During this time, management listened but refused to consider the alternative proposals I suggested regarding "information security", proposals that involved removal of the screen.

The problem, as perceived by management, was my refusal to obey a supervisor's order to use the terminal. The issue, as I perceived it, was the possible damage the screen could cause my vision.

I was suspended.

On the day of suspension I picketed the office to protest and air my concerns. Following the one-day suspension, I was expected to use the VDT. Of course I grieved, but I was still exptected to return to the terminal until the issue was resolved. I had little hope of winning the grievance. It seemed to me that I was faced with a no-win situation.

When I returned to the job, I maintained my position. Management did not initiate further disciplinary action.

Within ten days, workers involved were called together and advised of a change in policy. We were asked to implement the alternatives that I had proposed at the outset. The security screens were removed.

Although I am happy about the victory, I know that my concern was but a small part of a greater issue. Workers should have the right to their jobs and their good health, too.

Until our rights are guaranteed in contractual or parliamentary law, management will continue to try to coerce workers into unsafe and unhealthy working conditions.

Linda Lore-Iversen
Canada Employment & Immigration
Union, Local 633, a component of the
Public Service Alliance
of Canada (PSAC)

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NEWSLETTER

Vol. 1, Supplementary Issue Toronto, Ontario Winter, 1983

Interview . . .

Carol S. is a bank worker whose job involves some VDT use.

Q. What is your main concern about VDT work?

A. My main worry is that we have no access to information about our work. I work with other young women who may want to have children, and we have no idea of the possible hazards. There should be a handbook available from every employer on VDT hazards and on how best to use VDTs.

Q. How has VDT work changed your job?

A. The biggest change is that VDTs eliminate jobs. Computerization in banking is very great, everything is "on-line". I can see the office staff shrinking. Last year, 400 people were layed off across Canada in my company. We have all become numbers, and everything we do is monitored.

Q. What changes would you like to see in your workplace?

A. I would like to see the work day shortened since the machines make our work easier. We should get the benefit of the increased efficiency. I would also like more training to get into the systems end of computer work. My employer provides incentives for any commercial courses I would take, but not for computer courses. They aren't "job related," or so I've been told.

Q. What is happening in your office to change and improve the work environment?

A. People are concerned about conditions, but we are limited because we aren't organized. Also, we are isolated from each other, from bank to bank, and from branch to branch.

The ad hoc committee on VDTs was formed under the umbrella of the Labour Council of Metropolitan Toronto two years ago, to share information and investigate the hazards associated with VDT work. Members of the committee work at other jobs full-time; some at terminals eight hours daily, others are involved professionally with worker health and safety.

CLC report links VDT work and health-related symptoms

"Their responses confirmed what numerous studies in other countries had already documented. Canadian VDT workers, like their counterparts around the world, experienced eyestrain and visual impairment, musculo-skeletal discomforts and psycho-social or stress symptoms. The connection between these health problems and VDT work was again made clear."

The Canadian Labour Congress (CLC), in an ambitious, scientific survey of 2,336 workers in 15 workplaces across the country, clearly links a broad range of health-related symptoms and VDT work. Indeed, the study documents most strikingly the direct and dramatic increase in both severity and frequency of symptoms with the amount of time a worker spends using the terminal and with the length of time worked without a break.

A VDT operator, for instance, who spends a full working day at a terminal, is 3.5 times likelier to suffer from burning eyes almost every day than is someone spending two hours or less at the screen. Similarly, that first VDT worker is 2.25 times more likely to have daily headaches and lower back pain than is the latter operator (See Graph I).

Other symptoms increase when the time worked at VDTs without a rest break is analysed. A worker who must spend two hours without a break at a terminal is twice as likely to suffer almost every day from the problems of burning eyes, headaches and lower back pain (see Graph II).

The study also documented the following differences between VDT users and non-users, the most dramatic differences related to vision:

— VDT users are twice as likely as non-users to suffer from burning eyes, and three times likelier to report aching eyes on a daily basis;

— They are almost twice as likely to report difficulty focussing the eyes;

— VDT users are more likely than non-users to suffer from a variety of stress-related symptoms such as general tiredness, irritability, headaches and sleeplessness;

— VDT operators were also more likely than their non-VDT counterparts to report a range of muscular problems such as lower back, neck, upper back and shoulder pain.

These results will not surprise VDT operators who have complained of similar symptoms almost from the day the machines were introduced. However, reports from workers are not considered significant until "science" has documented those same problems.

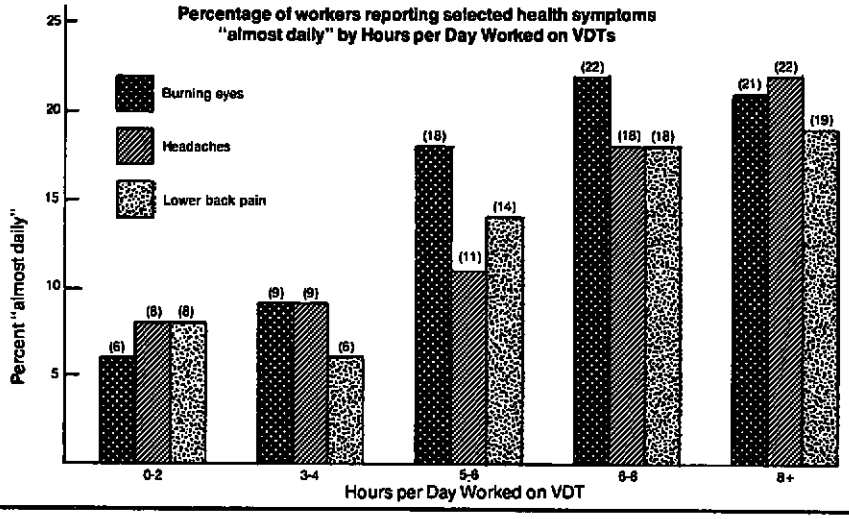
The authors of the CLC study make 21 recommendations in all for improving the working conditions of VDT workers. The suggestions cover better machine and workplace design, as well as job organization and job content.

This report makes some of the same recommendations as the Federal Govern-

Continued on page 2

GRAPH I

Percentage of workers reporting selected health symptoms "almost daily" by Hours per Day Worked on VDTs



CLC report links VDT work and health-related symptoms

Continued from page 1

ment Task Force on Microelectronics (see Vol. 1, No. 3), by calling for a limit on daily VDT work of four hours, regular hourly rest breaks, employer paid visual examinations and corrective lenses, if necessary. The CLC study also calls for a ban on electronic monitoring of workers.

In addition, the CLC is requesting minimum government standards on the manufacture and installation of VDTs, with a ban on machines that do not meet basic adjustability requirements. The report recommends re-evaluation and re-design of jobs causing deskilling, so that workers are no longer treated as simple extensions of the machines.

Worker involvement in all aspects of the decision-making process regarding introduction of this new technology is a further recommendation. Simply informing workers after all the real decisions have been made is inadequate; working people have a clear right to exercise greater control over working conditions.

Finally, the study calls for research into the possible effects of VDTs on the reproductive system of terminal operators.

The Canadian Labour Congress has provided an invaluable aid to all VDT workers by supplying them with solid scientific data in the struggle for a safe and healthy workplace. There is no longer any excuse for inaction by either government or employers.

Those workers in unions must raise the issue as one of primary importance at bargaining. Other VDT workers, those lacking unions, should start talking with their co-workers about useful strategies within their own workplaces. Making contact with others and recognizing that the problems are not individual concerns, is an important first step. Further action could include petitions or a letter-writing campaign to the Minister of Labour.

Every action taken will bring us closer to healthy working conditions. VDT workers voicing their common concern can achieve changes as outlined in the CLC report.

A 46-page digest of the CLC report is available for $5, the full study costs $20. Both can be ordered from:
Canadian Labour Congress
Labour Education and Studies Centre
2841 Riverside Drive
Ottawa, Ont. K1V 8X7
(613) 731-3052

Two recent books probe office hazards

Two recent books on the health and safety of office work include useful chapters on VDTs and other job-related stress.

Office Hazards, by Joel Makower, Tilden Press, is an American publication, while *Office Workers' Survival Handbook*: A guide to fighting health hazards in the office, by Marianne Craig, is published in Great Britain by BSSRS Publications.

Both books contain useful questionaires and check lists to help monitor the workplace. Topics covered are noise, lighting, ventilation, toxic substances, the "office of the future", and more.

This is important reading for all those who think or are told that the office is a hazard-free environment.

OFL Course

A 30-hour Health and Safety Course for clericals and VDT operators will be held every Tuesday night from 7-10 p.m., beginning Feb. 15, 1983, at OPSEU, 18 Grenville St. (Yonge and College Subway), Toronto. Topics to be covered include stress, office hazards, legislation, reproductive hazards, noise and VDTs. For information and/or registration, contact Patty Clancy at Metro Toronto Labour Council, 441-3663.

NEWSLETTER

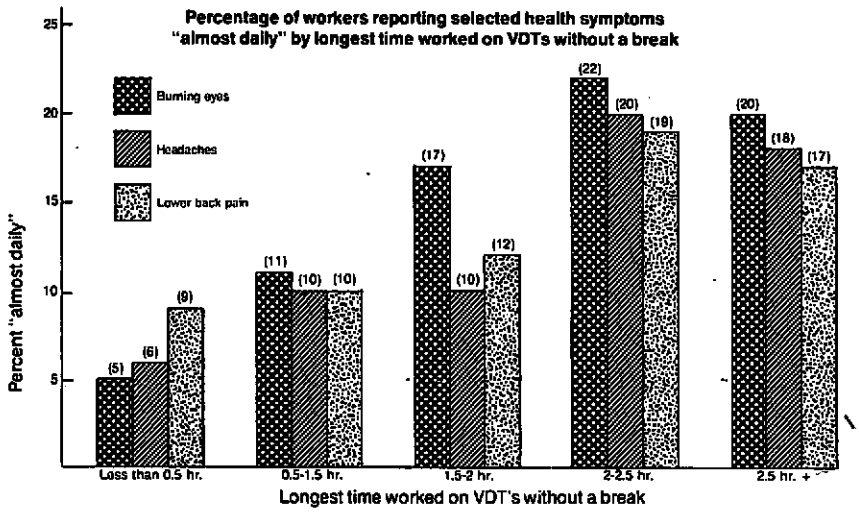
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Staff: Gary Cwitco, Susan Meurer. Thanks this issue to Local 50, Communication Workers of Canada, and University of Toronto Staff Association, whose contributions made this Supplementary Issue possible.

GRAPH II

Percentage of workers reporting selected health symptoms "almost daily" by longest time worked on VDTs without a break



Advance Notice

VDTs and Stress

a one-day conference
Saturday, April 30, 1983
in Toronto.

Speakers, workshops, audio-visuals.

Free daycare available.
Details in the next issue of the *VDT Newsletter*

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NOUVELLES

SANTÉ AU TRAVAIL

CLSC centre-ville
(centre local de services communautaires)
1199, Bleury – 2e étage **866-5761**



Vol. 1 n° 3, mai 1982.

Dans ce numéro: 1ER MAI FÊTE INTERNATIONALE DES TRAVAILLEURS

- «GAGNER SA VIE EN NE LA PERDANT PAS.»
- C'EST VOTRE TOUR!
- UNE LOI POUR PROTÉGER LA SANTÉ-SÉCURITÉ DES UTILISATRICES D'ÉCRANS CATHODIQUES
- NOUVELLES DU CLSC

1er MAI
FÊTE INTERNATIONALE DES TRAVAILLEURS

«Gagner sa vie en ne la perdant pas.»

En 1886, 190,000 travailleurs et travailleuses américains firent la grève pour obtenir LA JOURNÉE DE 8 HEURES. Le débrayage déclenché le 1er mai fut suivi dans la plupart des grands centres industriels américains, mais spécialement à Chicago.

Dans cette ville, il y eut des affrontements dès le début. Le 3 mai, la police tira sur les manifestants, en tua 6 et en blessa 50. Il y eut d'autres affrontements. Une bombe a tué des policiers. On tint les dirigeants syndicaux responsables de cet attentat et 4 d'entre eux furent pendus en novembre 1887. Six ans plus tard, une enquête gouvernementale les exonérait de tout blâme.

C'est pour honorer les martyrs de Chicago que le 14 juillet 1889, le Congrès de la deuxième internationale ouvrière adopta une résolution faisant du 1er mai une fête internationale de solidarité ouvrière. Ce sera aussi l'occasion de mettre de l'avant les revendications des travailleurs pour la réduction de la durée de travail.

Quand on y pense bien, la lutte livrée en 1886 par les ouvriers américains pour l'établissement de la journée de 8 heures était déjà une revendication importante pour protéger la santé et la sécurité au travail.

De plus, cette revendication pour une journée de 8 heures contenait déjà en germe les luttes que beaucoup de travailleurs et travailleuses mènent encore actuellement pour réduire dans certaines situations le temps de travail dans le but de protéger leur santé et leur sécurité.

- Luttes que les travailleurs et travailleuses mènent contre le salaire au rendement et ses atteintes à la santé.

- Revendications que les femmes mettent de l'avant contre la semaine de 66 heures (double journée de travail et ses conséquences graves sur la santé).

- Actions que les femmes avancent pour limiter la durée et l'utilisation quotidienne des écrans cathodiques à 4 heures par jour pour diminuer la fatigue et le stress.

- Revendications des hommes et des femmes pour la réduction de la durée du travail de nuit car le travail de nuit est «nocif et condamnable du point de vue physiologique et du point de vue familial et social pour une forte majorité de travailleurs et travailleuses».

- Actions des hommes et des femmes pour réduire leur temps d'exposition à la chaleur dans certains milieux de travail: cuisines d'hôtels et de restaurants, industries du vêtement, buanderies,...

Le 1er mai de cette année doit être l'occasion de nous rappeler et de continuer toutes ces revendications et actions et de penser qu'il est important «de ne pas perdre sa vie à la gagner».

Une loi pour protéger la santé-sécurité des utilisatrices d'écrans cathodiques

Il nous en est arrivé une bonne. Cet après-midi-là, nous avons reçu copie d'un projet de loi ontarien, le bill 169, intitulé «Une loi pour la protection des utilisateurs d'écrans cathodiques.» (traduction libre). Tel qu'indiqué, il était passé en 1ère lecture le 17 novembre 1981 devant la législature de l'Ontario. Les membres de l'équipe en prennent connaissance. Très intéressant, les articles proposés reprennent les principales recommandations des experts de la santé. Oui, très intéressant, les répercussions ne peuvent que se faire sentir à Montréal où plusieurs grandes compagnies canadiennes ont leurs bureaux. Il était temps, car il n'existe toujours pas de norme canadienne protégeant la santé et la sécurité des utilisatrices d'écrans. Comme vous le verrez dans le résumé, le projet de loi s'attaque à la durée du travail continu devant l'écran, aux conditions de travail, aux contrôles et à la question

du retrait préventif de la travailleuse enceinte. Enfin, trop beau pour être vrai, pourtant le texte est là. Les travailleuses de l'Ontario ont dû mener une lutte pour obtenir cette loi de leur gouvernement! Au Québec, les travailleuses auront aussi leur lutte à mener pour protéger leur santé et leur sécurité au travail... Réveil brutal, après plusieurs téléphones à Toronto, on apprend que le bill 169 est mort au feuilleton de la Chambre. Même si deux autres bills ont été présentés à ce sujet à la session d'avril, on apprend que ces bills ont peu de chances d'être adoptés parce qu'ils sont présentés par des députés de l'opposition néo-démocrate! Un instant de rêve dans un merveilleux après-midi de printemps, presque un poisson d'avril! Enfin, si vous voulez rêver vous aussi ou préparer vos revendications, voici un résumé de ce fameux bill 169:

- art. 4: Obligation pour les employeurs de respecter 14 conditions pour l'utilisation des écrans cathodiques par leurs employés: filtres anti-reflets, sièges de hauteur ajustable avec dossier, éclairage spécial, clavier détaché de l'écran, etc.

- art. 6: (1) Tout employeur doit permettre à l'utilisatrice de prendre une pause de 15 minutes par heure de travail à l'écran et ne doit pas la faire travailler plus d'une heure de façon continue à l'écran.
  (2) Aucun employeur ne doit faire travailler une opératrice sur écran cathodique plus de 4 heures par 24 heures.
  (3) Droit pour la travailleuse(eur) d'être affectée à un autre travail le reste de la journée sans perte de salaire ni d'avantages.

- art. 7: Droit pour la travailleuse enceinte ou qui croit l'être d'être affectée à un autre travail sans perte de salaire ni d'avantages.

- art. 10: Tout employeur doit permettre à ses opératrices de passer un examen oculo-visuel sur ses heures de travail avant de travailler sur écran et à tous les 6 mois sans perte de salaire. Les frais des examens et des lunettes prescrites sont à la charge de l'employeur.

- art. 12: Interdiction à tout employeur d'utiliser l'écran pour contrôler la productivité d'une opératrice sur une base individuelle.

- art. 13: Tout employeur doit former un comité de santé-sécurité composé d'opératrices avec mandat d'enquêter, de recommander des correctifs, de participer aux décisions concernant l'acquisition des appareils, d'enquêter sur les plaintes des opératrices et de les communiquer à l'employeur.

BONNE FÊTE AUX TRAVAILLEUSES(EURS) SUR ÉCRANS CATHODIQUES!

C'est votre tour!

Plusieurs groupes nous ont communiqué leurs activités pour le mois de mai. Il nous fait plaisir de leur donner la parole.

L'ASSOCIATION DES GENS À POURBOIRE (AGAP) PRÉPARE DES RENCONTRES D'INFORMATION.

Nouvellement mise sur pied pour faire face aux récents démêlés avec le fisc, l'AGAP prépare pour le mois de mai des rencontres d'information sur la santé, la sécurité au travail et sur les normes minimales de travail à l'intention des travailleurs et travailleuses de la restauration et de l'hôtellerie. Dites-le à vos amis(es). Pour renseignements: 598-2358.

«QU'ENTENDEZ-VOUS PAR PROTECTEUR?»

L'Union des travailleurs accidentés de Montréal (UTAM) vient de publier une petite brochure sur les limites et les dangers des protecteurs auditifs. La brochure vise à appuyer les travailleurs et travailleuses aux prises avec les problèmes de bruit dans leurs actions pour éliminer le bruit à la source. Vous pouvez vous la procurer en vous adressant à l'UTAM, 4650 av. des Erables, Mtl H2H 2C9, ou par téléphone à 527-3661.

LE THÉÂTRE DE QUARTIER VOUS INVITE À UN ATELIER D'IMPROVISATION.

A l'occasion de la fête internationale des travailleurs et travailleuses, le Théâtre de quartier tiendra un atelier intensif d'improvisation de 15 heures sur le thème du travail, les 7, 8 et 9 mai prochains: «Le travail c'est la santé!». Mais le travail répond-il à nos attentes, à nos espoirs de réalisation? Ne serait-il pas plutôt frustrant, stressant, déshumanisé? Pour renseignements et inscription: 845-3338.

CONNAISSEZ-VOUS LES RADIOS COMMUNAUTAIRES DE MONTRÉAL?

Il existe deux radios communautaires sur le FM à Montréal dont une au centre-ville: CINQ-MF, 102.3 et une autre dans l'Est: CIBL-MF, 104.5. Sans but lucratif, ces radios permettent aux divers groupes et individus de produire des émissions. Dans le cadre de la fête des travailleurs et travailleuses, le 1er mai et durant tout le mois, ces deux stations présenteront diverses émissions à leur intention. Si vous avez des suggestions et commentaires à leur faire ou si vous êtes intéressés à produire une émission, n'hésitez pas à leur téléphoner. Voici en bref, ces émissions.

Radio Centre-Ville, CINQ-MF, 102.3

Dans le cadre de son émission d'informations communautaires, le mardi de 17h à 18h, CINQ-MF consacrera ses 4 prochains sujets au monde du travail.

* mardi 27 avril: Le chômage avec le Mouvement action-chômage.

* mardi 4 mai: Emission spéciale sur la Fête des travailleurs et travailleuses avec des représentants syndicaux.

* mardi 11 mai: «Voleurs de jobs» et immigration avec le YMCA.

* mardi 18 mai: La santé et la sécurité au travail avec des travailleurs et des représentants de CLSC.

Pour renseignements et commentaires: studio (288-1731)
bureaux (288-1601)

A l'Est du CADRAN, CIBL-MF, 104.5

Deux émissions seront consacrées à la Fête du 1er mai: la 1ère, lundi le 26 avril de 18h à 18h30, sera réalisée par le Conseil central de Montréal (CSN) et la 2ème, mercredi le 28 avril de 18h à 18h30, sera réalisée par le Conseil du travail de Montréal (FTQ).

De plus, le Conseil central de Montréal réalisera, les lundis de 18h à 18h30 durant tout le mois de mai, 4 émissions à l'intention de ses membres, dont voici les sujets:

* lundi 3 mai: «Ce qu'est la CSN.»

* lundi 10 mai: «L'inflation.»

* lundi 17 mai: «Le fonds de défense professionnel.»

* lundi 24 mai: «L'orientation et le projet de société de la CSN.»

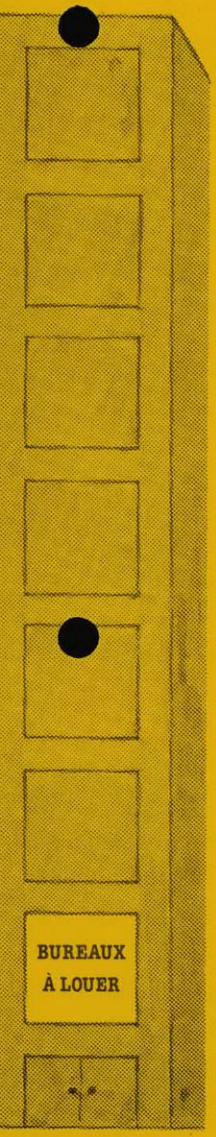
Enfin, le magazine «Pignon sur rue» présente tous les mardi et mercredi soirs de 19h30 à 21h, diverses informations susceptibles d'intéresser les travailleurs et travailleuses.

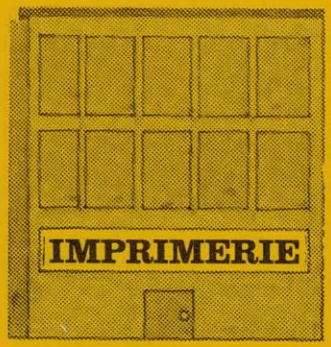
Pour renseignements et commentaires: 526-1489.

NOUVELLES DU CLSC (suite de la page 7)

ÉCRANS CATHODIQUES: LE COMPTE RENDU DE L'ASSEMBLÉE PUBLIQUE DU 1ER MARS EST DISPONIBLE.

Celles et ceux qui n'ont pu assister à la rencontre publique d'information du 1er mars dernier sur les risques pour la santé des utilisateurs(trices) d'écrans cathodiques peuvent se procurer le compte rendu et les exposés présentés en communiquant avec le CLSC.
Deux travailleuses y exposent les problèmes qu'elles ont rencontrés et trois personnes-ressources en expliquent les causes et donnent plus de précisions sur les radiations, le stress, l'organisation du travail et les solutions.





Nouvelles du CLSC



FRANC SUCCÈS DE L'ASSEMBLÉE PUBLIQUE SUR LES RISQUES EN IMPRIMERIE

Environ 150 travailleurs(euses) de l'imprimerie ont participé à l'assemblée publique du 13 avril dernier sur les risques pour leur santé dans leur milieu de travail. Les divers exposés ont suscité beaucoup d'intérêt et d'échanges. L'équipe du CLSC y a offert ses services, particulièrement aux travailleurs(euses) non syndiqués(es) du centre-ville (de Guy à St-Hubert et de Sherbrooke au fleuve) aux prises avec des problèmes de santé et de mauvaises conditions de travail. Nous pouvons les aider à faire le portrait des risques présents dans leur milieu et à faire les démarches pour les éliminer. Si vous connaissez des personnes qui travaillent dans l'imprimerie et qui veulent s'informer ou entreprendre des démarches pour améliorer leur santé-sécurité au travail, dites-leur de nous contacter: 1199, Bleury, 2ème étage, Mtl ou à 866-5761.

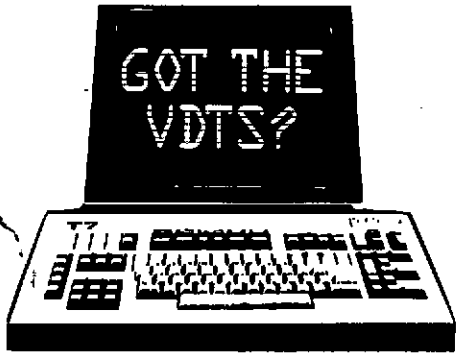
DOSSIER «INFORMATION-ACTION» SUR LES RISQUES POUR LA SANTÉ EN IMPRIMERIE MAINTENANT DISPONIBLE

Dans le cadre de cette campagne de sensibilisation des travailleurs et travailleuses de l'imprimerie aux risques pour leur santé et leur sécurité, le CLSC rend disponible un dossier complet d'information et d'action. Diverses suggestions et outils d'action sont proposés aux travailleurs et travailleuses en vue d'éliminer les risques présents dans leur milieu de travail. Le dossier est disponible au coût de $2 et vous n'avez qu'à communiquer avec le CLSC pour vous le procurer.

(voir suite à la page 6)

Travaillez en santé avec votre CLSC

1199, Bleury - 2e étage 866-5761



NEWSLETTER

Vol. 1, No. 1 Toronto, Ontario Summer 1982

Right to transfer upheld

The right of a pregnant employee to refuse to work in front of a video display terminal because she feared radiation from the terminal might harm her unborn child has been upheld by a government arbitration board.

Helen Barss, a data processing technician in the Ministry of Education and mother of a healthy baby boy, had been assigned to a lower paying classification for her transfer. Her union, the Ontario Public Service Employees Union, argued that the transfer was "for reasons of health" and she should therefore not lose pay for the transfer period.

Barss asked for the transfer on her doctor's advice since she was worried about reports that VDTs can emit radiation dangerous to the foetus. The government maintained it transferred her strictly for "personal reasons," denying that a VDT posed any hazard.

The Board found Barss' fear was serious. It said she had grounds for being sceptical of scientific pronouncements about safety. The decision, written by board vice-chairperson E.B. (Ted) Jolliffe, said scientists "can and do change their minds.

"The public is well aware of changing opinions about the harmfulness — or harmlessness — of urea formaldehyde, DDT, 2-4-D, contraceptive pills, saccharin and a host of other products once hailed as a boon to mankind — not to mention thalidomide," the decision continued.

"The public has noticed that it took many years before much interest was shown in the effects on the ecology of acid rain, mer-

(Continued on page 4)



Desks introduced in Air Canada reservation offices demonstrate poor working conditions faced by VDT operators. The cramped leg space results in an uncomfortable sitting position. The workspace leaves little room for other material. See page 3.

Airline agents Test work stations

In November, 1981, Air Canada announced that new prototype desks were to be installed in the Edmonton reservations office in December. To ensure a thorough evaluation of the desks, the Canadian Air Line Employees' Association (CALEA) organized a committee. They insisted that the committee's own extensive questionnaire be used for the evaluation.

(Continued on page 3)

VDT legislation

Of interest to VDT operators is a Private Member's Bill introduced to the Ontario legislature by Richard Johnston (NDP, Scarborough West). A copy of "An Act for the Protection of Video Display Terminal Operators" is available from Queen's Park. VDT operators and their friends may wish to write to their MPP or to Premier Davis urging support of the Bill.

Bell tests indicate: VDTs emit low level X-rays

Tests conducted by Bell Canada indicate video display terminals can produce low levels of X-radiation.

The testing was conducted on all operator services machines in both Ontario and Quebec as a result of an agreement between the Communication Workers of Canada and the company.

> A sympathetic judge in Frankfurt, Germany dismissed charges against a bookkeeper who attacked his company's VDT with a chair and then set it on fire. According to the January 29 *Guild Reporter*, the employee was frustrated by system failures that regularly forced him to work overtime.
>
> *Reprinted from Microwave News, March 1982*

While the levels are all below government standards, they are cause for concern for two reasons. First, all X-radiation is dangerous and, second, no radiation should be present. Dr. E.G. Letourneau, Director of the Radiation Protection Bureau of the federal government, has argued that VDTs cannot produce any X-rays outside the tube.

In an article in the *Canadian Medical Association Journal* of September, 1981, Letourneau wrote that his testing . . . confirms "that the basic laws of physics are still operating and that there is zero X-ray emission from these terminals. (Zero in this case is defined as less than one thousandth of the natural background radiation to which everyone is exposed.)"

The results of these tests cast doubt on Dr. Letourneau's assertions. Some terminals were producing levels greater than the measured background.

The current Federal Standard for these machines is 0.5 millirems per hour (mR/hr.). If Dr. Letourneau is correct, and they *cannot* produce anything greater than zero, it is time to lower the standard and deal with the machines that do not conform. In this study, some terminals measured as high as .14 mR/hr above background or .23 mR/hr — nearly half the federal government standard.

The union is actively persuing the results of this testing. It is interesting that VDTs at Bell do something the government claims is impossible.

Use of terminals in schools questioned

The ad hoc committee on VDTs recently became involved in the Toronto Board of Education's decision to introduce VDTs into the school system's classrooms. Presentations and recommendations have been made by several members of the committee to the Board's Joint Occupational Health & Safety Committee.

There is no known study of the effects of long-term, low level radiation on children. Medical experience has indicated that radiation has a strong effect on cell tissue which is dividing, i.e., involved in a growth stage. An example for this is the therapeutic use of radiation treatment for cancer cells.

Children may therefore be more susceptible to the possible radiation hazards associated with VDTs. But ergonomic aspects cannot be ignored either. Will classrooms be equipped with adjustable furniture which will suit all sizes and types of teachers and students? What steps will be taken to ensure correct lighting?

In addition to these and other common concerns related to the use of VDTs, the ad hoc committee was alarmed at the proposed use of "boosters" for the VDTs. These are devices which increase power voltage on the machines. They should not be used under any circumstances.

In fact, cathode ray tubes (CRTs) carry a manufacturer's warning that operation of a tube above the X-ray reference level, i.e., the point at which the specified allowable level of radiation is measured, can require special shielding precautions if exposure is prolonged at close range!

NEWSLETTER

VDT newsletter is published four times a year by the ad hoc committee on VDTs of the Labour Council of Metropolitan Toronto. Subscription cost: $5 per year. Bulk rate: $2.50 per year. To subscribe, send name, address and five dollars to:

VDT Committee
Labour Council of Metropolitan Toronto
Room 407
15 Gervais Drive
Don Mills, Ont.

Staff: Gary Cwitco, Katie FitzRandolph, Susan Meurer. Thanks this issue to: Jane Armstrong, Dave Markle, Peggy Nash, Chris Schenk, Linda Torney, and to Toronto Typographical Union for the volunteer labour which produced this issue.



You look like you need a break. Why don't you take a lunch break like Thelma.

Provincial VDT operators Report high rate of miscarriages

When ten out of nineteen pregnant women who worked at the provincial court office in Toronto's Old City Hall had miscarriages, their union, The Ontario Public Service Employees Union (OPSEU) called for an independent investigation.

In 1980 and 1981, since video display terminals were installed in the court office, the rate of miscarriages and birth defects has risen to 52.6 per cent. (Health and Welfare Canada suggests a rate of 10 per cent is normal. Toronto Family Planning Services reports a rate of 19 to 20 per cent is to be expected.) In one room at Old City Hall, which contains two VDTs, a photocopier and other electronic equipment, all four women who were pregnant miscarried.

While the cause of the miscarriages cannot be determined, work on VDTs cannot be ruled out at this point. "There has been nothing else to explain these tragedies," said OPSEU President Sean O'Flynn, "and what is even more irresponsible, these startling statistics have not prompted the full-scale research that is required.

"Until we have answers; until we know what is causing these birth defects and miscarriages, we are faced with the evidence in front of us: women working on VDTs seem to be facing a reproductive hazard of major proportions."

One representative of the provincial government stated during a television report on the miscarriages that the high number of spontaneously terminated pregnancies was a statistical quirk. Another radiation expert, from the Federal government's radiation protection bureau, insisted that VDTs are absolutely safe and that the "normal" miscarriage rate is 40%.

Whether or not VDTs are associated in any way with the miscarriages can only be determined by a thorough, independent study. In the meantime, it is important to remember that the statistics represent individual instances of personal and family misfortune.

"Got the VDTs?" buttons are still available. The cost is $1 per button, bulk rate available on request. Contact the *VDT newsletter* for more information.

Contract News

Southern Ontario Newspaper Guild
Brantford Expositor

The employer shall cooperate with the Guild in urging all current and new employees to get ophthalmological examinations prior to beginning work on VDTs, and at yearly intervals thereafter. Employees shall be asked to obtain these examinations from the doctors selected by the Guild to conduct the VDT eye survey, and shall be given time off work with pay for the examinations.

A lighting survey shall be conducted, following which the lighting will be modified where necessary to accommodate VDTs. Once the lighting has been corrected to levels suitable for VDTs it shall be maintained at that level and will not be adjusted without the permission of the Guild.

Machines shall be tested for ionizing radiation every six months and provision shall be made to enable ionizing radiation tests immediately on any malfunctioning.

The company recognizes the need for breaks away from VDTs and will allow for them. It is expected that employees will exercise responsible judgment in taking breaks, as is the present practice.

British Columbia Federation of Government Employees

One eye examination during working hours per annum with no loss of income to the employee.

A 10 minute break to be taken during each hour while operating a VDT.

Any program capability to monitor individual employee performance must not be utilized.

Lighting should be such as to reduce eyestrain to the maximum. No employee is required to work more than four hours per day on a VDT.

To reduce the hazard of driving while visually impaired, no employee who has worked for a period exceeding 2 hours at a VDT shall be required to continue work at such a machine for a period 30 minutes perior to day's end.

Regular maintenance and emission level tests must be carried out four times annually. The results of those tests are available to all members.

Help Wanted!

The first issue of the *VDT newsletter* is in your hands at last! We hope it isn't the last issue as well, but that too is in your hands. We need your subscription(s) to continue. Send $5 for one year; ask your group or organization to send for a bulk subscription at $2.50/year, for 20 or more copies. We need your non-monetary contributions too! Tell us about your successes, struggles, failures, experiences, health concerns, etc. What kind of information do you expect to read? How do you find this issue? To keep you informed about VDTs, please keep us informed.

(Continued from page 1)

The evaluations were completed in January, 1982. Both the local and national committees concluded that the prototypes provided were totally unsuitable to the needs of reservation agents:

> *The desks appear to have been designed by someone who knows nothing about ergonomic features let alone the job, its requirements, the work environment and who obviously does not have to spend 8 hours a day working at them.*

Following the union's rejection of the desks, the company announced that commercially available ergonomically designed desks would be tested in the Toronto reservations office in February.

The CALEA/Air Canada tests demonstrate that those using VDT equipment on a daily basis are the best judges of the accompanying ergonomic factors. CALEA members will now have to continue the struggle for improved working conditions: until the desks are actually purchased!

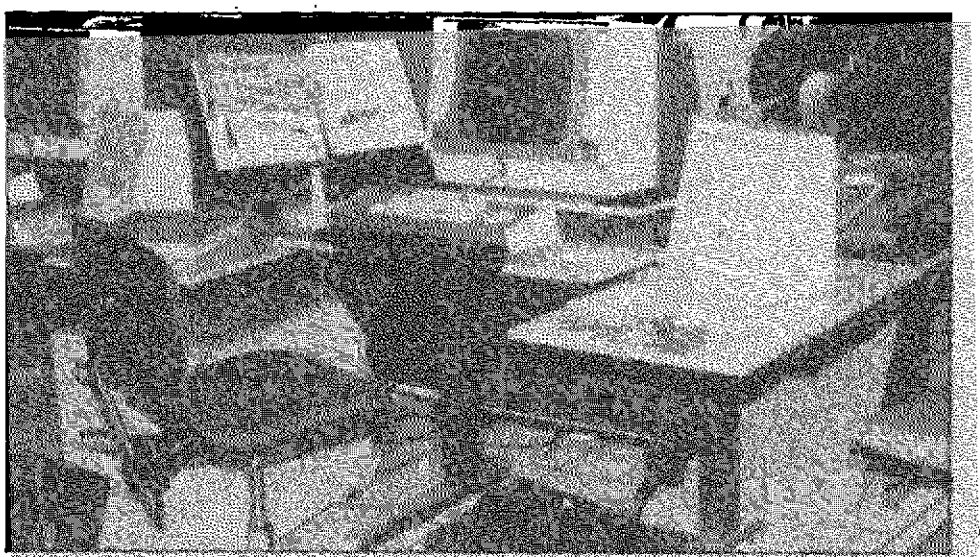
NDP Caucus Workers' VDT contract language

VDT operators often despair at the likelihood of negociating effective contract language for work at terminals. There are, however, precedents for such contract language and one example is the collective agreement between the Ontario New Democratic Caucus and the Ontario New Democratic Party Caucus Workers' Union.

This agreement limits the daily VDT exposure of the employee to a maximum of four hours, and provides for a 10-minute rest period after each fifty minute period of continuous VDT use. Pregnant employees and those experiencing health problems can transfer to alternate work at equal pay.

Under the Occupational Health and Safety Act of Ontario, office workers are specifically excluded from the section on mandatory joint health and safety committees. The Caucus Workers' contract provides for the establishment of a joint health and safety committee which can propose changes, i.e., to ergonomic factors such a "lighting, seating and other aspects of office design and equipment" related to VDT use.

There is also a provision for ophthalmological examinations every six months. These examinations can be carried out during working hours and are at the employer's expense.



Desk shown suggested by union testing committee. Keyboard and terminal are adjustable. Work space is sufficient, material holder is ergonomically designed. The desk accommodates left- and right-handed workers.

VDT operator quits job after developing eye disease

by Rebecca Schechter

On March 5 I left my job as typesetter at *The Globe and Mail*. My resignation was prompted by an eye disease which I developed a year after beginning work on a VDT. Although media reports about my resignation were accurate and well-balanced, they failed to deal with two questions that VDT workers might want to ask.

First, how did I know something was wrong with my eyes? Following my resignation, other VDT operators questioned me in detail about the disease. Not surprisingly, most of them suffer from a range of eye problems: itching eyes, aching eyes, color distortions, etc. They wanted to know whether their symptoms were anything like mine.

The technical name for my disease is "recurrent epithelial corneal erosion." The cornea is the outermost membrane on the surface of the eye. It's a layered membrane and the top layer of the cornea — its skin — is the epithelim. The disease is called "erosion" because this top layer of skin starts to erode or separate from the rest of the cornea.

In the morning, this extremely thin layer of epithelium sticks to the eyelid instead of the eye, and is literally torn off.

If the erosion covers a large area of the cornea, the pain lasts 16-18 hours. If the eroded area is smaller, 2 or 3 hours.

Another symptom is a blurring of vision. When the surface of the cornea is repeatedly disrupted, the membrane clouds over for one or two days.

A second question I've been asked concerns Dr. Milton Zaret of New York, who stated that work on VDTS had either caused or contributed to my condition, whereas four other eye specialists had told me that the disease could have nothing to do with working on a VDT.

These doctors showed no interest in environmental health effects. Not one asked a single question about my work or health history — except to inquire about any previous eye injury. Their brief answers to my questions about the VDTs led me to believe that none of them were familiar with these machines or with the effects of radiant energy on the eyes.

At first I assumed that the absence of interest in environmental factors meant that these ophthalmologists understood the internal physical cause of my disease well enough to eliminate external factors. But if this had been the case — if they understood the physiological mechanism which was causing my cornea spontaneously to erode — they should have been able to suggest a "cure" to interrupt the disease-causing process.

I quickly discovered that there was no cure.

I contacted Dr. Zaret last fall, after hearing about him and his work at the conference organized by the ad hoc Committee on VDTs. Unlike the other doctors, he undertook more than a thorough examination of my eyes: he compiled a detailed history of the progress of the condition and asked me for a complete medical and work history. His approach to the problem was so much more thorough and scientific than that of the other doctors, that I initially had confidence in him.

Further, I was impressed by his caution. He was neither alarmist about the machines nor did he make any judgments until he had accumulated as much evidence as possible. It was also quite clear that he was familiar with the effects of radiant energy on the eyes and related problems. Dr. Zaret has been doing research in this area for over 20 years, and during that time has seen many, many patients suffering from cataracts and cornea problems — all of whom had worked with equipment that emits supposedly safe levels of radiation.

Dr. Zaret didn't tell me that he had scientific proof that the VDTs had caused the disease, but he did say that there is a growing body of evidence incriminating radiant energy in a variety of cornea diseases.

(Continued from page 1)

cury, PCBs, asbestos and other contaminants."

In reaching the decision, the board termed the history of regulating radiation in Canada "rather strange to say the least," noting VDTs were not regulated until March, 1979.

"The fact that a regulation was found necessary at that very late date suggests there could be something more than 'zero' radiation emitted from VDTs, perhaps by reason of a malfunction or a defective product," the decision stated.

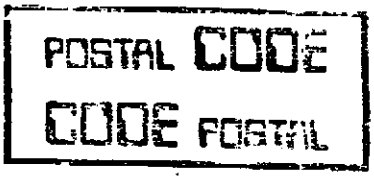
The board determined Barss had reasonable ground for believing VDT exposure could put her unborn child at risk, and said, "every pregnant woman . . . consults her physician and is entitled to rely on his advice, whether he be proven right or wrong by subsequent inquiry."

It continued, "We cannot accept the argument that there is an onus on the employee in circumstances such as these to prove actual danger . . .

Helen Barss made a decision on the side of safety. The Grievance Settlement Board has set an important precedent for all those concerned with the health and safety of VDT operators.

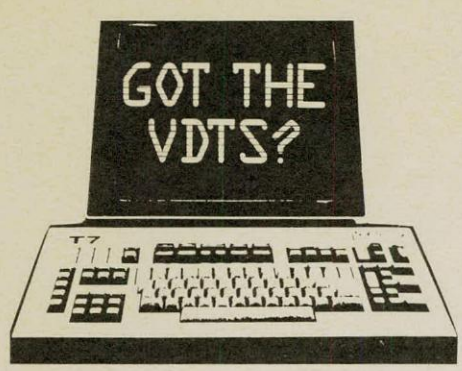
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NEWSLETTER

Vol. 1, No. 2 Toronto, Ontario Fall 1982

Texas study fails to find answers

When eight of 12 pregnancies of video display terminal operators during one year in one department of a large corporation in Dallas, Texas, ended in spontaneous abortion or the death of the newborn, a division of the U.S. Center for Disease Control was asked to investigate.

According to a reliable source, a preliminary report concludes that no particular agent could be identified as the cause of these problems. This conclusion was reached despite a comprehensive survey of the women, covering where they lived, how they were seated at work, their age, ethnic background, previous medical history and even if the pregnancy was wanted or unwanted.

Other aspects investigated were infection during pregnancy, smoking, alcohol intake, use of medication, X-rays during pregnancy and maternal illness.

Although the only point common to all women was their work on a VDT, the authors of the report conclude that the terminals are an unlikely cause. Instead they refer to an "expected-unexpected" cluster, i.e. if enough groups are studied, there will always be those which fall outside of expected statistical bounds.

In Canada, government authorities referred to similar numbers of miscarriages in a single workplace as "statistical quirks", which are to be expected.

In spite of the fact the VDTs were the only common link among the women, and in spite of the fact very little is known about the links between the terminals and reproduction, it appears that the agency was not even prepared to admit that VDTs are worthy of further study.

Important contract news
10 min. breaks/hour
See Page 3

Vancouver VDT users report serious health problems

Of six pregnancies among VDT operators at Surrey Memorial Hospital, B.C., two ended in miscarriage and four were carried full term. Of these, one baby required corrective eye surgery and had a deformed foot, one was born one month premature, another baby suffers from bronchitis, and one is normal.

"There was only one normal, healthy, full-term baby out of six pregnancies," reported the Hospital Employees' Union (HEU), Local 180, in July to the Federal Task Force on Micro Electronics and Employment. VDTs were first installed at the Surrey hospital in 1978.



The report mentions other health problems of VDT operators. "Almost all our members who work with VDTs are experiencing severe eye strain, some have VDT-caused cataracts. Many have needed glasses since working with the screens. Most . . . have noticed a marked increase in headaches, dizziness and nausea . . ."

HEU membership also records problems sleeping, an increase in sore throats, migraine headaches, increased sensitivity to light, back and shoulder problems, numbness and/or tingling in limbs and ruptured blood vessels in the eye.

One member of the federal task force in responding to the HEU brief is quoted as saying that the Vancouver study was "the first hard evidence we've had on this." Another had "heard about it, but not in this gruesome detail."

According to the B.C. report, those working on terminals may in fact have indirectly subsidized the corporations whose machines seem to affect their health. The Canadian Development Corporation, a crown corporation, provided AES Data Ltd. with a capital loan in 1978. AES word processors are the models used in the B.C. hospitals.

PCBs found in VDT work place

PCBs have been found in VDT workplaces and it appears they are coming from the terminals.

PCBs, or poly-chlorinated biphenyls, are known to cause a wide range of health problems, from skin rashes to cancer.

A study was conducted in a single VDT workplace in Oslo, Norway. Three air samples were taken in the workplace and three in the outside air. The values inside the workplace indicated levels of between 56 and 81 nanograms per cubic meter (ng/m^3). While this level is below the 1977 U.S. National Institute of Occupational Safety and Health (NIOSH) average exposure limit of $1000ng/m^3$, this should not be cause for security.

The levels found inside were as much as 80 times higher than the levels found outside and were as high as levels found in workplaces where PCBs are actually used. Added to this is the fact that there are no known "safe" levels of exposure to chemicals which can cause cancer.

The PCBs are contained within components of the electrical system of the terminal. This application was banned by the Federal government in the summer of 1980, although Canadian manufacturers were allowed to use up existing stock. All imports of terminals containing PCBs were banned that year.

VDT workers should begin making demands on their employers and government agencies to determine if their terminals contain PCBs and, further, if the chemical is escaping into the workplace air. The chemical has been banned for more than two years.

PCBs may be responsible for skin rash problems reported by operators or may be linked to the reported reproductive problems. There is no reason why any VDT worker should be exposed to the risk of PCBs.

Toronto Star study remains incomplete

Since 1980, when four women working at the *Toronto Star* bore babies with birth defects, the findings of the "Star" investigation have frequently been cited as proof that VDTs are safe.

Two years later, the *VDT Newsletter* has learned that in fact no study has ever been completed. Only one of the four women involved agreed to be interviewed, which would make any study inconclusive.

The Ontario government initially tested the *Star's* VDTs and found no radiation emissions. According to John Bryant, executive officer of the Southern Ontario Newspaper Guild (SONG), the terminals were tested for X-radiation only. Recent U.S. studies suggest that extra low frequency (ELF) radiation may in fact cause serious health problems.

Following the testing, newspaper management was advised by four experts to have a researcher from the Hospital for Sick Children gather information to determine the cause of the birth defects.

"We are not satisfied that VDTs are safe," said Bryant. "Without any solid answers as to what caused these birth defects, we want some way to monitor VDTs. If there aren't any harmful effects, great. But if there are, we want to know about them."

If, as it seems, there are no definitive answers to the questions surrounding the birth defects, the Ontario Ministry of Labour can hardly continue to use the *Star* example as positive proof of VDT safety. The reasons for the reproductive problems are as unknown today as in 1980.

NEWSLETTER

VDT newsletter is published four times a year by the ad hoc committee on VDTs of the Labour Council of Metropolitan Toronto. Subscription cost: $5 per year. Bulk rate: $2.50 per year. To subscribe, send name, address and five dollars to:

VDT Committee
Labour Council of Metropolitan Toronto
Room 407
15 Gervais Drive
Don Mills, Ont.

Thanks this issue to: Jane Armstrong, John Bryant, Norma Drummond, Jim Montgomery, the New Zealand Public Service Association, Janis Sarra and to Toronto Typographical Union for the volunteer labour which produced this issue.



VDT operators demonstrated their support of Richard Johnston's bill at the Ontario Legislature. The legislation was defeated 52-35.

Legislature defeats VDT protection

The Ontario government has clearly stated it does not intend to protect VDT operators from potential health hazards.

A private member's bill introduced by Richard Johnston, (NDP, Scarborough West), received second reading on June 3 (see Vol. 1, No. 1). "An Act for the Protection of Video Display Terminal Operators" attempted to provide comprehensive protection including required radiation shielding, radiation testing at the point of production, the right of VDT operators to rest periods, maximum daily hours of work, pregnancy exemptions and the right to information on possible health effects.

Johnston's bill called upon government to require regular inspection of machines in use, to study the individual and synergistic effects of radiation and to prohibit use of the technology to monitor workers.

In his opening remarks, Johnston said, "People who are working on these machines should not be guinea pigs. They should not be left without protection until we know the total effect of these machines on the people who are using them."

Progressive Conservatives turned out in numbers to defeat the bill 52 to 35. Al Kolyn (P.C., Lakeshore), in presenting the government's arguments, urged defeat, calling those concerned with radiation the "hysterical fringe". The government made it clear "special statutory control measures with respect to the use of VDTs are not necessary at this time."

Johnston cannot re-introduce his bill until a new session next March. In the meantime, he intends to continue pressing for legislative action and assisting the labour movement to obtain information.

Long-term goals include urging the government to act and promoting the health and safety of operators. Letter campaigns to local members of the provincial parliament, such as that currently being undertaken by the Canadian Air Line Employees' Association (CALEA) are of great assistance in applying additional pressure. For copies of Johnston's bill or of the debate on second reading, call Queen's Park, 965-7771.

Letters . . .

The following letter was received by the editors of VDT newsletter. The name of the writer has been witheld to avoid jeopardizing the author's employment.

Dear Sir/Madam:

I was thrilled to find out . . . that there will be a "VDT Newsletter" available to operators. It is a relief to know there is someone out there who shares my concerns, and would like to be educated . . .

I have been working a (word processing) System since October 1979, where I was employed as Marketing Support Representative for the company which sells the system.

As an MSR we were taught that the systems were safe; that there weren't any radiation emissions. Now that I have been working with a VDT for almost three years I have developed some concerns. My eyes were opened when I watched a program from "W5", in the early spring. A couple of days following the program, I approached my boss where I am presently employed, and informed him of what I had seen. He shared in my concern. I made some inquiries, and kept being referred. Finally I was put through to A.M. Muc, Ph.D. Our Personnel Manager also made phone calls and received some printed information from A.M. Muc, Ph.D., but it was dated *September 1980*. Not only that, but he didn't even sign his letter! One of my questions is, "What are these people doing?!"

Information Can be Bad for Your Health

"Frankly, I worry about the effect of raising unnecessarily, the level of public concern about VDTs, perhaps to the point where the level of concern itself may cause health problems."

MPP Andy Brandt (P.C.-Sarnia) during the debate of Richard Johnston's bill for the "Protection of Video Display Terminal Operators."

Editor's note: the above mentioned "information" package consists of the form letter; a Ministry of Labour News Release dated Aug. 15, 1980 regarding the *Toronto Star* investigation; two unclear tables of laboratory results; a list of selected references, dated Sept. 1980, most of which would not be available at a regular public library; an article from Nov. 1980 reproduced from the Civil Service Commission newsletter "Topical" (in which Dr. Muc is quoted: *"It has been calculated that the body burden of radiation carried by one's bed partner exposes you to more radiation than working with a VDT all day,"*); and a copy of a pamphlet issued by *Toronto Star* President Martin Goodman.

This, then is the total amount of information which a concerned worker was able to receive from the Ontario Ministry of Labour.

Contract News

Ontario Public Service Employees Union Ontario Government Employees

An Ontario government arbitration board has awarded the following provisions for employees who are required to use VDTs:

1) Rest Breaks

a) *That VDT operators be given a ten minute rest break after every hour of continuous work on VDTs.*

2) Eye Care

a) Each employee required to use VDT-CRT shall be given eye examinations at the beginning of employment or assignment to VDTs by an opthalmologist and every six months thereafter. The eye examination shall be paid for by the employer.

3) Pregnant Employees

Employees who are pregnant shall not be required to operate VDTs. At their request, the employer shall temporarily relocate such employees to other appropriate work, without loss of employment benefits, but at the wage rate of the job in which the employee is relocated.

It is hoped that what the Ontario Government must provide for its employees will soon be required for all VDT operators in the province.

Communication Workers of Canada Saskatchewan Telecommunications (SaskTel)

Pregnant VDT operators requesting a reassignment to an existing non-VDT position may be assigned to any available position. *If no alternate position is currently available, the company will create a supernumerary position* until twelve weeks before the estimated date of birth. At that time the employee assigned to a created position will be granted a leave of absence or allowed to fill any available job in accordance with the provisions of the Collective Agreement.

Employees reassigned will not suffer loss of pay for the duration of the transfer.

During the period outlined, the traffic load normally handled by the VDT operator will be absorbed into the network.

New Democratic Party Caucus Workers Union NDP Caucus Workers

In Vol. 1, No. 1, "Contract News" included the language negotiated by the NDP Caucus Workers with the Ontario New Democratic Party. A few new items have since been negotiated and are included here.

At the request of an employee, *the Employer will not require* a pregnant employee, or *an employee who advises that she is intending to become pregnant, to operate a word processor with a VDT.* Such employees shall be entitled to be placed in work at equal pay for the duration of the period in question and the Employer has the right to make all such assignments necessary to effect such a placement.

The Employer shall, at least once in each six month period,

1) have every VDT in his possession inspected and maintained by qualified persons;
2) carry out a full lighting survey of all working areas containing VDTs, such survey to be conducted by qualified persons;
3) carry out a full survey of radiation emissions from VDTs in the workplace, such survey to be conducted by qualified persons.

The Employer shall not use monitoring devices on the VDTs to monitor the productivity of operators.

Canadian Air Line Employees' Association (CALEA) Air Canada

In the late spring of 1981, a number of CALEA members in the province of Quebec provided the company with medical certificates stating that continued performance of Passenger Agent functions constituted a potential health hazard to themselves or to their unborn fetuses. In providing these certificates, the Passenger Agents were relying upon the provisions of the Quebec Occupational Health and Safety Act.

Air Canada initially responded by taking the position that the provisions of the Quebec Act could not be applied to an airline. As well, the company took the position that there were no health hazards associated with exposure of a pregnant employee to VDTs. Nevertheless, the company permitted the employees to leave and remain off work.

CALEA, in an effort to codify within the Collective Agreement the implicit right recognized by the company and to extend that right across the entire system, raised the matter and negotiated a Letter of Understanding.

Where "working conditions may be physically dangerous to her unborn child", pregnant women will be given the option of reassignment without loss of pay, or extended maternity leave. In order to trigger this Letter of Understanding, a medical certificate must be provided by the employee. However, it would appear that the company recognizes it cannot challenge the veracity of the medical certificate and accordingly once it is presented, the company is under an obligation to either reassign immediately or to place the employee on extended maternity leave in accordance with the employee's election.

Bell VDTs: Do they or don't they?

The Federal Government's Radiation Protection Branch (RPB) has dismissed the results of VDT X-ray testing done by Bell Canada (see Vol. 1, No. 2, Summer 1982).

The Bell testing indicated a significant number of VDTs were producing X-rays in excess of measured background readings. The RPB, when told of these readings, expressed scepticism that Bell's numbers were accurate. This should not be surprising since their own position has been that it is physically impossible for VDTs to produce X-rays.

In a series of tests, staff from the RPB retested Bell machines which had recorded the highest levels in the company's tests. The survey was conducted on machines in Ottawa, Toronto and Hamilton. In all cases the RPB reported that no X-rays were present.

The Communication Workers of Canada (CWC), in a letter to its members, has suggested that the union believes the government testing was accurate and that it was their belief that normally operating VDTs used at Bell do not emit X-rays. The union went on to say that while this was good news it did not remove all VDT radiation related concerns because the whole non-ionizing spectrum has not been tested at Bell, nor have VDTs which are malfunctioning.

The CWC also indicated the absence of radiation of any type does not explain the various reproductive problem clusters among VDT operators even though it eliminates a potential cause.

Humber College VDT committee

A VDT User Committee at Humber College, recommended by the Manager of Safety Services, Gary Jeynes, has been formed.

The new committee had its first meeting last February. The meeting, attended by users from administration, faculty and support groups, including union (Ontario Public Service Employees Union — OPSEU) representatives and managers, heard a presentation by J.A. Montgomery, Technology Division of Humber College.

Two recommendations were made at the session:

1. that a second information meeting be arranged with instrumentation available for a radiation measuring demonstration using a VDT, a black-and-white TV and a color TV for comparison; and
2. that a study be undertaken during the summer to evaluate the conditions of all VDT installations at Humber College.

Toronto City Hall VDT Committee reports "epidemic"

Maybe "epidemic" is not the word — though we do have VDTs mushrooming in every office. Last year, Toronto city workers were using over 300 VDTs. This year there will be more at City Hall.

Unlike most office workers, we have a written policy and joint health and safety committees. We also have an official Sub-Committee on VDTs.

In the spring of 1981, a report for the local Board of Health and City Council on the non-radiation health effects of VDTs was released. This report suggested education and ergonomic adjustments to the workplace.

Management overreacted with a proposal that would have turned City Hall into a laboratory, and VDT operators into guinea pigs. The Canadian Union of Public Employees (CUPE) Local 79's members didn't think much of the proposed human engineering studies and medical testing program. City Council agreed.

Local 79's recommendation was adopted that in future, management notify and consult with the union before introducing substantial technological changes. Council also requested that the Occupational Health and Safety Committee prepare both educational programs and detailed guidelines.

The VDT Sub-Committee has been requested to:

1. Plan and implement education programs;
2. Recommend appropriate adjustments to the workplace for ergonomic reasons;
3. Prepare guidelines for workplace studies;
4. Design a program to monitor possible radiation hazards; and
5. Ensure that unions are involved in plans for technological change.

The Committee has already implemented and evaluated a pilot educational program. The City also has provided funds to purchase six experimental ergonomically-designed work stations. These will be evaluated to eventually provide all operators with the best possible work environment.

The City is purchasing equipment to measure the various types of radiation emitted by VDTs and technicians will be trained to carry out monitoring.

Despite union co-operation, nothing has successfully ensured that city workers are involved in plans for further expansion of workplace technology, the most important of the Committee's mandates. If management continues to purchase more and more VDTs, then the education, equipment and monitoring programs will always be playing "catch-up."

A basic problem remains: management is making plans for more VDTs and other new technology. Council agreed last summer that the union should be notified and consulted before major changes are implemented. Nothing has been heard.

Fortunately, because we work in the public sector where decisions have to be approved by City Council, we can monitor proposed changes.

Norma Drummond
Health and Safety Committee
CUPE, Local 79

Typographical Union undertakes health survey

Toronto Typographical Local 91 has undertaken a health and safety survey of its membership. The study, conducted by the Health & Safety Committee, focuses on the problems of VDT operators, but other local members were questioned as well.

Although it will take several months before all items of the questionnaire have been tabulated and analyzed, preliminary findings indicate a number of health concerns which may be related to work on VDTs.

It was found that TTU operators work an average of 6.7 hours a day at a terminal, 93% five days a week. Fifty-four percent of operators work at the machine without a regular break. Of the operators replying to the survey, 68% report headaches at least some of the time. There were also numerous cases of skin rashes, nausea and disturbed sleep mentioned.

There seem to be a range of problems related to eyesight: burning or itching eyes, tearing and eyestrain, the latter reported by a large majority of operators, 71%. Perhaps the most disturbing finding in this respect is that 54% of VDT operators believe their eyesight has deteriorated since starting their present work.

When questioned about the factors contributing to headaches, 79% indicated stress as a recognizable factor. 58% attribute headaches in part to lighting conditions. Other factors mentioned were noise, chemical fumes, smoke, air conditioning, poor chairs, dust, boring work and — the supervisor!

Although there were reports of miscarriages among female operators, reproductive problems (difficulty conceiving children) reported by male operators suggest new questions into VDT safety and hazards affecting future generations. Protecting pregnant operators may prove to be but a partial solution.

Correction:
In Vol. 1, No. 1, Contract News (page 3), the British Columbia Government Employees' Union was incorrectly identified. The unit which negotiated the contract language is the Open Learning Institute.

VDT newsletter
Labour Council of Metropolitan Toronto
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Don Mills, Ontario

Subscription Rates:
$5/year individual
$2.50/year bulk rate
(20 copies or more)

Categories

1) Research results + cases brought to public attention;

2) problems

3) solutions

Things to ask manufacturers or figure out about machines we use

- flicker rate (in Hertz - should be no less than 60)
- Dot matrix
- voltage
- viewing distance
- char. height

general info

ionizing radiation: e.g. x-rays, alters atomic structure of cells & creates dangerous unstable ions. Can affect reproduction, cause cataracts, premature aging, cancer

cathode ray tube - tube beams electrons onto screen where they react w/ phosphors to produce light in the form of letters + numbers. In the process, machines emit ionizing + non-ionizing radiation.

microwaves - nonionizing radiation

VDT cataracts - "bilateral incipient radiant-energy cataracts". start on capsular surface rather than w/in the lens.

non-ionizing radiation - ultraviolet light, microwaves, infra-red waves, radio frequencies + static electric fields. Exposure can cause cataracts, b-defects, blood disorders, spontaneous abortion

more Bibl.

g. Colm Beitrag zur Geschichte und Soziologie des Ruhraufstandes von März-April 1920, Essen, 1921.

** Kommunistisk Program, La question syndicale et la gauche allemande dans la IIIe Internationale Bagsvaerd, 1972.

PC ...

- splits not cause of ↑ of Fascism.
- get around focus on org. forms
- look at masses not represented by split leaders
- against idea that could be educated in SPD, etc. + treat problem w/ roots not, lack of organization

Outline questions -

- trade unions + rev. unions
  - unions by region
    by trade
  - part. in parties
    gov.
    FAUD -- AAU etc.

- Parties
  - part. in unions
    part.

- foundation KPD Dec. 9 1989
  split left (Luxemburg Frankfurt Oct. 1920

KPD foundation
Right - wing leadership - left masses

KPD split
- no break left -
- get big only by joining SPD.

N° 101 ILO.

Text 1935 Päter Korrespondenz N° 10-11. "Temps de travail social moyen, base d'une prod. et d'une repartition comm." sum of Grundprinzipien des kommunistischen Produktion und Verteilung. ed. Rüdiger-Blankertz Verlag, Berlin-Ouest

aufgeklärte -

Aufklärung - clarifying of consciousness

Vollzugsrat - Executive Council

Einwohnerwehren - legal org. created 1918 Germany to protect order & prop.

Einheitsfront - united front

CASES + studies

1980 ~~Newspaper Guild of N.Y.~~

Swedish Nat'l Board of OSH did a survey Nov. 1975:

1976/77 2 copy editors from NYT dev. cataracts in their 30's / UDT models: tello model HDI Xenis 1500A Encoterm SPF 10/20

- they worked on VDU's all day long.
- they lacked VDTs. No medical history to warrant. Their machines leaked, one not above "allowable level"

- Dr. Milton Zaret, NYU - Bellevue medical center demonstrated opthalmologically. "conclusively" that VDU's emit microwaves.

concern w/ malfunctioning screens produce microwave radiation capable of causing rare eye cataracts.

Zaret supported claim of Canadian VDU worker that she got cataracts from VDT (worked on it average of 4 hrs/day for 2 yrs.) (Thunder Bay, Ontario, 198?)

- Zaret thought cataracts from non-ionizing
- non-ionizing radiation known to cause cataracts in radar workers. Some kind of cataracts in some VDT workers.

- Studies in E. Europe + Sweden suggest exposure to microwaves damage testes.

- Ontario - of 7 pregnant workers at Toronto Star 1981. who gave birth during 3-mo. period, 4 children abnormal. Machines tested for leakage at current standards - deemed o.k. IBM machines 2 of women had worked on VDTs for 3 yrs, one for 2 yrs, the other unknown - worked in early mos. of pregnancy. Aged 20-30. Took no drugs, careful diets, + had quit smoking during pregnancies

- Niosh investigation says no radiation danger.

Nat'l. Inst. for OSH

Mean Thickness of Vision (1990). Vision hasn't deteriorated

excerpted from
the guild Reporter 7/25/1988

14 women in the Bernie dept. 7 on UDTS, 7 not. one 7 not
had no birth defects.
three mothers said no history of deformity
in family: one yes. (her kid had cleft palate)
one baby unaware., one club foot, one had
minor heart defects

Cases & Studies 2

1980 Hunting et al. VDT operators report more musculoskeletal complaints than typists or reg. typewriters

1980 Smith et al. NIOSH operators report > musculoskeletal complaints than non-operators. But non-operators dif. level keying tasks.

psychological stress + depression etc. reported by countless studies.

1977 - 2 journalists at Baltimore Sun have cataracts or incipient cataracts. several years on VDTs. Under usual cataract age.

July 1977 - article by Lyon in Wash Post - R. Carpenter's experiments show high enough radiation → cataracts in rabbits. But microwave rad. may have a cumulative effect. More than 100 patients w/ cataracts due to microwave - several were exposed to well below 10 milliwatt safety standard.

Browne 1977 UNI "Experts debate amt of microwave that can cause danger". +U, microwave ovens, etc.

- Zaret questions NIOSH stats, for whom he was a consultant.

Jan. 1979 - 3WIC stoppage at UN Typing pool.

Oct. 1980 - American nat'l Standards Institute (non-ionizing radiation) Considering reducing standard to 1 milliwatt

checkstuds

April 1980 Computer world mag.

'Newsday' VDTs pawns leaking. metal shields installed

much ado about editors + reporters.
Some newspapers pay for exams

- Zero patients. several on VDTs or combination of VDT + radar work

one ear injury similar to other problems resulting from exposure to non-ionizing radiation

1979 ± Sidney Lemon study:

.1 microwatt / sq. cm (0.1μw/cm²) of ultraviolet can cause cataracts.

'Newsday' - study of "newsday" VDTs:

2 Teleram 2277s gave off 15mw/cm² of radio frequency waves. 1½ x 7 U.S. standard, 1500 x 7 USSR + Czechoslovakia standards.

NIOSH denies problem.

- radiation in Times bldg 1mw/cm² disregarded cos found some even w/ VDTs off.

-

Recommendations |

If you wear glasses, they should be specially designed for VDTs, i.e. for distance greater than standard 30cm assumed for regular prescriptions

- paper holder to reduce neck movement if working from hard copy.

adequate to relieve temporary muscular

NIOSH - 15 min break every 2 hrs } depending on work load
" 15" " 1 hr. }

Recommendations - 2 hrs max. continuous

general work habits - from no longer to 100 min/day total.

~~to 4 hrs total~~.

total 6 hrs/da best 90 min. w/ alt. breaks.

- frequent breaks away from machines

- none should be working full time on a VDU.

- separate machines to prevent multiplying effects of radiation.

For glare -
- adjustable desk lamps
- filters
- dimmer switches for general lighting
- less illumination
- VDTs parallel to light source
- ~~"luminance ratio" (comparison~~
- screen hood
- indirect lighting
- recessed direct lighting
- adjustable desk lamps
- clip-on glass screens
- even cardboard visors

Recommendations 2

back + neck discomfort
- sep. Terminal + Keyboard
- tilting/rotating screens
- adjustable mounts for VDTs.
- 7-8 in. knee room
- forearms parallel to floor when using keyboard. Feet flat, thighs parallel to floor.
- footrests, esp. for short people.

lighting
- "luminance ratio" - comparison of light intensity bet. reflecting light + light-absorbing objects - should be 1:3 in central vision - 1:10 in peripheral vision
- (contrast bet. bright window surface + normal VDT screen is 300:1)
+VDT screens, keyboards, carpet, wall covering + even notepads should be chosen w/ this in mind.

VDT features
- 7×9 dot matrix preferably } TUC recommendations
5×7 O.K. for smaller characters
- square characters
- brightness control
- colors - ~~dk~~ some like yellow on amber
white on black ~~amber~~ ~~black~~, some yellow/green on dark green
- metal casings
- no black keyboards (accentuate reflection problems)

comfortable operation
at lower brightness
at levels → ∠ eyestrain

yellow-green corresponds to peak spectral
response of human eye.

yellow-green CRT provides greater apparent
contrast at lower beam current.

lower current → less beam diffusion →
better resolution + focus.

VDT features, cont - tilting screen
- enough space inside letters (O + A) (e.g.) for clear recognition
- constant luminosity (no lag break between when characters are refreshed.
- high contrast
- uniform focus
- large screens

flicker - rate should be no < 60 times/sec., i.e., 60 Hertz (cycles/second), preferably 100 Hertz.
- This is a fairly simple modification
- individual dots should not be visible (if they are, this is "small area flicker") looks like light is dancing w/in letters.

- lower voltage, less radiation
- ~~not too bright~~
- character size - 3/16 in. (height)
- viewing distance - 2 ft.
- maintenance 2/yr. log of repairs
- able to distinguish clearly: u, w, v / m, n / I, (, < , f, I

general work environment - wall colors that reflect less light. esp. walls that face operator, or partition ~~behind~~ behind machine
- ~~people~~ no one shld have the back of an operating VDT at their back. avg of heat
- ~~Heat~~ which can lead to hemorroids.
- VDT placed so you look slightly down at them (less eye strain than looking up)
- chairs w/ good backs, adjustable version

general

eye glasses - people w/ glasses or contacts should tell their doctors they work on VDTs.
- have eye exams before getting VDTs & again every 6 mos.

general - - stress vitamins
- keep record of problems. to locate problem machines.
- keep record of physical problems.

inspection - - for monthly for radiation, clarity & focus
- tests for radiation using e.g. an ionizing chamber for ionizing radiation

radiation - capability for no radiation exists, & not real expensive.
- metal casings & filters reduce x-ray microwave & ultra-violet.

Resources

For more info on the VDT fight write to: NYCOSH, P.O.Box 3285, Grand Central Station, N.Y., NY 10017 for "Health Protection for the Operators of VDTs & CRTs" $1.00, or, TUCRIC, 29 Blenheim Terrace, Leeds for their supplement to VDTs. 5p. Share information with Women's Action On Occupational Health, VDT group, 150 West Broadway, Vancouver, B.C. Read Zapping of America, Paul Brodeur, Norton Press, 1978, about microwaves, and the cover-up by the government/industrial/military complex of their dangers.

NYCOSH 32 Union Square #404
NY NY 10003
(212) 674-1575

The V.D.T. Manual. The most extensive work. About 300 pages. By A. Cakir, D.J. Hart, T.F.M. Stewart. IFRA, Inca-Fiej Research Association; Washingtonplatz 1; D-6100 Darmstadt; Germany.

Ergonomic and Medical Aspects of Cathode Ray Tube Displays. By Etienne Grandjean. Swiss Federal Institute of Technology, Zurich.

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Eye Tests for VDT Operators. T.F.M. Stewart, VET Advisory Group, Dept. Human Sciences, University of Technology, Loughborough, Leicestershire LE11 STV.

Towards Standards and TLV's for Visual Work, Olov Ostberg, Dept. of Human Work Sciences. University of Lulea, S-95187 Lulea, Sweden

VDT-Health Collective Bargaining Kit. The Newspaper Guild, 1125 Washington, D.C. 20005

Testimony of Andrea Hricko: and other materials. Labor Occupational Health Program, University of California, Berkeley, CA 94720

Women's Occupational Health Resource Center has a survey questionnaire for V.D.T. operators. 320 E. 43 St., N.Y., NY 10017.

standards

- exposure to radiation - levels higher here than Europe.

Brodeur's standard (article in New Yorker called Microwaves)

U.S. standard for microwave: 10 milliwatts/sq. cm.. This is 1,000x higher than USSR: 10 microwatts/" " ~~in US~~. Rec. for radar workers. U.S. doesn't consider non-thermal radiation to be hazardous. USSR recognizes that ~~microwaves~~ ~~television~~ ~~transmitters~~ in use: to ~~widening~~ ~~picture~~? ~~blood~~ ~~pressure~~? contrast?

- radiation ~~can~~ at levels too low to heat sensitive parts of body could affect central nervous system: in U.S. complaints of radar workers re headache, eye strain + fatigue were dismissed as "subjective symptoms".

NIOSH X-ray standard for VDT workers 5000 millirem/yr. (mR/yr)

While official standards for general population (vs workplace) is 500 mR/yr.

TV standard - .5 mR/hr - But this designed for recreational viewing (not so close or so long)

maybe write Zand + ask for local dr.?

Call eye-doctor.
preferably
specialist on
cataracts +
eye strain

Call NYC Dept
for product info.

Call Bay area
Typographical union.
re their memo of understanding
w/ SF newspaper agency.
section re ~~test~~ radiation tests.
24

Zapping of
America
produce

Hypocrites:

Ben's
charming off Tilly
good sn. service.

11/15

MILLER

MEMO: CMers

From: Caitlin

Re: Chores and phone updates

A couple of people have requested an updating of the chore schedule. Jan, who is coming in regularly every Wednesday, is in charge of most of the heavy cleaning. She also does dishes, though usually by Friday the dirty dishes have formed a precarious pile in the wash bin. As I see it, the chores that need to be assigned are 1) dish-washing and tidying kitchen area, and 2) emptying the garbage. (You may have noticed there's a new dumpster out front, twice as big as the old one.)

I will take care of recycling and going through the magazines and newspapers. Am I forgetting something?

Following is a list of people who will share the chores. If I have left someone out who should be on it, take it as a compliment but please let me know so you can be added to the list. (I have intentionally left out some people that don't spend much time here).

Caitlin, Carl, James, Jeff, Jude, Meg, Phillip, Sue B., Peter, Michael, Jordan.

As I understand it, the rule in the past has been that chores rotate every week except for those who don't pass quality control at Tues. night meetings. Sounds good to me. Names will be posted somewhere visible (I'll be responsible for making sure they are). For this week, I'm doing garbage and Peter is on K.P.

UPDATED PHONE SCHEDULE 11/15/83

	Mon.	Tues.	Wed.	Thurs.	Fri.	
9-1	James	Carl	Tom	Caitlin	9-10	Sue
					10-2	Meg
1-5	Phillip	Jude	Jeff	Karen	2-5	Sue

You are encouragedd to politely remind and remonstrate shirkers. If you can't make your shift, please make sure someone else will cover for you. Maybe CMers who are currently off the hook (so to speak) on phone duty can act as substitutes when regulars can't make it.

MAGAZINES: Since I'll be going through mags and newspapes, I'll need to know what you want to keep in the library and what can be thrown out (say, one month after it gets here). Currently, there are (random?) back issues of the following

→ CAITLIN

not junk

special case of newsprint pubs

probably mine

publications upstairs in the "library"(?): Electronic Engineering Times, MIS Week, Computerworld, OEM Computer Newspaper, Information Systems News, Software News, Computer Retailing, Byute, Scientific American, and Interface (maybe I missed a couple it's hard to tell). I'd be willing to go through and straighten out those dust-ridden yellowing piles little by little if people think it's worhtwhile, but first I'd like to know what is worth keeping.

Do we really need to keep all this stuff on file? This is just a question, but you can see what my inclination is. I mean, if you can get back issues of some publications by spending 15 min. in the U.C. library, what's the point of taking up the space and time to keep them on file? How often does anyone really go to the library and look up back issues?

RSVP

I doubt U.C. has these
Do you have any info on that? jm
I bet SF Public Library is closest source of the Trade mags

In any case there is a real good reason for our own Library: people will use it, they won't get in a car and drive to near UC find a parking place walk the Library find the .... etc

Note: All Technical (Academic) publications are my personal library as are all older microcomputer trade publications

MUSTS:

do not throw out my magazines from 1975-1978, these are rare and hard to find

do not throw away any technical as opposed to trade jumble (examples: don't throw my ACM publication my IEEE publication my AFIPS or IFIPS, etc etc) Do not throw Electronics or Data Communications

I Suggest! throw newspaper stock stuff after 6 months trade magazines after 2 years keep all Byte SCCC Interface and a few others Throw Datamation, Mini/Micro etc after 2 years see Lee about engineering pubs

Well-designed equipment is only the first step in assuring a safe, healthy, and productive work environment. The implementation of automation in the workplace is of equal, if not greater, importance. The new technology should relieve office workers of repetitive work, upgrade skills, and increase promotional opportunities. Following are 9to5's recommendations for purchase and implementation.

9to5 Recommends

To employers

- Equipment should be ergonomically designed; that is, it should be adjustable to the worker, *not* vice versa. The angle of the keyboard to the screen should be easily adjustable. Both the brightness of the letters and the contrast between the letters and the screen should be adjustable as well.
- Display screens with glare-reducing glass are preferable. Printers should be as quiet as possible and not placed near the operator. Optional antiglare shields and noise covers should be purchased and installed for all operators.
- Comfortable, adjustable chairs are essential for VDT operators.
- Frequent rest breaks are essential and should be provided as recommended by the National Institute for Occupational Safety and Health.*
- Regular employer-paid eye exams should be provided for all operators, and employers should pay for special eyeglasses, if needed for VDT work.
- Office workers should be informed of company plans to introduce automation before decisions are made. Employees should be involved in making decisions about the applications of the equipment and the systems introduced.
- Women who choose to become pregnant should be given the choice to transfer to non-VDT work at no loss in pay.
- Preventive maintenance checks should be provided for all equipment at 6-month intervals, and workers should have access to maintenance logs.
- The VDT work environment should be redesigned to prevent crowding and noise and to provide proper lighting, adequate work space, comfortable furnishings, and good air quality.

To manufacturers

- All quality and safety features shown here should be *standard* for all equipment.
- Computer manufacturers should be responsible for training sales and other staff and for informing purchasers of word-processing equipment about proper placement, lighting, work area redesign, maximum daily use, rest breaks and maintenance, and monitoring of equipment.
- Manufacturers must make high-quality, safe equipment that minimizes the risk of exposure to low-level radiation and that provides flexibility for the operator's comfort.
- Manufacturers should upgrade low-quality equipment and should remove unsafe models of VDTs and other word-processing equipment from the market.

To public officials

- Federal, state, and local governments should use their purchasing and legislative power to ensure the quality and safety of equipment for public employees.
- Government agencies should conduct studies to determine (1) whether pregnant women working at display screens are especially at risk for developing health problems and (2) whether potential long-term risks are related to low-level radiation emissions from cathode ray tubes.

*See ''General Recommendations,'' NIOSH Research Report, Potential Health Hazards of Video Display Terminals, DHHS (NIOSH) #81-129, June 1981. Single copies are available free of charge while supplies last from Publications Dissemination, DHHS, 4676 Columbia Parkway, Cincinnati, OH 45226.

©9to5/National Association of Working Women, 1982

9to5, National Association of Working Women, 1224 Huron Rd., Cleveland, OH 44115. $5.00 for institutions, $1.50 for individuals.



The Human Factor

9to5's Consumer Guide to Word Processors

Effects of Office Automation

One-third of today's 42 million working women are clerical workers. The number of those using word processors daily is growing rapidly. At least 5 million machines are now in use in such industries as publishing, insurance, banking, and law. The number of users could grow to 10 million by 1985.

The potential advantages of the automated office are many. Information could be processed more quickly and efficiently, production could be increased, and office workers could be freed to take on more challenging tasks.

The many potential disadvantages, however, require attention. Studies reveal that back and neck aches, eyestrain, headaches, and nausea are among the symptoms experienced by VDT users. Pregnant women may be especially at risk for serious health effects. The application of automated equipment may also be used to redesign, and to downgrade, the jobs affected. The checklist with which 9to5 evaluated automated equipment was developed with these concerns in mind.

''Ergonomic'' features, those that affect the user's environment, must adjust the equipment to the user. Adjustable screens and detachable keyboards help to alleviate back and muscle strain; glare-reducing glass or shields help to reduce eyestrain and headaches. Printer covers or sound hoods are important features in reducing noise. Both the terminal casing and keyboard should be of a matte finish (nonreflective) to reduce glare.

Video display terminals (VDTs) are technically cathode ray tubes (CRTs) around which word processors are built. Increasing concern has focused on the long-term health effects of exposure to low-level radiation emitted by CRTs. Scientists cannot fully explain either the recent series of ''clusters'' of miscarriages and birth defects among pregnant VDT/CRT operators in the United States and Canada or the previously reported cataracts among users. Limited government studies have found radiation emissions from display terminals to be well below federal standards, yet both the current legal exposure limits and the methods of measurement have been criticized. As a minimum precaution at this time, screens should be enclosed in metal casing designed to block as much radiation leakage as possible.

9to5's Study

9to5, National Association of Working Women, has developed ''The Human Factor'' to provide potential buyers and users with comparative information about safety and user comfort features of automated office equipment. The guide was compiled by 9to5's Boston affiliate.

In this study, we focused primarily on manufacturers located in the Boston area. For each model evaluated, we conducted an on-site visit with a company representative available to show us the equipment and to answer questions. In some cases, the representative was well informed, but we were surprised to discover that many were unaware of the health and safety concerns of users. We looked at only one model per manufacturer. The model number is clearly noted in the center table. Our evaluation is of this model only, not of the manufacturer in general. In some cases, we were shown the manufacturer's most current model, not necessarily the equipment most often used by office workers.

''The Human Factor'' is an important first step in guiding purchasers in the selection of high-quality equipment. The results are not an endorsement of any product. We urge all purchasers to use criteria here in evaluating the health and safety features of any models considered for purchase.

*Preferred feature	**DIGITAL** Model #VT278 Decmate	**HONEYWELL** Model #7803	**IBM** Displaywriter	**LEXITRON** Model #VT1303	**PHILLIPS** Model #2001 or #2002	**PRIME** Model #PT65	**SAVIN** Model #IS2000	**SYNTREX** AQII	**T.I.** Model #940	**WANG** Wangwriter
Ergonomics										
Screen Tilt										
up/down					✓					✓
side/side										
both*	option		✓				✓	rotates	option	
neither		✓		✓		✓			✓	
Printer Dust Cover/ Sound Hood										
standard*			✓	plastic plate					✓	
optional	✓	✓		✓	✓	✓	✓	✓		✓
Printer										
detachable*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
not detachable										
distance capability		6 ft	200 ft	25 ft			10 ft	3-4 ft	6 ft	10 ft
optional	up to 1000 ft	4000 ft		4000 ft			✓			✓
Keyboard										
detachable*	2½-ft cable	✓	3-ft cable		5-ft cable	✓	✓	✓	✓	✓
not detachable				✓						
Screen										
Glare-Free Glass*		✓	matte finish	✓	✓	✓	✓		✓	✓
Optional Glare Shield or Filter	3 types	✓		free on request				filter	✓	
No Optional Shield or Filter										
Character Size				not available					not available	
>3 mm*	✓	uppercase	✓		3.9 mm	uppercase	4.8 mm			5.8 mm
3 mm						lowercase		✓		
<3 mm		lowercase								
Dot Matrix										
>5 × 7*		✓	7 × 9	7 × 9	15 × 8	7 × 9 uppercase/ 7 × 11 lowercase	10 × 15	9 × 12	9 × 11	7 × 8
5 × 7	✓									
<5 × 7										
No Visible Flicker or Jitter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
adjustable by operator	brightness	brightness	brightness and contrast	brightness	brightness	brightness	brightness	brightness	brightness	brightness
Color (Screen/Letters)	white on grey	green on black	green on black	light green on dark green	green on black	white on dark grey	light green on dark green	white on black	black on white or white on black	light green on dark green
Machine Construction										
Hardware Enclosure										
metal (type)*		lining	lining		✓ (cold rolled steel)	lining				lining
plastic	✓	✓	✓	✓		✓	✓	✓	✓	✓
Casing Finish										
matte*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
shiny										
color	beige w/ black	white w/ black	pearl white	putty	off-white	putty/grey	grey	putty	grey	beige/grey
Keyboard Finish										
matte*	keyboard	keyboard	✓	✓	✓	✓		✓	✓	✓
shiny	keys	keys								keys
color (keyboard/keys)	black/black	grey/white	pearl white	brown/putty	beige/brown	putty/grey	putty/black	putty/black	grey	grey/grey
Exhaust Ventilation										
up/down*			✓						not available	
side/side	of machine						✓	side of disc drive		
back	of printer	✓		✓	✓		✓	side of typewriter		✓
convection*		✓	✓							
TYPE forced	✓	✓		✓	✓	✓		✓		✓
other		(fans on back convention on top)				w/ fan	w/ fan	(fan in back of printer)	✓	fan in rear

Community Memory Project

November 19, 1982

Carol Horowitz
La Clinica del Pueblo de Rio Arriba
P.O. Box 104
Tierra Amarilla, NM 87875

Dear Carol:

Enclosed are a brochure about the Community Memory Project and a subscription form for the Journal of Community Communications.

I have forwarded your letter to a member of our staff who is doing some research on health hazards associated with video display terminals.

As far as donation of equipment goes, you might try contacting the community relations department of Apple Computers.

Good luck!

Susan Bloch

Susan Bloch
Community Memory Project

CAITLIN —
Respond if you like.
Ignore it if you don't.
Sue

916 Parker Street, Berkeley California 94710 (415) 841-1114

la clinica del pueblo de rio arriba
P.O. Box 104, Tierra Amarilla, New Mexico 87575
Phones 588-7252 and 588-7253

September 17, 1982

Community Memory Project
Box 996
Berkeley, CA 94701

I read that the Community Memory Project exists to help community organizations with computer and microprocessor technology. We are a large rural clinic in Northern New Mexico and have been debating the purchase of a computer for a while. We would rather write a grant and try to get one donated and are working on a Radio Shack proposal right now.

One thing that I am concerned about that you may be able to help with is reports in the media of radiation exposure from computers. Do you have some information about this or how to set up safe work stations? Is there a list that you know about which rates computers with regard to safety? I have some information about ergonometric considerations with work stations but am still very concerned about radiation. National Public Radio recently had a program on this but it was too brief, so hopefully you will be able to supply more complete information about this.

Do you know of other companies which are giving away equipment now? If so, please send me a list so I can write to them. Finally, do you have more information about your project?

Thank you very much,

Carol Horowitz

Carol Horowitz, Clinic director

Apple Computers
has a community
rel dept

11/19/82
CM
letter
subform

CHAPTER III: VIDEO DISPLAY TERMINALS

By 1985, more than ten million people will use video-display-terminals (VDTs) at work. Observers estimate that a new VDT is installed every thirteen minutes, and experts predict that 10% of all workplaces will have at least one display unit in the near future. 1/ They are already used extensively in banks insurance companies, law firms--in any industry where large secretarial pools are employed.

In 1979-80, the NIOSH conducted a study of video display terminal operators at the request of a coalition of labor unions. Five worksites were examined, including newspaper offices and the clerical departments of Blue Shield in San Francisco. Eighty to ninety percent of the clerical VDT operators experienced eye strain or muscle strain. High levels of anxiety, depression and fatigue were reported by VDT users at all of the worksites. 2/

The NIOSH research team found that VDT operators in strictly clerical type operations showed higher stress ratings than any group of workers NIOSH has ever studied including air traffic controllers.

Clerical workers using VDTs were compared with a "control group" consisting of office clericals doing similar work but with pen and paper, conventional type writers, and with professionals using terminals--mainly newspaper reporters and editors. All of the clericals reported high levels of anxiety, confusion, depression and fatigue, as well as very high rates of physical health problems. The "VDT clericals" experienced the highest levels of job stress, while the "VDT professionals" had reported the lowest stress levels with the "control clericals" in the middle. A vivid description of the differences in working conditions for the clericals and professionals follows:

> "When the job features of the various groups are examined we see that the clerical VDT operators held jobs involving rigid work procedures with high production standards, constant pressure for performance, very little operator control over job tasks, and little identification with and satisfaction from the end-product of their work activity. In contrast to the clerical VDT operators, the professionals using VDTs held jobs that allowed for flexibility, control over job tasks, utilization of their education and a great deal of satisfaction and pride in their end-product. While both jobs had tight deadline requirements, the professional operators had a great deal of control over how these would be met. In their case, the VDT was a tool that could be used for enhancing their end-product, while for the clerical VDT operators, the VDT was part of a new technology that took more and more meaning out of their work. It's not surprising that the professionals using VDTs did not report levels of job stress as high as the clerical VDT operators...This suggests that the use of the VDT is not the only factor contributing to operator stress levels and health complaints, but that job content also makes a contribution."

Health Symptoms Related to VDT Use

Conclusive information on the long-term effects of VDT use will take years to obtain and analyze, but the short-term effects are already well documented even though the causal mechanisms are not yet understood: eye-strain; headache; short-term loss of visual acuity and changes in color perception; back, neck and shoulder pain; fatigue; stomach aches and vomiting.3/

Health symptoms may result from problems in machine, workstation, office environment or job design, or a combination of these. Eyestrain is often worse for employees doing "terminal intensive" work--looking at an "interactive" terminal all day or looking back and forth between hard copy and a screen continuously. Muscular strain in the neck, shoulder, back, hands and wrists is often worse for data entry workers who do not look at the screen as often, but must adopt awkward set postures to work at top speed for hours on end.

Eyestrain, postural problems and musculo-skeletal problems are aggravated by poor lighting, uncomfortable chairs, mismatched chair, desk and keyboard heights, lack of workspace, humidity, temperature and air quality problems, bright, shiny surrounding walls and surfaces which maximize glare, and a general lack of adjustability afforded the office worker(s) using VDTs. When an office worker's chair, keyboard and screen, and lighting are all unadjustable, it is she who must do all the adjusting. The result: a set of problems which compounds the stressfulness of the job and threatens one's health.

> Kathy and Susan work as reservationists for a travel agency. They have both worked there for a year and a half in jobs paying less than $8,000 a year. They spend their full day at VDTs making reservations, looking back and forth between paper and the screen. The terminals have brown screens with orange letters. According to Kathy, "There is terrible glare off the screens because the lighting is so bad. The machines sit on white formica tables which makes the glare even worse. We have headaches at the end of every day..."
>
> Both women wear glasses, and say that working at the terminals has caused their eyesight to deteriorate.
>
> Another woman, B. spends about half the day at the display screen and has been on the job several months. She says her vision has worsened, becoming more myopic, due to continual focusing on the screen. A co-worker went from perfect vision to nearsightedness and had to get glasses for the first time. All four of the women report upper back and neck pain from craning to look into the screen. B. says that when she works at the screen for more than four hours, she comes home feeling more drained of energy than usual.
>
> They feel that something must be done about the glare and the lack of adequate rest breaks.
>
> "The company only allows two ten minute breaks, and thirty minutes for lunch. But what's worse is that you cannot take these breaks when you need them. They must be taken at a time specified by management, and if you're on the phone taking a reservation when the time comes, you lose your break!"

Machine Problems. Although improved equipment is available, there are still a great many low quality models on the market and in use. Frequent problems with machine design include: "nauseating colors" especially fluorescent green; "low resolution" images which lack contrast from background color or generally lack clarity; characters that are too small, too faint or otherwise difficult to read; overly flickering images due to an inadequate "refresh rate" in cheap machines or inadequate maintenance and replacement of cathode ray tubes; shiny keys and casings designed to look "space-like" without regard for the excess glare they cause the user; keyboards attached to screens which can't be adjusted for viewing distance or angle. Since anti-reflection filters are optional components for purchase, they are too often overlooked in the name of office economy.

Lighting problems are probably the biggest complaints from display screen users. Work at VDTs is very demanding visually, much more so than reading newsprint or a book for the same amount of time. One study found that under laboratory conditions, 50% of the subjects reported a burning sensation in the eyes, 33% reported headaches, and 25% experienced flickering vision. The study found that the operators experienced a 50% deterioration in visual clarity, especially severe after four hours of uninterrupted use. 4/

The problems caused by VDT work are increased by lighting conditions designed for traditional office work, according to Swedish scientist Dr. Olav Östberg. Östberg estimates that typical office lighting will cause discomfort for about half of all VDT users. Office workers often find that they need to wear tinted glasses to reduce glare. A combination of more subdued overhead lighting and adjustable "spot-lighting" for copy or "input" is helpful, but not always readily provided.

> Priscilla is a word processing specialist. She used to work for a financial corporation, "stuck in the corner" of a poorly lit, noisy area. The only lighting was overhead, fluorescent and unadjustable. She requested a desk lamp and waited for two months. When nothing happened, she refused to work until the company got her the lamp. She stayed out of work for two days, finally got the lamp, but then she had to work overtime to make up the time she lost. Priscilla's eyesight worsened. She had to get stronger glasses due to continuous work at the word processor, under poor lighting conditions. When she brought this to management's attention, they admitted it was work related but refused to pay for her eye exam or new lenses. Finally, she left for a job with better pay, fewer hours, and less stre

Workstation Design. As much flexibility as possible should be provided. Work spaces should not be overcrowded so that build-ups of heat, noise or stuffy air are avoided. Chairs and desks should be adjustable since office workers themselves come in all different heights.

> A. works in the resources department of a large university. She works on a Wang word processor about 3 or 4 hours per day, and does a variety of work at the terminal, entering and editing documents for four writers. Overall, she feels she enjoys working with the word processor as an aid in her job. However, she has several complaints: 1) Her neck and shoulders often ache. The screen is attached to the keyboard and she is tall. Even though the keyboard height is comfortable, she has to hunch down to see the screen. On rare occasions when she has to type all day, her body aches all over. 2) A. describes the lighting--two fluorescent lights directly overhead--as "terrible." She faces a white wall, which increases the glare. She has permission to correct the lighting problems, but must spend her own time and money to arrange for changes.

Office Environment. Altogether, office environments reflect too little attention to the comfort of the office workers who must sit in them all day. Appearance and fancy new equipment is unfortunately more important to some managers than their employees' state of health.

> Three women who work for a small accounting firm at a prestigious downtown location comment on the high turnover rate in their office:

"I've been there almost a year, and I've got seniority among the secretaries," Emily says. "It's the strain--everything must be done under the deadline, it always absolutely has to be done by 9:00 the next morning. We end up rushing around like crazy to make up for their delays in getting the job done so it can be typed. We are forever getting in early and there's staying late in order to use the word processor while no one else is waiting for it. We're just extensions of those dumb machines."

Her co-worker agrees, and adds, "You know, when the boss brings new clients through the office to show them around, he'll point right to me working at the word processor and say, 'Here we have our wonderful new LEXITRON' and then move right on. He doesn't bother to introduce me--just the machine!"

All three women experience almost daily headaches, nervous stomachs and shaky hands. They're upset that another one of the secretaries who has high blood pressure, was recently sent to the hospital for tests. Their employers don't seem to care: "The place looks gorgeous, and that's where the management's priorities lie. They're not really as interested in efficiency as they are in using people up and pushing them out the back door."

When improvements are made, office employees who will be using the new equipment should be involved in choice of machines and redesign of their work areas. A VDT operator who is a member of The Newspaper Guild says:

"I work at a terminal all day. When the union pushed the newspaper company where I work, they improved the colors and lighting and all that for the fulltime operators. Now they have a new set-up called "the open office". There are dark blue panels six feet high around all the operators. In many cases, we don't see another person all day except for a ten-minute break and lunch time. All we see is the walls around us and sometimes the supervisor. The isolation is terrible."

"'Comfort' is the best guide to follow, and a high degree of flexibility," advises Tobi Berman of the New York Committee for Occupational Safety and Health (NYCOSH). "People need to be involved in redesigning the work area to make sure it is still pleasant and comfortable for them after changes are made. There's a need for a high degree of adjustability--chairs that can be adjusted with an allen wrench, keyboards that are detachable. But in many cases what we see is that the desk is so crowded or the workspace so small that the keyboard or screen can't possibly be moved without falling off the desk. It doesn't solve anything if the keyboard is detached but you can't adjust the distance because you don't have any room."

Visual Strain.

A recent study in Vienna found that clarity of visual focus did not return to normal for more than 16 minutes after four hours of work at a display screen, even with a 15 minute break. The Viennese government therefore proposed a limit of four hours work at a screen per day with a 15 minute break after two hours. 5/ The vision of terminal operators undergoes short-term changes described as "minor" by the U.S. NIOSH. But the agency expresses concern that these temporary changes may indicate "the potential for chronic effects given longterm CRT use." 6/ An

industrial hygienist warns that VDTs "exaggerate the deficiencies in vision or any defects in the eyes".

> Anna works for a non-profit technology research center as an all-around secretary. A year and a half ago, she worked briefly in a fulltime word-processing position: "By the end of three months, working at the word processor, I developed a very frightening eye syndrome. I never had eye problems before and I've never even worn glasses. But I found that when I went from a lighten room into a dark room my eyes could not adjust--it took a full minute. I went to an Eye Clinic. The doctor said my eyes were generally fine, but they were being strained in a very bad way by my work at the machine. He advised me that if I wanted to continue in that job, I would need to take a 10 minute break every 20 minutes and focus on a faraway point. He warned me that if I couldn't do this, I had better quit or my eyes would continue to deteriorate. When I told my supervisor what the doctor said, she said 'Do whatever you want, but just get the work done!' I knew there was no way I could keep up if I took the breaks the doctor advised, so I quit after 4 months. My eyes have returned to normal, and I don't have any vision problems in my current job."

Fear that display screen viewing may cause permanent eye damage stems in part from an incident at the N.Y.Times in 1977 when two young male employees developed cataracts after working continuously at terminals (see section on low level radiation).

Office workers who wear contact lenses have even more difficulties with itching and burning eyes, especially if their offices are also too hot, too dry or smoky. And wearers of bifocals also have special problems, they must adopt extreme postures to view the screen.

"The computer is the Ultimate Unsupportive Boss."

The introduction of VDTs and other automated equipment intensifies the pace of office work in the name of productivity. Monotony and boredom increase. Operators complain of being "constantly watched" by the computer. Fear of job loss through automation is an added cause of stress. Unless the effects of computer-based systems on people are considered, NIOSH warns, such technology will become "a source of misery instead of a helpful tool." 7/

A comparative study of general clerical workers and VDT typists found that the latter experienced extreme fatigue, alienation, monotony and lack of challenge in their jobs at twice the rates of traditional clerical workers. Symptoms of stress and increasing job dissatisfaction were most prevalent among "computer-controlled" typists paid according to piecework, and "de-qualified" office workers, who were transferred from more varied clerical jobs into fulltime VDT work. 8/

> When Rose reentered the workforce last year, her excellent typing skills quickly landed her a job with a downtown Cleveland publishing company -- as one of 12 CRT operators working in a small crowded room. She found office work had changed a great deal during her years away from the workforce. "The chairs were good, expensive chairs, and the machines themselves were adjustable, too. But I have never been confined to one place doing key entry at such a pace." She explains, "The computer at one end of the room keeps track of how

many key strokes per minute you do. The more key strokes, the more money you might get. At the end of the day the figures were posted. You look at your speed, you look at everyone else, and you say, 'Tomorrow I'm going to do better.' They get you thinking just like they want to, you're really pushing hard."

"I was often totally disoriented during the first two months. ...One day --I'm not just telling you this to be dramatic -- I was sitting there at the terminal, entering data, reading from the screen, and I suddenly thought I was having a terrible nightmare. I didn't know where I was. It took all the discipline I had to sit there quietly, until the whole thing passed. I knew something was wrong and I was frightened. But I didn't understand what happened to me until I read about office health and safety in Cleveland Women Working's newsletter. As I understand more, now I feel like I can do something about it."

Zombie

Rose changed jobs, and now works in a less hectic, conventional office. The strain of extremely fast-paced and contolled work at display screens does not only affect employees who once did traditional office work. Rose describes a co-worker at the publishing company: "One girl who is also a CRT operator came to the company right after high school. She's been running a CRT for close to ten years, and she's as fast as the wind. But it's really affected her personality. I used to wonder if something was wrong - she had no exuberance. Once she said to me, "Rose, as soon as I sit down at that machine in the morning I feel like I'm going to cry."

Low-level Radiation Emissions.

The original health concerns of workers on video display terminals had to do with the issue of radiation. Early NIOSH studies looked at the cataractogenic potential of VDT's, finding that radiation emissions by VDT's were below federal threshold standards. 9/

A grievance filed by the Newspaper Guild prompted a 1977 study by NIOSH of the potential radiation dangers of VDT's. Two newspaper employees who had worked continuously on VDT's developed bilateral, posterior cataracts (the type caused by radiant energy exposure). Most regions of the electromagnetic spectrum have been implicated as being cataractogenic. 10/ Although NIOSH found that all categories of radiation emission by VDT's were below threshold standards, the etiology of the employees' cataracts remained undetermined. The type of cataract observed has only four known causes; neither man had any medical history pointing to the other three causes. 11/

Many employees and labor officials fear that long-term low-level radiation dangers from VDT's will be proven 15 or 20 years from now. One Newspaper Guild official told Working Women: "This whole thing may end up like Three-Mile Island. We won't know the damage for another 10 or 20 years." The Newspaper Guild and Mt. Sinai School of Medicine have launched a long-range study of the health effects of VDTs which "should begin to provide a definitive answer as to whether VDTs produce cataracts or other damage to the eyes as well as answer persistent questions about other possible effects of radiation..." 12/

Manufacturers could use substitute technologies (which they already have developed) to remove CRT-based display screens from the workplace, eliminate this source of concern and avert potential health hazards. 13/

An excellent readable guide to proper lighting standards, workstation design, and criteria of high-quality equipment is available from the New York Committee for Occupational Safety and Health, called Health Protection for Operators of VDTs/CRTs. Important points about machine and workstation design include:

- Screens should be detached from keyboards so they are adjustable.
- Screens, keyboards, and room decor should be in mat, subdued colors to reduce glare; conventional office lighting should be redesigned.
- Look for "high resolution" screens, proper size, color and clarity of screen characters.
- Screens should allow individual operators to adjust angle, brightness and focus for viewing comfort.
- Too often, devices which reduce glare and/or noise are optional -- make sure they are purchased.
- Regular maintenance and repair are essential.

Only high quality equipment should be used, and flexibility should be built into programming and systems design. Automation in the office has the potential to reduce rather than increase stress if the following job design principles are followed:

- New technology should mean you use more skills in your work, not fewer and that promotional opportunities are increased, not reduc
- New office technology should mean more control over the pace and organization of work, not less control.
- Increased productivity should be compensated by increased pay, more breaktime, and/or a reduction in weekly hours without a reduction in pay.

The risks associated with VDTs can be reduced while further research is in progress. Improved machines are already available for purchase. A writer for a management research firm notes that protections against operator discomfort "are to a great extent within the control of the office manager." 14/

Adequate rest periods and job rotation are the key to protecting the health and well-being of video-display terminal operators. The NIOSH recommen a 15-minute break per hour of visually intensive work and 15 minutes per two hours of continuous work at a VDT to reduce eyestrain and stress. In other countries, limits of one and a half hours continuous VDT work and/or four hours per day have been recommended or mandated. 15/

IV. OFFICE AIR QUALITY AND VENTILATION PROBLEMS.

"We always thought people got 'Monday morning sickness' because they didn't like coming back to work. Now we're realizing that it may be because they're coming into an environment that's an irritation to their system," explains Craig Hollowell, Director of Indoor Air Quality Program at the Lawrence Berkeley Laboratories.

Energy conservation, new building and furniture materials (particularly plastic-based synthetics in furnishings and either chemical or paper-based insulation materials),office supplies and machines which emit fumes, the "weatherless" office with its sealed windows, and improperly maintained or faulty ventilation systems that can recycle infectious bacteria, dust, smoke and harmful airborne chemical contaminants throughout a building -- all of these factors are causing an explosion of concern about office air quality. "There's probably more damage to human health by indoor pollution than by outdoor pollution," says a scientist for the World Health Organization.

The effects of poor office air quality range from fatigue, lethargy, headaches, and mucous membrane irritation or skin rashes, to nausea, colds bronchitis, increased stress and menstrual irregularities, to longterm respiratory diseases. Some airborne toxic substances, such as asbestos or ozone can lead to blood diseases, or possible mutagenic damage or cancer. Many others, such as methanol and organic solvents, can cause "a drunken state", blurred vision or nervous conditions.

So many outbreaks of building-related health problems have occurred in the past few years that scientists coined the term "Tight Building Syndrome" to describe these "mystery illnesses." Perhaps as many as 30% of all requests for on-site health evaluations received by the NIOSH last year involved office workers.1/ In only a few cases has the agency been able to find a chemical "cause," but faulty ventilation plays a major role as does stress. Employers have been forced to recognize the dangers of poor air quality in "sealed" buildings because large numbers of employees have become too sick or too drowsy to work, many have called in public health officials, and some employees have walked out of their offices in protest. 2/

"Sealed" Buildings. Poor ventilation is a key environmental contributor to air contamination. Office machines such as photocopiers, specialized printing, duplicating and new "signature-writing" machines are often located in small, windowless rooms or in closets to reduce office noise. This only increases the dangers of accumulating toxic concentrations of byproducts such as ozone, methanol, formaldehyde and aromatic hydrocarbons. If the exhaust flows into an air-conditioning system rather than to the outside, the air contaminants can be recycled throughout the entire work area.

"Sealed" older buildings and newly constructed "energy-efficient" buildings pose more problems for office workers. An inadequate supply of fresh air means that the percentage of oxygen in the office air declines. Lack of fresh air can produce headaches, make one drowsy or faint, and can interfere with concentration.

Health and Safety Fact Sheet

Hazard	Effects	Prevention
Stress, from lack of job satisfaction and job mobility; repetitive, demanding work; discrimination or harassment; noise, muscular or mental fatigue.	Chronic stress has been linked to hypertension, migraine headaches, insomnia, extreme fatigue, ulcers and heart disease.	Improved working conditions, greater control over job tasks, more rest breaks, group discussion and action on problem areas and solutions.
VDTs/CRTs, continuous use, improper lighting, glare, improper workstation, poor machine design, overly small or flickering images; low level radiation emission.	Eyestrain, short-term loss of visual clarity; headaches, neck and back pain; dizziness, nausea; job stress.	Frequent rest breaks and job rotation; adjustable chairs, lighting and screens; detached keyboards; regular eye exams; improved machine design and care.
Poor air quality and ventilation, "sealing-in" and recycling toxic fumes and vapors, dusts, spores or bacteria, or asbestos particles. Temperature and humidity problems.	Colds, fatigue, bacterial infection, respiratory problems. Asbestos is a potent cancer-causing agent.	Increase air exchange rate and fresh air supply; clean circulation systems. Immediate removal of asbestos if exposed during renovations in offices built with asbestos insulation (esp. 1958-1970).
Toxic substances, such as **ozone** from photocopiers; **nitropyrene** in toners; **methanol** from duplicators; **solvents** in stencil and correction fluids and "erasing" compounds.	Eye, nose and throat irritation; coughing; headaches, drowsiness. Long term exposures may lead to permanent damage.	Well-ventilated areas for all machines; control of ozone levels below OSHA limit (0.1 ppm); replacement of hazardous products with safe substances.
Noise, lighting and chair design — excessive noise, poor lighting, crowding, constant sitting in badly designed chairs.	Headaches, irritability, anxiety; stress, potential hearing damage, eyestrain; back pain and varicose veins from constant sitting.	Carpeting, room dividers, machine shields to reduce noise; adjustable lighting, elimination of glare; adjustable chairs providing back support.
Accidents, caused by slippery floors, overcrowding, poorly secured or designed furniture, obstructed passageways, deadline rush, insufficient fire protection.	The Department of Labor estimates a rate of 40,000 disabling injuries and 200 work-related deaths in offices every year.	Maintenance of safe, non-obstructed passageways; well-designed, secured equipment, chairs and file cabinets, fire precautions.

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Air exchange rates of 15 to 20 complete changeovers of fresh air per working day are recommended. Dr. Hollowell of Berkeley Laboratories found that "a new energy-efficient structure typically allows but one air exchange every 10 hours." 3/In buildings where smoking is permitted, five times as much ventilation is required to remove the soot, carbon monoxide and benzopyrene released. NIOSH researchers have found that increasing air exchange rates per day goes a long way toward relieving symptoms.

By closing off exhaust ventilation and cutting down the movement of air inside, the indoor equivalent of "smog" is born. Air refresheners, solvents, adhesives in building products, cleaning fluids, fire-retardant chemicals, chemicals which prevent aging of paints and finishes -- all these are trapped inside. "We may be transforming offices into virtual gas chambers," says Dr. George Burch of Tulane University Medical School. 4/

> In September 1979, 150 employees were evacuated from the Itel Corporation's brand new building in Port Washington, N.Y. Days after moving in, reports of headaches, nausea, lethargy, stuffy noses, puffy eyes and dizziness became so widespread that employees were temporarily relocated in trailers. Investigators from the Federal Center for Disease Control concluded that they were "poisoned" by emissions from copiers, typewriters, rugs, furniture chemically treated wallpaper and cigarette smoke. It cost Itel only $5,000 to improve the building's ventilation and make the office "liveable" again. 5/

Ventilation and air quality are often worst around clerical workspaces, since clerical workers are usually located farthest from windows, even when a window can be opened. And, in most cases, they are closest to and spend the most time using office machines which emit fumes.

> Jane works as an insurance policy examiner in Boston. At least half of the women in her department have developed eye problems since the company moved into a new building two years ago. Most describe it as a "gritty feeling in their eyes" and use eye drops 3 to 4 times a day to relieve it. The work is visually demanding as almost everyone works at a VDT.
>
> Jane has lost the ability to produce tears and must rely on a tear replacer. She gives an example of what this means: if an eyelash or foreign body gets in her eyes, she doesn't have the tears to wash it away, and it has to be removed with a tweezer!
>
> "I've spent all kinds of time and money running back and forth to eye specialists because after the irritation starts to get out of control, I get allergic conjunctivitis. We assume these irritating fumes are from a lack of fresh air, not changing air filters often enough, and the use of photocopying machines. Smoke hangs in the air like a cloud. 'Management' states that there is nothing wrong with the air, yet everyone who goes to their ophthalmologist hears the same thing: 'It's from the building.' "

When Jane raised the problem with the management, she was told her "complaint" would be entered on her work record under a section called "attitude" which could affect her annual salary review. Most of the departme policy examiners are minority women, many cannot speak English and are convinced that no one else will hire them and are afraid to risk losing their jobs by going to management together. Jane is reluctant to call in health officials because as the only one who has complained her anonymity can't be protected.

Temperature and Humidity Problems. Allergic reactions, fatigue, colds, respiratory problems, dry skin, and general discomfort can result from poor humidity and temperature controls. Too much or too little humidity can compound eye irritation from pollutants, adding to the strain of intense visu work. The effects are often worse for wearers of contact lenses.

> Geri has worked for the Social Security Administration in Cleveland for 13 years as a data review technician. One immediately senses "dead air" when walking into any one of the 35 floors of the federal building. Uncirculated, hot air is made worse by smoke and dust and windows that are sealed to outside air. The dust-attracting carpets are vacuumed twice - literally twice - per year. Of the 60 employees in her section, at least six, including Geri, have developed sinusitis, a painful and chronic sinus condition. Geri has seen a doctor for the condition every two weeks for the past five years. She is on almost constant medication.
>
> R. works for one of Boston's biggest banks. For the last five years, she worked as a clerk in a basement area nicknamed "the vault" by the 50 people in the collections department. She developed pleurisy --a painful inflammation of the inside one's lungs -- from exposure to drafts of cold winter air blown into the work area through the bank's revolving doors. Once she catches a chill and contracts the illness, it can take up to four days to recover. On some days, she has gone to the company nurse to lie down on a heating pad to relieve the chill and pain. Last year, R. lost 14 days of work due to pleurisy. Several days were taken without pay, and she lost her eligibility for a raise.
>
> A year ago, a co-worker contacted the Board of Health. The bank was given six months to solve the problem, but they did nothing. The Board never followed up to enforce the recommendations.

Organic Pollutants. The classic case of health effects involving biologi agents indoors was the Legionnaire's Disease in the hotel in Philadelphia. Now several other organisms and allergies have been identified and associated with workers in offices. Hypersensitivity pneumonitis -- also called "humidifier lung" may appear to be flu, but is caused by bacterial infection. Primary sources of these organisms are cooling towers or evaporative condense and humidifier reservoirs.

Scientists who investigated a large office complex of 4,000 employees found 50 cases of hypersensitivity pneumonitis. They estimate that such infections happen often, affecting from 3% to 16% of those exposed in a given office. These risks are increased in large-space offices with forced-air circulation systems.6/ Insulation material based on organic compounds such as newsprint can also provide breeding grounds for

Toxic Contaminants in Office Air

Sources of office air contaminants include exhaust fumes of office machines and special printing processes, vapors from common office products, nearby laboratories or industrial processes, outdoor pollutants drawn inside and asbestos fibers loosened from insulation in older buildings. There are more than 20 possible airborne irritants under study in relation to office workers' health complaints. 7/

Several guides are available which provide information on symptoms, effects, legal limits of exposure, and levels of exposure which cause health symptoms. A few of the most prevalent and potentially dangerous toxic hazards found in offices are described below.

Photocopiers. There are at least four types of hazards associated with photocopying machines: 1) ozone in exhaust emmissions; 2) dangerous chemicals in toners such as nitropyrene; 3) chemicals used in the photocopying process, such as trinitrofluorenone; and 4) potential exposure to ultra-violet radiant light.

Ozone. A NIOSH pamphlet urges that unnecessary exposure to any concentration of ozone, however small, should be avoided. Exposure to low concentrations depresses the nervous system and produces drowsiness. Prolonged exposure to ozone in an immediate work area without adequate ventilation can cause permanent lung damage. 8/

Photocopying machines, electrostencil machines, and electric typewriters emit ozone. One study found that in a poorly ventilated area, a health risk could occur when 83 photocopies were made over a two-hour period. 9/ Proper machine cleaning and maintenance reduces risks, but further study is needed.

> Anita Reber works as a secretary in Philadelphia. Formerly, she was a secretary for Sperry-Univac Corporation. In the fall of 1980, Anita won a Workers' Compensation claim from Sperry to pay the medical costs of permanent sinus and respiratory damage resulting from working close to a photocopier. (The particular machine model was recalled in 1976.) Recently, she testified before the House Subcommittee on Health: "For a year and a half, I worked three feet from the copier with the exhaust facing me...It go so bad, I felt like I was being poisoned...It's important that I have won a Worker's Compensation claim...but I cannot place an order for a new pair of lungs and I cannot wipe the worried look from the faces of the members of my family when I can't breathe, can't stop coughing, when I have to sit up to sleep..." 10/

Nitropyrene is a contaminant found in carbon black, a component of toner products. Nitropyrene proved carcinogenic and mutagenic in bacteria tests performed on Xerox and A.B.Dick toner in 1979 and 1980, and is suspected as a cancer-causing agent for humans.11/ Although the levels of nitropyrene in Xerox toner were reduced in March of 1980, the product was not recalled, so it may still be on supply shelves.

Trinitrofluorenone (TNF), used in certain large copying and computer printing machines, is considered to pose some risk of cancer for human beings, according to the E.P.A. TNF has been used by I.B.M. to coat photocopying "drums" for ten years, and is found in I.B.M.'s 3800 Printer and I.B.M. Copiers 1 and 2. The greatest risk is to repair personnel, but all office employees should avoid skin contact with "used" toner, since traces of TNF are transmitted during the copying process. I.B.M., which has known about the potential cancer risk for ten years, finally recommended that repair personnel wear protective gloves as of November, 1980. According to the trade journal Computerworld, I.B.M. is alone among photocopying manufacturers in using the substance. 12/

Ultraviolet Radiation. Dry copiers, particularly photocopiers, use ultraviolet or infrared light as their light source. Short-term exposure to intense ultraviolet light, or long exposure to low intensity levels, is painful to the eyes but generally, eye damage is self-repairing. Prolonged exposure can cause permanent damage. Symptoms of excessive ultraviolet exposure are frequent headaches, soreness and swelling of the eyes.13/

> Shawn is a senior secretary at M.I.T. Her description of the xerox room in her department is typical in many offices: "The once-large room has been halved, and the xerox room is now the size of a small closet, big enough for a small xerox machine, one small table, and one person. Not until someone fainted this past summer did they install a fan in the wall; however, everyone keeps the door to the room open. The fan blows out into the hallway, NOT to an outside vent. There are fumes in the room, and in the hallway, although more dispersed than before."
>
> The light-flashes in the machine bother her eyes. Even though she looks away, the light bounces off the walls. Also, if one is xeroxing a page in a book, because the cover is not a flexible cover, one has to keep the cover open so it doesn't crush the book.

Photocopiers should be in well-ventilated areas. If necessary local exhaust vents should be installed near machines to remove fumes to the outside. Machines should be regularly cleaned and maintained, and ozone levels should be measured and kept below the OSHA limit. Clerical workers should know what chemicals are in toners and make sure nitropyrene is not present.

Methanol or Methyl Alcohol. A recent study of "spirit duplicators" in the Everett School District found that teachers' aides faced a health hazard due to excessive exposure to methyl alcohol or methanol.14/ A powerful solvent, methanol is used in inks and cements and is a cleaner of photographic film. Chronic exposure at the threshold limit value (200 ppm) irritates the mucous membranes of the eyes, nose and throat; low concentrations can cause headaches, dizziness, insomnia and blurred vision.15/ Persons with central nervous system problems or weak visual acuity should not work where exposure is repeated, according to the National Safety Council.

Formaldehyde is a well-known respiratory and skin irritant. In November 1980, a special federal panel advised that formaldehyde "should be considered to pose a risk of cancer for human beings," after rats developed nasal cancer when they inhaled doses of the gas within the range of levels encountered by people. 16/

Formaldehyde is a very common industrial material, used in particle board and fire retardants, as a furniture sealant in wood-laminated desks and panels, as a coating for paper in "automatic signature-writing" machines, and in urea formaldehyde foam insulation (UFFI), quite widely installed since 1976. Formaldehyde and acrolein gas can also be released from disintegrating carpets and curtains as they wear down over time.

In greater Los Angeles, 150 women office workers in a new building called in public health officials, complaining of burning eyes, coughing, difficulty breathing and even chronic nausea. An industrial hygienist told the press "formaldehyde gas was flowing from the walls" next to many of the clericals' desks. The gas was measured at 6-7 ppm -- three times the levels considered safe by OSHA.17/

A NIOSH health hazard evaluation at a California school found formaldehyde levels of 2 ppm released from pressed-wood boards used as shelving in classrooms.18/

The National Academy of Sciences recommends that exposure to formaldehyde gas should be reduced to the "lowest possible practical concentration." Although the current standard allows exposure to 2 ppm (parts per million parts or air) over an eight-hour day, symptoms occur at much lower levels. Because irritation and disturbed sleep can occur after exposure to as little as 0.3 ppm of formaldehyde, NIOSH recommends a limit of 1 ppm exposure.

Urea formaldehyde foam insulation was banned in Massachuestts in 1979. In January, 1981, the U.S. Consumer Product Safety Commission proposed a nation-wide ban, noting that "after being installed, UFFI may release formaldehyde gas for weeks, months or even years." 19/

Special Printing Processes. There are additional chemical contamination hazards with special processes. Four recent NIOSH health hazard reviews examined a micro-duplicator and blueprinting operation for ammonia concentrations, an instant copy service for acetic acid and hydroquinone mist concentrations, and an electrostatic copying machine for alphatic hydrocarbons as well as ozone emissions. 20/ In general, the complaints by employees were filed during times of continuous use or when the ventilation system was inadequate. When provisions were made for exhaust control, the problems were generally resolved. However, NIOSH found in the case of the electrostatic copying machine that if the machine were used more than two hours a day, a health hazard would result.

Recently two women left their jobs in the audio-visual facility of a government office in Washington, when they could no longer bear the effects of toxic poisoning from a darkroom-like center next to their office. When air samples were tested, a lab technician remarked that the trace levels of xylene and toluene found were "usually only found outside of a petrochemical plant."

Laboratory or Industrial Fumes. A number of investigations have found fumes from car exhaust (from parking lots under or next to buildings), by-products from combustion processes (such as faulty furnaces) or on-site energy sources (burning gasoline, coal or diesel fuel) and fumes from industrial processes nearby. Cleveland Building Inspector Juanita Jones recalls one incident in the summer of 1980: "A print shop was located on the ground floor, with offices right above it for several stories. The chemical exhaust was issued directly outside, the heated air with chemicals in it traveled up the side of the building and went right into the offices, making everyone sick."

WORKING WOMEN received numerous complaints from staff of universities and colleges with science laboratories and medical schools. The following example is representative:

Laura has worked as a medical secretary at Tufts Medical School for 5 years. "There is a major problem with fumes about once a month. The vapors have been monitored and include benzene derivatives, toluene, xylene, formaldehyde, and acrylates (used to make dental impressions). The fumes from the animal lab's penetrate the ventilation system, particularly the bathrooms, making their use nearly impossible. Fumes from all other floors are picked up by the system and spread throughout the building. At times this involves substances, particularly the acrylates which cause a very acrid smell and taste in the mouth, as well as a feeling of coating the surface of the mucous membrances, especially the nose and throat. Laboratory hoods aren't maintained or fitted properly. And the ventilation system should be re-vamped and improved, as it's a very old, remodeled garment factory."

So far, Laura says her health hasn't been affected except for the sensation of "coating" of the mucous membranes, but she and her family are concerned about possible long-term effects.

PCBs. The manufacture of polychlorinated biphenyl (PCB) was outlawed in 1976 because the chemical is so dangerous. Yet, it is still commonly used as a lubricant and high-temperature coolant in electrical transformers and in industrial machinery. PCB causes cancer in animals and attacks the immunization system of people.

In 1979, 43 electricians who were exposed daily to leaking PCBs during their maintenance and repair work in federal buildings in Washington, D.C., called in health officials. They complained of skin rashes, headaches and fatigue after contact with the spilled chemical. The Washington-based Health Research Group estimates that at least one-third of all federal office buildings in the D.C. area have transformers leaking PCBs., and warns "...Anytime you see some PCB spilled on the floor, the chances are that workers are going to be breathing excessive amounts of the stuff."21/

In February, 1981, a fire in the electrical circuitry of the brand new 18-story Binghampton, (N.Y.) State Office Building released a layer of toxic soot which permeated the entire building. More than 180 gallons of coolant laden with PCBs leaked out of the buildings' electric transformer into the fire, and up to 200 people were exposed to the chemical fumes. Days later, workers performing a routine clean-up discovered that the PCBs combined with intense heat and oxygen produced dibenzofuran and dioxin, one of the deadliest chemicals known. Dioxin, known as "Agent Orange" when it was used as a defoliant in the Vietnam War, has been linked to cancer, is known to attack the liver and nervous system, and can cause birth defects. 22/

Although the incident is believed the first in the United States, authorities said it could happen in most of the nation's large office buildings, since the same type of transformers are commonly used. In 1979, a similar incident in Toronto prompted the Canadian government to ban the use of transformers which contain PCBs23/An international panel of pollution-control experts will propose a safe method for cleaning up the evacuated building.

N.Y.'s Governor Carey sparked a furor when he told the press that the panel was only convened "to satisfy the unions" and cavalierly offered to "swallow an entire glass of PCBs" and clean up the building himself with a vacuum cleaner. Days later, the governor had to swallow his words instead when more information on the dangers of the dioxin and PCB contamination was made public.

Chemicals in Office Products. Other potentially harmful chemicals contained in commonly used office supplies include: trichloroethylene (TCE), tetrachloroethylene perchloroethylene both suspected carcinogens found in liquid eraser products; benzene, a carcinogen, and toluene, a powerful narcotic, found as impurities in cleaning solvents. At moderate levels of exposure to organic solvents workers complain of eye irritation, changes in skin color, and heart palpitations. Several deaths have been connected to the sniffing of a typewriter correction fluid. 24/

Many common office products are also potential causal agents of skin rashes for clerical workers: adhesives, carbon or "carbonless" paper, copy paper, duplicating fluids and materials, inks and ink removers, rubber, solvents, typecleaner, and typewriter ribbons.25/

Since manufacturers of office products are not required to label them, other harmful chemicals may also be in use. It is crucial to obtain information on what solvents and substances are being used and determine their health effects and safe use. Requiring manufacturers to label product contents and requiring employers to post contents and instructions for safe use would be a positive first step.

Airborne Asbestos. Asbestos is a well-documented and severe health hazard. Exposure can cause: asbestosis (a chronic lung ailment); cancer of the lungs, esophagus, stomach, colon and rectum; and mesothelioma, an invariably fatal form of cancer involving the thin membrane lining of the chest and abdomen. The latency period between exposure and appearance of disease may be 20 to 40 years. There is no safe level of exposure to asbestos fibers.26 / The particles are extremely durable and very difficult to destroy or degrade. Fibers remain airborn for long periods of time and are inhaled easily. Particles that are retained in the lungs stay indefinitely. Asbestos exposure at work also endangers the employee's family if particles are carried home on clothes. For cigarette smokers, exposure increases the likelihood of lung cancer 30 to 90 fold.

In buildings, asbestos exposure most commonly occurs when fibers come loose from building insulation and are circulated through ventilation systems. The Environmental Protection Agency, in conjunction with OSHA and D.H.E.W., recently conducted a nationwide educational campaign on asbestos hazards in school buildings. As a result, the E.P.A. has announced regulations and made funds available to schools to prevent asbestos dangers, since it found voluntary compliance inadequate to eliminate the dangers.27/

A study in 1975 estimated that half of the nation's office buildings built between 1958 and 1970 used asbestos for fireproofing.28/ In New York City, dangerously high levels were measured in 20% of the buildings tested in the same study. In 1980, the N.Y. Commissioner of Buildings asked NIOSH to conduct a renewed investigation to assess the dangers of airborne asbestos in the city's older buildings. Recent incidents of asbestos insulation exposure have been reported in Cleveland and Boston's city offices, state offices in Albany and Philadelphia's train station, among others.

Mary works for New England Telephone Company in Lynn, Massachusetts. She shows photographs of the cramped, crowded Record Room, where she has worked for seven years. What is particularly horrifying are the asbestos fibers and dust dropping all over the records and the people who spend considerable time working there, including herself. A year ago, she called the state Asbestos Commission to investigate. She believes that the commission must have called the telephone company beforehand, because by the time they came (2 months after she registered her complaint), the company boarded up the ceiling of one room with asbestos ceilings, and LOCKED THE RECORD ROOM so the inspectors couldn't get in. This occurred a year ago, and nothing further has been done since.

Recently, two co-workers died of cancer, one from lung cancer. Both people had been heavy smokers. Mary believes that the asbestos may have been a contributing factor because both workers spent many hours in the Record Room. She's frightened for her own health, which is already very poor.

Cigarette Smoke

Cigarette smoke in the office environment is a further hazard to smokers and non-smokers alike. According to one environmental consultant, "The level of particulate matter in office buildings where smoking is allowed is 10 to 100 times higher than the allowable limits for outside air."29/ For clerical workers who spend all day sitting, the effects of smoking on health are magnified, since carbon monoxide from cigarettes stays in the bloodstream longer during low physical activity.30/ A recent epidemiological study concluded that longterm exposure to smoke, limited to the work environment only (i.e. not at home), is deleterious to the non-smoker and significantly reduces small-airway function to the same extent as smoking one to ten cigarettes per day."31 / Cigarette smoke contains numerous potent carcinogens, including benzopyrene, affects not only the lungs but many other organs, and maximizes the effects of other indoor air pollutants because of the density and persistence of particulate matter released. In addition, many legal secretaries and clerks in law offices complain of cigar smoke. Preliminary experiments show that one cigar generates three times the respirable particles of the average cigarette and up to 30 times as much carbon monoxide.32/ There is a great need for improved ventilation and creation of "non-smoking" areas to protect the two-thirds of U.S. adults who do not smoke.

Tight Building Syndrome.

Typical symptoms of tight building syndrome include: fatigue and lethargy (even numbers of employees falling asleep at their desks at about the same time of day); headaches, nausea, dizziness, or lightheadedness; problems with vision; irritated nose and throat; difficulty breathing or sthma-like symptoms; frequent and widespread colds and sore throats; and menstrual irregularities (including intermittent spotting between periods, prolonged or continuous menstruation for weeks or even months, missing menstrual periods).* Previously, such problems were often deemed the result of "hysteria" on the part of workers, but tight

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*There are many potential causes for such problems, and individuals should see a doctor for medical evaluation.

building syndrome is now understood as a "disease entity" related to the work environment.

Researchers describe several types of factors known to bring about this set of health symptoms: 1) irritating and/or toxic indoor air pollutants; 2) biological agents such as fungi, spores, bacteria; 3) inadequate supply of fresh air, stagnant and/or very dry air; 4) high levels of job stress -- excessive work demands, highly regimented work, and/or problems with supervisory style. There is usually a physical 'trigger', a toxic or irritating air pollutant, but at too low a level to account for the widespread health symptoms.33/

Numerous stories of these problems have been reported by the media. More than 400 employees in the 26 story U.N. building signed a petition that the building was intolerable. For instance, Dr. Dean Baker, medical officer for NIOSH in N.Y. describes an instance where the employees voted to evacuate the building because health problems were so bad, but no "cause" could be found. "We made some suggestions, to set up a worker-management committee, for example," he comments. "We find we have to look at organizational factors as well as toxic agents, although the reports tend to de-emphasize this type of thing. But they (the stress factors) are always there, between the lines...30 out of 31 employees get sick, but no 'problems' are found..."

For years, employees of the Brookhaven (N.Y.) I.R.S. Service Center have complained of burning eyes, sore throats, sinus problems, vomiting, dizziness, headaches and a metallic taste. Last fall, NIOSH investigators found some evidence that diesel fuel contaminants enter the buildings via rooftop air vents, but "no conclusive toxicity" explaining the symptoms. They point out that the problems are "particularly frequent and distressing" in the Data Conversion, Collection and Computer Room areas, which they describe as follows: "Many of the employees in this building are working under conditions of considerable stress. In the data collection and conversion areas, workers are required to enter tax info onto microfilm machines using VDTs. (They are under pressure to process a large number of forms, their productivity is measured and they are evaluated accordingly..."

Drs. Kearnlyside and Hartle conclude that: "These additional stress factors clearly may act to potentiate any health effects from fumes, and should be considered when planning measures to correct the problems. "34/

Summary

Low levels of air contaminants, permissible under government standards, can still have adverse effects on health. People with allergies, respiratory or nervous system problems are often especially affected. Accidents become more likely if employees are drowsy, lightheaded, giddy or dizzy from inhaling fumes. High levels of job stress can increase the effects of low level exposures, while decreasing resistance to illness.

The combined effects of exposure to low levels of several chemicals at once are not well understood, nor are the effects of many years of exposure to very small doses of toxics well documented. For certain substances, scientists point out that no safe levels are known. New chemicals are introduced at such a rapid rate that harmful effects are only discovered many years later.

Furthermore, many allergy specialists are concerned that an increasing number of patients have become oversensitized to all materials made from petrochemicals and other synthetics--even perfumes and some man-made fabrics.

Once damaged, the immune system (which should protect the body) reacts constan and drastically, causing symptoms which include muscle pain, aches or spasms, extreme weakness, or breathing difficulty. Many of these patients are former office workers who have no known chemical over-exposure outside of their workplace. 35/

New York State and the city of Philadelphia now have "Right-to-Know" laws which require employers and manufacturers to inform employees of the contents, possible health effects, and procedures for safe use of substances used in the workplace. The Philadelphia law also requires that doctors and public officia will be provided with lists of all potentially hazardous substances and associated symptoms. Other countries have laws to ensure improved indoor air quality and to protect employees against low level toxic exposures.

Some steps to improve office air quality include:

- Proper architectural and ventilation engineering design which ensures a good supply of fresh air, adequate air turnover rate, and ventilation of any toxic air pollutants to the outside.
- Offices should be "aired" periodically by opening windows (in off-hours during winter months). Inexpensive air and heat exchange may prove useful.
- Regular maintenance of ventilation systems and machines is essential; logs should record cleaning and repair schedules should be available to employees to bring attention to health problems.
- Allow employees some control over temperature, humidity and air flow controls, to protect themselves from extremes and drafts.
- Install or "unseal" windows; design buildings which allow the maximum number of employees access to windows which can be opened don't sacrifice windows in renovating older buildings.
- Special care should be taken to provide exhaust ventilation in workrooms or any areas where printing and copying machines are used; improved filtration methods are needed.
- Substitute safe products for those containing toxic substances; write to manufacturers for "Material (or Product) Safety Data Sheets" on their products and post contents and instructions for safe use.
- If potentially dangerous materials must be handled as part of a job, wear protective gloves and avoid inhalation.
- Jobs should be designed to involve a variety of tasks, so that no one does photocopying or duplicating excessively, for example.
- Airborne asbestos fibers should be immediately eliminated; well-established safety procedures should be followed if asbestos insulation is repaired; if exposed insulation should be sealed at once.

V. DESIGN PROBLEMS IN THE OFFICE ENVIRONMENT

Constant Sitting and Keyboard Work

Most women office workers use machines with keyboards -- type-writers, key entry machines, accounting machines, VDTs-- for a substantial part of the day. They are particularly vulnerable to a variety of muculo-skeletal problems.

> "I'm fine when I first go into work, but by the time I've been there an hour, all the muscles in my neck and shoulders are completely tight," says a data entry worker who processes checks at a specialized machine at the rate of one per 4 seconds all day.
>
> An insurance clerk in Boston comments: "Prolonged use of key entry equipment has caused me neuralgia (acute pain radiating along the course of one or more nerves). Keying with one hand makes your body tense up, especially your arm. I have pain in my wrist, arm and shoulder. Typing does not seem to cause this for me, maybe because you're using both hands then."
>
> A 54-year old file clerk for a Cleveland bank says, "I must lift out heavy parts to fix the check-processing machine when it jams checks. I have tendonitis from lifting the heavy trays, as well as high blood pressure from the stress of the job." She notes that sources of stress on her job are production quotas, inadequate breaks, low pay, an unsupportive boss and supervision problems.

A survey of the scientific literature on the ergonomics of office work-related stress, prepared for NIOSH in 1979, reveals that 25% of the operators of keyboards (such as typewriters, keypunch, accounting machines and video-display terminals) studied were diagnosed as suffering from occupational cervico-brachial syndrome (OCBS), also referred to as occupational cramp/myalgia. 1/ About 50% of the office keyboard operators complained of muscular distress in the arm, neck and shoulders -- symptomatic of OCBS. These problems are substantially worse for users of video-display-terminals (VDT's), and are exacerbated by rapid work-pacing which is characteristic of clerical work. 2/

Some scientists believe that static load production resulting from the dynamic muscular activity of the fingers while the muscles of the upper body operate statically in order to keep the hand properly positioned is inherent in conventional keyboard design. But excessive muscle strain can be dramatically reduced if ergonomic recommendations are followed in workplace design. Japanese scientists who observed office workers engaged in mechanical tasks recommended periodic examination, and emphasized job rotation and rest periods for such workers. 3/ The NIOSH literature review concludes that the importance of rest periods "cannot be over-emphasized."

Office workers are also particularly susceptible to musculo-skeletal problems, such as tendonitis, carpal tunnel syndrome and tenosynovitis, a painful inflammation of the tendons of the wrist due to overexertion from constant repetition of stereotyped movements.4/ In addition to these problems, a Swedish study conducted in 1976 found that frequent upper back pain tends to accompany office computerization. 5/

A woman, now in her fifties, did item-processing for a Cleveland bank for ten years. The work involved using a special processing machine with one hand all day to process checks. "First my wrist and arm and shoulder would ache, and it got worse gradually. Then I began to get sharp pain -- in different spots along my arm, sometimes my wrist, other times my shoulder, it was hard to tell sometimes where the pain came from. Finally, I completely lost the use of that arm and had to stop working. Well, I recovered after a while of being disabled, and now I do other work. I can't do that type of job again."

Office Chairs

"Executives get the best chairs, and secretaries get the worst, which is too bad, because secretaries spend more time in them," remarks a University of Wisconsin professor who designed "model" chairs. 6/ Sitting all day can add to blood circulation problems, varicose veins, and hemorrhoids. Poorly designed office chairs and constant sitting contribute to muscle and spinal column tension, leading to lower back pain commonly cited by office workers, and can even lead to spinal damage. 7/ Again, rests from constant sitting and job rotation can reduce such health problems, although long-term solutions require job redesign and proper office furniture design standards such as other countries have. The least a manager can do for the clerical and secretarial staff in an office is to buy each a good $75 or $90 chair, as many occupational health researchers recommend. From a cost-benefit point of view, a good chair pays for itself almost immediately in the time it saves employees from "squiggling" and awkward motions and gestures in a non-adjustable chair. Dr. E.R. Tichauer of N.Y.U. estimates a gain of 40 minutes of productive working time per day when employees are provided with properly designed seating,8/ which adds up to 21 working days a year. In one instance, an industrial engineer recommended an additional two hours per day for VDT users in the workplace studied to complete their work unless the uncomfortable, inflexible low quality chairs were replaced with well-designed ones.

Lighting and Eye Strain

Many office workers work in areas where lighting is described as "twilight," while others suffer from glare, as offices often register a glare index of 24 rather than the recommended value of 19. 9/ Poor lighting often combines with other design problems.

"I'm not positive, but two things have especially bothered me and affected my health," says a 28 year old cashier for a Boston university. "My sitting on a high chair pitted up to a counter where I am a cashier is really uncomfortable and may have contributed to the lower back strain that kept me out of work for a while last Spring. Also, the fluorescent lights are too bright, and I think they may be what gives me splitting headaches

Adjustable lights, spot-lighting, and the use of non-reflecting materials (such as matte rather than shiny finish in wall paints) and colors can reduce glare problems.

In addition, scientists are raising concerns about the long-term effects of fluorescent lighting. 10/ Full-spectrum light is important to good health. Full-spectrum fluorescent lights are available, but are rarely found in typical work areas.

"Referred Pain"

"Referred pain" can also result when the muscles of the eyes are severely strained. Eye muscles are especially likely to become worn out from switching focus back and forth from hard copy (black on white print) to light on dark images on most display screens. Dr. Stellman explains the phenomenon, which is easily recognizable for many employees who do visually demanding work:

> "Your eyes do not have the capacity to become stronger, and therefore, they'll become fatigued. When your eyes become fatigued, you're not goint to necessarily feel eye pain although you may. What will happen is that the nerves in your eyes will rapidly become overwhelmed, and your body will refer that pain to someplace else -- you'll get a neck ache, you'll get a back ache, you'll get a stomach ache. You'll get an ache in those areas of the body that are more capable of expressing pains... And when you overwhelm your total system, you'll become totally fatigued..."

Noise.

Experiments have shown that workers exposed to moderate or intense noise on the job have increased incidence of circulatory, digestive, neurological and psychiatric problems. Noise is also a major contributor to occupational stress for women office workers, and can cause fatigue. Prolonged exposure to noise levels above 90dB (A), the OSHA limit, leads to hearing loss. Many scientists believe exposure at or below 85 dB can cause hearing problems. 11 /

Office noise levels are considered acceptable in the range of 55 to 70 dB.12/ Typical measured levels of noise in offices with five machines operating register 64 to 73 dB(A), beyond recommended standards. Under such conditions, phone conversation is difficult and a normal voice can only be heard within a 2-foot range.

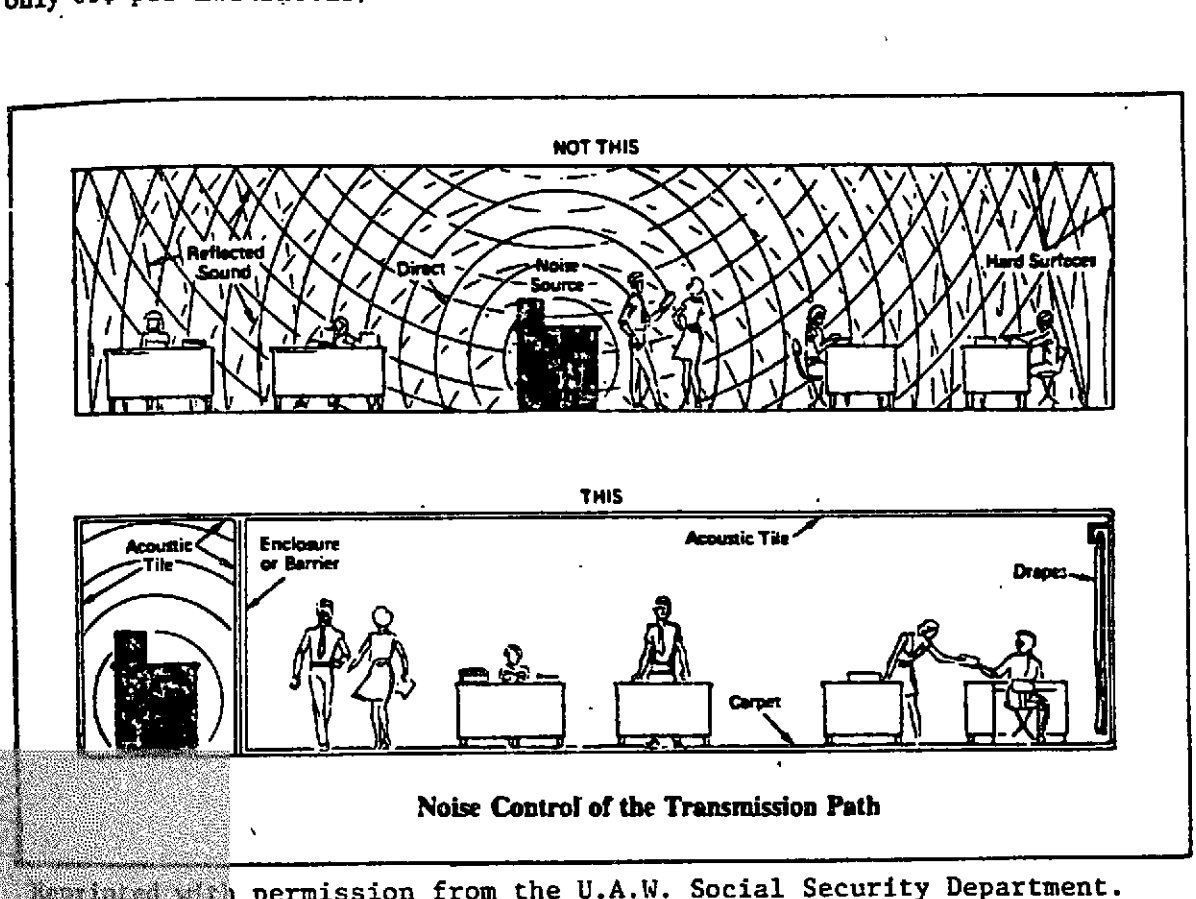
Typewriter noise is generally 63 to 69 decibels, while an office tabulating machine has a decibel level of 80 or above. An employee who works continuously on machines such as these in a small, confined room (as if often the case) encounters a potentially hazardous noise level. Years of noise exposure on the job have caused some keypunchers to suffer permanent partial hearing loss.13/

> An executive secretary who has worked at the same corporate headquarters office for seven and a half years writes: "After sitting near two telecopiers, a MagCard and an electronic typewriter every day, I developed ringing in my ears and subsequently went to two ear specialists who said I have noise-induced hearing loss at the 6,000 frequency level."

The illusion that large-space open office solve the problem of noise is disproven by an ergonomic investigation of fifteen such offices in Switzerland.14/ Noise levels still ranged from 56 to 64 decibels with machines operating. The upper limits casue stress and are considered loud enough to make phone and voice communication difficult and interfere with concentration.

> A secretary for a Houston retail company describes the conditions she has worked under for the past 11 years: "Calculators, typewriters, piped-in music -- loud -- MagCard memory typewriter, air conditioning (large) fan -- all of the above are in an open office with four secretaries answering telephones, placing calls, taking orders, etc. all in an open type area." She indicates that the noise levels cause stress, interfere with concentration and communication and make it harder to hear conversation, radio or tv at the end of the workday.

Office noise can be absorbed by carpeting and plants, and reduced by mats under typewriters and plastic covers over typewriters and other equipment. But a better solution would be the production of "quiet" office machines. A typewriter manufacturer testified at a noise hearing that sound-attenuating materials could be built into electric typewriters at an additional manufacturing cost of only 60¢ per machine.15/



Noise Control of the Transmission Path

Reprinted with permission from the U.A.W. Social Security Department. Power Noise Control: A Worker's Manual, edited by Dan MacLeod (Feb. 1978).

Environmental Design.

Many office workers are confined to overcrowded workspaces, while others work in near isolation. In Working Women's survey, the majority of respondents complained that there was no rest area or lunchroom to go to for peace and quiet or to get to know co-workers. One-third cite overcrowding as a problem, a condition which is highly correlated with respondents' rating of their jobs as "pleasant," "somewhat stressful," or "very stressful."

A full-time secretarial "temp" for the last several years, M. estimates that she has worked in about 30 different offices in downtown Cleveland: "I cannot believe some of the situations in which full-time employees continue to work," she says. "Claustrophic work areas are among the problems I've seen. This includes 'wooden pens' which provide the secretary total privacy but no view of anything but her typewriter. Many secretarial rooms are literally 'closets' and even one sloset opening off another closet (hard to describe; this must be seen), and usually overcrowded. Psychologically, this confinement has to be harmful..."

Office Safety Hazards

Accidents and Injuries. The U.S Department of Labor estimates an annual rate of 40,000 disabling accidents among the nation's office workers, and approximately 200 office-related deaths per year.16/ The most frequent causes are falls or slips, accounting for 50% of all office accidents;20% of falls in one study were attributed to "chair design." 17/ Other frequent causes are lifting stress, and accidents which involve unstable file cabinets and shelving (generally striking against or being struck by objects). Accidents are most likely to occur during or just after an office move, and during office "rush hour" when a deadline must be met.

> A legal secretary in Boston told Working Women: "Shortly after I began working here, one of the other secretaries who had been here a long time and seemed to have a good work relation with her supervisor hurt her back when she pulled a file drawer and the cabinet almost tipped. I saw it happen, I saw the painas her back went out. She filed for Workers' Compensation, and after that the lawyers were just terrible to her, they made it miserable for her to keep working here. And the firm fought the comp case very hard. Just like that, she went from being a well-liked employee to an enemy overnight, on top of suffering her injured back..."

In a California study in 1959, women office workers constituted 66% of the observed population, but accounted for 80% of the injuries. A New York insurance company, where a study was conducted for five years (1962-66) found that disabling injuries were twice as frequent among new employees; women office workers accounted for 50% of all newly hired insurance employees in 1977. Most of these accidents could have been prevented if workers were trained properly with available educational materials.

Fire Hazards. Concern over fire dangers in giant office complexes has been heightened by the tragic hotel fires of 1980. A number of factors increase the risks in modern offices. "The completely undivided ceiling" and floor-to-ceiling windows typical of large open-space offices make it possible for "an instantaneous flash of fire" to spread. Modern high-rises are "criss-crossed with wiring that may become overloaded." The widespread use of synthetic materials in buildings poses perhaps the most frightening new problems. When plastics burn, most generate fumes with poison gases. Dr. Jeanne Stellman writes that many fire deaths attributed to smoke inhalation are more accurately described "as due to chemical-fume poisoning." Lax enforcement of building and safety codes, codes inadequate to deal with modern fire dangers, and codes compromised for the sake of "economic development" at the cost of employees' safety only add further risks.18/

> "Safety Officials Fear Skyscraper Holocaust Could Kill Thousands. They Cite Buildings' Design and Location, Lax Codes, Poison Gas From Plastics," ran the headline of a Wall St. Journal series in the winter of 1981. 19/

> Two members of Pittsburgh Women Working's staff were in their office on the 12th floor of a 20 story office building at the end of the workday. Earlier in the week, the fire alarm had gone off and all the employees had evacuated the building but it was a false alarm. On Wednesday morning, the building management circulated a memo describing the new fire alarm system and reassuring employees. At about 5 p.m. that same day, Betty Arenth recalls, "A man from the office across the hall opened our door and said, 'There's smoke in the building.' Before he finished the sentence, the smoke started coming in to our office. He grabbed his things and joined us. We stuffed our jackets, anything we

Lighting

1. Is there adequate light for source documents?
2. Is the room lighting comfortable and subdued?
3. Is the user free from reflection and glare?
4. Does the lighting have dimmer switches?
5. Is fluorescent lighting worsening flicker problems?

Screen

1. Is the screen regularly cleaned?
2. Are the symbols well focused and readable?
3. Is there adjustable brightness?
4. Is the screen uncluttered at all times?
5. Are screen colours comfortable to the eyes? (eg. yellow/green on a dark green background)
6. Is the screen angle adjustable?
7. Has flicker been reduced to a technical minimum?

Workstation

1. Are adjustable footrests provided?
2. Are chair and table heights adjustable and stable?
3. Is there an adjustable backrest?
4. Is the work surface large enough and non-reflective?
5. Is the keyboard as low as possible on the desk?
6. Is the console moveable, with screen and keyboard separate?
7. Is there a document stand?
8. Are special function keys on the right for right-handed, and on the left for left-handed, operators?
9. Can the user reach and operate all controls?
10. Is there plenty of leg and knee room?
11. Is there enough accessible storage space for personal belongings and documents?
12. Is the user safe from electrical hazards?
13. Are any potentially hazardous chemicals used with the machine?
14. Does the VDU generate excessive heat?
15. Is all the equipment regularly maintained and radiation emissions monitored?
16. Does the layout enable easy communication between operators?

Environment

1. Are windows screened?
2. Are walls too light?
3. Is the temperature comfortable and adjustable?
4. Is the user's environment noisy?
5. Is the VDU at right angles to, or away from a window?

Note

This is a very short basic checklist for VDUs. A comprehensive one has been published as Appendix 1 of *VDT Manual* by Cakir, Hart and Stewart (IFRA, INCA-FIEJ Research Association, Washington Platz, D-6100 Darmstadt, W. Germany).

good summary
of problems &
solutions
list of dif. groups'
recommended ~~Guide~~
amount of time on
VDT per day.

good checklist
p. 152

Health hazards: tomorrow's technology, today's headache

But what if you're one of the 'lucky few'? Say you get a job as a word processor operator. What about the health effects? Are VDUs safe? Will this 'labour-saving device' save *you* labour and make *your* job easier?

> 'Employees working with computer display screens are showing a range of alarming physical symptoms, ranging from just discomfort to pain and extreme visual fatigue.' (Dr O. Ostberg, *National Board of Occupational Safety and Health, Sweden*)[1]

In this section we shall look at some of the 'alarming physical symptoms' together with ways of improving your working environment to cut down risk. This does not imply that the answer to health problems with visual display units is simply better machines – how they are introduced and operated, including staffing levels and hours of work, are equally important.

The Swedish National Board of Occupational Safety and Health did a survey of operators engaged in 'full-time sedentary visual work'.

75% felt discomfort in their eyes
55% felt discomfort in their back and shoulders
35% felt discomfort in their head and neck
25% felt discomfort in their arms and wrists
15% feld discomfort in their legs

Eyestrain and visual problems

Many VDU operators complain of sore and tired eyes, sometimes including prickling, dryness or burning sensations, twitching of the eye muscles, and conjunctivitis. Sitting staring at a VDU for hours tires the muscles of the eye. You may get a throbbing behind the eyeballs, or tense, heavy lids, often tender to pressure. You may feel nauseated. Headaches and feelings of strain occur especially if you work in front of a display screen for long and uninterrupted periods. In one study, continuous intense terminal work during an eight-hour day led to various types of visual strain for 75 per cent of the operators.[2] Strain which affects the ability to see can be dangerous for anyone coming off a VDU shift and then driving home.

You may have trouble watching television after work. One VDU operator in Birmingham puts a tea towel over her TV in the evening because she literally can't face it – even when it's switched off!

Much eyestrain is actually muscular fatigue caused, like other aches and pains, by the muscles having to work for long periods doing the same thing. Eyes have a very small range of focus changes, so the operator needs the opportunity to gaze periodically at some distant point, thus resting the eye muscles. This is normally achieved by turning the gaze away from bright light, focusing on the distance, or closing the eyes. If you are required to work at the pace of the machine this becomes impossible.

Glare from a wrongly adjusted screen, excessive heat emitted by the machines, the dryness of a poorly airconditioned atmosphere and the flicker effect of the VDU add to the resulting problems, which include difficulty in focusing, double vision, disturbed colour vision, or a coloured fringe round things. Research suggests, however, that in the case of both eye fatigue and colour distortion, particularly red-green blindness, sight rapidly returns to normal *with rest*. Tests on long-term effects have been inconclusive. A study of users on air reservation terminals for Air France concluded after a year's monitoring that although there was an increase in short-sightedness of ten per cent of the group tested, sight deterioration was anyway a feature of age. However, nearly all of the 216 VDU operators suffered eye fatigue at the end of the day.[3] Safety representatives on a number of trade union courses have reported that significant numbers of VDU operators' eyesight deteriorated after a while and they have to start wearing glasses.

Danger! Eyes at risk

I became a VDU operator in 1976 and stuck it out for nearly three years. My job was to process information by typing on a computer terminal. The job demands that you sit still all day, staring at a screen which is about 25 inches from your face.

It's potentially damaging to your health for several reasons. First, you are prevented from exercising most of your body, you can only leave your seat to go to the toilet. Where I worked we had no fresh air and the central heating was stifling. I suffered from continual colds and coughs.

Our chairs were supposed to be adjustable, but most of them were broken and the firm didn't waste money mending them. Most women had backache or neck cramps.



The lighting was the fluorescent strip variety, which shone on the screen so that you couldn't see the print without turning up the brightness, and this really hurts your eyes after the first couple of hours. What we needed was soft, individual lighting which we controlled. The print on the screen was lime green (this is the cheapest to buy) and it makes you feel sick. Other colours are available, cream and soft pink are more comfortable to look at.

Having done this work for a few months, I realised that my eyesight was affected. When I left work I could hardly see across the road, although this used to wear off after a couple of hours. We all suffered with frequent headaches and carried aspirins around with us. When I left that job, I got my eyes tested and was prescribed glasses to compensate for my blurry short-sightedness. But I realise how lucky I was – my eyes have improved and I don't wear glasses now. But one girl I worked with went blind in one eye very suddenly. She went to the hospital and they asked about her work. They thought it probably contributed to her

condition. She left the job, and fortunately her sight returned. She didn't come back!

We had three short breaks in an eight-hour day. I've heard it's recommended to have a five-minute minimum break every hour, just to rest your eyes. It has been said that VDUs only exaggerate existing eye troubles – but the vast majority of people have potential problems with their vision anyway.

The only thing that VDU operators can do to improve such dangerous working conditions is to organise through trade unions, with specific health and safety demands. Regular visits from an eye specialist would help, and a shorter working week is vital, not only to share the few new jobs which are replacing the old ones, but also to prevent unnecessary risks to operators' eyesight.
(Heather Bryden, letter to Womens Voice, *December 1979)*

If you are using a VDU together with other material, for example checking figures or invoices against it, or writing down information taken from it, then your eye has to refocus from screen to paper and back again repeatedly. This can cause fatique in the muscle used to focus the lens of the eye. In other words, eyestrain. A union representative in the French Post Office received a number of complaints from women in the telephone information centre. They suffered from excessive eye fatigue and had difficulty in focusing. Through union pressure they succeeded in getting more rest breaks and better conditions.
If you are taking drugs, your eyes may be more at risk, and the combination of VDU work and drugs could adversely affect your vision.

Microfiche viewers

Microfiche readers units are a form of visual display unit now widely used in libraries and some office. Pages of information are photographed and reduced for storage on a small sheet of film. Light is passed through the film and a magnifying lense is used to recall the tiny images. Sometimes computer output is directly transferred to microfilm.
The health hazards of microfiche viewers are mainly visual, causing eyestrain, headache and nausea after prolonged use.
Most of the guidelines for VDUs in the previous section apply also to these reader units. But here there is the additional problem of 'scrolling'. Finding the right page on a film means that unwanted images flash across the screen in a rapid blur leading to a feeling of nausea. No manufacturer to date makes provision for blocking out this blur. Blurring occurs also as a result of a poor focusing system, bad maintenance and poor siting of the machine. Eyestrain also arises from peering at images with low contrast between light and dark areas. Letters reproduced in negative, i.e. light against dark, are thought to be easier to read, because the letters appear larger. However, there is generally conflicting

evidence on screen colours (see p.129). So you may have to reject some types until you find one that suits you.
Almost all currently available viewers demand that you operate them from close-up. This forces your eyes to focus on a close-up image, and could cause a form of eyestrain known as asthenopia. This can occur because our eyes have evolved over time to focus easily on distant objects 'at infinity'. The eyeball muscles are then relaxed. When you focus on a close object (eg. the tip of your nose) the eyeballs have to turn inwards, creating *tension* in the inner muscles. It is this tension that causes headache, fatigue, discomfort and ultimately double vision. A large screen viewed from a *distance* is always easier on the eye muscles than a small screen viewed up close.
ASTMS makes the following recommendations for microfiche viewers:

Recommendations

1. Larger screens should be preferred to smaller, and documents should be reproduced at least to their original size. Optimal is A4 reduced to 24X then magnified 24X at the screen. Higher magnification than 24X should be avoided, as this introduces graininess into the image and enhances the speed of the moving image.
2. Brightness of screen should be variable to adjust to surrounding lighting conditions; it should contain no 'hot spots'. Ratio between screen brightness and ambient illumination should be around 3 to 1.
3. Contrast of image should be high; machines that cannot guarantee uniform, sharp focusing ability should be absolutely rejected.
4. The screen should be protected from reflections, either by a hood, or by a matt finish that does not destroy image quality. Hoods should not cast a shadow across the screen.
5. Viewers should be solid enough to absorb vibrations from passing people, for example, without shaking the image; controls should be flexible and not jar the image.
6. Masking should be introduced to cover the image while the right document is being found, to avoid nausea.
7. The screen should always be sloping at least gently away from the vertical and be viewed from above; looking *up* at a screen becomes very tiring.

Continuous work at even the best designed microfiche viewers will result in related illness unless frequent breaks are taken. One Russian study recommends a 30 minute break after 45 to 60 minutes of reading microfilm.[4]
This section is largely based on an ASTMS article. For more information on microfiche see ASTMS *Health and Safety Monitor* No.3.[5]

VDUs and lighting

Ambient, or room lighting should be below 300 lux according to VDU manufacturers, and some recommend levels of 100 to 300 lux for background illumination for older types of VDU (see chapter 3 for more on lighting levels). In normal offices lighting is between 500 and 1,000 lux. So these recommendations are for *dimly lit* offices. Is this what we want in the office of the future – working practically in the dark? Local lighting to supplement general lighting is often recommended, especially where the operator is also writing or reading written material. However, specially designed lamps may be necessary, since ordinary desk lamps are unsatisfactory here. The eye has to keep adjusting from light to dark when moving from screen to paper.

VDUs are being introduced at an alarming rate, often in offices with totally unsuitable fluorescent lighting. Baffles and diffusers must be fitted to overhead lighting to help prevent glare and reflection.

Glare and reflection



A significant cause of eyestrain is glare on the screen produced by light from windows, from shiny work surfaces, key boards and lighting that is too bright or incorrectly positioned in relation to the machines. This *reflected* light makes it difficult to see the characters on the screen. This may also be a cause of neck and backpains as the operator contorts her body posture to minimise the glare.

The General and Municipal Workers Union (GMWU) recommends the following:

> 'Tests should be made to ascertain glare and reflection on the display screen and to remove this glare or reflection by either moving the work station or installing screens in sufficient quantity as to remove these stressors. In some cases experience has shown that reflection can be largely eliminated by removing the transparent screen of coloured glass in front of the display tube.'

Anti-glare filters and adjustable screen angles can reduce glare. But marketed VDUs for offices are rarely equipped with any form of anti-reflection filters of the type always used in aircraft cockpits. Some manufacturers have filters as an option, but because they're not standard they are often not purchased. An anti-glare coating on the screen may be better than an anti-glare filter, which can allow dust to collect. Note that anti-glare modifications may make the screen more difficult to read.

As pointed out above, lighting is crucial. Only indirect and deflected light should be permitted so as to minimise the problem of glare on the screen. The National Union of Journalists states:

> 'Reflective surfaces – desk tops, screen surrounds, even the typing keys – should be dark-coloured [or neutral – author], and if necessary shields should be provided around the screens. The Visual Display Terminals should be positioned to avoid the operator having to face unshielded windows and/or other strong lights or screen. As the level of ambient lighting suitable for continuous Visual Display Terminal work is lower than ideal for other types of work, VDT areas are best kept separate from the areas where other work is to be carried out.'

Even where the isolation of the operator is simple to arrange, you may want to question whether this is the best way to deal with a health hazard. This looks like a classic case of modifying the person rather than the process. Ideally we want processes that are inherently safe and healthy to operate. The isolation of VDU operators in dimly-lit rooms could easily add to the stress and boredom of the job, thus creating more hazards.

Flicker

Flicker can be distressing and it causes severe eyestrain. There is a small possibility that flicker on the screen can precipitate epileptic fits and migraine attacks in some people.

The characters on the screen are not illuminated continuously but are flashed on a large number of times every second. This is known as the 'character refresh rate'. This rate should be no less than 60 times a second (60 Hertz)*. All VDUs flicker, but the problem is made worse if there is fluorescent lighting or flicker from multiple VDUs in use. To reduce flicker the operating frequency should be increased to 100 Hertz. (Note that in many units the rate is between 25 and 60 Hertz.) Manufacturers say that few customers specify this fairly simple modification, so most units flicker at 50 Hertz, which is mains frequency. To keep the price down, virtually no VDUs for offices have a flicker frequency above 60 Hertz, and they all cause complaints from their operators.

Screen and character size and colour

VDU screens and characters vary in colour. Swedish studies recommend yellow text against an amber background for office VDUs,[6] while the TUC says that yellow-green symbols on a dark green background is most acceptable. Try demanding a variety of trial units to find out what people in your office find most comfortable – if any. Negotiate the right to send back what you don't want. Too low a level of screen brightness makes the characters difficult to read; too high a level results in disturbing glare. Luminosity contrasts should be adjustable. Beware of management attempts to limit brightness control to cut costs and extend the life of the machine.

The characters on the screen are made up of tiny glowing dots. The more dots there are, the clearer the character will be. The number of dots in a character will be shown by the 'dot matrix'.

* Hertz is a unit of frequency, expressing the number of cycles per second.

The TUC recommends a minimum dot matrix of 5 x 7 (35 dots) or preferably 7 x 9 (63 dots). The dot matrix print displayed on many terminal screens is exhausting. You constantly have to try to bring the characters into focus, forcing the eyes to work harder. If the individual dots are visible to the operator, this makes the light appear to 'dance' within the letters, causing annoyance and stress.

Characters should be 'squared' and in upper and lower case for long texts, and lower case for intermittent work. There are recommended minimum standards for character sizes, together with recommended sitting distance from the screen, published by the TUC Printing Industries Committee (see addresses below, Appendix 2).

You should monitor carefully how much information is being placed on the screen. Pressure to put the maximum information on the screen should be resisted, since the use of the screen edges significantly reduces the quality of presentation.

Tubes should be inspected regularly, since worn tubes will blur the edge of the screen display

Eye defects

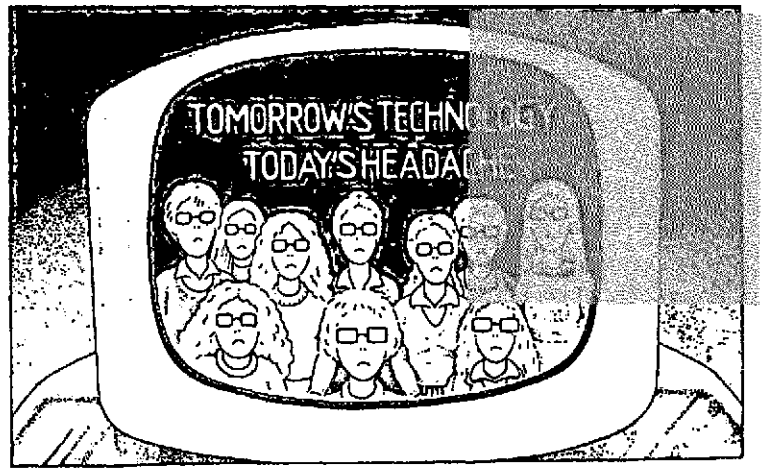
Up to one-third of the working population have uncorrected or insufficiently corrected visual defects. The likelihood of visual fatigue associated with close work or work requiring constant visual attention increases with age, and is increased if an operator wears reading glasses. Vision changes with age and experience. As the lens in the eye hardens over time, the curvature changes and an inability to read text close to the eye develops long-sightedness or presbyopia. Most glasses prescribed for correcting your vision assume that material will be read at approximately 33 cm. VDUs are usually situated at a distance of 50 to 100 cm, so the glasses are often unsuitable. Similarly, standard bifocal lenses are not suitable for display work. In addition, these may provoke neck and arm pain through straining to focus on reading the screen. Spectacles and contact lenses need to be specially designed for display operation, and if required should be paid for by the employer. But special glasses can never be the answer to visual problems *created* by this technology. It must be more carefully designed and the work organised in such a way that it suits all our health needs – if we are going to have it at all.

Computer terminal operators at the French Post and Telephone Office have compiled a dossier on health and terminals. They are accusing the employer of making statements to the effect of 'Give us your health – in return you will get a modern word processing machine, a bonus and a pair of spectacles'. Their colleagues operating a microfiche system for directory enquiries are demanding rest-time allowances.

Screening workers

As outlined above, there are many kinds of eye defects and our eyesight does not remain constant. It is impossible to say how many people have absolutely perfect eyesight and how many have some kind of defect at some time in their lives. Yet some trade union guidelines and most medical studies recommend regular eye tests and screening tests to prevent those with eye problems being employed as VDU operators. Many also recommend that no one over the age of 45 work with VDUs. This is essentially recommending a *selection process*. The danger of selection processes is that they divide workers into the healthy and employable, and the susceptible, disabled and unemployable. The latter group (over 45 or short-sighted in this case) are quite simply discriminated against. And it's not just in work with VDUs that this screening-out process goes on: pregnant workers, people said to be accident-prone or stress-prone, those with a weak back, and so on.

Yet we *all* have weaknesses, we all have our area of susceptibility. Who is really in a position to make the division between the superworker and the 'susceptible, weak worker'? Who controls the eye test results? What happens to those whose eyes were perfect on beginning work with a VDU and tests show up subsequent damage? Do they get compensation? Are they tossed on the rubbish heap to join the other susceptible workers, to make room for a young, healthy worker – who then goes on to get eye trouble from the work...? This aspect of the new technology underlines its sheer brutality. If your branch decides on eye checks it is important to include safeguards in the agreement. The GMWU in their checklist for using VDUs recommends:



'...eye checks should test vision on a regular basis and should be done at the place of work during the normal work day so as to reflect the effects of the normal work-load on the eyes. Eye tests must not be used to screen out those workers with less than perfect vision. Machines like VDUs should be designed and manufactured to suit all workers, whatever their differences in age and physical condition.
The purpose of eye tests is 1) to check on the health effects of VDUs over a period of time, and 2) to *prevent* possible deterioration in those workers who already have serious eye defects and who are likely to be adversely affected by the VDU work.
The results of the tests should be explained to the workers and given to them (or their GPs) and safety reps if required. The tests should be performed by qualified personnel, agreed by unions and management.'

Medical tests often come across as progressive management practice. Your employers are seen to be doing something for your health and safety. But remember, screening saves the employer money by keeping down disability expenses.
ASTMS recommends that people with eyesight problems should *refuse* the work – a very different position from being told you can't do the job.

fatigue

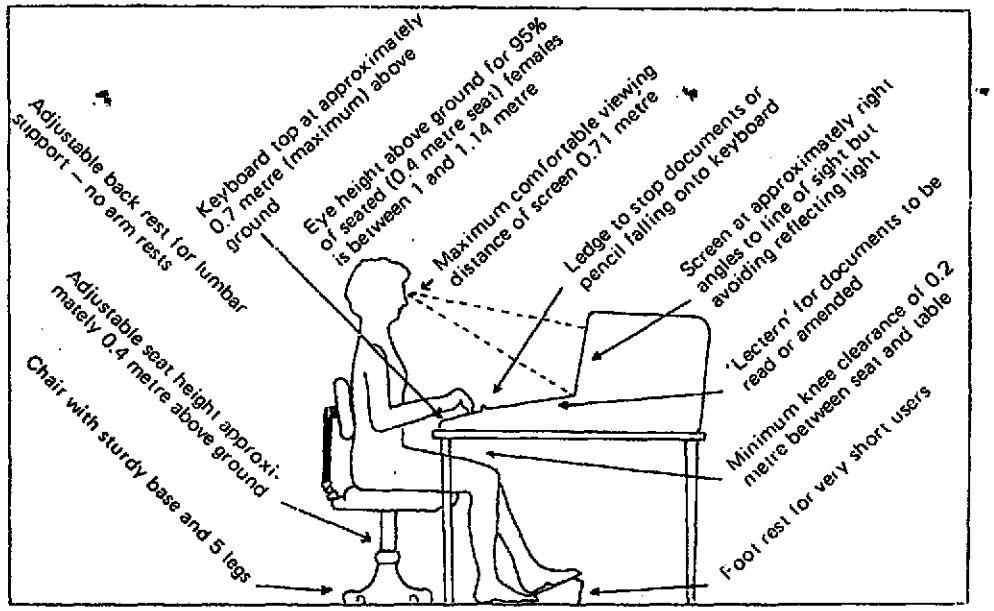
There is a rising tide of complaints from VDU operators of aches and pains during and after work. AUEW/TASS states:

'The standard layout in current use, "screen above keyboard", imposes an immobility which can lead to backache, aching muscles in head and shoulders, and headaches. Well designed supportive seats, desks of the correct height and regular breaks are essential to avoid posture problems.'

It is all too easy for management to blame 'poor posture' for your aches and pains. Poor posture is usually caused by bad seating and inadequate lighting – that is, by badly designed jobs. (For more information, see chapter 4)

ıg with VDUs
- to
ıs Voice.
: 1979)

I read with great interest your article about visual display units. I work on a VDU in Bradford, doing the clerical work for a mail order catalogue firm. Until recently there were four pregnant women in our department. It must be worse for them than the rest of us because the chairs we use sort of push you over on the machine.
The VDUs not only record how many times you touch the keyboard (correctly) in an hour, but also when you signed on and off. If you're one *minute over the time you have to make it up out of your tea breaks. We are allowed 50 minutes for lunch, three 12-minute breaks for respite, and two 20-minute breaks for tea. The respites must be spent in a grotty wee room, where there is a vending machine which hardly ever works, and bad ventilation.*



From Visual Display Units and their application (D. Grover, ed.)

Screen and keyboard console should be separate so that operators can arrange them to suit themselves. Equipment can then be individually positioned for either left or right-handed operators. Height, screen angle and seating should be adjustable. Some Swedish equipment (eg. Facit) incorporates gas infilled legs on their furniture so that the operator can adjust the screen and keyboard with little effort. Ideally, the keyboard should swivel from left to right. Typing or 'keyboarding' should be possible with the forearms horizontal, the feet comfortably on the floor or a foot-rest, and back supported. The keyboard should be as low as possible on the desk, but the console must not be too steeply inclined as this tires the wrists. The keys should be 'dished' to help the operator to locate them. Hand rests should be provided which should be approximately 60 mm deep and continuous with the keyboard. ASTMS recommends also that a paperholder of some kind or some system to reduce neck movement in reading should be installed. The work station should ideally provide two different height working levels for activities involving paper and console work, and should be sufficiently large to give you enough room to spread out material and to develop a comfortable work posture. Provision should be made at the work station for all ancillary equipment.

Communication with other operators should be possible, and vast, impersonal layouts should be avoided. Walkways, floor areas and work surfaces should be kept clear of obstructive wiring. Storage space should be provided for your belongings.
Flexibility in work is crucial. Adjustable equipment so that posture can be varied is essential, as are regular breaks to prevent tensed muscles. Note that breaks, together with varied jobs throughout the day, are even more important in combating fatigue than 'ergonomically well-designed' equipment. Any job which forces you to work in one position for long hours will give rise to body fatigue, but there is evidence that while the new technology is perhaps more efficient for employers, it is more fatiguing for the operator. The International Labour Office has said: 'The fact remains... that machine operation is still more tiring for many operatives than straightforward manual methods of copying or calculating and can in some cases be a serious drain on their physical resources.'

king a VDU

To find out what it's really like to work with a visual display unit, and the sort of conditions which prevail in Leeds, the Trade Union and Community Resource Centre (TUCRIC) interviewed a worker in the order processing department of a large local manufacturing and distribution firm – a typical application of the new technology.

Q. How long have you been working with VDUs?
A. About three and a half years, but only continuously for the last six or seven months.
Q. What do you mean by 'continuous'?
A. We work a 7½-hour day, with half an hour for lunch. We have a ten-minute break in the morning and another ten minutes in the afternoon, but the afternoon one isn't official. We've been on flexitime for about two years, but now it looks as if they're trying to get rid of it. All the word processing machines are switched on and off at the same time, and they want us to make a record of all the work we do, so they can monitor how many orders each person is dealing with. We're against this. It isn't our fault if an order takes a long time. You can get one order that's a page and a half long that could take fifty minutes to deal with if it hasn't been properly checked by the scrutineers. Sometimes you have to query just about every item on an order.
Q. How would you feel about losing the flexitime system?
A. Well, a lot of us really depend on it. You can leave early to do your shopping or whatever one day and then make up the hours the next day. It would be difficult for a lot of the women here if it goes – especially those with kids.
Q. Do you think the hours you're spending on the VDUs are too long?
A. Definitely. We've found out through the union that in some other places in Leeds nobody's allowed to use the machines for more than four hours a day – and that was introduced by the *management*.
Q. What are the effects on your health?
A. When you get home you feel tired and tense and irritable. All the girls here complain about headaches and waking up in the morning with puffy eyes. Sometimes when you're working you get very dizzy and have to have a break. A friend of mine went to have her eyes tested because the headaches were getting so bad. The optician said she had long vision so it's very bad for her to be working so near the screen (it's about 18 inches away). He said she'd have to wear glasses if she went on working under these conditions. He'd been getting people in practically every day from working with these things.

Keyed up: VDUs and stress

> 'It has been shown that workers who work for machines have a far higher incidence of neurotic pathology than workers who work for (other) men.' (Dr E. Krapf, *Chief Mental Health Secretary, World Health Organisation, 1957)*

Eyestrain and body fatigue cannot be separated from mental fatigue or stress; for example, in some systems, if you make a mistake on the keyboard, messages of warning flash across the screen until the error is rectified. These incessant flashes are exhausting to the eyes and the mind.

A telling description of the everyday effects of working with VDUs comes from a worker for a large supermarket warehouse in Leeds. He doesn't work with VDUs but remarked: 'The VDU operators are always round the coffee machine during their breaks. They seem to need nine or ten cups a day; the rest of us will only have two or three at the most – and it's not exactly what you'd call a nice cup of coffee.'

The risk of stress from work is greater for those already under strain, such as working mothers, or those taking tranquillisers. The list of stress symptoms is long and the causes complex (see chapter 1). On stess and work with VDUs, NUBE (the National Union of Bank Employees) had this to say:

> 'VDU work is inherently stressful: the operators' work pace is subordinated to that of the machine. It is necessarily fraught with problems where VDU work involves manuscript reading, which has an entirely different set of environmental requirements. It also tends to be highly monotonous. These problems persist even where the

"technical" and environment conditions are adequate, and they are far more difficult to tackle.'

Linda McVeigh, a secretary of seven years' standing, found work on a word processor intolerably boring. She worked on an Olivetti system in an estate agent's where the job made little demand of her intelligence:

> 'The only time it wasn't boring was when it went wrong and there was something to do! On the other hand, that could be irritating. It would flash up all the symbols in completely meaningless succession, zooming along at a rate of knots. Then it would go dead. The engineer would com and it would work perfectly; he'd leave and it would conk out. He'd say it was my fault; I'd say it was the machine's. Without it the agency ground to a halt, as we'd thrown away all the name and address cards once the processor was programmed. Worse still, it once wiped out the memory discs. I'd be constantly frustrated by its illogicality.'[8]

The job of VDU operator may require a high degree of concentration, and under the conditions of the job as it now stands in most places, this is stressful. So is the lack of rest or relief pauses. VDU operators might *seem* to have an opportunity to gain relief during the frequent delays that show up at send-and-receive operations. But these delays are in reality stressful since you don't know exactly when and for how long the pauses will show up, so you can't really take a break. Instead you are spending your time *waiting* for the computer response. When computer technology was in its infancy, computer operators were highly trained and highly skilled. They were familiar with the elements of computer design, memory storage, coding language and similar skills. Now computer terminal display units have been made simpler to operate; the work has been deliberately broken down into a series of simplified tasks, and is more easily controlled and managed. It has been *deskilled*. Stress is greater. Word processor operators are often employed purely to key in text, with virtually no prospect of further learning or advancement.

Noise

While VDUs are certainly quieter than their forerunners, teletype, they still whirr, roar or hum due to cooling fans or transformers. Such low noises can be stressful to operators. The main potential noise problem is high-frequency noise from the VDU, which can cause discomfort and stress. Manufacturers should ensure that noise levels are minimal. The fan removing excess heat should not produce irritating humming, nor draughts. The printing machines can also create noise, particularly with several word processors in one room. It is possible to transfer printing facilities to a separate room.

Breaks and hours

Machines are expensive and there is pressure on employers to get the maximum possible use out of them before they deteriorate. This means an increase in pressure to do shiftwork. (For more information on shiftwork and health, see p. 16)

The 'twilight shift' has already existed for some time in many offices, eg. mail order firms in Bradford. This trend is likely to spread with the use of the special telephone lines which can transmit typed copy from one word processor to another and which are cheaper to operate in the evenings. There are moves in some firms to eliminate the dubious advantages of flexitime and to increase shiftwork and/or to employ more part-time women workers on VDUs. At Barclaycard in Northampton, VDUs are used extensively. The 'auxiliary staff' bash details from the forms into the computer. The women work two hours at a time, then get a ten-minute break.

Working shifts, working at the pace of a machine, goes against your body's natural rhythms and causes untold mental fatigue. The body's primary reaction to stressful work is a powerful urge to stop doing those actions which promote further fatigue, i.e. *to stop work*. This goes for most muscle fatigue and general stress. Many VDU operators complain regularly about general fatigue. The degree of fatigue is directly related to the amount of data processed, the more data processed, the greater the fatigue. This can only be reduced by frequent breaks as well as a *reduction in workload.*

Here are some union recommendations and agreements

All workers should have adequate regular work breaks from the VDU.

ASTMS	Maximum two hours, with half an hour break. Maximum work in any day should be no more than four hours. Shorter work periods with a greater number of breaks are advisable, eg. 50 minutes work followed by a 15-minute break. All breaks should be taken away from the work station.
NALGO (GLC branch)	Total time spent working on a VDU should not exceed 100 minutes per day. Fifty minutes should be the maximum period of continuous work, followed by a break of at least 15 minutes.
CPSA	At the GPO, CPSA members have agreed a code of practice whereby normal time spent with VDUs is 100 minutes a day maximum (180 minutes during abnormal work peaks). No operator is required to work more than 50 minutes continuously without a break of at least 15 minutes.
TUC Printing Industries Committee	*Minimum* of 30 minutes break from the screen in each period of two hours continuous work, and there should be an agreed maximum of work on the screen during any one shift. Whenever possible the work pattern should be programmed so that periods of work at the VDU alternate with periods which give the eyes an opportunity to become restored.

t	Twenty minutes rest in every hour for operators involved in continuous VDU work throughout the day. Wherever possible the work pattern should be arranged so that periods of work at the VDU are alternated with periods which give the eyes an opportunity to become restored.
w/	Maximum of four hours work at a VDU during a working day. Regular breaks from screen working are essential – at least twenty minutes break in each period of two hours continuous working.
U	All workers should have regular fixed work breaks away from the display unit, preferably every hour. If it is inconvenient for the worker to leave his(!) work station on a regular basis, there should be provision for the display screen to be turned off or made dark at regular intervals.
ing, nce inance nerly £)	There should be an agreed maximum period of operation of VDUs during any one shift: this maximum will depend on the concentration needed in any one task. However, the following should be observed: (a) the operators must work *no longer* than two hours continuously at a VDU; (b) the relief period between spells of work on a VDU must be no less than thirty minutes.

Some medical studies have also made recommendations. A French study recommends 90 minutes maximum time without a break, and a six-hour day.[9] A report for Air France carried out by the French Institute of Health recommends that no staff be employed full-time on VDUs.[10] A German study noted that while a system of short breaks is preferable as regards output levels, this is 'a source of great fatigue which can only be overcome by longer breaks and periods off work'.[11]

There is a danger in adopting a rigid attitude to rest periods, because their length and type must vary according to things like the overall workload and your own health needs. Go for a flexible agreement with minimum safeguards with your employers on the subject of rest pauses. Ideally what we want is a shorter working day and a shorter week for all. More holidays and periods of paid educational leave or long service leave, together with good maternity and paternity conditions, are all things you should consider in any agreements you draw up with management. In fact, the trend in British workplaces seems to be *away* from these recommendations – as long as employers get their way:

> 'Employers are tending to ask an increasing number of their staff to spend more of their day looking at displays.' (Roy Gladman in *Visual Display Units and their Application*, edited by Derrick Grover)

APEX surveyed its members and found many working on VDUs for 7½ hours a day. And operators at ICI's Millbank headquarters work all the time on word processors. But one VDU manufacturing boss suggests that this is in fact an *abuse* of the equipment. In a letter to *Computer Weekly*, 9 December 1978, Bill Ross, European Manager of Informer Inc. said:

> 'VDUs are basically transitory devices and should be regarded as ancillary devices to help a store keeper, bank teller, etc. do their normal work at their usual desk... Used in this way, no complaints have been received of fatigue, dizziness or claustrophobia.'

No one should be working full-time on a VDU. Breaks must be plentiful and long, and tasks varied. *You* should choose when to use the machine and when to take a break. The equipment should be designed so that you have control.

> 'Mental hazards caused by inhumanely designed computer systems should be considered a punishable offence, just as endangering bodily safety.' (A suggestion from a working party of the *International Federation of Information Processing*)

VDUs, radiation and heat

VDUs emit X-rays, infra-red rays, ultra-violet rays or microwave radiation. When functioning correctly VDUs are supposed to emit very little ionising (X-ray) radiation. Tests show exposure levels below the limits set in both the UK and USA at which it is necessary to wear film badges to record exposure.

Older models of VDU may pose problems from ionising radiation and must be checked periodically.

As with most dangerous substances, what may be considered a 'safe level' by one authority one day may be considered dangerous another day by someone else; there are many examples of this among industrial chemicals. The NUJ recommends new, more sensitive radiation detectors for operators to wear. TASS recommends:

> 'To minimise risk from radiation, VDUs should be frequently serviced by qualified engineers. The front of the cathode ray tube should be covered by a glass panel and the set enclosed in a metal case to give maximum protection in case of explosion.'

Cataracts

In 1976, two copy editors working for *New York Times* developed cataracts, a disease which clouds the eye and leads to blindness if not surgically corrected. They work at VDUs all day long. Both were in their thirties and blamed the radiation from the VDUs. Ordinarily cataract victims average sixty years of age; it is highly unusual in people in their thirties. Neither of the editors had any significant medical history that would lead to

the development of cataracts.[12] However, the US National Institute of Occupational Safety and Health held an inquiry and found that radiation levels were not high enough in their view to cause cataracts.

In March 1980 Dr Milton Zaret, who had acted as a consultant to the Newspaper Guild of New York during the dispute, informed the Guild's shop stewards that he disagreed with the inquiry's findings. He now believed that there was a greater danger for VDU operators than in 1977 when he first investigated the problem.[13]

Amounts emitted are thought to be small, and GPO tests, for example, have shown no detectable level, yet there has been no study on the *long-term* implications of the operators being exposed to such low-level radiation. Nor do we know of any studies on the possible fertility hazards of this work.

This equipment is new. What happens when it's been around for thirty years? Will we be exposed to leaking radiation from old and faulty machinery? The risk of low-level radiation may be an unknown, but it is enough to argue against the installation of VDUs in small rooms.

A single VDU can produce 400 watts of heat, the power of a small electric fire. A survey for Air France found that reservation centres often had several units placed close together producing 'hot spots' due to problems of overheating and poor airconditioning. Existing ventilation provisions were obviously inadequate.

Office worker s at Birmingham's Aston University downed tools and walked out when the VDUs and other office machinery heated to such an extent that work became impossible. Ann Lee, the NALGO safety rep, explains:

> Early in 1979 new word processors/VDUs were introduced. The typists were just given brief training, and an instructor then stayed at the university for a week to monitor the machines in operation.
>
> During that week the build-up of heat was noticed, even by the instructor, and was complained of by the operators, until one day one of the machines wouldn't work. It was discovered that this machine wouldn't function at an internal temperature of over 80°F. The manager informed the university's estates department and they referred it to the Maintenance and Minor Works (M&MW) Committee. This committee only meets once a year and happened to be meeting in just over a month's time.
>
> The heat continued, and the women complained of discomfort, headaches, tiredness, etc. With still nearly three weeks to go before the M&MW Committee was due to meet, and the temperature at 92°F, we stopped work.
>
> The non-members all joined the union and NALGO became involved. Emergency measures were agreed with NALGO, including installing fans and temporarily moving two of the operators to a nearby room.
>
> The M&MW Committee met and agreed to find a permanent solution (possibly an airconditioning system).'

In March 1980 Dr Tjonn, the medical director of the Department of Occupational Health in the Norwegian Directorate of Labour Inspection reported some possible cases of occupational dermatitis among ten VDU operators. Symptoms included a reddening of the face and an itching rash between half an hour and a full working period on the VDU. They disappear some hours after the operators stop work on the machine. At the time of writing this book, there is no satisfactory explanation as to the cause. Radiation has been discounted by the investigators. A number of reports of apparently similar symptoms have come to light in Britain.[14]

Safety and VDUs

VDUs present the usual electrical hazards (as described in chapter 8) and in addition they have internal high voltages. Paper clips, hair pins, hot drinks and inflammable liquids suddenly become dangerous weapons when dropped or spilled on the machine.

Because static electricity can have adverse effects on VDU equipment, employers may attempt to locate machines in anti-static rooms and restrict entry of other employees. According to a report on the experience in Bradford Council's word processor installation:

> 'The machines are in constant operation and are programmed by the rate material comes in. The workers have one ten-minute break in the morning and afternoon, and otherwise have no contact with other workers during office time. All new work comes in through a special anti-static glass box, and no non-section workers enter the room.'
> (Counter Information Services report, *The New Technology*, p.12)

Make sure your protection comes before a machine's! Steps taken to protect VDUs must not be at the expense of unacceptable isolation and segregation of office workers.

A full record of repairs for each machine should be kept and workers should have access to it.

Where machines are provided with a service contract, this should include *regular* servicing and not just a 'call out' procedure when something goes wrong. It's not only the office workers who suffer. According to one Finnish study:

> 'The installation and repair of these machines necessitates many difficult and painful work positions and movements. It appears that insufficient attention was given to these aspects during machine design. Lighting levels and cleaning fluids are emphasised as hazardous.'[11]

The health risks from the long-term use of VDUs are totally unknown. Long-term risks of new technologies must not be ignored: look at the recent discoveries of cancer-causing properties in substances used at work, such as vinyl chloride and glass fibre, which have gone undetected for years while hailed as progressive, scientific discoveries.
Steps can be taken to improve the safety of VDUs and to improve the office environment where they are used. But the burden must be on the manufacturers to prove that equipment is safe and healthy, not on you to prove it is dangerous.

here does new chnology come on: silicon's dy secret

> *Young women in South East Asia are employed (by the microprocessor multinationals like Hewlitt-Packard) to test the silicon chips – around 3,500 chips a day each. Caustic chemicals, all poisonous and many suspected of causing cancer, sit in open containers, giving off fumes. Eye ailments is another serious hazard. Most workers suffer at some time from conjunctivitis or 'red eye'. "After some time we can't see very clearly; it's blurred. We'll be looking into the microscope for over seven hours. We have to work with these gold wires, very thin like our hair..." Virtually anyone who stays on the job more than three years must eventually wear glasses.*[15]

Microelectronics are being heralded as a triumph for world progress. Progress for whom? For you? For me? For the woman in the electronics plants in South East Asia on a dollar a day? Or for the multinationals and the businessman laughing all the way to the bank?

ocial costs

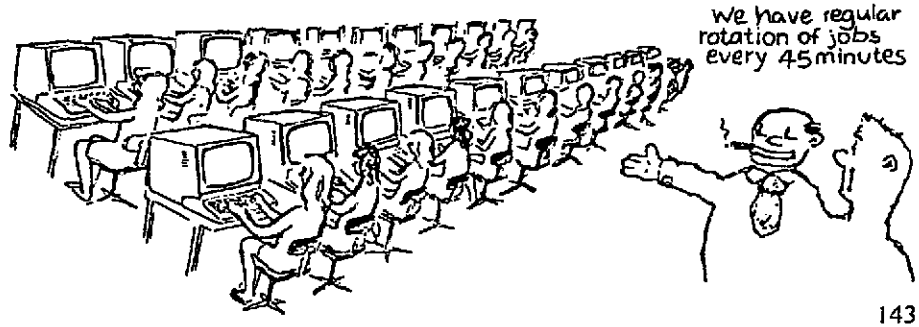
> 'Where the computer does not eliminate the need for a human operator altogether, it has been associated with an increase in the intensity of work, whether this be for a design engineer or a typist. Automation has been observed to make jobs short-cycled and repetitive. The room for decision-making is reduced, the pace of work and attitude to work becomes determined by the machine. Work performance can be recorded and monitored. All this creates feelings of frustration, alienation and stress, and this affects the workers' health.' (*Women's Report*, April 1979)

The International Labour Office was saying in the 1950s that the long-term result of the development of mechanisation in offices in many cases 'has been a downgrading of clerical jobs, as the work formerly performed by experienced semi-skilled workers is now entrusted to young, unskilled machine operators'.
The new technology means *deskilling*. Traditionally office workers have exercised a whole range of skills, from shorthand to devising filing systems. As more and more jobs are reduced to pushing

buttons, these skills are no longer needed because the vast experience and skills which office workers have accumulated are being transferred to computers. The new technology carries on the old tradition, deskilling some jobs and eradicating others. Increased productivity through progressive deskilling is the objective.

> *All the natural breaks you get using a typewriter – when you change paper, shift the margin, move from one job to another – disappear, since the word processor does all these things for you at a very high speed. You still have to pay the same mental effort to each part of the task that remains to you, putting words together to make a grammatically sound sentence, and sentences together to make a complete piece of work. But you have to do more such tasks because of the speed of the word processor, with fewer gaps between tasks. The mental effort is more repetitive and more continuous. You get the feeling you are being forced to exert yourself ever more by the pace of the machine.*
> *(Fleet Street clerical worker quoted in* Is a Machine After Your Job? *by Chris Harman, Socialist Workers Party, 1979)*

Job satisfaction disappears when you lose control of the work process, and the loss of skills leads to the loss of promotion prospects, where these existed, and the loss of mobility. When new machinery is introduced it is claimed that it will only do the humdrum jobs, that such automation will free workers from soul-destroying jobs for more creative things. Well, one former secretary who now trains people to operate word processing machines said: 'All we do is chain the secretary to a machine. We only freed one secretary, and that was me...'
Word processor systems are sometimes described as 'master' (controller) stations and 'slave' (terminal) stations. The master is generally to be found in the manager's office, the slave at the typist's desk! Lanier have introduced a centralised dictating system with a management control unit. At the press of a button, the unit flashes on the screen a complete record of a secretary's activities, and the boss can pinpoint workers whose output has fallen beneath the required level.



The reality is having to work at the machine's speed, and no longer being able to make decisions about what order to do things in, what wording to use in a letter, or the other little things that used to make some office work less boring. The VDU operator can spend her entire day a slave at the keyboard, with no opportunity for a walk, a chat or an extended lunch break. The intensity of the work is greatly increased. Word processors *make you work harder.*

> 'One survey of typing productivity has shown that the average secretary produces barely 76 lines of type in a day. With a centralised dictating unit, however, a typist can average at least 600 lines a day and show an improvement in production of more than 600 per cent.' (*The Times*, 2 October 1978)

Even if this is true, will her wage packet show an improvement of 'more than 600 per cent'? With the introduction of word processors at the Halifax Building Society, there has been a trebling of the workload and no new staff. Bonus systems are being introduced in many offices with VDUs and operators are paid according to the number of key depressions per hour.
Traditionally, few office workers have been paid on piece rates or with bonus schemes (although key punch operators were the exception) because there was no easy way to measure their productivity. All this has changed. Measurements can be taken undetected within the machines to see who is doing how much work, and when, with how many errors. Master Mind system is advertised as having a display terminal which 'provides complete information on the status of up to 200 active dictation and transcription jobs in the centre. A disc memory offers a permanent, unlimited archive of the completed work. A companion report printed provides detailed daily, weekly or monthly summaries of input and output activity.' Needless to say, such technology threatens the jobs of a whole layer of supervisory staff. Built-in supervision is a major selling point:

> 'A built-in reporting system helps you monitor your work flow. It automatically gives the author's and typist's names, the document number, the date and time of origin and last revision, the required editing time, and the length of the document.' (Wang, manufacturer of word processors)

If you suspect this kind of monitoring system, you could always try ringing the manufacturer to check. It might be best to bluff your way as prospective buyer. AUEW/TASS and TGWU/ACTSS won an agreement from the Ford Motor Company which stated that: 'All information acquired specifically or incidentally by computer systems shall not be used for individual or collective work performance measures.'

Management may deny that this information exists and never use it openly against individuals (although they might!), but they can still use it to reorganise the work, keep the pressure up and minimise the number of jobs. In one Danish store, cashiers went on strike until such surveillance programmes were wiped off the computerised cash registers. VDU operators in Leeds subvert this policing mechanism in their word processors. They sit pushing the space button so that they are recorded as working while they have a chat and a cup of tea!

Trade unions are now taking up the fight for control of the new technology. The NUJ, state that:

> 'We are sceptical of the benefits of new technology as proposed by managements here and elsewhere... but we recognise the rationale behind their plans. It is a rationale trade unionists should not adopt when faced with technical innovations likely to speed up the pace of work for those who remain and to add to the dole queues those who do not.'
>
> ASTMS recommends:
>
> 'There should be no agreement on workloads before a six-month trial period is completed by the operator. Agreements fixing rigid targets should be avoided. All agreements should attempt to maximise the control of the operator over the output.'

Who controls the new technology is indeed a fundamental question, and the fight for jobs and for better working conditions is part of the struggle to control it.

> 'Information technology is basically a technology of co-ordination and *control of the labour force*, the white-collar workers which Taylorian organisation does not cover.' [author's emphasis.] (F. de Benedetti, managing director of Olivetti, in the *Financial Times*, 23 October 1979)

Technology that has been *specifically developed* to cut jobs and other clerical costs, to break down each task into its simplest component parts, to measure and control workers' performances- this kind of technology does not serve our needs. It is inherently bound up with the values of the society that produced it – a society based on power and production for profit. A different sort of society would evolve a different sort of technology. We need to question the very *nature* of technology. That goes for all of it. In health care, for example, at first glance technology seems progressive, its aim being to cure disease. But is it? Conventional 'high technology' medicine reinforces the interests of the medical profession and the drug companies, is developed for profit and prestige, and concentrates on cure rather than prevention, eg cancer therapy and organ transplants. Technology, whether military, medical or in business, is never neutral. It always serves the interests of those who own, develop and control it.

Workers' response to new technology – 'when my chip comes in'

Microprocessors affect jobs and health, and have far-reaching social and political implications. Your jobs and future school-leavers' jobs are threatened by this technology. *That is why you should consider saying 'no' to its introduction.*

reeze it

The ACTU (the Australian TUC) has passed a motion in support of a freeze on the introduction of new technology for five years. At the very least you should call a halt to the introduction of new technology. Refuse to work on this equipment until you have carried out your own investigations.
It's a good idea to set up a trade union working party. Camden NALGO did this and brought out a report with their own recommendations. Try contacting office workers at other sites of the company you work for and find out how they feel. After investigations you may decide to accept some new technology *on your own conditions.*

The introduction of new equipment is bound to involve a period of disruption, with some jobs being redesigned and new job definitions arising. So good trade union representation is essential. It's crucial that agreements are negotiated before machines are installed so that you are not forced to bargain from a defensive position. If your employer attempts to introduce microelectronics by saying they will make your job easier, try demanding that they prove it by guaranteeing in advance and *in writing* that there will be no reduction in the total workforce and that working conditions will be improved by cutting your working week – for a start.

t took ASTMS nd ACTSS iembers at CPC UK) Ltd in Trafford Park wo years to btain acceptable onditions for the ntroduction of omputerisation. They now have ne of the few ew technology greements. Sam Darby explains:

From the start of our negotiations we involved rank and file members and stewards through a liaison committee which the management agreed to consult with on all aspects of the introduction of VDUs.

We took a dual approach to the health problems involved with VDU operation. In the first place we insisted that the management prove to us that the equipment was physically safe as far as radiation, implosion, character legibility, etc. were concerned.

Secondly, noting that constant operation could escalate general feelings of frustration, anxiety, stress into various physical symptoms such as headaches and backaches, we aimed to safeguard health and save jobs by trying to gain some reduction in the working day and by restricting the periods of constant VDU operation.

Although we did not achieve a reduction in working hours, our agreement now specifies:

1 *the maximum session of constant operation;*
2 *any session of constant operation must be followed by 30 minutes off VDUs (possibly on other types of work);*
3 *a* total *of no more than three hours' operation in one day/shift (6 x 30-minute sessions in our seven-hour working day).*

It seems possible to us that as more and more work is computerised, we will only have thirty minutes work in every hour, as there will only be VDU work to do. (From Red Collar, *September 1979)*

Making demands

1 Security of employment

Agreements should emphasise that no worker will be declared redundant following the introduction of microprocessors, VDUs or any other equipment. Natural wastage and voluntary redundancies are also dangerous: these are simply ways of running down the workforce and selling future jobs for money, and depriving school-leavers of work. The job is not yours to sell.

2 Prior consultation

Trade union representatives (shop stewards and safety reps) must be involved in the decisions on purchasing of VDUs, their location and use. Thus the criterion of health and safety can be built into the new work situation being created. The type of VDU should also be your decision, eg. colour and size of characters, screen thickness, keyboard design and layout. The report for Air France stated:

> 'One is beginning to see on the market cheap versions of this type of unit which show most of the faults which we have tried to eliminate. These units will almost certainly cause adverse reactions in their operators and could present more serious problems than those we have shown.'

If you are to be expected to work with VDUs and other new office technologies, given their manifold disadvantages, you have the right to demand that the *very best* equipment be bought. Expensive, safer versions are on the market, but who is going to buy them? Your employer? Only if *you* put on the pressure. Prior consultation is crucial on changes in staffing levels and work methods, and changes in the workload. The training and retraining of workers and the grading of everyone involved must also be matters of consultation. Safety reps potentially have considerable powers (see chapter 11) which include the right to consultation on any changes in the work process.

3 Health and safety

All measurements, technical information and results of tests should be readily available: this is the legal right of safety reps (see chapter 11). The number and length of rest breaks, and time on the machine, as well as the basis of any medical checks with

guaranteed safeguards should be the subject of agreement. There should be written guarantees for no victimisation: no loss of earnings or position, and no sackings for anyone whose health prevents them from working on a VDU or whose health is impaired by the job. Workers involved should have the right to veto work on equipment they think unsafe or causes too much mental stress. Given the health risks, there should be no increase in shiftwork. The GMWU recommends that world-wide research on health effects of VDUs be monitored and new findings supplied by employers to safety reps. TASS recommends that the employer must provide a policy document giving guidance on the health hazards of VDUs. NALGO members in the Southern District working for the Gas Board have blacked the introduction of VDUs until they are satisfied that they meet their health and safety requirements.

No increased workload

Hours must be cut, not jobs. A shorter working week with increased holidays and rest breaks and fewer hours would guarantee better working conditions. Instead of part-time workers, who are highly exploited women with few rights and paid peanuts, ideally everyone should work 'part-time' with guaranteed full-time conditions of employment. This would avoid the misery of unemployment for millions on the one hand, and the misery of overwork on the other for those left. If a word processor can do eight hours work in four hours, then the VDU operator should only do four hours a day and then go home. If, as we're told, the new technology is more efficient and results in increased productivity, then it is our right to share the gains of that higher productivity without crippling ourselves.

The London Clerical branch of NATSOPA produced a petition and pamphlet with a programme for action to save jobs. They stated:

> 'The employers tell us of the benefits that will come from new technology. But it's always "jam tomorrow". We want our jam today.'

Variety in work

Jobs should be rotated so that VDU operation becomes merely part of the worker's more varied work tasks. Operators should be able to choose their own work rate. Be very wary of any proposed specialisation and centralisation of clerical workers' jobs which will deskill, routinise, lower status or isolate the affected staff. Why can't more office workers engage in the creative and design part of work – instead of always working on the production end of someone else's ideas?

Control

Demand written guarantees that management will not use the new machines to get information on the work speed. An agreement will only be the first step. Use the demands as the basis for draft resolutions to launch a debate at your union's national

conference and to go on to mount a campaign around new technology. Link up with other union representatives in your workplace – this technology will affect everyone.

7 Saying no

New technology usually represents a massive productivity deal in disguise. If you are well organised and decide that microelectronics on any terms will be against you and your co-workers' interests, it may be possible to oppose it altogether.

In 1979, 250 conference typists and translators at the United Nations walked out from their jobs in protest over the operation of word processing equipment. The walkout occurred when their management refused to agree to their demand that the cathode ray tubes presently in use by the typists should be shut down until a health study had been carried out. They further demanded that *alternative technology* be developed, technology that does not endanger health or jobs.

Broader implications of new technology

Some people, including the government, say that we must embrace the new technology whole-heartedly because it is 'progress' and Britain must be competitive in the world economy. The trouble with this approach is that it sees British employers' interests coming before the interests of working people. Workers in other countries are also fighting for their jobs. And when the 1975-79 Labour government committed £400 million to developing the use of new technology, it took no step towards protecting jobs in Britain.

This argument also equates Britain's interests with the interests of multinational corporations. What's good for ICI is assumed to be good for you and me. Yet big business increasingly moves capital and production outside Britain, pays little or no tax, and swallows millions of pounds of public money while creating mass redundancies. Whilst IBM and GEC make profits out of microelectronics the unemployment they cause costs us all massive amounts, not to mention the personal degradation, the effects on families and the medical costs of unemployment-induced stress.

Competition – 'if we don't use word processors, our competitors will, and we'll be out of business' – what kind of system is it that gives us this choice? New machinery and higher unemployment, or old machinery and higher unemployment? What kind of system is it that tries to blind us with a 'tomorrow's world' of technology which is supposed to be so progressive but which in reality makes working people's lives worse instead of better?

Microelectronics will get rid of a lot of boring jobs, but even boring jobs are preferable when the alternative is inadequate unemployment and social security benefits.

> 'People are not being "freed" to do more interesting work because there aren't interesting (or any) jobs available. In our society, unemployment means poverty (unless you have a private income) and lack of status. And cuts in the public sector are decreasing educational, childcare and leisure facilities.' (*Spare Rib*, June 1979)

As for more leisure – ask any pensioner or unemployed person what more leisure means to them in this society. If you argue that new technology means more leisure, *you are talking people into unemployment*. The overall effect of new technology could be to increase the difficulties faced by the poorest people who won't have access to all this stuff in their homes and have no jobs. Employers want fewer employees. They don't want a shorter week or union control. Their aim is to maximise their profits. Like other developments in automation, this new technology looks as though it will continue the trend to concentrate even more power in fewer hands, diminishing workers' control over how and what they produce – unless there is a concerted effort to oppose that trend.

Opposition is and has been in a variety of forms. Groups have formed to develop ideas about alternative technology, such as alternatives to nuclear power. Organisations linking trade unions, community and student groups are flourishing – SERA, the Socialist Environment and Resources Association, for example. And various left-wing political groups have taken up the questions of science and technology and include them as part of the struggle for change, part of the struggle for a new, more equal society. More specifically, shop stewards 'combine committees' in Lucas Aerospace and Vickers have recognised the need for socially useful technologies which serve our needs and don't replace workers or their skills. They have drafted 'alternative plans' in which they propose that the company develops useful products. They question not only the nature of technologies which deskill and dehumanise but also management's right to control technology and decision-making. This is part of the struggle to halt redundancies and secure better pay and conditions. Their battles are difficult and some have been victimised, but debate about this strategy and support among trade unionists is growing.

The British Society for Social Responsibility in Science (BSSRS) has formed a microelectronic working group to help trade unionists find out information about the implications of introducing new technology at their place of work, and to raise awareness of the possibilities of different sorts of technology in a society based on people's needs rather than profits and competition. The aim of all these groups is to launch an offensive against this 'white heat of technological revolution' that burns up jobs, increases economic and social inequality and degrades work.

Footnotes

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5 'Hazards of Microfiche Viewers: Prevention of Occupational Eyestrain' in *ASTMS Health and Safety Monitor*, No. 3, April 1980.
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CHECK LIST

VDUs

General

1 Is the new technology being introduced without job loss?
2 Has a maximum working period of operating a VDU been agreed?
3 Are rest breaks plentiful and adequate?
4 Is the work varied?
5 Can jobs be rotated and shared?
6 Is good training available for operators, in the use of the system and in the recognition of health hazards?
7 Are there regular eye tests for operators, with safeguards against discrimination?
8 Is the new technology being used to monitor work levels, control or supervise those working with it?
9 Do operators suffer from any stress symptoms, body fatigue or eyestrain?
10 Have operators been prescribed drugs which might affect eye movements and cause increased stress and eyestrain?

Teleram believes radiation of 2277 below standards

Teleram Communications of White Plains, N.Y., sent to their customers on March 26, 1980, a memo on the test results on RF Radiation in Models 2277 and 2277 MK II. (See E&P April 12).

A copy of that memo has just been received by E&P from Teleram along with a copy of a letter on the Teleram test results sent by Dave Eisen, research and information director of The Newspaper Guild, to local Guild presidents and administrative officers.

The Bureau of Radiological Health of the U.S. Department of Health Education and Welfare is presently conducting tests on the Teleram terminals and expects to have results available within the next two weeks, according to the president of Teleram.

The contents of the memo and the letter are as follows:

The purpose of this memo is to briefly summarize the history of reported excess RF radiation in the Model 2277 (MK I) and provide you with test information received from the Bureau of Radiological Health this very day.

On July 26, 1979 I received a letter from Harry Beery of *Newsday*, Garden City, New York with his consultant's report indicating that a 15 mw/cm² r.f. radiation level was measured at the top center of the 2277 (MK I).

In an effort to learn what existing standards and regulations apply, we had our engineering department contact NIOSH, ANSI (American National Standards Institute) and others versed in this field. There appeared to be no established specification for VDT's except an ANSI C95.1-1974 suggesting incident 10 mw/cm² personnel level.

Teleram performed some in-house testing but found that the test equipment necessary to cover the broad frequency spectrum was not quickly or economically available. To satisfy Newsday, we provided a metal shield which apparently cut down on the observed r.f. radiation. Only a few other customers have made similar requests for these.

On January 26, 1980 a test report from Burruano Associates, retained by Teleram for r.f. measurements, was made available. Two items of importance can be found in this report:

1. It is not clear how the RAHAM meter (used by Newsday consultants) measures 15 mv/cm² at 20 KHz when its primary range is 10 to 10,000 MHz.

2. Conclusion—Based on the present NIOSH requirements, all the data derived during the radiation tests on the VDT, there are no levels emanating from the VDT which can be stated to be harmful to human beings, given the present requirements and the data presented.

On January 29, 1980 David Eisen of The Newspaper Guild wrote to us asking for further elaboration and information regarding radiation. A copy of the Burruano Associate report was sent to Eisen.

Attached is a copy of his February 28, 1980 letter to Local presidents and administrative offices. Note the opening sentence of the next to last paragraph "The case that Teleram 2277s produce harmful radiation is far from clear."

On March 26, 1980 I spoke with John Farnham of BRH, Rockville, MD. His WEAC, Winchester, Mass. have had two Teleram 2277 terminals—a MK I and a MK II under r.f. radiation test. The findings of the WEAC lab is that both terminals have under .5 mw/cm² a level far below that measured at Newsday. The MK I measurements were made with and without the r.f. shield, and in both cases, under .5 mw/cm² was measured. Farnham indicates that this is a very acceptable level—and that details of these test results will be forwarded to us in due course.

One further suggestion to all of our customers who may be interested and concerned with r.f. radiation—obtain a copy of NIOSH "A Report on Electromagnetic Radiation Surveys of Video Display Terminals" dated December 1977, from NIOSH, Division of Biomedical and Behavioral Science, Cincinnati, Ohio 45226 for more background.

The current ANSI C95.1-1974 which shows a 10 mw/cm² incident to the operator of a terminal is the closest specification which we can quote. There is talk of a future change to a 1 mw/cm² rating but this is not yet approved. To our knowledge the European standards are 1 mw/cm².

In all, we are pleased to advise that your Teleram terminals not only in detected radiation, but more importantly in incident radiation are safe to use.

TO: Local presidents and administrative officers

FROM: Dave Eisen, research and information director

RE: Possible Radiation from Teleram 2277 VDT's

Tests at two newspapers during the past eight months have raised the possibility that some Teleram 2277 (desk model) VDTs may be emitting radiofrequency radiation in excess of U.S. government standards.

The first test, by a private consultant at Newsday last July 5, produced readings as high as 15 milliwatts per square centimeter over a two-inch area on the top of two Teleram 2277s. The second test, by a Teleram representative at the New York Times Nov. 29, produced a reading of 40 milliwatts on the top of another 2277.

The present Occupational Safety and Health Administration standard for radiofrequency exposure in the frequency range from 10 to 100,000 megahertz is 10 milliwatts. Technical information on the 2277 indicates that it generates frequencies within the lower end of that range.

The high readings were found only at the surface. They fell off sharply a few inches away from the machines.

The case that Teleram 2277s produce harmful radiation is far from clear. Subsequent tests on two 2277s at Newsday, by the New York State Labor Department later in July and by another private consultant in November, produced a maximum reading of 2.66 milliwatts four inches from the top in the first case and no measurable radiation in the second. And a test commissioned by Teleram at a New Jersey laboratory in mid-November found, in the words of a consultant's report sent to us by Teleram, that, "Based on the present NIOSH requirements and the data derived during the radiation tests on the VDT, there are no levels emanating from the VDT which can be stated to be harmful to human beings, given the present requirements and the data presented herein."

That carefully qualified conclusion is, to some degree, reinforced by a NIOSH (National Institute for Occupational Safety and Health) radiation official's opinion that the instrument used in the Newsday and New York Times tests is not reliable as a device for measuring radiofrequency radiation.

However, both Newsday and the Times have installed metal shields inside all their Teleram 2277s. These shields cut back the radiation sharply, and Teleram informs us it is making them available to all 2277 owners at a cost of $40 per machine. At least one other Guild paper, the Minneapolis Tribune, has announced it is installing the shields, warning employees in the meanwhile not to rest their hands or arms on the tops of its 2277 terminals when they are turned on.

TNG strongly recommends that all Locals with members working on Teleram 2277 VDTs insist, through grievance channels if necessary, that their managements, like those at the Times, Newsday and the Minneapolis Tribune, obtain and install shields on all 2277s as a necessary safety precaution. Meanwhile, to be on the safe side, members should be warned against resting their hands or arms on the tops of the machines.

Dairies to promote cheese and butter

A March through September American Dairy Association advertising campaign for cheese and butter products will include a mix of television, radio, newspaper and outdoor ads.

CATARACTS FOLLOWING USE OF CATHODE RAY TUBE DISPLAYS. M.M. Zaret, M.D.

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firmed that he exhibited a mature stage of nonionizing radiation cataract in his left eye and an incipient stage of nonionizing cataract in his right eye.

For 24 years, from 1948 to 1972, practically all of his work was performed by viewing radarscopes. His eyes and vision were normal until 1967 when intermittently he began to experience visual and ergonomic related complaints. Occasionally, he made errors in identifying aircraft on his radarscope and placed them into potential mid-air collision courses. It was not until 1970, at age 48, that an incipient cataract first appeared in his left eye. Nevertheless, this was continuously waivered by the FAA until 1972 when he caused near misses on two successive shifts. The attending ophthalmologist stated that the patient's visual problem and cataract were due to his prolonged viewing of the radarscope. I concur but add that now his opinion can be rationalized with greater certitude.

DISCUSSION

Until recently, the principal health concerns about CRT systems had been related to visual or ocularly-related ergonomic factors. Now, it is apparent that the problem is far more serious than functional disorder because it also involves at least one pathological process, cataractogenesis.

Regarding the latter, relatively stringent diagnostic criteria were used here, so that only the cases meeting the test of nonionizing radiant energy cataract were presented. Many additional cases could have been cited but were not. Instead, those selected represent examples which demonstrate different facets of the overall problem.

Cases #1 and 2 represented a cluster implicating the occupational environment at The New York Times. Case #3 indicated that the problem was not limited to the Times but also could occur at any other newspaper with a similar installation. Case #4 was an example of the cumulative effect of nonionizing radiation; whereas, Case #5 was an example of the additive effect of nonionizing radiation to prior exposure by ionizing radiation. Case # 6 indicated that other organ systems, in addition to the eye, could be affected adversely. Case #7 showed that individual vulnerability must be factored into any equation purportedly representing safety for the individual. And, Case #8 demonstrated not only that visual, ergonomic and cataractogenic factors can be inter-related, but also, that, for some occupations, reduced cognition in a CRT operator could result in injury to others.

As if the CRT problem were not bad enough, its resolution is being hampered further by many different but not unrelated attempts for a quick fix. As gross equipment defects are found by crude testing, manufacturers, who previously denied there could be any problem, now pronounce these have been corcorrected by newly installed shielding (which didn't exist in the original model). NIOSH keeps citing its arbitrary, contrived standards for human exposure to nonionizing (both ultraviolet and hertzian) radiation as being safe while there is no ratiocinate reason to believe this to be true but, moreover, human pathology to affirm the opposite view. Labor and management, although it is in neither's long-term interest to do so, join each other in reassuring the workers with the palliative that there is little cause for concern. And, epidemiologists are attempying to ascertain how to keep score of the aftermath. Meanwhile, tragically, nothing meaningful is being accomplished regarding prevention!

This does not mean that investigations should not be continued nor that CRT workers should not participate as subjects of investigation: both should be done. Instead, it means that the credibility of the research should have been established first and then maintained thereafter; to date, that has not been done. In view of this set of facts, there was no alternative for me except to inform the Guild[19] to notify its shop stewards that my prior opinion has changed and I now believe that there is a greater danger for VDT operators than there was three years ago when I first discovered this problem.

Meaningful interim and long-term solutions are attainable, but will not be achieved by intelligent appearing investigations into wrong directions.

References available from author.

Case #6, a 44 year old white female, was first examined by me on February 18, 1980 because she had a uniocular incipient cataract. She had been working with VDTs for three years: the first year-and-one-half was at full-time and the second year-and-one-half was on a part-time basis.

Her present illness began about November 1978 and ran a bizarre course. The first symptoms were a partial loss of hearing in the left ear associated with tinnitis and vestibular dysfunction and blurred vision associated with a loss of pupillary reactions. Following this she had many examinations and extensive clinical and laboratory testing by many physicians, including neurological, otological and ophthalmological consultations, but no etiological diagnosis could be established for any of her pathological conditions. No significant improvement occurred except for the vestibular dysfunction which waxed and waned.

The proximal prior ophthalmological examination was performed in February 1979 at which time her visual acuity was 20/20 in each eye and the lenses in both of her eyes were completely normal. However, my examination revealed that the visual acuity of the left eye had begun to deteriorate, could not be corrected to a full 20/20 and that an incipient radiant energy cataract was now present at the posterior surface of this eye. The right lens was normal except for the early stage of roughening, thickening and a trace of opacification at the posterior refringent edge of the lens which can be the earliest signs of nonionizing radiation cataract.

Another aspect to this problem concerns the special vulnerability of some individuals because of a pre-existing condition as exemplified by the following patient.

Case #7, a 33 year old white male, was first examined by me on May 23, 1980. My consultation was sought because the patient only had one eye; it had recently acquired a cataract; and, this was suspected of being related to his work with VDTs.

The patient's birth weight was 850 gms (under 2 lbs!) and this resulted in his developing retrolental fibroplasia, RLF. His left eye was blind shortly after birth and, subsequently, it was enucleated in 1963. Because of RLF, he was examined by ophthalmologists at least twice yearly throughout his life. His remaining right eye had high myopia, but visual acuity could be corrected to better than 20/40 with eyeglasses. Due to residual RLF induced retinal degeneration, prophylactic retinal surgery was performed in 1967 to prevent an impending detached retina of his only eye.

The patient worked with VDTs a minimum of five hours daily during the two year period between July 1977 and July 1979. Afterwards, he worked with VDTs for lesser periods of time. In September 1979 the patient was examined because a significant change in his visual function had become apparent and, at that time, although his eyeglasses were changed, nevertheless his visual acuity could not be corrected to better than 20/50. Over the next few months, it was discovered that a cataract was forming and now six months later visual acuity could only be corrected to 20/200. The visual loss was due to a radiant energy cataract which exhibited both well-defined posterior capsulopathy and nuclear sclerosis.

Another relevant feature of this case was that, because of his extreme degree of nearsightedness, the patient had to get very close to the screen, within three to four inches, for viewing.

There are certain industries, like aviation, where visual disturbance in an individual worker can create the risk of injury or even death for others. For example, the following case of radiant energy cataracts in an air traffic controller was reported first in relationship to avionic environments[17], and, then in relationship to air safety[18].

At those times it was not possible to consider a single source of exposure as the predominant causal agent because air traffic controllers can work near radiating equipment, such as radar sets, radio transmitters, microwave telecommunication systems and radio navigation devices. In this case, however, the FAA determined that the patient had no significant exposure to any of its high power hertzian radiation transmitters because his principal work only was related to viewing radarscopes.

Case #8, a 54 year old white male, was examined by me on June 4, 1976. I con-

and cumulative effects of radiation can be recognized with relative confidence. This is demonstrated by the following two cases, where their own ophthalmologists documented the fact that an active process of lens opacification made its clinical appearance only after working with cathode ray tube displays. The first had prior exposure to nonionizing radiation; the second had prior exposure to ionizing radiation.

Case #4, a 41 year old white male, was first examined by me in 1960 at which time he exhibited the earliest evidence of microwave radiation injury -roughening and thickening at the site of the posterior capsule in both lenses. He had been a radar technician for the previous 15 years but was now a radar instructor.

He was examined at several year intervals from then until 1969 at which time there was a marked asymmetry between the two eyes - a radiant energy (microwave) cataract had formed in his right eye while his left lens exhibited only a very early stage of capsular opacification - and he was one of the 42 cases of microwave cataract reported[15] by me that year.

The patient was then transferred to office work, he had no further exposure to microwave radiation and I performed a cataract extraction on his right eye. Following this, he was re-examined at approximately six month intervals and the cataractogenic process in the left eye became arrested in a forme fruste state. It remained quiescent until about 1976 when the opacification began to show definite signs of progression. It went through the incipient cataract stage relatively rapidly and surgery to remove the cataract became necessary in June 1978.

From my considerable experience in investigating radiant energy cataracts, this was an unexpected course. When removed from further exposure, it is unusual for a microwave injured lens in a forme fruste stage to undergo such an accelerated transformation to the advanced stage of cataract formation as occurred here. Also, the patient did not have any known sources of exposure away from work such as a microwave oven or C-B radio transmitter. In obtaining a retrospective work environment history, it was discovered that he had begun working daily with a VDT about six months prior to the reactivation of the cataractous changes.

Case #5, a 53 year old white female, was first examined by me in consultation on February 15, 1980 because of a unilateral cataract that recently appeared in her right eye. Previous eye examinations had all been entirely normal with visual acuity of 20/20 in each eye until November 1979 at which time her complaint was monocular diplopia and reduced vision, both in her right eye only. A diagnosis of uniocular nuclear sclerosis was made but no etiology could be discovered. The week before I examined the patient, she was seen in consultation by another ophthalmologist who confirmed the diagnosis of uniocular nuclear sclerosis but who also could not determine the cause. As radiant energy injury was the only remaining suspected etiology, the patient was referred to me because she has been working with VDTs for about four years and there was a suspicion that this could be causal.

In obtaining her radiational exposure history, I discovered that she had been treated for acne of the face by x-ray therapy in 1942 when she was 16 years old (an accepted form of therapy then). Also, in addition to the findings of the other ophthalmologists, my examination revealed the presence of a minimal, but definite, capsular opacification at the posterior refringent edge of the lenses in both eyes. In my experience, this indicated that her recent exposure to VDT radiation was a contributory etiological factor for her unilateral cataract, that prior x-ray exposure sensitized the lens and the cataract was due to the additive effect of the two different types of radiation.

Radiant energy cataract can evolve concommitantly with other pathologies and there is much in the literature which indicates that injury can occur to neurological function and special sense organs, like the ear, following exposure to nonionizing radiation.

One report[16] chronicles the evolution of blindness, deafness and vestibular dysfunction in a microwave worker. The following case of a VDT worker resembles the early findings in that microwave worker.

three individuals (ages 48,34 and 26) and their exposures were measured in microwatts (μW) per sq cm; whereas, the second article[13], by Weiss and Petersen, stated that they had measured emission of ultraviolet radiation from normally operating VDTs at a level approximating 0.1μW per sq cm. By integrating the exposure time duration of Lerman's data to the typical exposure duration of a VDT operator, the mathematics reveal that both types of exposure would be at an average power density of 0.1 μW per sq cm and this is above threshold for cataractogenesis in humans. This was reported by me to the Arbitrator[14] along with a statement pointing out that there is no validity to the arbitrary standard for ultraviolet radiation so that it should not be considered to be a reasonable standard of industrial safety!

The impetus leading to the literature review, where the above referenced citations[12,13] were discovered, came in part from finding an additional case of radiant energy lens injury in a newspaper reporter.

ADDITIONAL CASE

Case #3, a 49 year old white female, was first examined by me on April 20, 1979. Her chief complaint was personal concern about her eyes because, as a newspaper reporter, she had been working with VDTs from 15 to 25 hours per week for a duration of six months. It was ascertained that her eyes had been examined by other ophthalmologists, practically annually for many years, her most proximal previous examination being less than six months prior to commencing work with VDTs, and in all of these office visits her intraocular lenses were examined and found to be free of opacities and reported as being normal.

My examination revealed her visual acuity to be correctable to 20/20 in each eye and her eyes to be free of pathology except for the slit-lamp biomicroscopic appearance of her lenses. The right lens exhibited an opacity at the posterior pole contiguous with the posterior capsule of the lens which also was opacified at this site. Although this was small, about 0.01 sq cm in area, it was unlikely to have been missed in prior examinations because it was also easily visible by direct viewing with the ophthalmoscope. Therefore, it was acquired in the interval between May 1978 and April 1979 during which time the patient worked extensively with VDTs.

The left lens exhibited a microscopic opacification limited to the posterior capsule, itself, at the posterior pole of the lens and the lens substance was free of any opacification. This was of particular interest because it represented one of the earliest findings of radiant energy injury[7] and because assymetric evolution of cataractogenesis acquired during life is observed not infrequently when caused by environmental exposure to radiation[7].

The patient was instructed to minimize her use of VDTs, to avoid using any malfunctioning equipment, not to use such consumer products as microwave ovens or C-B radio transmitters, to inform her physician and dentist should either propose diathermy or ultra-violet radiation treatments and to be re-examined after an interval of six months duration.

Other CRT Workers

The first logical consideration on which to base the need for an epidemiological investigation would be to determine whether or not sufficient evidence existed to suspect the presence of a problem. The above finding of a cluster of cases, each fulfilling relatively stringent criteria for the clinical diagnosis, radiant energy cataract, and each acquired only after intimate contact with cathode ray tube display systems, satisfied that requirement.

Nevertheless, accumulating meaningful human data about radiational injuries is extremely difficult; indeed, to this date, it has never been accomplished in a satisfactory manner. One reason is that humans do not live in vacuo; instead, they are bathed by a normally occurring as well as an artificially created radiational environment and both are variable. In this context, if one also considers that the effects of radiation are both additive and cumulative (neither in an exact mathematical relationship!), then this complicates matters further.

Despite those problems, by utilizing the clinical constraints of differential diagnosis, in some cases the additive

full significance of that failure. However, certain observations are germaine to this paper. The most important being that radiofrequency irradiation of humans at a field intensity of about 1 mW per sq cm had been reported to be cataractogenic for some individuals not only by me[7] but also by Parker and Hirsch[8] and by Carpenter and Donaldson[9] of the United States and by Sadcikova[10] of the Soviet Union. Incidentally, that is one of many reasons why the contrived arbitrary American Standard permitting human irradiation at this field intensity is fatally flawed.

Be that as it may, the significance of the NIOSH study was its finding that some areas in the Times building did, in fact, contain an ambiance of electronic smog known to be capable of producing radiant energy cataracts in human eyes-which is precisely what the cataracts acquired by the two young copy editors implied!

Knowing that NIOSH's knowledge, measurements, standards and statements were not helpful in resolving the VDT problem, the Times and the Guild were advised to investigate the problem cooperatively. Two factors could be examined relatively simply: (1)test for spurious emissions of radiation and (2) determine whether or not the VDT systems in use at the Times could malfunction.

Contrary to the opposite preconceived notion, a quick and dirty investigation revealed that spurious radio frequency emissions could be elicited from normally functioning VDTs. Also, the Times revealed that it had trouble reports for hundreds of malfunctions of its VDT system.

Unfortunately, at this critical stage of my investigation, cooperation ceased abruptly because the Times and the Guild had become engaged in an adversarial proceeding and the grievance of the two copy editors became a matter of formal arbitration. In essence, that action, for all practical purposes, eliminated the possibility of discovering additional data bearing a direct health-safety relationship to the problem.

Two important factors for the study of exposure conditions were altered. The first was that only VDTs, instead of the entire integrated system network, were to beinvestigated. The second was that the Times refused to permit malfunctions to be placed on any of the VDTs, stating that that would invalidate the warranties-the logic of which is difficult to understand either from the humanitarian point of view or, more pragmatically, on the basis that hundreds of malfunction repair reports had already been recorded! In other words, the physical tests to be conducted for the arbitration were altered so that they did not replicate, in the broad context, the cathode ray tube visual display network system, either regarding its ordinary electronic smog ambiance or during intermittent spurious emissions from its frequent malfunctions.

The Arbitrator had available a competent engineering firm to conduct his tests and at least three prominent ophthalmologists as his personal consultants. After studying the problem, which represented a novel experience not only for him but also for his advisors, the Arbitrator reached a somewhat curious conclusion:-that based on reasonable (emphasis mine) standards of industrial safety, the environment of the Times was safe for the great majority of individuals but that this conclusion did not apply absolutely to the two copy editors so that their grievance could be reconsidered at a future call of the parties by their mutual consent.

Two years later, some major deficiencies in the Arbitrator's ruling became apparent, due to the discovery by others[11] that, as I had posited, spurious hertzian radiations were, in fact, being emitted from VDTs in use at newspapers (including the Times!) and due to my continuing research.

Regarding the latter, my analysis of two disparate articles demonstrated both that normally functioning VDTs emit cataractogenic levels of ultraviolet radiation and that the "reasonable" standard of permissable exposure to ultraviolet radiation was excessive by more than four orders of magnitude!

The first article[12] reported on a clinical study by Dr. Sidney Lerman in which he determined that ultraviolet radiation had produced cataracts in

encountered (other than radiant energy injury) causes for cataracts had been excluded in the differential diagnosis, as radiant energy exposure was a known etiological factor in cataractogenesis and as cathode ray tubes were known to be radiant energy emitters:therefore, the patient was referred to me for an opinion as to whether or not his cataracts were relatable to radiant energy exposure and, if so, was it likely that his occupational environment was at fault?

My diagnosis was (1)immature radiant energy cataract of the right eye and (2) incipient radiant energy cataract of the left eye.

At this juncture, the Times requested that its consulting ophthalmologist examine the patients and my findings were provided to him. On February 22, 1977, he examined them and found that the acquired cataracts in both patients were compatible with radiant energy injury. Moreover, as I had also done previously, he, too, effectively excluded by differential diagnosis all other ordinarily encountered causes for the cataracts. (He also postulated the possibility of a concommitant pre-existing congenital defect in Case #1 but this had no bearing whatsoever on the clinical appearance of the cataracts).

It does not matter from what perspective one views the Times' consultant's reports; in essence, they confirmed my findings that cataracts were being acquired by these two patients after they began working with cathode ray tube generated displays. If one knew little about ophthalmology, it would be clear that, even by differential diagnosis alone, the only clinically reasonable etiological diagnosis for the cataracts in both patients was radiant energy injury. If one were knowledgeable about and experienced in the effects of radiant injury on the human eye and understood the significance of the detailed descriptions of the specific cataracts provided in my reports, not only does radiant energy injury of the lens become the only working diagnosis having any degree of medical reasonableness, but also one can state, with relative assurance, that the proximal causal sources were more probably from the nonionizing portion of the spectrum than from ionizing radiation sources.

The determinant question then becomes not the moot point, whether radiant energy probably caused the cataracts; but, instead, <u>whether or not the occupational environment at the Times could have contained harmful spurious nonionizing radiations?</u>

The Newspaper Guild of New York, meanwhile, because it had no expertise of its own, engaged my services as a consultant in the grievance of these two patients. However, one of the first matters requiring my urgent attention was a meeting at the Guild with the shop stewards who, understandably, were apprehensive about the other employees who were working with word processing devices. In good faith, I advised them (1)that although there appeared to be some degree of hazard associated with VDTs, the danger did not appear to be great, (2)that with a full and open cooperative investigation conducted jointly by the Times and the Guild, it should be possible to analyze the problem properly and then to institute whatever appropriate corrective actions that appeared to be required and (3) that, if at any time I became convinced they were being placed in undue jeapordy, I would so inform the Guild.

CDC and NIOSH on behalf of the Times, Meanwhile, the Center for Disease Control (CDC) of the United States Public Health (NIOSH) conducted an investigation and their reports, if anything, unnecessarily obfuscated the problem of VDT safety. { Health Service and National Institute Occupational Safety

Not only did NIOSH use instruments that were inadequate for measuring a large segment of the suspect portion of the electromagnetic spectrum, but also it found a dangerous level of hertzian radiation, 1 mW per sq cm, in the Times building without ever even attempting to identify its source! In addition, it became evident that NIOSH had no meaningful knowledge about nonionizing radiation cataracts in humans although suitable information was available[2,3,4]. Nor did it exhibit any awareness of the significance attached to capsular opacification at the posterior surface of the lens as this relates to hertzian radiation exposure[5,6].

This is not the time nor the place to discuss, in all its ramifications, the

Although I had examined them separately each patient advised me that they both worked at the same place, The New York Times, during the same time interval, while VDTs were being introduced into its newsprint operation. What neither knew was that, based on my 20 years of experience as a trouble-shooter of radiant energy injuries associated with electronic smog environments, either case, by itself, would have elicited my attention because each exhibited an early stage of radiant energy injury of the intraocular lens.

In that context, the two cases represented an unusual cluster because they had multiple inter-relationships of epidemiological significance; i.e., a signature of radiant energy injury in addition to both spatial and temporal proximity to the same environment! This set of facts did not, per se, prove that the occupational environment at The New York Times was at fault. Instead, it provided a clear implication that priority should be given to investigate that environment properly and thoroughly with special attention being paid to the CRT generated displays and their associated equipment, but that all other potential sources of exposure should also be considered.

The principal purposes of this article are (1)to describe a methodology for investigating an incident of this type, (2)to discuss some of the major obstacles encountered pragmatically, (3)to provide a rationalized opinion, based on medical reasonableness, regarding the existence of a radiation hazard associated with word processing technology and (4)to offer a meaningful methodology whereby this problem can be investigated epidemiologically at a minimal risk to the VDT operators.

THE CLUSTER

Case #1, a 35 year old black male, was first examined by me on January 24, 1977. His chief complaint was a slight deterioration of the vision in his left eye during the previous month associated with a concomitant sense of chromatic aberration in that his perception of colors also was slightly altered for his left eye when compared to his right eye (anisometachromatopsia).

Examination by his ophthalmologist established that the patient was acquiring cataracts and that no other cause, by physical examination, laboratory findings or family history, could explain the findings except possible exposure to radiant energy. Therefore, because the patient had been using a cathode ray tube terminal viewing device at work for about four months immediately preceding the onset of his visual problem, the patient was referred to me for an opinion.

My examination revealed that visual acuity was correctable to a faulty 20/20 for the right eye and a faulty 20/30 for the left eye. The remainder of the findings were within a physiological limits except for slit-lamp biomicroscopy of both lenses and the ophthalmoscopic appearance of macular region of the left retina.

My diagnosis was (1)bilateral incipient radiant energy cataracts and (2)early macular retinopathy of the left eye.

Case #2, a 29 year old white male, was first examined by me on February 2, 1977. During the previous month he had an ophthalmic examination because of eyestrain. Then, for the first time, he was informed that he had incipient cataracts. Subsequent physical examinations, laboratory tests and family history revealed that he was in excellent health and failed to identify the cause for his cataracts.

Review of the records of previous examinations revealed that he was both asymptomatic and free from lens opacities when examined ophthalmologically on October 22, 1970, January 11, 1972 and December 18, 1973. However, on February 23, 1976 his eyes were again examined because they were inflamed for the previous two days: then, for the first time, he was discovered to have small opacities at the posterior poles of both lenses. Apparently, because these did not interfere with visual function, the patient was not informed of the newly discovered lens opacities.

As the patient had been working with cathode ray tube terminals since November 1975, as his ocular symptoms and cataracts only became apparent and intensified afterwards, as his opacities were in an active state of progression so that visual function was now adversely affected, as all the usually

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CATARACTS FOLLOWING USE OF CATHODE RAY TUBE DISPLAYS

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ABSTRACT

A previously unsuspected cataract problem recently became evident in relation to the use of cathode ray tube generated displays. These cataracts exhibit characteristics resembling nonionizing radiation injury. Case Reports are presented which clearly indicate (1)that both cumulative and additive effects occur, (2)that there is a time-related delay before the appearance of lens pathology and (3)that the cataractogenesis, if discovered and recognized at any early state, may become arrested in forme fruste by protection from continuing exposure.

RESUME

Une nouvelle forme de cataracte développée à la suite de l'utilisation de rayons cathodiques a eté recemment identifiée. Ces cataractes montrent des caracteristiques identiques aux dommages provoqués par les radiations non ionisantes. Les observations ici décrites indiquent clairement:(1)qu'il en résulte des effets à la fois cumulatifs et additifs, (2)qu'une intervalle temporelle précède le developpement de la pathologie cristalline et (3)que le processus cataractogénique diagnostiquee à un stade précoce, peut à la faveur d'une protection contre les émissions prolongées être bloquée in une forme fruste.

INTRODUCTION

Cathode ray tube (CRT) generated displays, known as video display terminals (VDTs) or video display units (VDUs), represent an innovative integration of cathode ray tube, telecommunications, data storage/retrieval and electro-optical technologies. With the widespread introduction of word-processing devices, into the workplace, it soon became evident that a large number of operators developed eyestrain after prolonged use.

Subsequently, many underlying causes were identified as ergonomic factors. Some of these have been corrected following the impressive applied research of investigatigators like Professor Östberg of the University of Luleä in Sweden.[1] Nevertheless, a number of employees who were affected adversely became concerned as to whether or not any permanent harm could result from continued work with VDTs.

In this regard, a new dimension was added to the VDT health-related problem three years ago when two young copy editors acquired incipent cataracts, one at age 34 the other at age 29, shortly after beginning work with VDTs. Eventually both were referred to me for ophthalmic consultation because their own ophthalmologists each had excluded, by differential diagnosis, all of the other etiologies for acquired cataracts except radiant energy injury.

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...yscrapers Hexing HP 3000s?

Linda S.

or whether there is a problem with its disk drives that make them vulnerable to RFI.

The safe operating environment for HP 3000 processors is ±.5 volt/meter in the 14 KHz to 1 GHz frequency range, HP said. One Manhattan computer room was rated at better than 7 volt/meter (see story on Page 7). Two other HP 3000 users, while they didn't know exactly how their

(Continued on Page 7)

COMPUTER WORLD 7/19/82

Canadian Union Links CRTs With Miscarriages, Birth Defects

By Bruce Hoard
CW Staff

VANCOUVER, B.C. — The British Columbia Hospital Employees Union has claimed members from four of that province's hospitals have suffered ruptured eye vessels, miscarriages and other disorders after working in front of CRT screens. The claims were made in a series of briefs submitted to a Canadian government task force.

Hospital representatives contacted last week confirmed the existence of most of the health problems, but denied there was any proven link between them and CRT screens.

According to union spokeswoman Jean Greatbatch, who submitted the briefs to the Canadian Labor Department's traveling Task Force on Microelectronics and Employment, office workers at the Surrey Memorial Hospital in Surrey reported that two of six pregnancies reported since 1978 ended in miscarriages. In the remaining cases, one child needed cor-

(Continued on Page 8)

Union Ties CRTs to Ills

(Continued from Page 1)

rective eye surgery and had a deformed foot, another was born a month prematurely, one was born with a bronchial disorder and the fourth was normal.

The ruptured eye vessels were also reported at Surrey.

Greatbatch said that office workers at Chilliwack General Hospital in Chilliwack had suffered from hands so swollen that they could not form a fist. Two out of three employees in the medical records department, who had been working with CRT terminals for six months, reported such severe eye strain that they could hardly drive home, she said.

At Shaughnessy Hospital in Vancouver, employees who had been working with CRT terminals for "two or three" years experienced migraine headaches, intense light sensitivity, back and shoulder problems and, in one case, a tingling sensation and numbness in the right arm, according to Greatbatch.

An office worker at the University of British Columbia Health Center in Vancouver claims to have lost 80% of her hearing in one ear, while others there have suffered sleeping problems, sore throats, dizziness and "a general lack of energy," the union spokeswoman said.

According to Greatbatch, the British Columbia Workers Compensation Board, which presides over work-related injuries and compensation, does not consider CRT screens a possible cause of health hazards. Dr. Tony Nichini of the Workers Compensation Board denied Greatbatch's allegation that the board has a policy that says CRT screens are not potential health hazards.

Nichini said Greatbatch had not returned telephone calls from him seeking information on the health problems, but "I am trying to find out what the facts are."

"There is no evidence that there is excessive radiation from the terminals," he commented.

Margaret Woodward is hospital administrator at Surrey Memorial Hospital. Asked about the pregnancy problems there, she replied, "I heard some vague things about them in one management meeting and I tried to track it down last week after the union got involved." She got information on five of the six women.

Woodward said that the information contained in Greatbatch's brief was "essentially perhaps correct" on those five. The administrator said the premature baby was born three weeks, not a month early, an occurrence that would not usually be called premature.

After hearing about potential health problems at union management meetings, the hospital did some "reasonable investigations," Woodward said. That consisted of having CRT terminals checked out by electrical engineers and talking with provincial occupational health representatives.

"The essence of all of this was to bring us some literature and reassure us that there's no scientific evidence that these problems exist," Woodward commented, "so we have not taken any dramatic action." She noted at least 10 other hospitals in the province are using the same CRT terminals and there have been no complaints.

Walter Hiller, assistant administrator at Chilliwack General Hospital, said: "Basically, our employees in that [affected] area have made us aware they were beginning to experience some problems, but they never made us aware of the magnitude or severity of them."

He has tried to monitor working conditions in accordance with government regulations and called claims of eyestrain that impairs driving "an exaggeration."

A spokesman for the government task force looking into the situation said the five-person group was "pleased to have the data" in the briefs and will incorporate it into a report with recommendations that will be issued this fall.

Niosh: No Link Between CRT, Health Hazards

By Bruce Hoard
CW Staff

WASHINGTON, D.C. — Despite recent testimony from Canadian office workers linking CRT terminal use with a host of health hazards [CW, July 19], officials here at the National Institute for Occupational Safety and Health (Niosh) maintained last week that there is no scientific basis for such claims.

It is outside the realm of possibility that radiation emitted from CRT terminals could be responsible for the miscarriages and ruptured eye vessels reported by the Canadian office workers, William Murray, chief of Niosh's radiation section, said. Measurements made by Niosh are "far below" the threshold of any biological danger and current standards for occupational exposure, Murray observed.

Niosh has performed a dozen surveys on radiation danger dating back to 1975, and "we're convinced there's not a radiation hazard," Murray said. However, the watchdog agency continues to review standards and literature in the area, he added.

Asked to compare the radiation output of CRT terminals and television sets, he replied, "They're fairly comparable."

Barbara Cohen, a research psychologist with Niosh, has heard more concern over possible CRT dangers expressed in Canada than in the U.S. "Time and time again," she noted, Niosh has found no excess radiation associated with the terminals.

After talking with gynecologists and obstetricians, Cohen believed that stress, not radiation, may contribute to miscarriages and birth defects. Stress "does have an effect on the body," she said, "but it doesn't always affect everybody the same way."

Cohen could not pin down the specific number of CRT-related complaints Niosh receives because many are phoned in rather than written, and they are distributed among various staff members. But "it's not uncommon" for Niosh to receive complaints of that type, she said.

Most of the complaints concern visual and muscular/skeletal problems. There is a long list of complaints about red, tired and burning eyes, and backaches, shoulder aches and neck pains are all reported, Cohen said. However, she added that none of the Niosh studies have encountered claims of miscarriages.

Cohen advocated additional research in the area of possible CRT-related radiation problems, but claimed budget cutbacks have hampered such efforts.

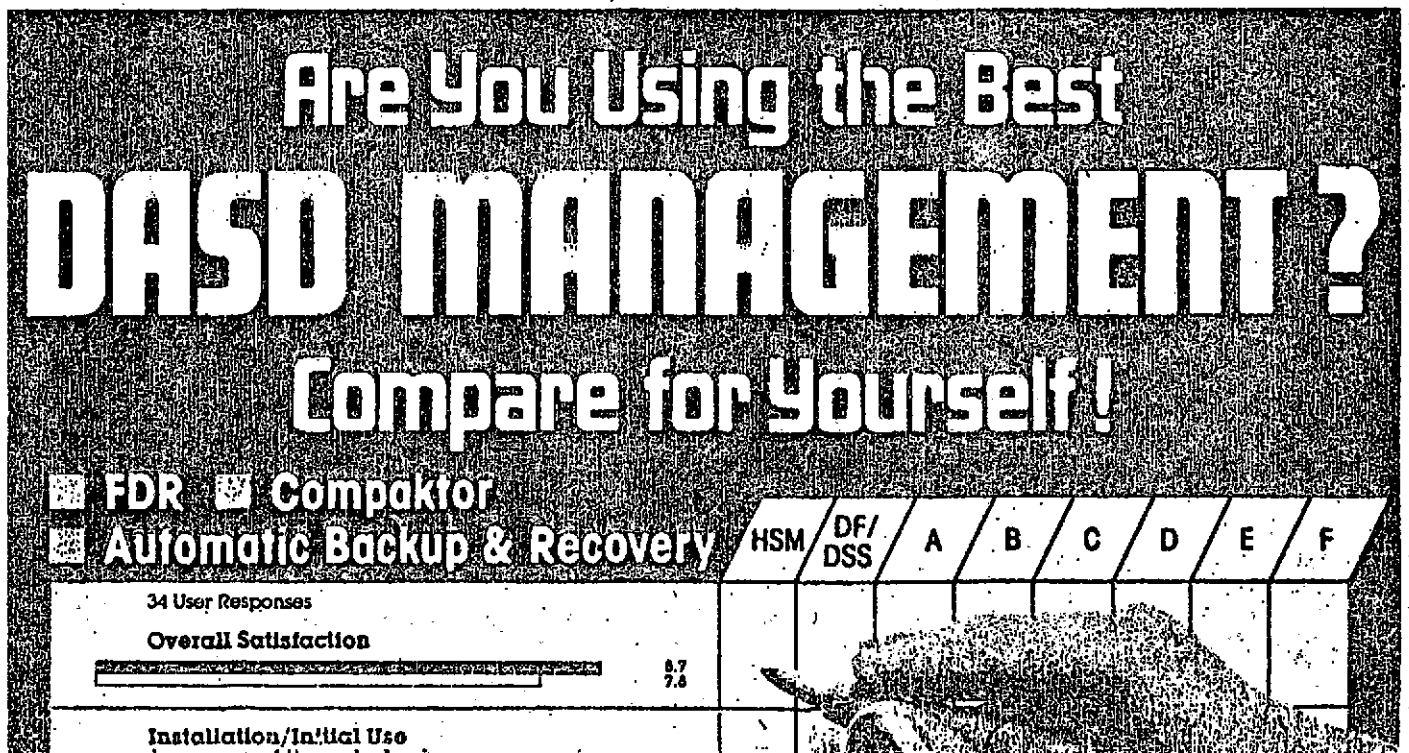
In related news, the Canadian Business Equipment Manufacturers Association has told the traveling Canadian Task Force on Microelectronics and Employment that while it recognizes the need for further study to examine CRTs' "ergonomic and social" effects, radiation fears are "totally unfounded."

The vendor group said its members make it a practice in their design criteria to incorporate safety standards that are frequently more stringent than those required on national or international levels.

Managers On the Move

DENNIS P. GELLER has been named director of the Babson College Computer Center in Wellesley, Mass.

Geller, who has authored a number of papers and training films relating to computer programming, has been an adjunct professor at Boston University and an associate professor at the School of Advance Technology at the State University of New York at Binghamton. Most recently he was a



Hospital union calls for ban on VDTs

LA Daily Examiner 7-7-82.

VANCOUVER, British Columbia — A hospital workers union has called for a provincial moratorium on the use of video display terminals after VDT operators complained of problems ranging from headaches to birth abnormalities.

A Canadian federal task force studying the impact of micro-electronics has been told that of seven pregnancies among VDT operators at Surry Memorial Hospital, only one produced a normal, full-term baby.

Two pregnancies resulted in miscarriages, one baby was born a month prematurely, one baby was born with a deformed foot and also has had eye surgery, another had bronchitis and one is normal, Jean Greatbatch of the Hospital Employees Union told the task force Monday.

Union business manager Jack Gerow said the machines in use in the hospitals are AES word processors, but he said the union's complaints were with all brands of word processors.

RD/ FC

MICRO WAVE NEWS

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The new ANSI radiofrequency and microwave health standard has finally been approved. See p. 7; details next month.

Microwave News invites letters from its readers. We ask writers to be brief, and we reserve the right to edit contributions for length.

Bioelectromagnetics Society Meeting

Budget Cuts Taking a Toll

The talk among the researchers at this year's Bioelectromagnetics Society (BEMS) conference was about money and where to get it. A cloud hung over the meeting as many of the participants wondered where they would find new grants to keep research projects alive. Some even questioned whether the society itself would survive. Although this seemed to be an exaggeration, the realities of the Reagan budget cuts were underscored by the absence of many familiar faces in the conference rooms of the Beverly Wilshire Hotel in Los Angeles.

The technical papers provided few exciting moments. Reports of new experimental findings did more to muddy than clarify the state of biological effects research. Negative findings where others had found positive ones, and vice versa, left many of the participants unable to explain their results. The search for mechanisms appeared as elusive as ever.

Interviews with government officials responsible for sponsoring bioeffects research indicated a period of austerity. The Office of Naval Research is the one exception, with some new money for work on biomedical applications, synergistic effects and complex field interactions. Otherwise, the programs at the Air Force School of Aerospace Medicine, the Bureau of Radiological Health and the National Institute of Environmental Health Sciences are staying at last year's levels. These are comparatively well off compared to those of the Environmental Protection Agency (EPA), the Department of Energy and the Naval Medical R&D Command, all of which are cutting back. EPA's Dr. Joe Elder said that the funding outlook was "very bleak."

(continued p. 8)

VDTs:

Eighth Cluster of Pregnancy Problems

A new cluster of pregnancy problems among Canadian video display terminal (VDT) operators has heightened concern over the safety of the terminals. Five out of six pregnancies among clerks in the accounting department of Surrey Memorial Hospital in Vancouver, British Columbia, have had adverse outcomes. This is the eighth unexplained cluster reported in the last two years. (See *MWN*, November 1981, January/February, April and May 1982.)

According to Jean Greatbatch of the Hospital Employees' Union, among the six pregnancies there were two miscarriages, one infant with a club foot and in need of eye surgery, one infant with bronchitis, one premature birth and one healthy baby. All the women worked in the same room and each had a VDT on her desk. Detailed information on the age and medical history of the affected women is not yet available.

The union maintains that the machines have not been proven safe and has

(continued p. 8)

Ontario, Canada.... Langley-St. Clair Instrumentation Systems Inc. of New York City is marketing a VDT screen X-ray shield. I-Protect, a leaded acrylic sheet fastening to the front of the terminal, comes in two sizes and sells for $50 to $60. For information, call (800) 221-7070. (*MWN* does not endorse commercial products.).... In a paper prepared for the BEMS meeting (see p. 1), Charles Wallach of Decisions and Designs Inc. in McLean, VA, suggests that ion imbalances in the air around operators and VDT screens could cause a number of health problems.... Norwegian researchers found PCB levels in offices with VDTs that were 50 to 80 times greater than levels outdoors. According to a report in the *International Archives of Occupational and Environmental Health*, Volume 49, p. 193, 1982, by Vemund Digernes and Erle Astrup of the University of Oslo, workplace air samples had PCB concentrations of 56-81 ng/m^3. PCB's cause cancer in experimental animals. The authors hypothesize that VDT capacitors and transformers may be the source of PCB's and recommend further investigation of the terminals.... Are you a cyberphobe? The June 8 *Wall Street Journal* reports on Professor Sanford Weinberg's research indicating that up to 30 percent of US office workers suffer from cyberphobia, the fear of computers. Weinberg is at St. Joseph's University in Philadelphia, PA.

BEMS *(continued from p. 1)*

Calcium efflux research emerged as a new growth industry. A number of researchers, following the lead from Drs. Ross Adey and Carl Blackman, are trying to extend and explain what is known about the frequency and power windows that govern the movement of calcium in the brain.

Blackman reported that he was taking the amplitude modulation to higher ELF frequencies — multiples of the 16 Hz window first identified by Adey and Dr. Suzanne Bawin. Blackman and his co-workers at EPA's lab in Research Triangle Park, NC, found no effect at 30 Hz, but they did measure a response at 45 Hz and 50 Hz. In the process, they uncovered one interesting new dimension to the window phenomenon: power windows appear to become narrower as the frequency increases. At 45 Hz they measured significant calcium changes at 35-50 V/m, but at 50 Hz the power window had shrunk to 45-50 V/m.

Before completing his presentation, Blackman preempted the obvious question: Is there a window at 60 Hz, the power line frequency? That experiment, he said, had not yet been run.

In the one non-technical paper on the program, Professor Nicholas Steneck, a historian at the University of Michigan in Ann Arbor, took aim at the new American National Standards Institute (ANSI) safety standard. He called the final product pro-industry and warned that it "will not attract more supporters than did the old 10 mW/cm^2 standard."

John Monahan of the Bureau of Radiological Health perplexed his audience with the preliminary results from his experiment involving both the permeability of the blood brain barrier (BBB) and microwave-drug synergy. He injected mice with scopolamine and then exposed them with 2450 MHz radiation at an average SAR of 10 W/Kg for 30 minutes. He saw no leakage through the BBB and, surprisingly, found that microwaves wiped out, instead of enhanced, the effect of the drug.

Describing a three generation study of rats exposed to 80 kV/m, 60 Hz electric fields, Dr. Debbie Majeau-Chargois of Tulane University in New Orleans said that her team had found significant changes in white blood cells (but not red cells) and in the paired organs such as kidneys and testes. In an interview, she said that the overall pattern was one of reaction to "mild stress."

Members of Dr. Bill Guy's group presented progress reports on their three-year, low-level exposure study at the University of Washington in Seattle. Nearly all the tests made after 21 months of exposure revealed no difference between the exposed animals and the controls. One variation was in a few of the screening tests—the significance of this finding will have to await further results. There was also an increase in malignant neoplasia among the exposed animals, but as Dr. L.L. Kunz warned, much more data must be collected before any inferences can be drawn.

The BEMS conference was held the week of June 28 in Los Angeles, CA. At the society's membership meeting, Guy was elected the next president of BEMS.

VDTs *(continued from p. 1)*

called for a moratorium on introducing more VDTs into provincial hospitals. This position puts it at odds with the provincial ministry of health, which is pressing for widespread automation in hospitals.

The cluster at Surrey Memorial has fueled the already intense controversy over VDT safety, though neither federal nor provincial health officials have indicated that potential VDT radiation hazards require investigation. A number of Canadian study groups are looking into the problem, however.

- The Task Force on Micro-Electronics and Employment was briefed on the Vancouver cluster at a hearing last month. Murray Hardie, executive director of the five member group, said the union's report "shows there are potential health problems that have to be addressed. The absence of sound scientific research in this area is a problem." The task force, established by Labor Canada this March with a $300,000 budget, is focusing on job displacement and health problems created by new office technology. It plans to publish its report and recommendations early this fall.
- A subcommittee of a $12 million federal project to develop prototypes for the office of the future will review existing VDT studies and could recommend that a new study be done. According to Phil Kinsman of the federal Department of Communications, which is coordinating the project, the group will review radiation issues because "at this point you just can't avoid them." Kinsman said VDTs will be designed to meet user specifications and will be tested for radiation as part of the project. In addition to government funds, two major participating business consortiums will spend over $50 million on research and development of office systems.
- The VDT task force set up last year by the Ontario Ministry of Labor's Advisory Council on Occupational Health and Safety (see *MWN*, December 1981) is now looking at potential reproductive hazards. According to task force chairman Dr. Gordon Stopps at the University of Toronto, this issue was added to the group's agenda because of "the upsurge in interest and the number of reported clusters." Stopps hopes the group's report will be ready in September.

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AEJ board urges intern pay, onvention action is postponed

Boston—The executive board the Assn. for Education in urnalism has unanimously ap-oved a set of recommenda-ns on the operation of for-dit internship programs that ludes a call for interns to be d "at the prevailing entry-level ary for inexperienced employ-."

Four days later, however, the J's 1980 Convention voted to stpone consideration of en-rsement of the recommenda-ns until next year after some egates expressed concern that ne of them—particularly those ling with working and credit urs as well as pay—might be restrictive.

The recommendation on in-n pay states that an internship "should be a professional experience, one that encourages professional development," continuing:

"Professional activities signify services performed that have economic utility. Therefore, intern performance should be recognized through pay at the prevailing entry-level salary for inexperienced employees.

"Interns should, if they are ready for the experience of an internship, be able to perform at a level sufficient to make some economic contribution to hosts. The absence of compensation in this context is a form of exploitation. It can implant the idea that hosts do not place value on the interns.

"Additionally, the number of interns is increasing and they are competing, at least in a marginal way, with the graduates of our programs. This is unavoidable, but the absence of pay balances the scales against new graduates of our programs, not our interns."

The recommendations are the product of a special nine-member, AEJ committee appointed to study internships late in 1978. Co-chairs were John Stevens of Michigan and Bob Carrell of Oklahoma. Other members included Charles Arrendell of Alabama, Barbara Strauss Reed of California State in Los Angeles, William Dulaney of Penn State, Mark Popovich of Ball State, Joe Scanlon of Carleton University in Ottawa, James Hoyt of Wisconsin and David J. Eisen of TNG.

The committee's report called its recommendations "minimal." Other recommendations include:

✓ Selection of interns and their assignment "hosts" should be by "the academic unit" or by employers "from candidates approved by the academic unit."

✓ Contact between the school, the newspaper and the intern should be no less than weekly and regular reports by the intern should be filed with the school on days and hours worked and the kind of work performed.

✓ Interns should be evaluated at least twice during their internships, by both their schools' intern supervisors and the papers for which they are working.

✓ Each school should establish a minimum number of hours to be worked per credit hour and a minimum duration of intern-



No hazards found in babies probe

Toronto — Ontario's Labour Ministry has reported that the first two phases of its investigation into possible causes of birth defects in four children born to Toronto Star employees who had been working on video display terminals have shown that neither radiation nor chemicals to which they might have been exposed at the Star exceed existing safety standards [Guild Reporter, Aug. 8 and July 25].

Radiation tests on all 296 VDTs at the Star produced maximum X-ray readings of 0.05 milliroentgens per hour at five centimeters while the maximum permissible under federal regulations is 0.5, the ministry reported.

And no radiofrequency or microwave readings greater than 0.05 milliwatts per square centimeter at five centimeters were detected, the ministry said.

While there are no legislated standards for the latter, it said that the standard for microwave ovens—1 milliwatt per square centimeter—is "appropriate for comparison."

Tests for possible exposure to chemical hazards also were conducted, the ministry said in its report, and none was found. In a letter to the Southern Ontario Guild accompanying the report, the ministry said that while it feels the possibility of the mothers having been exposed to chemicals that might have had an effect on their unborn babies was "very remote," the ministry is checking with manufacturers of substances whose chemical composition was not readily available.

The ministry said it has now begun the third phase of its investigation—an examination of the medical histories of the mothers and their families.

Gannett pays $1,850 in ethics code dispute

Rochester, N.Y.—An arbitrator has ordered Gannett's Rochester dailies to pay a photographer more than $1,850 as compensation for income lost when the company unreasonably forbid him to cover the 1980 Winter Olympics on his own time for the Lake Placid Olympic Organizing Committee.

While the Rochester Guild's contract with the Times-Union, Democrat and Chronicle [illegible]

ity . . . for conceptually speaking, anything is possible," Shister said.

The evidence presented did not uphold such a finding he ruled, pointing out that another photographer from the Rochester papers, not the grievant, was assigned to cover the olympics for the paper. This eliminated any significant probability of a conflict of interest being created by the public relations nature of the work, the [illegible]

Pregnant CRT Operators Win Work Boycott

By Lois Paul
CW Staff

TORONTO — Four pregnant employees at Bell of Canada here recently won the right to refuse work on CRT terminals without loss of pay.

The women, who took part in a work boycott at the end of March, cited a Canadian law that allows workers who believe their health and safety are in jeopardy to refuse to do a particular job.

"The source of their refusal was fear of radiation with relation to birth defects and the stress of not knowing for sure that the equipment caused any kind of hazards to reproduction," according to Gary Cwitco of the Communications Workers of Canada.

The government was called in to investigate, but the Communications Workers union felt the radiation test would not give a definitive answer.

"It was our sense that the machines would be tested and the radiation levels would indicate low or no levels of radiation, as the National Institute for Occupational Safety and Health test showed in San Francisco, or tests in the United Kingdom, or anywhere else," Cwitco said.

A source of major concern was a case in August 1980 at the *Toronto Star* where four of seven children born to women working on CRTs in the same office during the same period of time had birth defects.

Cwitco said that although the issue of radiation has been rejected by science as a positive factor in that case, there has been no substantial information explaining how that kind of cluster could have occurred.

"Chances of that occurring by coincidence are very low, given the national average of three out of 100 births and the fact that this involved four out of seven births," he stated.

The union wrote to Bell of Canada indicating that in the absence of specific information to the contrary, it would be better to err on the side of safety and allow these women to do other jobs.

The employer agreed and, after a day of negotiation, said the women could ask for and receive other work or take early maternity leave, in addition to their general leave, without losing their jobs.

This interim agreement is effective until the end of May. Until then, the union and the company are looking at other parts of the agreement, regarding items such as seniority rights, in terms of looking into a more long-term agreement.

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Local Network

Net Up at IBM, CDC, NCR, Honeywell; Burroughs' Dips

IBM reported a 12.4% increase in revenues and a 7.1% increase in earnings for its first quarter of fiscal 1981.

Net earnings for the period totaled $730 million or $1.25 per share, up from $681 million or $1.17 per share in the corresponding period last year.

Revenues climbed to $6.5 billion, up from $5.7 billion in the prior year's first period. Revenue from sales totaled $2.47 billion, up 15.8%; rental revenue was $2.7 billion, up 4%; and revenue from services reached $1.2 billion, up a whopping

quarter results.

At the company's annual meeting last month, Burroughs Chairman W. Michael Blumenthal told shareholders that earnings comparisons for the first half of 1981 would be unfavorable when compared with the first period of 1980, but that the second half of the year should show positive growth.

Revenues were $756.5 million, up from $673.6 in the same quarter a year ago. Outright sales revenue increased 12% and rental revenue rose 7%, while service revenue advanced

and operators—through an RB unit clarification proceed-ng," after it reorganized its cor-porate structure. It combined management of its newspaper and broadcasting interests and created a corporate data process-ing department to handle finan-cial data previously performed in separate newspaper and broad-casting divisions.

The regional director ruled that the transferred employees had not been removed from the Guild's bargaining unit, noting that al-though they are working with newer, more sophisticated equip-ment on an expanded basis, they are performing "essentially the same functions that were per-formed previously."

He also noted that they had transferred between different di-visions of the same employer and perform essentially the same basic work functions and job duties ... and remain under the same ultimate supervision at the same work facility, the transfer cannot be viewed as removing the employees from the currently recognized bargaining unit," the regional director wrote.

VDT testing ending in birth defects probe

(Continued from Page 1)

couver Sun and Province.

In the United States, the St. Louis and Philadelphia Guilds re-ported that they had begun dis-cussions of radiation tests with the managements of the newspa-pers with which they hold con-tracts.

A full report on the findings of the nearly three weeks of radi-tion testing at the Toronto Star was expected from the provincial labor ministry after the tests' completion, Bryant said.

Meanwhile, however, he ex-pressed amazement at the conclu-sion of an official of the Toronto Dept. of Public Health that "the energies of government officials should not] be wasted" on testing VDTs for radiation since previous sts have not turned up levels of emissions considered harmful.

Gerald Caplan, co-ordinator of the advocacy unit of the city health department, stated categor-ically in concluding a 14-page re-port released July 30 that "the birth defects in the babies of the four Star employees were *not* caused by radiation emissions from VDTs."

Bryant said that as nearly as he could determine, neither Caplan nor anyone from his department had participated in the provincial ministry's testing of the Star's VDTs.

As far as he could tell, Bryant said, Caplan's report is simply a compilation of reports of tests conducted by others elsewhere.

aily News group tes 'no' on Guild

New York — The New York ild lost a bid to represent 37 culation telephone solicitors in New Hyde Park office of the ly News, July 25.

he vote in an election con-ted by the National Labor Re-ns Board was 12 for the ld and 29 for no union.

he local filed a petition to esent the 37 circulation em-ees on April 23.

On recherche un(e) adjoint(e) administrif(ve)

La Guilde des services de presse du Canada est à la recherche d'une personne intéressée à faire une carrière au sein d'une organisation syndicale qui représente des membres des services de radiodiffusion et des services de presse à travers le pays.

Les candidats(es) doivent être BILINGUES et capables de travailler dans les deux langues officielles. Ce poste com-prend des fonctions de secrétariat et d'administration. Le bureau se situe à Toronto.

Une connaissance du mouvement syndical et de l'expéri-ence dans les média d'information serait un atout. Le salaire et les avantages sociaux sont à discuter.

Prière de communiquer avec:

Jerry E. MacDonald
Directeur exécutif
Guilde des services de presse du Canada
265 Balliol Street
Suite 1708
Toronto, Ontario M4S 1C8

Capital Cities, Times-Leader against the Wilkes-Barre Guild, TNG, the Wilkes-Barre Council of Newspaper Unions and the other local and international unions in-volved in the 22-month-old strike against the paper.

The publisher charged the Guild local and TNG with breach of contract, alleging that Guild members violated the outside ac-tivities clause of the Guild's old contract by participating in the organization and operation of the Citizen's Voice, the interim strike paper launched after the Guild, printers, pressmen and stereo-typers struck Oct. 6, 1978.

The other unions, the council of unions and TNG were charged with inducing Guild members to violate the outside activities clause of the contract that ex-pired Sept. 30, 1978.

The U.S. District Court judge dismissed the charges as not prop-erly before the court noting, among other things, that the company had not exhausted ar-bitration remedies in its claim that the contract has been vio-lated and that it failed to show that TNG is a party to the con-tract.

The company has appealed the ruling.

Meanwhile, National Labor Relations Board elections have been conducted on petitions to decertify the Guild and the Ty-pographical Union locals as bar-gaining agents for employees of the Times-Leader.

Both strikers and strikebreakers voted in both elections and bal-lots have been impounded pend-ing the disposition of challenges. In both elections the strikers voted at the court house, while strikebreakers voted in the plant.

The election to decertify the printers was held May 23. Eighty-four ballots were cast, 17 inside the plant.

Guild's jurisdiction, was con-ducted July 17. It had been de-layed by Guild charges to the NLRB that the company had committed unfair labor practices by engaging in surface bargain-ing. These charges were dismissed by the NLRB's regional director and the dismissal was subsequent-ly upheld by the NLRB in Wash-ington.

Guild strikers cast 85 ballots in the election; 72 ballots were cast by strikebreakers.

Both the Guild and the Typo-graphical Union have objected to the NLRB's counting the ballots of the strikebreakers on grounds that they are temporary replace-ments and, therefore, not eligible to vote. The strikers point to the absence of notice from the em-ployer that they have been per-manently replaced.

An NLRB regional director has ruled, however, that the replace-ments are permanent. Appeals from that ruling are before the NLRB in Washington.

More recently, the Guild has filed a new unfair labor practice charge alleging that the company has discriminated against strikers in computing pension credits of those who have retired since the strike began.

Vancouver petitions for Racing Form unit

Vancouver — The Vancouver-New Westminster Guild has pe-titioned the British Columbia Labour Relations Board for certi-fication as bargaining representa-tive for all six members of the editorial staff of the Vancouve edition of the Daily Racing Form.

The petition was backed by membership applications and bargaining designations from more than the 55 percent requiredfor certification without an electon, a local representative said.

Guild Reporter Aug. 8, 1980

VDT testing ending in birth defects case

Toronto—The Ontario Ministry of Labour's Bureau of Radiation was expected to complete tests for emissions on all the video display terminals at the Toronto Star Aug. 7, the first step in an investigation into the possible causes of birth defects in four children born to Star classified telephone sales employees late last year [Guild Reporter, July 25].

All four of the mothers had worked on the machines during their pregnancies.

Next steps in the investigation will include testing of the air in the plant for potentially harmful chemicals and a study of the medical and health records and histories of the four women, according to a Guild representative.

John Bryant, Southern Ontario Guild executive secretary, said all four mothers have agreed to co-operate.

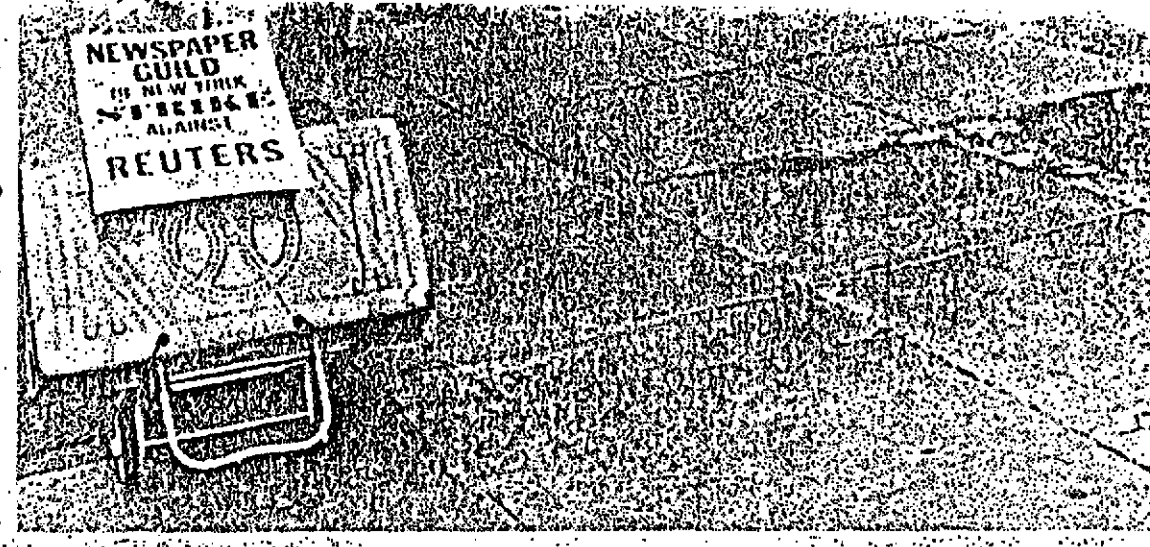
The emissions tests were begun July 22 at the behest of the Guild. First machines tested were those in the classified telephone sales department and none tested during the first three days was found to be emitting either X-rays or microwaves in excess of Canadian standards.

The provincial radiation bureau was testing "every VDT in the Star—even the closed circuit television sets used in plant security," Bryant said.

Meanwhile, the Star continued to permit pregnant employees in all of the newspaper's departments to decline to work on VDTs, Bryant said, a practice also instituted by at least four other Canadian newspapers as well in the wake of the reports of the birth defects in the Star employees' four children, all born between October and December.

The Toronto Globe and Mail, in response to a Guild request, said it would not require pregnant employees to use the machines at least until after its VDTs are tested for radiation. The same sort of arrangements followed Guild requests at the Montreal Gazette and at the Van-

(Continued on Page 4)



Raymond Crowell/Merkle Unit/Washington-Baltimore

HAVE SIGN—WILL PICKET

Striking Reuters Guild Unit members picketing Washington Bureau are, from le Marsha Dubrow, Ralph Dannheisser, Graham Colville, Ron Thomson, Mary Beth Michael, Chris Hanson and Ranjit DeSilva. Obscured: Robert Green.

Cleveland Press is latest to go on sales bloc

Two newspapers—one chain-owned and one not—plus an entire newspaper chain—with a Guild contract at one of its dailies—are on the sales block.

In addition, two papers in a chain bought early this year by a larger chain are going to be combined into a single all-day daily.

On top of that, one chain has sold one of its papers to another chain and the U.S.'s largest chain has been ordered by a Federal court to return a paper to its previous owner.

On the block are Scripps-Howard's Cleveland Press, the independently-owned Denver Post and the Panax chain's papers, including the Macomb Daily where the Detroit Guild has a contract.

The two papers to be merged into one are the Victoria Colonist and Times of the old F. P. Publications chain, purchased by Thomson Newspapers in January.

In addition, the Thomson chain has sold the Calgary Albertan to the Toronto Sun Publishing Corp., and a U.S. District Court ordered Gannett to return the New Mexican in Santa Fe, to its former owner after a jury found the chain had violated the terms of the 1976 purchase agreement.

A prospective buyer of the Cleveland Press, Joseph Cole, former treasurer of the Democratic Party and a Cleveland businessman, has met separately w leaders of the Cleveland Gu and local Teamster leaders proposed a package of econor concessions, including some offs, contract extensions and year's wage freeze.

In May, the Press redu Guild-covered commercial dep ments by 18 employees thro economic discharges and buyo

Cole, who reportedly wo convert the Press to morning p lication and perhaps add a S day edition, has said the Tea ters are pivotal to his decision purchase.

There are reports that Scri Howard will close the Press is unable to sell the paper or ter a joint operating agreem with Newhouse's Cleveland P Dealer.

(Continued on Page 6)

All Bay Area pacts OK'd Page 3

$50 more won for trainees Page 3

Tribute to a Guild friend Page 5

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IRLG Comes to an End Quietly p. 5

Birth Defect and Miscarriage Clusters Stir Up More Fears Over VDTs

The debate over VDT radiation hazards continues despite the government's verdict that the machines are safe. The controversy, initially focusing on alleged microwave-induced cataracts, now includes allegations that VDTs might affect pregnant women. In the last 18 months, there have been at least four reported clusters of miscarriages and infants born with defects among clerical workers in the US and Canada. Each group involved women who either worked on or around VDTs during pregnancy.

The cluster at the *Toronto Star* is best known: 4 out of 7 infants born to a group of VDT operators within a year had defects. Three other clusters have received less publicity: 7 out of 13 Air Canada employees in Montreal miscarried during one year; 3 cases of birth defects and 7 miscarriages out of 15 pregnancies occurred at a defense contracting office near Atlanta over one year; 8 out of 12 pregnancies had adverse outcomes at a Sears, Roebuck office in Dallas within a 14 month period.

Chance is the only explanation offered for these cases. Dr. Nancy Binkin, an epidemiologist at the Center for Disease Control (CDC), explained that clusters will occur simply because so many women work on VDTs. She hypothesized that the one case she investigated was such an "expected-unexpected" cluster.

Several unions representing VDT workers find this reasoning difficult to accept. Commenting for the Ontario Public Service Employees Union

(continued p. 2)

DOD to Expand Project ELF and Add Fourth PAVE PAWS

The Department of Defense (DOD) announced plans to expand its Project ELF antenna system and build another PAVE PAWS radar in the southwestern US, as part of its program to strengthen and rebuild the nation's command, control and communications (C') system.

The Navy will spend $230 million enlarging its extremely low frequency (ELF) submarine communication system, known as Project ELF, designed to send orders to submerged submarines in case of nuclear war. The existing 28-mile test facility, located near Clam Lake, WI, will be upgraded and a new transmitter with a 56-mile antenna will be built on Michigan's upper peninsula, near K.I. Sawyer AFB. The Navy plans to have the system operational by 1985.

Michigan's two democratic senators, Don Riegle and Carl Levin, immediately denounced the move as a waste of money. Northern Michigan Congressman Bob Davis said that he preferred a blue-green laser system to Project ELF. Jenifer Speicher of Stop Project ELF, a local citizen's group, warned that the DOD decision "was just a foot in the door for a much larger system," and vowed to continue to fight the project.

(continued p. 3)

VDTs

(continued from p. 1)

(OPSEU), Robert DeMatteo said, "I don't know how anyone can chalk up the clusters to chance, to a statistical quirk. They warrant very intense investigations, including radiation testing." A number of Canadian unions, responding to the events at the *Star*, have won the right for pregnant women to do non-VDT work. Labor agreements with Bell Canada, the Open Learning Institute in British Columbia and the Ontario New Democratic Party Caucus now include this option.

This labor concern is not supported by the majority of expert opinion in the US and Canada. At both a House subcommittee investigation on VDTs (see *MWN*, June 1981) and a National Academy of Sciences symposium on VDTs and vision (see *MWN*, September 1981) the consensus was that radiation risks are negligible. Reports from Scandinavia, however, have linked high electrostatic charges from the machines to facial rashes.

Sears, Roebuck and Company

In August 1980, the consulting physician at the regional headquarters of Sears, Roebuck and Company in Dallas, TX, placed a concerned call to CDC in Atlanta, GA. Within the last 12 months, a majority of pregnancies among VDT workers resulted in miscarriages. An investigation by the center's Abortion Surveillance Branch found 7 miscarriages and a premature infant death between May 1979 and June 1980 among workers at the Sears VDT computer center. Four other pregnancies successfully came to term.

CDC could not identify a common factor to explain the 8 out of 12 adverse outcomes, according to its May 1981 report [EPI-80-113-2]. The 5,000-square-foot computer center employed 75 people and contained 29 VDTs. Only two of the eight women worked full-time on the terminals.

The CDC report described VDTs as "an unlikely cause," in part because the risk of miscarriage "was not related either to proximity to the VDTs within the room or to the amount of time spent working with the machines." It continued, "Consistency with known scientific facts is also important in establishing causality. No previous clusters of spontaneous abortion due to VDT exposure have been reported."

The estimated probability that 8 out of 12 pregnancies would be unsuccessful by chance is 6 in 10,000. The expected rate of adverse pregnancies is 16 out of 100 in the US.

CDC calculated the probability of the cluster over a three-year period encompassing 20 rather than 12 pregnancies. By beginning the time interval from August 1977 instead of from May 1979, the expected chances for the cluster rose to 6 in 1,000. Binkin, who was CDC's chief investigator in Dallas, told *Microwave News* that the longer interval was recommended by NIOSH epidemiologists to help identify trends within the population, including its normal rate of problem pregnancies. Since the report was completed, the figures have been recalculated to include a fourth year.

Binkin hypothesized the miscarriages were a chance cluster. In her report she explains: "With 7 million VDT workers in the United States, many of whom are women of reproductive age, we would expect to see—on the basis of chance alone—several clusters similar to the one reported at Sears."

CDC sent another set of questionnaires on pregnancies to Dallas this summer. No problems have been reported since the initial investigation.

Defense Logistics Agency

There were 7 miscarriages and 3 cases of severe birth defects out of 15 pregnancies between October 1979 and October 1980 at a Defense Logistics Agency (DLA) regional contracting office in Marietta near Atlanta, GA. Two other pregnancies conceived in this period failed to come to term—one was ectopic and one was terminated by a therapeutic abortion. An investigation by the Army Environmental Hygiene Agency in February could not find a cause for this cluster: it termed the birth defects an "unusual statistical event."

The Army consulted CDC in setting up its study. The center was also called in by DLA to review the Army report and to speak with employees. According to Larry Edmonds, the participating CDC epidemiologist, some workers were concerned that the Army's role constituted a conflict of interest. He said the center "basically agreed" with the report [Occupational Health Special Study No. 66-32-1359-81].

Investigators reviewed VDT use and then ruled it out as a possible factor. According to the DLA office's health and safety manager, the amount of time each woman spent on a VDT ranged from full-time to a few minutes a week. He said 14 healthy babies have been born since the study period. The office employs 206 women who are below the age of 45.

Air Canada

In the most recently confirmed cluster, 7 out of 13 pregnant employees at Dorval Airport miscarried between February 1979 and February 1981. The women used VDTs as part-time workers at Air Canada's check-in counter. The airline employs about 130 women at this Montreal-area airport.

The Canadian Air Line Employees' Association (CALEA), representing the Air Canada workers, surveyed the women at Dorval early this year and in February requested radiation checks. According to CALEA's Jane Armstrong, both the Department of Health and Welfare and Labor Canada felt tests were not warranted. At the union's insistence Air Canada hired the Canadian Standards Association (CSA) to check for X-rays. CSA found no detectable ionizing radiation among the 26 VDTs tested.

CALEA wants tests for non-ionizing radiation and precautions for VDT users, including alternate work for pregnant women. Armstrong stressed, "We must take a more critical attitude. The government should be much more involved in promoting radiation research, rather than just giving VDTs a clean bill of health."

Air Canada contends VDTs are safe. In a July 1980 position paper, company director of medical services, Dr. Peter Vaughan, cited surveys by the US National Institute of Occupational Safety and Health and concluded VDTs "do not appear capable of producing levels of radiation presenting an occupational hazard."

Frank Stevens, Air Canada's manager of airport services, underscored this position in a recent interview: "We are convinced as a company and as a country that there is no radiation problem."

Canada's Department of Health and Welfare has ruled there is no radiation hazard. According to Dr. Ernest Letourneau, director of the department's radiation protection bureau, surveys of over 200 VDTs performed in Canada over the last ten years support this conclusion. Summarizing these data in an article for the September 15 *Canadian Medical Association Journal*, Letourneau wrote: "VDTs emit no ionizing radiation

(X-rays). There is no evidence that at the detected levels the non-ionizing radiation emitted from VDTs can produce biological effects or pose any hazard to health. Thus, in the absence of a cause it is hard to establish a link between VDTs and cataracts or birth defects."

The absolute statements in this widely read article, as well as Letourneau's use of unpublished data, have drawn criticism from Toronto union officials. The author's assurance that terminals emit no X-rays, for example, appears to contradict a US Bureau of Radiological Health (BRH) report [FDA 81-8153, February 1981] which revealed some units, tested since 1975, emitted X-ray radiation. (See *MWN*, May 1981.)

Letourneau, when asked to comment, explained that the leaking units were old color sets requiring much higher power levels than common black and white VDTs. He said X-rays cannot escape from low power machines. A BRH spokesman said that two out of three models in question were color monitors.

A report on the Canadian surveys, now in draft form, should be published by spring 1982.

Toronto Star

Four cases of birth defects at the *Toronto Star* generated the most fear among VDT users. Four out of 7 pregnant VDT operators in the classified advertising department gave birth to infants with defects between May 1979 and May 1980, but two of the defects, a club foot and a cleft palet, might be explained by family medical history or the condition of the pregnancy. The causes of an underdeveloped eye in a third infant and multiple heart abnormalities in a fourth are unknown. Birth defects occur in approximately three percent of live births in Ontario.

The Ontario Ministry of Labor checked all 296 terminals at the *Star* at the request of the Southern Ontario Newspaper Guild. The classified advertising department accounted for 100 of the machines. According to the ministry's report, no power densities greater than 0.05 mW/cm^2 were detected for 10 MHz to 26 GHz radiation.

The *Star* investigation is continuing. Union and newspaper officials are now attempting to get the four women to fill out a questionnaire prepared by doctors from the University of Toronto. Only two of the women filled out a previous questionnaire made up by the *Star's* physician.

Union spokesman John Bryant confirmed that radiation is still a concern: "There is no proof that VDTs are the culprit, but we are not satisfied by the investigation of the Ontario government nor by their conclusion that VDTs are safe." According to Bryant, VDTs will be an issue in next year's labor negotiations with the *Star*. Among other measures, the union wants to guarantee the option of non-VDT work for pregnant women. *Star* policy now allows for a job change, but the union wants to formalize this rule.

At the time the *Star* story broke, rumors spread about birth defects among VDT operators at the Gander, Newfoundland, telephone company. Since Terra Novel Tel (TNT) installed VDTs in 1976, 1 infant was stillborn and 2 infants had defects out of 31 pregnancies. After the birth of the third baby, the company discovered the other birth problems and had the VDTs checked for X-ray radiation. Canadian National Telecommunications in Toronto, TNT's parent company, checked 98 machines and found no detectable ionizing radiation.

* * * * *

It is impossible to know how many clusters exist. CDC is the clearinghouse for queries on abnormal pregnancies and birth defects, and receives one or two reports of clusters each month. It cannot evaluate how many of them are significant, however. Edmonds knew of only two other possible clusters involving clerical workers, one in Great Neck, NY, and another in Washington, DC.

American Express Company contacted CDC this year when four women at its Greak Neck building miscarried between June 23 and 29. Altogether, six women miscarried between April and July. A spokeswoman for the company said none of the people involved used or worked near the 15 VDTs in the building. American Express declined to release independent reports on investigations performed by the Fireman's Fund of Connecticut and the Occupational Health Services of Union, NJ, but confirmed no causal links were identified.

In Washington, DC, a CDC survey found 7 out of 20 women in one building miscarried between spring 1979 and spring 1980. The women worked in several different offices. Because of a poor response to the center's questionnaire, Edmonds reported the survey could not confirm or rule out a problem.

The Mount Sinai School of Medicine's epidemiological study of VDT operators could be a key to evaluating "expected-unexpected" clusters. David Eisen of the Newspaper Guild believes the study's comparison of user and non-user populations "could provide the basis for figuring out if anything is happening because of VDTs." Mount Sinai's questionnaires were sent out to seven participating guild locals in late October. Project director Dr. Arthur Frank expects preliminary results by the beginning of next year.

ELF and PAVE PAWS

(continued from p. 1)

Last spring, there were reports that Chief of Naval Operations, Admiral Thomas Hayward, had recommended that the project be scrapped. Within a month, however, Secretary of Defense Caspar Weinberger decided to reactivate the then-mothballed Clam Lake facility. (See *MWN*, April and May, 1981.)

The current design for the ELF antenna is much smaller than previous proposals, Project Sanguine and Project Seafarer, which had 6,400 and 4,000 miles of antenna, respectively. In fact, the antenna is now too small to allow full communication between ship and shore. With this new system, a typical message only tells the submarine to surface in order to receive more detailed instructions.

The Air Force has decided to build a fourth PAVE PAWS radar at Goodfellow AFB, TX, in the southwestern US. The installation is designed to detect and track submarine-launched missiles from the South Pacific. An Air Force spokesman said that the total cost of the Goodfellow radar will be $100 million, compared to $90 million for the previously announced southeastern PAVE PAWS at Robins AFB, GA. Two PAVE PAWS radars are now operating at Otis AFB, MA, and Beale AFB, CA.

Other elements of the Reagan plan to upgrade the C^3 system are to develop and install very low frequency and low frequency receivers on strategic bombers and to develop a new high frequency satellite system to improve battlefield communications.

* * * * *

In other developments, the Congressional Budget Office has issued a report, *Strategic Command, Control and Communications: Alternative Approaches for Modernization,* outlining various options for the Congress to consider....Eli Brookner of Raytheon has published "A Review of Array Radars," in the October issue of *Microwave Journal*. The article covers COBRA DANE, PAVE PAWS, PATRIOT and many other radar systems....Submarine laser communication will be the subject of a classified session at the IEEE's EASCON '81 "Government-Industry Interchange" at the Washington Hilton on November 17.

effective when used with 9-in. or smaller CRTs, though. It can be of some benefit when designing with larger CRTs, but it probably won't entirely eliminate reflection and glare. Most terminal manufacturers, therefore, use one of six other common antireflective treatments.

Plastic overlays. The least expensive antireflective treatment employs a plastic overlay or panel that is either user removable or permanently installed in front of the CRT. Choices range from simple matte-finish or dark-colored transparent panels—flat or following the CRT curvature—to contrast-enhancing spectral filters. Depending on type, these panels cause varying degrees of degradation in resolution and focus, reduce light output, scratch easily, are vulnerable to fingerprints and cleaning abrasions and might require periodic replacement. However, low initial purchase price makes plastic overlays the most cost-effective solution to date. Several US manufacturers produce this class of product.

Bonded, etched glass faceplates. Many cathode-ray tubes are available with an etched glass faceplate permanently bonded to the CRT face and conforming to its curvature. This method is very effective in terms of scratch resistance and durability, in eliminating ambient-light reflections and in enhancing contrast. On the debit side, it's not recommended for use at temperatures above 50°C, is substantially more expensive than plastic panels and causes some performance degradation. Etching produces varying degrees of optical diffusion, resulting in fuzzy characters. More importantly, the additional layer of glass or plastic in front of the CRT face reduces light output, mandating higher CRT beam intensity for a desired brightness. This higher beam intensity in turn produces additional diffusion, which degrades resolution and focus. Bonded, etched glass faceplates are the most common antireflective factory option offered by CRT-display-module manufacturers.

Direct-etch CRTs. Various means are available to directly etch the face of a CRT to eliminate the need for bonding an etched panel to it or using a separate overlay. Most of the direct-etch techniques (unpolished glass, acid etching, sand blasting) suffer mass-production limitations with respect to achieving both uniform gloss and even faceplate shading. Some problems also arise as a result of optical diffusion. But direct-etch CRTs currently are undergoing intensive development and in the near future could become a very cost-effective, marketable alternative.

Limited-viewing-angle panels. Extremely high ambient-light levels (such as direct sunlight or unusually intense interior lighting) render most antireflective treatments ineffective. However, you can obtain a microscopically louvered plastic panel capable of horizontal or vertical mounting on the terminal in front of the CRT, producing a "Venetian blind" effect. The display can then be viewed only from a limited direction or over a limited angle. Such panels come in a range of possible viewing angles. This method causes minimal degradation in resolution, focus and light output, but it is somewhat expensive, and the restricted viewing angle might not prove desirable in all applications. It is highly effective in blocking out intense ambient light, though. Limited-viewing-angle panels find extensive use in security applications (such as banking terminals), where they prevent anyone but authorized personnel from viewing data on the screen.

Polarizing filters. Made in two bonded layers, polarizing filters are plastic or glass overlays used in front of a CRT. The layer closest to the observer is a linear polarizer; the one next to the CRT face, a quarter-wavelength filter. Polarizing filters cause minimal degradation of focus, resolution and light output, but they are usually used only over small screen sizes because of their high cost.

Optical coatings. Vacuum- and heat-deposited optical coatings applied to a CRT faceplate produce an excellent-quality antireflective treatment that doesn't degrade CRT performance. Although optically coated CRTs are susceptible to fingerprint smudges, such smudges are readily cleaned up without abrasives. Typically, though, the optical-coating process is expensive compared with other alternatives.

Some of the foregoing antireflective treatments must be applied to the tube before assembly of the CRT module. Bonded etched glass, direct etch and optical coatings fall into this category, and their cost gets included in the purchase price of the module. Other alternatives (plastic panels, limited-viewing-angle panels and polarizing filters) can be purchased by the terminal manufacturer as add-on components. Table 2 summarizes the approximate costs of the various antireflective methods. **EDN**

Author's biography



Ed Fleissner, a customer engineer at Motorola Display Systems, West Chicago, IL, helps customers properly apply his firm's products. He holds an Associate degree from Old Dominion College, Norfolk, VA, and has been with Motorola for 4 yrs. Ed engages in personal aviation and amateur radio as hobbies.

Reference

"Increased capabilities for raster-scan displays," Application Note AP-01-1274, Motorola Display Systems, 1155 Harvester Rd, West Chicago, IL 60815.

Article Interest Quotient (Circle One)
High 488 *Medium* 489 *Low* 490

A video terminal's no better than its CRT's readability

A green phosphor of medium-short persistence, P31 is more luminescent than P4, has good focus and small-dot-size capabilities and is highly resistant to phosphor burn. It presents a slight cost premium, however, and like P4 it is not suitable for interlaced operation. The European equivalent of P31 phosphor is GH.

A yellow-green, long-persistence phosphor, P39 operates down to 25 Hz without flicker and because of its longer persistence is used almost exclusively in interlaced displays. It exhibits fairly good luminescence and, when used in a high-quality display, provides small dot size and good focus capabilities. Because of P39's long persistence, however, characters on the screen fade slowly, so a moving cursor leaves a momentary trail. Moreover, because it burns easily, it is not suitable for data displays in which the format remains fixed for long periods of time. P39's European equivalent is GR.

TABLE 1.— PHOSPHOR CHARACTERISTICS

TYPE	COLOR	PERSISTENCE	DECAY TO 10% BRIGHTNESS	COMMENTS
P4	WHITE	MEDIUM OR MEDIUM-SHORT	60 μSEC	LOW COST; READILY AVAILABLE. MODERATE RESISTANCE TO BURN; NOT SUITABLE FOR INTERLACED OPERATION
P31	GREEN	MEDIUM-SHORT	38 μSEC	GOOD LUMINESCENCE; HIGH RESISTANCE TO BURN; NOT SUITABLE FOR INTERLACED OPERATION; SLIGHT COST PREMIUM
P39	YELLOW GREEN	LONG	150 mSEC	ELIMINATES INTERLACED-MODE FLICKER; SUSCEPTIBLE TO BURN; SLIGHT COST PREMIUM

TABLE 2 — COST COMPARISON OF CRT ANTIREFLECTION METHODS

	75¢ TO $5 ($1.50 TYPICAL)	$10 TO $15	$20 AND UP
FACTORY SUPPLIED (COST INCLUDED IN PURCHASE PRICE OF CRT MODULE)	DIRECT ETCH	BONDED, ETCHED GLASS	OPTICAL COATING
ADDITIONAL COMPONENT	PLASTIC PANELS	LIMITED VIEWING-ANGLE PANEL	POLARIZING FILTER

Interlacing and CRT phosphors

Interlacing is one of the most common and cost-effective ways to achieve greatly increased character densities at conventional horizontal scan rates (EDN, September 5, 1979, pg 207). At the US-standard noninterlaced 60-Hz refresh rate, the quick fading of short- to medium-persistence phosphors presents no problem because the viewer's eye retains the character image long enough to make any fading imperceptible. In interlaced operation, however, where only half the image is refreshed during the vertical sweep cycle, the refresh rate effectively becomes 30 Hz. Here, the eye cannot retain the character image long enough to prevent a pronounced display flicker if a short- to medium-persistence phosphor is used. Therefore, the glow of the phosphor must persist long enough to compensate for the slower refresh rate—hence the need for a long-persistence phosphor such as P39.

The flicker threshold of the human eye occurs at about 50 Hz with a short- to medium-persistence phosphor, so terminal manufacturers designing for the European-standard 50-Hz operation must pay particular attention to the phosphor used. It should have a medium to medium-long persistence for noninterlaced operation and long persistence for interlaced arrangements. (You can reduce a small amount of flicker in the display by lowering the brightness very slightly, or by using an etched antireflective faceplate.)

Not all display modules are capable of interlaced operation; check with the manufacturer. The reference contains additional information on this subject.

Green phosphors? Why not white?

The recognition that yellow-green corresponds to the peak spectral response of the human eye has been responsible for a number of changes in society, including the shift to this highly visible color for use on emergency vehicles. Many terminal manufacturers have also taken note of this fact. Thus, although green and white phosphors are currently equally popular, a trend might be developing toward the increased usage of green.

Because the eye responds most effectively to yellow-green, a CRT with yellow-green or green phosphor provides greater apparent contrast at lower beam current. In turn, this lower current produces less beam diffusion, resulting in better resolution and focus. And because a display with yellow-green or green phosphor can operate comfortably at lower brightness levels, the use of these colors also helps alleviate operator eye strain.

Glare creates confusion, causes fatigue

Whichever phosphor is employed, glare and reflection on a CRT's face can promote operator errors and are suspected of causing eye strain and fatigue. Several ways of imparting antireflective capabilities to a CRT exist—each with its tradeoffs. Many are unsuitable for high-volume or competitive applications because of the prohibitive cost involved. And most cost-effective treatments result in some loss of brightness, focus or resolution.

One very simple solution, long used by instrumentation manufacturers, involves designing cabinetry with deep and angled bezels, or with hoods or visors. This technique eliminates ambient-light reflections without the addition of performance-degrading screens or filters. It's also possible to mount a CRT in a cabinet that lets the user adjust the angle of tilt for varying light conditions and individual preference.

Cabinet design as an antireflective treatment is most

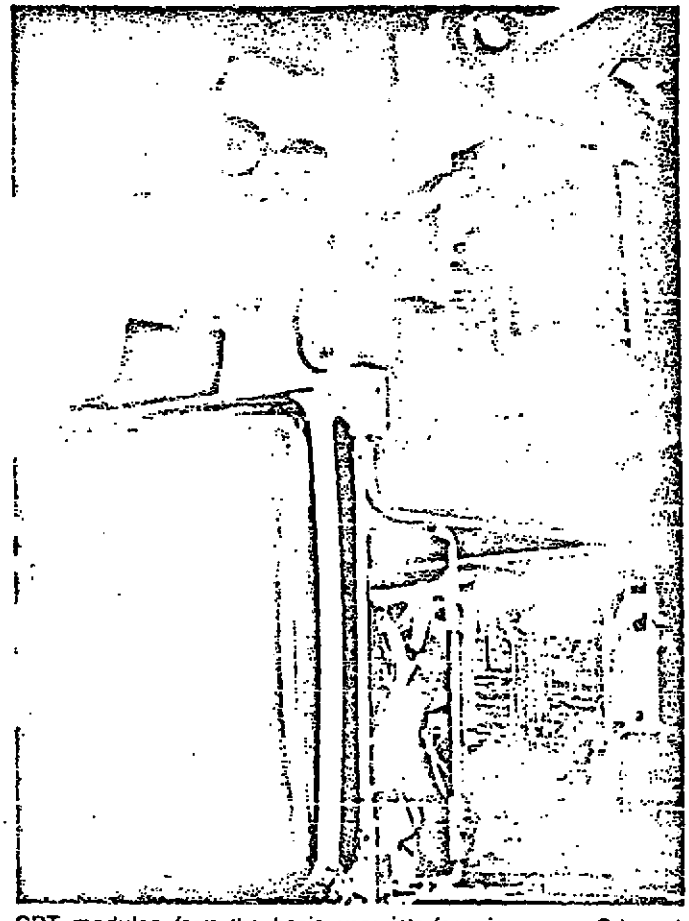
Designing/buying a terminal? Be sure to specify the right CRT

What type of phosphor is best for your CRT application? Do you need an antiglare shield? If so, what type? The answers to these questions are critical, for a terminal's CRT is the user's primary interface to your μC-system design.

Ed Fleissner, Motorola Display Systems

Assume that your μC-based system requires a video monitor and that the circuitry for that unit (whether designed in house or purchased from a monitor manufacturer) operates perfectly. Do you realize that—electronics notwithstanding—the user viewing the display might classify the entire system as a dud? Why? Perhaps because the CRT phosphor causes character distortion, or because the glare from ambient lighting renders the displayed symbols unreadable.

Fortunately, you can avoid both of these pitfalls by being aware of CRT options and the tradeoffs among them. What follows is some design perspective on common CRT-phosphor characteristics, plus the details of various CRT antireflective treatments.



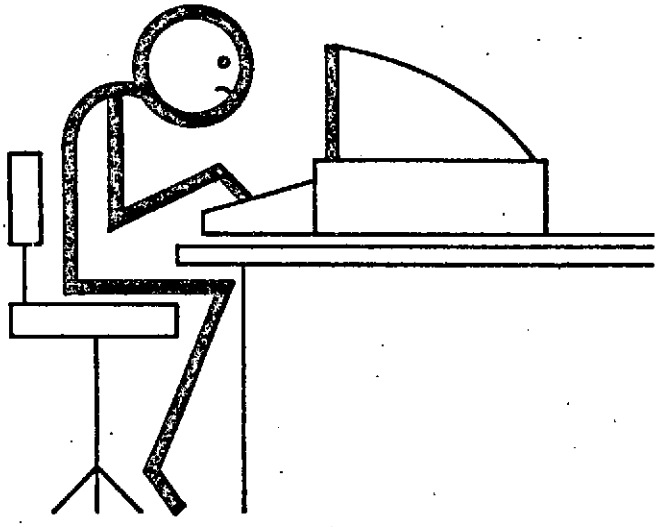
CRT modules *form the basic user interface in many μC-based systems, and critical to their ease of use is the quality of their display. That quality in turn depends on the type of phosphor used and the antireflective measures taken.*

White, green and in between

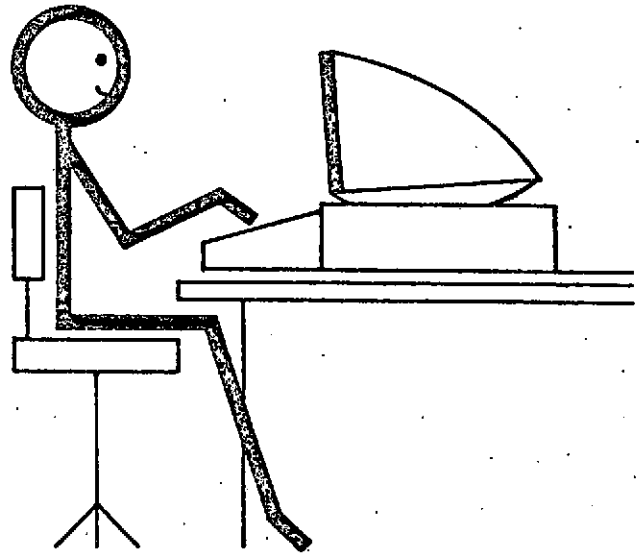
Cathode-ray tubes are available with a wide choice of phosphor types and color (see box, "Green phosphors? Why not white?"). More than 100 standard US and European phosphors exist, and there are at least as many custom-mixed varieties for specialized applications. However, many are unsuitable for data-terminal applications because of their physical properties, cost or availability. Therefore, just three phosphors are most often employed in data displays in the United States—P4, P31 and P39 (Table 1).

Low in cost and readily available, P4 (white) phosphor is a standard monochrome TV-receiver material that permits good focus and small spot size. It's a medium- to medium-short-persistence phosphor (depending on the manufacturer); i e, the glow activated by the electron beam fades away fairly rapidly, leaving no cursor trail or temporary ghost characters. As is characteristic of medium- and medium-short-persistence phosphors, P4 resists phosphor burn—the formation on the unlit CRT face of a permanent dark pattern of often-repeated portions of the character format. (Susceptibility to burn is somewhat proportional to persistence; longer persistence phosphors are more likely to burn.) Because of its relatively short persistence, though, P4 phosphor is not suitable for interlaced operation. Its European equivalent is W.

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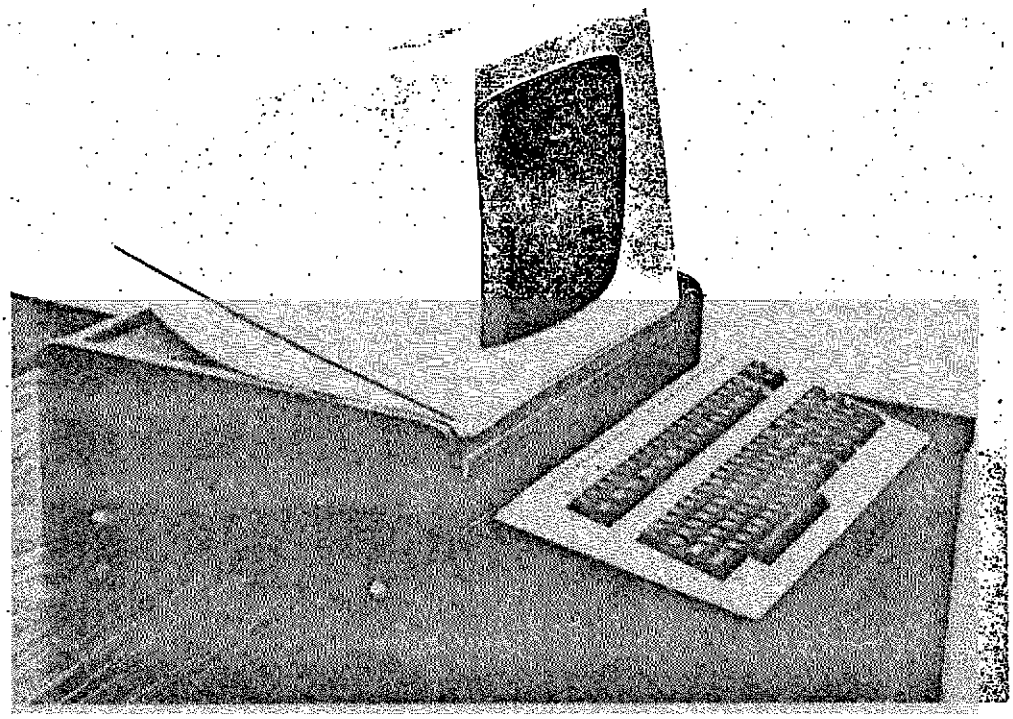
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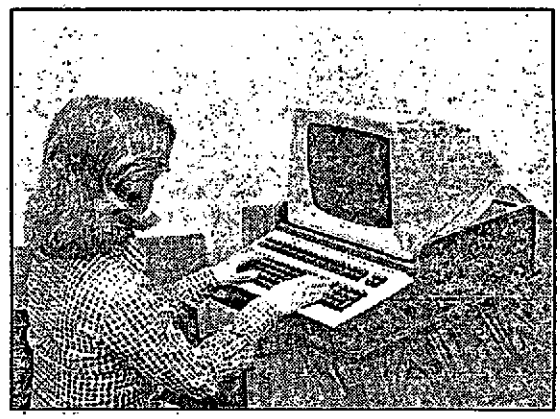
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Form defines video-display interface

Greg Beaumont
Zenith/CRT Display Products, Glenview, IL

In a world turning increasingly digital, systems designers often encounter difficulties when integrating a video-display monitor into their equipment,

MODEL EXAMPLE DATE March 7, 1980

HORIZ SYNC WAVEFORM — 20 μS — HORIZ FREQ 15.6 KHZ

0.0 μS — SIZE 8.5 "

51.3 μS

VIDEO INPUT WAVEFORM (HORIZ RATE) — 12.8 μS — 80 CHAR OUT OF 100 CHAR — VIDEO

VERT SYNC WAVEFORM — 128 μS — VERT FREQ 60 HZ

0 μS — SIZE 6.0 "

15.4 mS

VIDEO INPUT WAVEFORM (VERT RATE) — 1280 μS — 240 LINES OUT OF 260 LINES — VIDEO

	HORIZ	VERT
CHARACTER BLOCK	7	10
CHARACTER MATRIX	5	7
DOT RATE (MHZ)	10.920	

VIDEO INFORMATION	
POLARITY	White Letters
IMPEDANCE	75 ohm (Input)
PERCENT	
VIDEO INPUT RANGE (V)	0.0 V to 4V

	VOLTS	AMPS
CUSTOMER SUPPLIED INPUT POWER	110-220 50-60 Hz.	
REGULATED B+	15V DC	

	YES	NO
INTERLACE		X
BLEEDER	X	

CONTROLS	INT	EXT
BRIGHTNESS	X	
CONTRAST		X

CRT/TILT ANGLE DEGREES	P4 / 10°
FOCUS SET (FOOT-LAMBERTS)	8 Ft-Labs.
CRT SOCKET	
CUSTOMER REQUIREMENTS	☑ UL ☑ CSA ☐ VDE

SPECIAL REQUEST/INSTRUCTIONS

See print X4321 for mechanical frame dimension.

TIMING SPECIFICATION NO

FORM A ZENITH RADIO CORPORATION CHICAGO REVISION SHEET OF

To check for accuracy, *this video-display Interface Definition Form deliberately calls for redundant data—an approach that has proven useful in numerous situations. (Data from a hypothetical application is filled in for illustrative purposes.)*

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