2016

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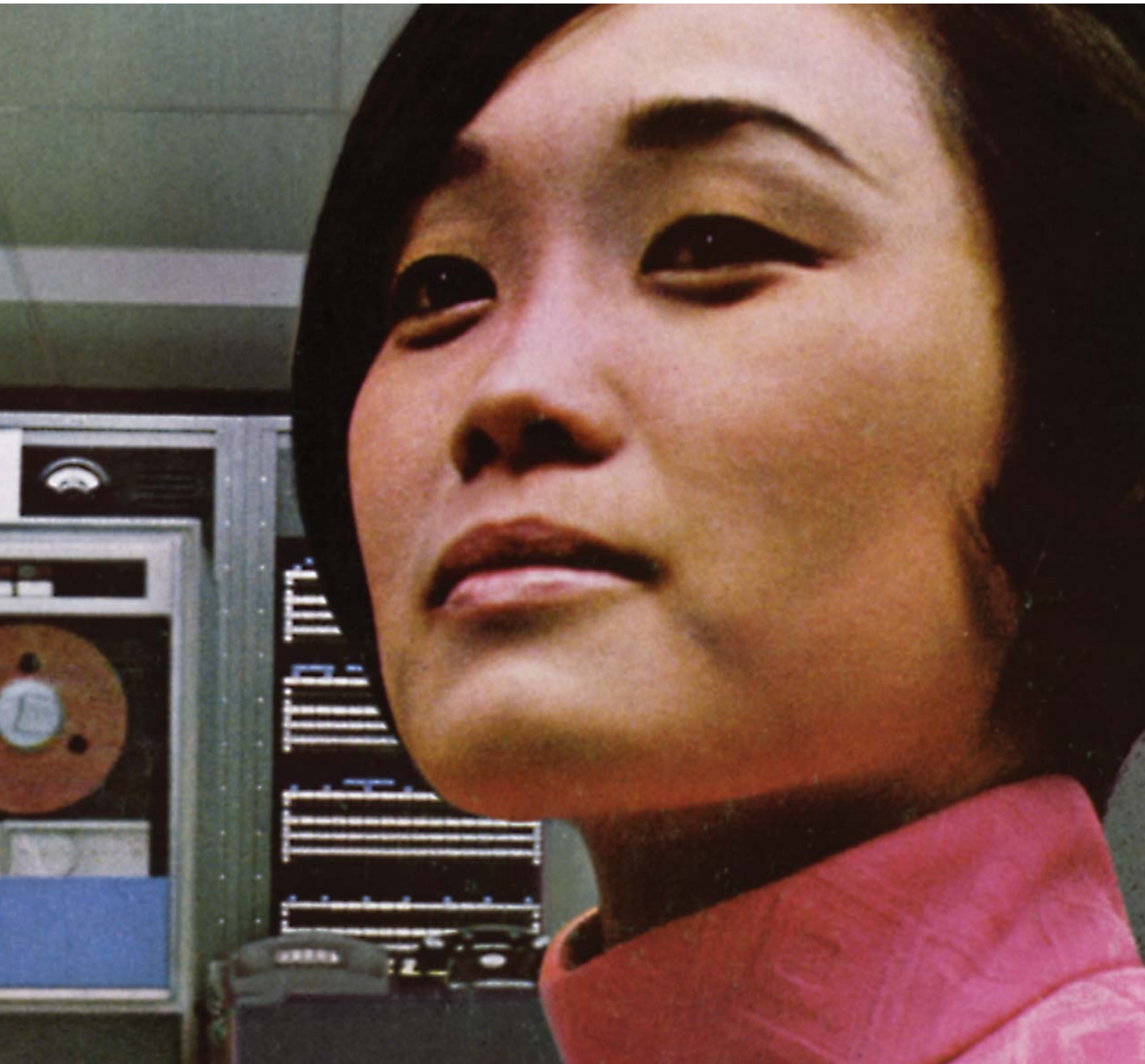
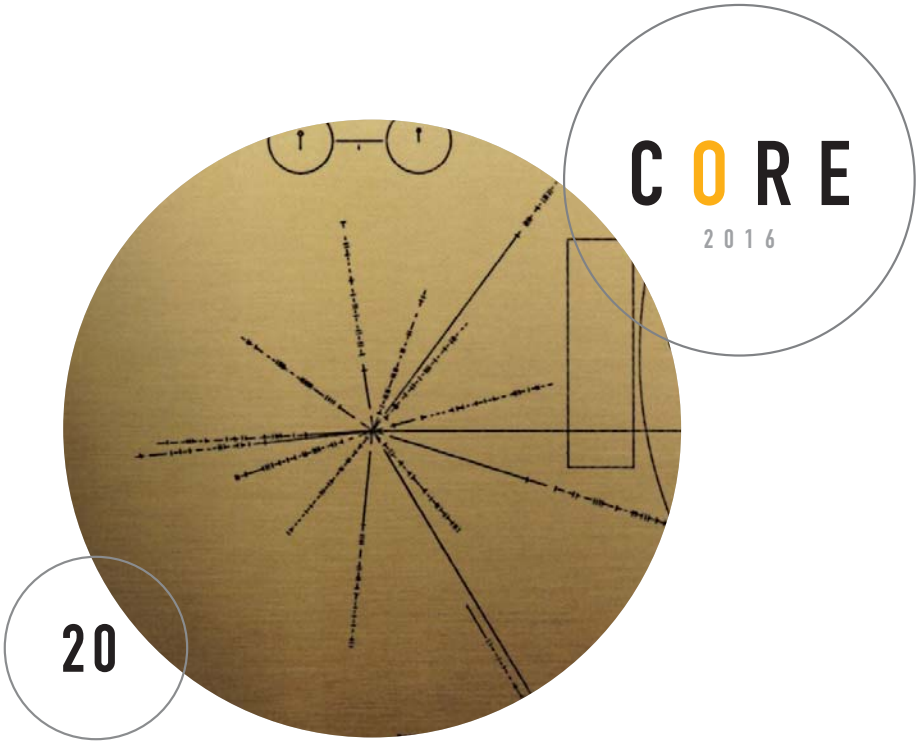
A Publication of the Computer History Museum

Women in Computing
Connecting Silicon Valley to History
Empowering Educators with Raspberry Pi





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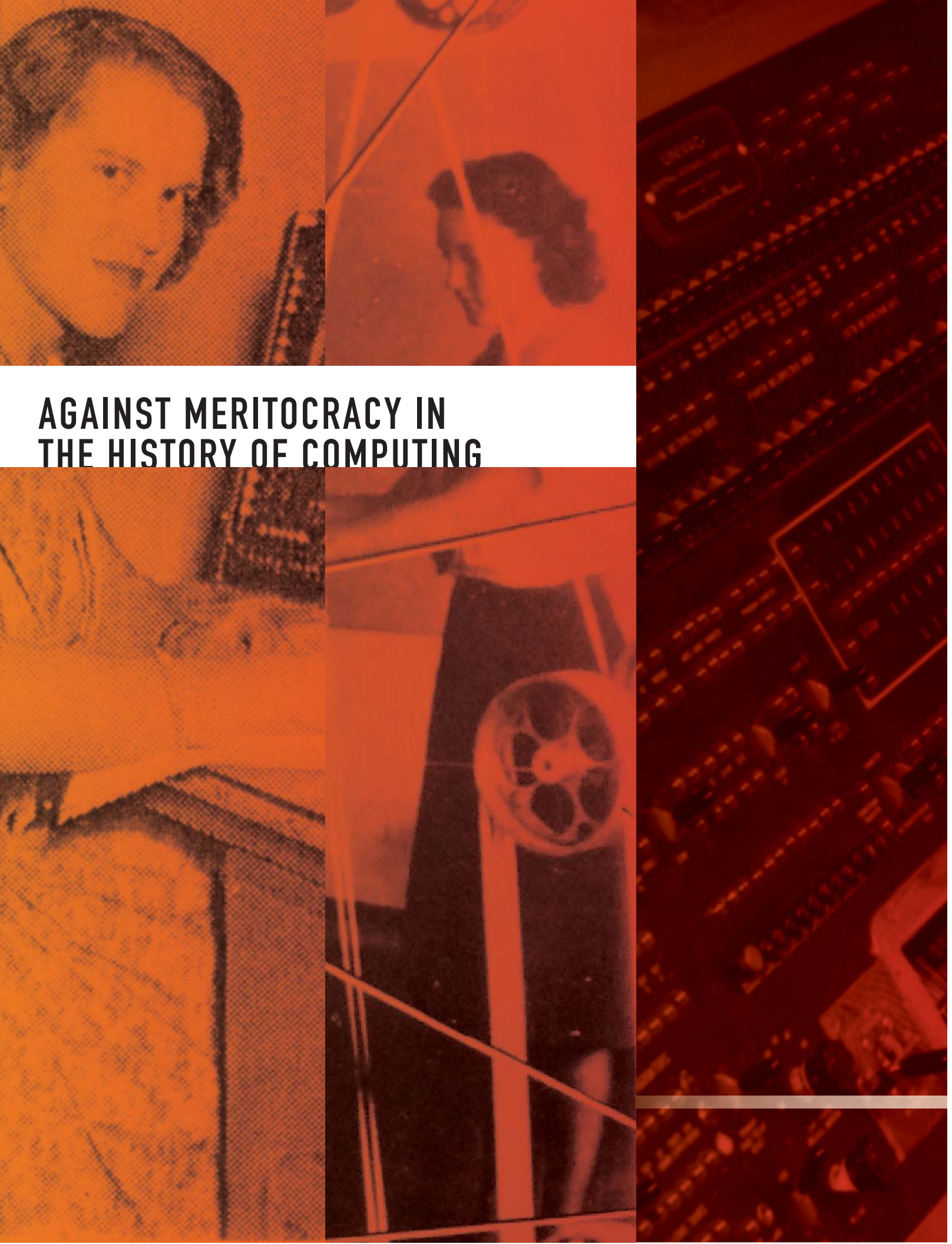


AGAINST MERITOCRACY IN THE HISTORY OF COMPUTING

Perhaps the most important fiction in the history of computing is the concept of meritocracy. Within the fast moving world of high technology, sheer talent seems to trump differences that lead certain people to ascend to the top while others sink to the bottom. Computing seems to hold the promise of the American Dream: a field where cleverness can trump credentials and success is dictated by ingenuity and hard work. Scores of current initiatives aimed at getting women and minorities into computing careers turn on the idea that computing is, at base, a meritocracy. But history tells a different story.

Technology as an equalizing force in society is not a new idea, nor a distinctly American one. Decades ago, at the beginning of the electronic age, a similar ethos took hold in the United Kingdom, our close historical cousin. During World War II, Britain had secretly invented the first digital, electronic, programmable computer for codebreaking, which ensured Allied forces knew where to land on D-Day and significantly shortened the war. Little wonder then that Britain had a thriving computing industry early on, rivaling—and often leading—American technological developments.

By the 1960s, Britain was gripped by the idea that success in building and using computers could save its shrinking empire. Current promises that Silicon Valley will "disrupt" the struggling postindustrial economy of the US echo the hopes and fears of Britain in the 1960s, when high technology became seen as the be-all, end-all of economic growth and global political power. Prime Minister Harold Wilson declared an era of "white hot" technological revolution that would "burn up" differences of class at home while launching Britain back into the role of a technological superpower. Having risen to the highest levels of government from a working class background, Wilson was captivated by the idea that, with the right technological tools and training, the entire nation could become a meritocracy.

The government already modeled itself on the ideal of meritocracy. Its Civil Service, which employed nearly a million workers, required examinations for promotion in order to privilege talent over connections. It had long been known as a "fair field with no favor," and those who moved to the top held enormous power—having the ability to shape the destiny of the nation. The huge public sector, which included not only the Civil Service but also workers in the nationalized industries and the National Health Service, generated massive amounts of data and required a huge amount of computing power. Providing the labor and know-how for this gigantic data processing machine were thousands of women workers.

BY MARIE HICKS
ASSISTANT PROFESSOR OF HISTORY, ILLINOIS INSTITUTE OF TECHNOLOGY

In 1958, British Tabulating Machines—the same company that had built the codebreaking Bombes for the government during World War II—sent a young computer operator named Andrina Wood around the world to "demonstrate" BTM's new general-purpose electronic computers. Wood wrote and tested all of the programs she showed to customers, yet her role was described as an "operator."[1] Wood was not unique: in industry most computer companies employed all-women "demonstration teams" through the early 1970s, in what we might today call sales engineer positions. Within government, many "machine operators" not only operated computers but, like Miss Wood, programmed them. These "Machine Grade" job classes in the Civil Service were also known as the "Women's Grades." "You are a women's grade, and we are a women's association with your interests at heart," pointed out a women's union at the time.[2] Despite the Civil Service's meritocratic underpinnings, these workers received substantially lower pay than their male peers.

When the government gave its workers equal pay in 1954, the Machine Grades were renamed the "Excluded Grades."[3] Computing was so feminized, the government declared, that it made no sense to raise the wages of women machine operators to the rarely used men's pay rates. The government reasoned that the "fair market rate" for computer work was the artificially low rate given to women.[4] Ironically, the vast majority of women working within this "fair field with no favor" did not receive equal pay as a result. After depressing their wages through unequal pay, the government made that the standard value of their work. At the time, few saw this as undercutting the Civil Service's meritocracy.

As computing grew in importance and prestige, one might have expected these women to gradually rise in status as well. Yet for the most part they remained stuck at the bottom of the labor pyramid. Hiring and promotion began to privilege nontechnical skills. Management ability and career potential, rather than actual technical experience, started to become the qualities that helped people get computing jobs. Computers, it was now thought, should be able to not only manage data, but also people. As such, they were a tool of management, and not a something to be controlled by lower-level workers, especially women, who could not be trusted to wield authority.

As such, the gulf between women in computing and their superiors widened. One woman, described by her supervisors as having "a good brain and a special flair" for programming, was demoted after training her two new management-level male co-workers how to program.[5] Despite her technical skills, she did not benefit from the rising prestige of computing. Her case serves as a potent reminder that skills often do not equate to leadership opportunities, and the most talented workers are often not the ones promoted to positions of authority.

In industry, where women's cheap labor was useful, thousands were employed in technical work. Where it was inconvenient, they were not. The British company that invented the world's first dedicated electronic business computer, LEO computers, refused to hire women operators because


★ YOU are a women's grade . . . .

★ WE are a women's association with your interests at heart . . . .

So Join the

N.A.W.C.S.

Without Delay!

All about Machine Operators

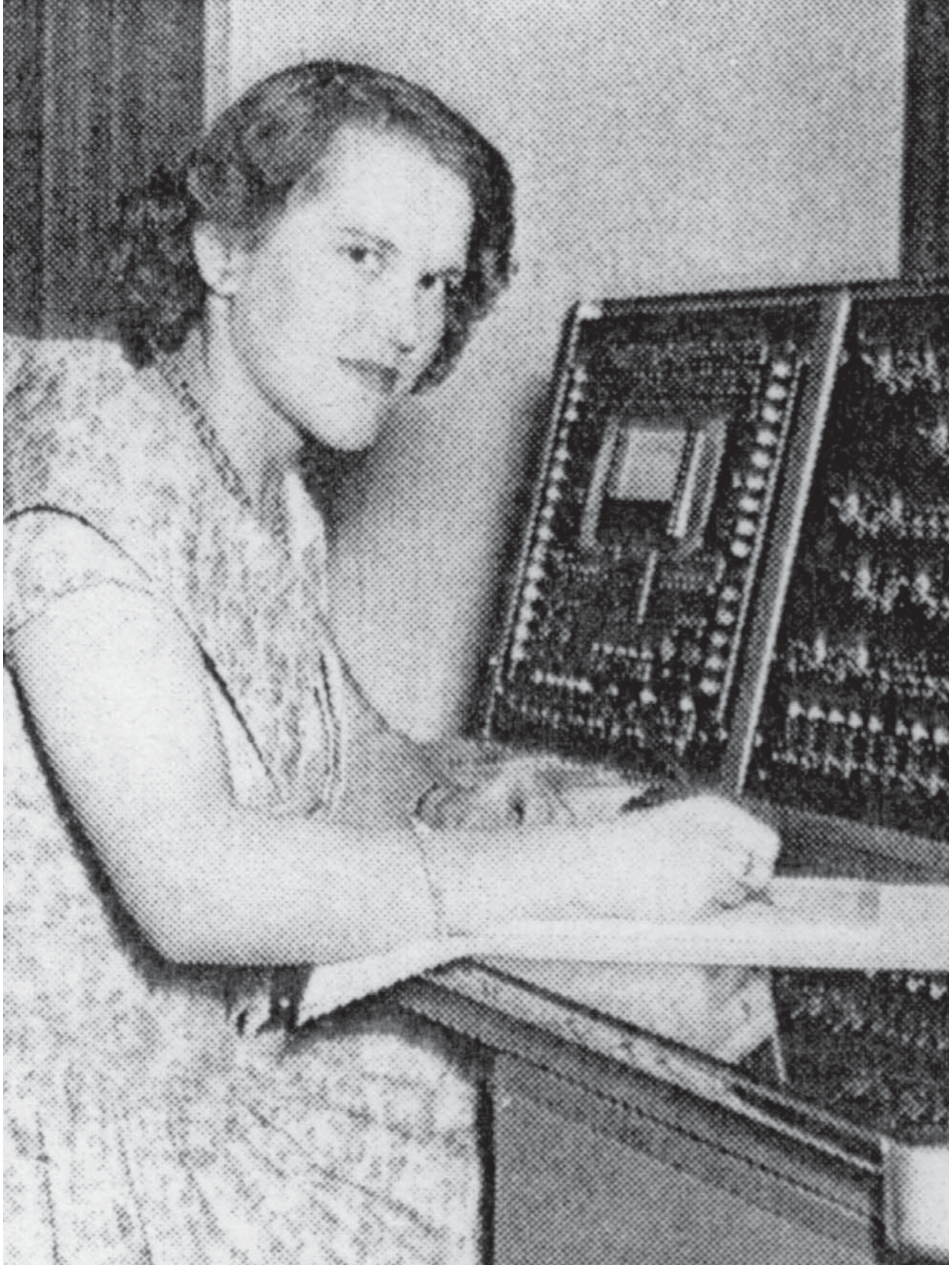
The Machine operating class contains three grades:—

MACHINE ASSISTANT, the basic or entry grade;

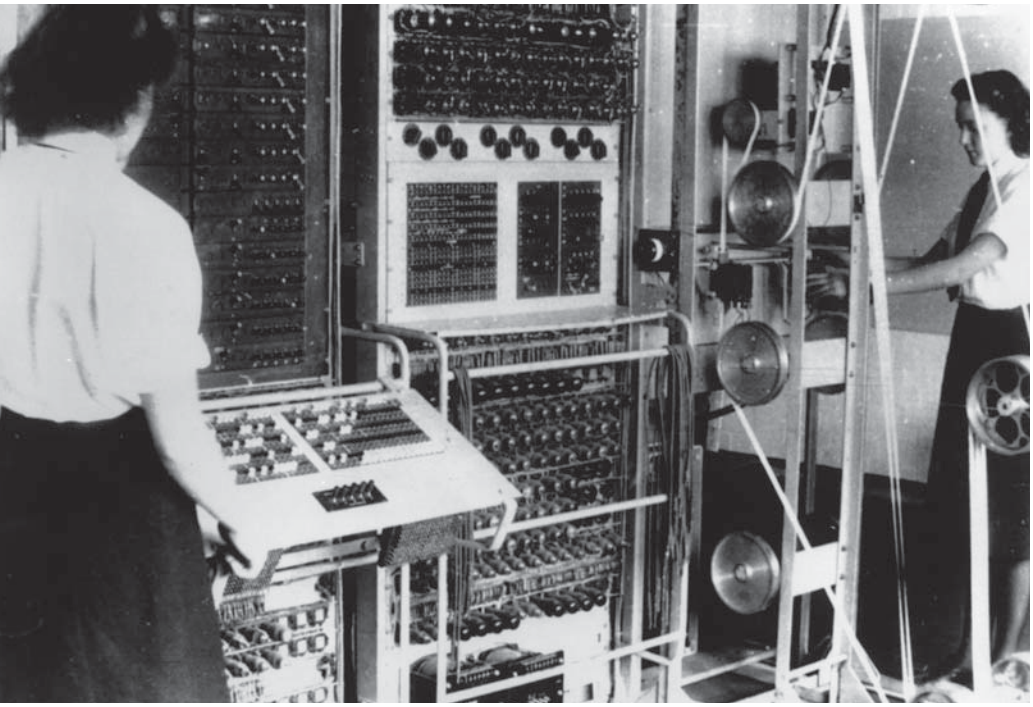
MACHINE OPERATOR, to which Assistants may be promoted; and

SENIOR MACHINE OPERATOR, the grade which

A recruiting pamphlet aimed at machine operators from the main women's labor association for civil servants. National Association of Women Civil Servants, "Pamphlet for Machine Operators," 1950.



Andrina Wood is shown here working at the console of a general-purpose electronic computer. Wood graduated from Girton College at Cambridge University with a history degree before going to work as computer operator/programmer and becoming the first "computer officer" to be sent overseas to train BTM customers. *Tabacus: The Magazine of the British Tabulating Company*, August 1958, p.8.



Dorothy Du Boisson and Elsie Booker operating a Colossus during WWII at Bletchley Park. Though men like Alan Turing and Max Newman are most associated with the triumphs at Bletchley, thousands of educated women worked there during the war, and British military intelligence was built on their labor.

they did not want to hire a "women's officer" (a type of HR supervisor) to oversee them.[6] "The worst places," to apply for a job in the 1960s said one computer operator, "were the computer firms. They didn't want women because they thought they couldn't work at night."[7] A fear of sexual impropriety blocked many women from the better jobs available at computer companies. Meanwhile, young men with no technical skills could work their way up from the bottom. Yet these same ideas about the need to protect women's chastity failed to prevent their persistent objectification and harassment in the industry.

The initiatives to change computing's status, though not its content, meant more and more men became computer "experts." Even within the government's supposedly meritocratic Civil Service, men with fewer skills rose to supervise or replace women with more skills. By the 1960s only those already working in managerial posts were allowed to compete for new computing jobs, cutting the vast majority of women out of the running. These top down initiatives to get more of the "right sort" of people into computer jobs became standard policy, upset only in times of severe computer labor shortage. In the mid-1960s labor shortages for programmers drew both more men and women into computing, blunting the effect of hiring policies intended to masculinize the work. But by the 1970s, computing had acquired a distinctly male image, shaped by the presumption that more men than women had the nontechnical abilities to rise to positions of power and responsibility in this newly important field.

In recent years, historical studies of women in computing have proliferated, uncovering women's contributions and adding them back into the historical record. Most focus on computer programmers, since programming has become seen as important, lucrative, and foundational to what computing is. Many zero in on the few women who have a claim to greatness or whose activities put them at the center of major historical events. Unfortunately, it is possible to interpret these accounts as supporting the idea of meritocracy in early computing, with some women rising to the top given their sheer talent. In reality, arbitrary circumstances made certain women visible while many others remain hidden. Before programming was a separate profession it was done by thousands of women who were known simply as "operators." They have largely disappeared from the historical record—not because they were unusual but because they were so common. Our unconscious desire to project meritocratic ideals onto the past ensures their contributions are assumed to be unimportant and their skill levels low.

When considering how the history of computing relates to women's roles today, it is important to remember that technical skills were not the main reason that women lost out. For a long time, technical skill was seen as being the opposite of

THE NATIONAL ARCHIVES OF THE UNITED KINGDOM

intellectual ability. Women working in electronic computing early on were dismissed precisely because they had technical skills, not because they lacked them. As those skills became more highly valued, women were often forced out of the field instead of being promoted, even in the context of an explicit meritocracy like the British Civil Service. In addition to hurting individual workers, this caused perpetual labor crises and ultimately harmed the British computing industry and Britain's economy as a whole.

It has been said that history "doesn't repeat itself, but it rhymes." If so, focusing on "re-skilling" women and minorities today might not be the best approach. Instead of assuming—or asserting—a fictive meritocracy and enacting solutions that invite women to start at the bottom and work their way up, we should look at the larger cultural and historical reasons why so many more women than men, and so many more black women than white women, have to start from the very bottom and often get stuck there. The problem of women in computing does not turn so much on lack of skill as it does on perception. Meritocracy is a worthy goal, but when merely asserted in the face of existing power imbalances it does little good. History shows that every meritocratic system is circumscribed in particular ways that allow only certain people to truly compete equally.


YEARNING MISS

I had a yen to be a boy,
To sit around and play with trains,
Such fun, but not girls' games.
A lady now, but still mechanical
(In Computers and they're satanical)
But when train sets become 'lectronic
Men are in, and that's ironic.

J.C.

A prescient cartoon, by an anonymous computer company worker, describes the gender change underway in the field. "Yearning Miss" Cartoon from *Tabacus: The Magazine of the British Tabulating Company*, 1957.

Today, many people are beginning to realize that while technical skills may be valuable, teaching girls to code is not going to create gender parity at the highest levels of power in industry.[8] It may simply allow women to fill a new set of worker-bee jobs, much as they did back in the mid-20th century. Though these jobs are currently lucrative, history shows that an influx of workers into a field—particularly women workers—depresses wages and contributes to a loss of status and prestige.[9] As such, the problem of women in computing is one that can only be fixed with knowledge of where we've been, as much as hopes about where we are heading: a big part of the solution turns on the difficult task of confronting the fiction of meritocracy head on. ○

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[1] "First Computer Officer Overseas," *Tabacus: The Magazine of the British Tabulating Company*, (1958): 8.

[2] National Association of Women Civil Servants, "Pamphlet for Machine Operators," 1950, 6/NCS Box 282 Pamphlets Folder, Women's Library, London.

[3] Women in the British private sector did not gain equal pay until well into the 1970s, when Britain sought to join the European Economic Community (EEC). Even then, the laws designed to enact equal pay in the UK were judged inadequate by the EEC.

[4] See Marie Hicks, "Meritocracy and Feminization in Conflict: Computerization in the British Government," in Gender Codes: *Why Women Are Leaving Computing*, ed. Thomas J. Misa (Wiley-IEEE Computer Society, 2010).

[5] Minutes, April 20, 1959, STAT 14/2320 Accounts Division: Combined Tabulating Installation Staff Inspection Report 1958–1959, The National Archives of the United Kingdom.

[6] Colin Hobson (Employee of LEO Computers), e-mail interview by the author, December 18, 2005, London, UK.

[7] Ann Sayce (Government Computer Operator), interview by the author, January 5, 2006, London, UK.

[8] Elizabeth Scharpf, "Why Teaching Girls to Code Is Not the (Only) Answer," *Pacific Standard Magazine*, October 16, 2015, psmag.com/business-economics/why-teaching-girls-to-code-is-not-the-only-answer.

[9] See Barbara Reskin and Patricia Roos, eds. *Job Queues, Gender Queues: Explaining Women's Inroads into Male Occupations* (Philadelphia: Temple University Press, 1990) for examples.

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