I₩c

AUSTRALIAN BROADCASTING COMMISSION

"GUEST OF HONOUR"

B'cast 2FC 7.15 p.m. 15th July, 1956.

PROFESSOR GORDON S. BROWN

The aroused state of mind of the general public on the topic of automation has on several occasions obscured many important issues that today face all industrialised societies. Automation is often presented as both a Dr. Jekyll and Mr. Hyde, when the truth of the matter is that it is basically merely a rapidly expanding concept important to you and to me. As to the word itself, it appears to have been coined by the automotive industry in Detroit, specifically by the people who designed some of the very large transfer machines, but I like to think of it in terms of the information given in an editorial of the London "Times" of July last year. In truly British fashion the London "Times" pointed out that since it is merely a Greek reflix attached to a Latin word, it is imaginary, and therefore we can think of it

The average citizen, then, chooses to think of it as a ghost and to him of course it is about as tangible as a ghost. But automation the concept and not automation the gadget is what we need to understand. Gadgets are short-lived, but a concept is open-ended and lasting, and bears directly on the problem of change — change in your life and mine, and what is even more important, on the rate of change of change. It is inevitable that most people will confuse the gadget whereby automation manifests itself with the concept, just as many people become primarily preoccupied with, say, automobiles, when their problem is transportation; or with computers, when their problem is computation; or with the marketing or the sale of coal or oil, when they are really selling heat or energy; or with the radio or television sets when they are really concerned with communication. The former of these terms — automobiles, computers, oil, radios — focus our attention on closed-ended gadgets — gadgets that are but a passing toy. The terms transportation, computation, energy, communication, are open-ended. They bear on abstractions that are self-perpetuating, and man will never cease to be concerned with them.

As we reflect now upon the word and the concept — automation — let me merely inject the thought that it adds up to the fact that man has come far along the road toward employing the modern developments of science and engineering in the mature, sophisticated ways to expand the base of industry, increase productivity, improve the quality of products, reduce the amount of muscle that in earlier times was explicit in industrial operations, and now, more recently, to replace much of the routine broin—work by the activities and capabilities of electronic computing machines. The high level of sophistication in today's accomplishment of these matters is an intellectual achievement, not a physical achievement necessarily, and is the only truely new face on the scene.

Now just briefly automation comprises three major components: First, truly massive machines which integrate hitherto separate manufacturing operations into lines of continuous production through which we can now say the product moves untouched by human hands. Second, it comprises widespread use of feed-back control principles, of feed-back control devices or servo-mechanisms. These devices allow individual operations to be performed without any intervention of human beings in order to control. Third, it comprises the development of general and specific purpose computing machines, capable of interpreting and storing information and performing both simple and complex mathematical operations on information.

New what does automation do? Well, briefly, throughout all industry, automation provides release from drudgery. Gone are the days when workmen in the steelmills were dangerously exposed to red-hot ingots. As automation has advanced its general effect has been to reduce the relative number of machine operators, and to increase the number of maintenance men, engineers, office employees and other non-machine operators. Also it permits increased output and increased quality of product. And third, it relates the operator to the machine in new and important ways, and it might be worthwhile to dwell on just a simple explanation by citing how a computer and its associated controls in certain modern machines, nicely provide an efficient coupling between the designer of the part and the machine that is to make it. Information is given to the machine, in a way that exploits the machine's

capability. Using automatic controls the designer gives the information to the machine in the way that he knows best; that is in terms of equations and numbers. It is the computer that merges the two into an harmonious and effectively working system. Fourthly, it increases the flexibility and the capability of management to make important and comprehensive decisions, and is being used widely in the million-dollar electronic computers, by the railroads, airlines, insurance companies, to process business statistics, make up payrolls, and regulate inventories. And of course as a general statement, automation achieves things that man can not.

Now what is the price tag? Well the answer is simple, and I think it is a very blunt one. It adds up to the fact that man must become better educated — in other words, he must become smarter. He must face up to the realities of change, and even be able to sense that he may be in an era of substantial rate of change of change. The challenge before us is an intellectual one, for as we move in the direction of exploiting science for the benefit of man, we call for less and less muscle, and more and more mind. By automation we inevitably end up with a society and an industrial machine that requires new ideas, new values in human conduct, and a greater intellectual capability to keep running.

Now just what are some of the specific changes that we are talking about? There are several. One of course, and the most important perhaps, is our changing set of values as to the human use of human beings. We will need to recast our appraisal of the value of leisure. For if the working week is reduced, as seems inevitable, we will need to be sure that leisure is financed. Otherwise it could conceivably develop into unemployment. When what mankind wants of course is more education, more culture, more research, more and better medical service, more entertainment, perhaps more leisure-time industrics. One example would be more tourism. More and better roads, parks, beaches. In other words, we will nead the power to purchase the tertiary goods and services. Then, of course, germane to these questions, are the contrasting opinions of whether increased productivity should result in increased wages or reduced working hours at the same wage. Is the return to go to the worker or to capital? The answer is of course, that it must be shared. Another change must be an increased flexibility of mind and habit. This increase is required of the working man, the labour leader, management and John C. Citizen. As automation the concept is translated into machine systems, a premium is placed on flexibility of mind coupled with a high degree of occupational adaptability. We hear a lot about the up-graded job. Failure to qualify for the up-graded job hits the engineer and even the scientist. History shows that within a very short while after a new machine appears, mankind always demands from it a performance far in excess of what its creators intended it to do. This increased demand on the machine continually increases the demands on the professional skills of the technical minds who create them, and also on the manipulative skills of the people who keep them running.

Another change of importance must be to keep up the pace in the continued expansion of the base of our technology, and in turn, the continued expansion in the base of our mode of life. We already have hosts of new industries producing new conveniences and services. To cite one situation, the General Electric Company in the United States today has of its 230,000 employees, 70,000 who work on products that did not exist in 1939. These people are working on new chemical products, new nuclear energy devices and machines, new sophisticated television systems (colour television for example), components of modern aviation, and on the horizon we see new devices such as the transistor and the semi-conductors, new metals like zirconium and titanium, which will permit us to do things that we are not now doing -- For example, even man-made diamonds.

Part of the price tag is that under the conditions that come to life beyond tomorrow's horizon, it is not adequate to train tomorrow's youth for today's job. Too often, today's job may have ranished before he graduates. With change all around us, education forces on us the supreme challenge. Speaking strictly of technical competence, the future looks more and more dim for the man with only the narrow, pinpointed skill. Everywhere technology demands of the young engineer and scientist a broader and a deeper command over the fundamentals in modern science, and a high degree of versatility and originality in its exploitation.

But have too few of us correctly gauged the lesson in these changes? Has our cultural and social progress kept pace with the accelerating tempo of material

progress? While admittedly we can only speculate about the social and economic structures of the world into which our children will grow to maturity, we should all realice as adults that the world into which we were born is now gone. Two great movements are now gaining momentum in American education. One goes loosely by the term "humanising the scientist", and the other in the scientist's words, of "scimonising the humanist." Just as technical education should look forward to the world of tomorrow, so should liberal education. Yet unborn is an enormous inventory of technology that the daily achievements of scientists will deliver, and which automation and other sociological movements will eventually exploit to maturity. To rephrase a statement made by Dr. Carlto Compton: "Science and automation creatively and humanely exploited, offer us the best chance for greater abundance without resorting to the old-time practice of taking it from others." Science is truly today s aighty multiplier, but all citizens, not merely the technologically trained citizens, need to be made aware of the scope and impact of science on their lives, for both its cultural exploitation and its materialism. Our best machinery for doing this is via our orderly process of education, from the elementary school to the University. A liberal education also must be held relevant to the times and our destiny, It is not enough that it be merely a straightline projection of our historical past.

I do not desprir that the goals we seek will come to pass. Frankly I am very bullish on the subject. Man has both intellect and conscience. As soon as he awakens to the fact that automation is not the Second or Third Industrial Revolution, but rather a manifestation of a great intellectual revolution in the way he co-operates with nature, he will be on his way.