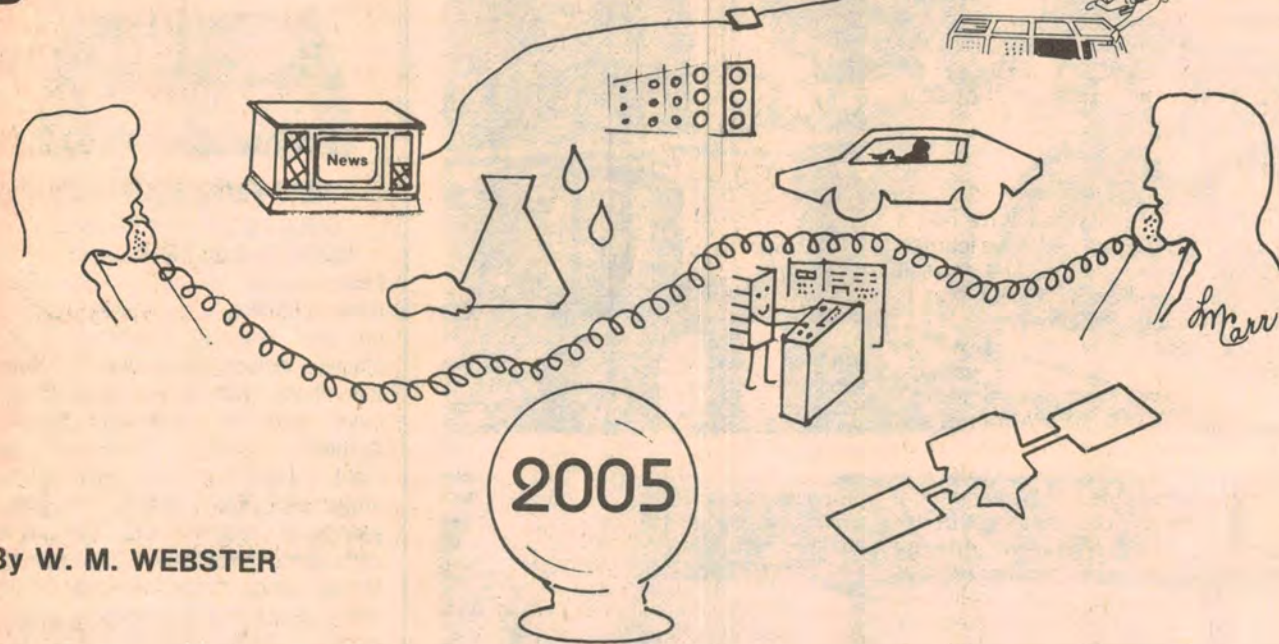


Twenty-five years from now



By W. M. WEBSTER

Technological change in home entertainment electronics, energy generation, and transportation will proceed more slowly over the next 25 years. But more importantly, sociological and economic pressures will play an increasing role in the selective development of technologies in these areas.

My assignment is to speculate about the world of 2005 — the end of the second 25 years of the *RCA Engineer*. To prepare myself for this assignment, I dug out a speech made by General Sarnoff in 1956 predicting some things about the world of 1976. This speech was one of the things that made me swear off making predictions.

In fairness, however, General Sarnoff was quite accurate in areas that he knew a lot about, such as television. I will learn from this and limit my comments to two areas: electronics with emphasis on the consumer, and energy including transportation. The main problem is in deciding what is likely to happen out of the many things that are or may become technically possible. In any event, it is unlikely that I'll worry much in 2005 about my accuracy — so here goes.

Electronics

Network and broadcast TV will still be with us. But television executives will emphasise news, interview and talk shows, and other formats that depend on immediacy. Also, alternative methods of delivering entertainment, such as pay TV and video disc, will partly displace broadcasting.

Low-cost digital technology will displace analog methods for most video signal processing but not for most transmission to the home. Digital transmission, however, will distribute signals via ground networks and satellites to broadcasters and cable operators.

The digital audio disc based on video disc technology will have a medium-sized market. But the audio disc will be less popular than the video disc, since most people will prefer good sound plus the picture.

Nearly every home in urban and suburban America will be connected to cable. And the cable will be two-way, with the upstream direction used for signalling and for low-speed data transmission. Access to channels carrying pay TV will be allowed or denied on a per-program, per-subscriber basis. Cable also will provide the main access to the services and databanks being market-tested today in Europe, Japan and the US. I think that the broadcast version of these services (similar in concept to RCAs "Homefax") will be introduced in the 1980s.

The systems which give telephone access to many different sources, but at a lower data rate, will be available in the

1980s, too. By 2005, these systems will be largely replaced by a switched system using the TV cable to achieve both the variety and the high data rate. This could be a connection supplied by the telephone companies. However, I think that the economics favour the development via cable. Distribution of these data services together with broadcast TV and pay TV, particularly of live shows such as sports, will share about equally the cable capacity.

With such widespread use of cable and the existing diversity of the broadcast system, I don't see a need in the US for direct broadcast from satellite to home. Although the technology will certainly be available, not enough homes will be without cable or be able to pay for the direct broadcast system. Direct transmission from satellite to home will be a reality in many other countries, however. Where the government owns the broadcasting system and particularly where no other system has yet been built (as in some Third World countries), the economics are quite different and will favour direct transmission from satellites.

A video disc with double the resolution in both the horizontal and vertical directions will be introduced in the mid-1990s. This high-resolution video disc will use an encoding technique that will permit compatibility with older players. Cable TV and probably broadcast TV will follow this lead. And, of course, the pictures will be displayed on a large, flat panel.

I have not put a computer in every home in 2005. Terminals with some intelligence will access the services and data I mentioned earlier. Some people will have fairly sophisticated terminals but I doubt it will be a mass market.

A great deal of intelligence, however, will be built into other things in our homes and autos. Appliances will be under microprocessor control. Discriminating switches will turn on lights, for example, only after sensing the simultaneous presence of darkness and a person. Room thermostats will operate similarly.

Energy and Transportation

By the year 2005, we will have had a war over energy or we will have learned to live with reality. In the first case, it would likely escalate to World War III and all predictions are off.

I believe that US energy needs will be somewhat reduced in 2005 — perhaps by as much as 15 percent of today's usage. More efficient climate control and more efficient transportation, both developed because of rising costs, will be mainly responsible for the reduction.

Use of passive solar heating, better insulation and efficient energy management will be economic realities by 1995. Photovoltaic solar cells will supply about 10 percent of our electrical needs in 2005. Nuclear power plants will supply 30 percent and the rest will be generated mostly by coal. None of these sources will be cheap.

There will be new oil and gas found, and liquid fuels will be developed from coal and alcohol. The energy packing-density of liquid fuels will increasingly reserve them for transportation. Gas, both natural and synthetic, will increasingly be used for residential heating because of the in-place delivery system.

The American public will not give up the automobile and the independence it provides. Mass transportation will continue to be used by commuters and for long-distance travel between large cities. Although the railroad system will have to be improved and rebuilt to deliver coal, the consequences will be some shift from roads to rails for goods but not for people. Instead, the autos of 2005 will be two- and four-passenger vehicles (for smaller families) of very lightweight but high-strength construction. The structural concepts used in aircraft construction will be adapted and plastics will replace steel. A comfortable two-passenger car with an empty weight of 550kg will get 30km/l. The difference between city and highway mileage will decrease because microprocessor-controlled stoplights connected in networks will phase themselves to the traffic needs.

I expect that the rate of technological change in the next 25 years will be slower in these areas than it was in the past 25 years. But one cannot anticipate



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major inventions such as the transistor which completely revolutionised our world and made today's computer technology possible. While other such revolutionary inventions are probable in the next 25 years, we engineers will have plenty to do to develop the technologies we already know about and to put them into profitable use.

Conclusion

In order to keep all predictors humble, let me remind you of the technical innovations of the past 25 years. In addition to the integrated circuit, solid-state memories and the microprocessor mentioned earlier, there were the Salk vaccine, manned space flight, lasers, microsurgery, the heart transplant, the "Pill", and permanent-pressed clothes. Some of these were perhaps predicted in 1955. But, I don't remember.