Part A

Opiate of the people: the television industry

Chapter 1

Origins and growth of a global medium

At 3 pm on 2 November 1936, the British Broadcasting Corporation (BBC) commenced the world's first public 'high-definition' television service with a speech by Britain's Postmaster-General. The program included a five-minute newsreel from British Movietone, Adele Dixon's performance of a song written especially for the occasion, some Chinese jugglers, and Buck and Bubbles, a pair of African American comedy dancers. An hour later the program was broadcast again on a different system. The BBC had installed two incompatible systems, which were to transmit alternately. Within a few months, it would scrap one of them.

Waiting in a BBC corridor was John Logie Baird, a dishevelled Scotsman expecting to be honoured in the opening ceremony, but instead being snubbed by the grandees who participated. Baird, after whom Australia's annual television awards – the Logies – are named, is now regarded widely as the inventor of television or at least the father of television. In fact, he was neither. Evangelical and obstinate, he pursued a dead end in the development of a technology that now owes nothing to the systems he designed.

From this inauspicious beginning developed the most powerful medium of the second half of the twentieth century. Now, in a new millennium, it's not yet clear whether television is going through a period of adjustment or showing the first signs of slow decline. Either way, it draws from and sustains the popular ethos on a mass scale that no other cultural industry has yet been able to approach.

Television is the product of a haphazard series of developments that culminated in that bizarre double act of 1936 and then got shelved while its players were engulfed in war. When it re-emerged after the war, it was in a world so changed that all bets were off. The race would start again.

Table 1.1: Timeline of global development of television technologies.

Year	Mechanical (analogue TV)	Electronic (analogue TV)	Digital TV
1884	Invention of Nipkow disc		
1897		Invention of cathode ray tube (Braun)	
1907		1st patent for TV system (Rosing, USSR)	
1923	Baird's 1st patent	Zworykin patent (US), Westinghouse drops out	
1925	Public demonstration of Baird system		
1926		1st TV broadcast (Grabovsky, USSR)	
1927	Public demonstration of Bell system (US) Baird transmits London to Glasgow and New York		
1928	18 experimental TV stations licensed in US		
1931		UK patent for EMI (RCA/Zworykin system)	
1934		Public demonstration (Farnsworth)	
1935	1st TV service (Germany)		
	Selsdon Committee recommends BBC adopt 2 broadcast systems (Baird & Marconi EMI)		
1936	1st 'high-definition' TV service (UK)		
1937	Baird system abandoned by BBC	1st test broadcasts in US (NBC-RCA)	
1939		1st TV service in US	
1940			Development of digital signal (Shannon, US)

1951		Colour transmission starts in US	
1955		Commercial TV starts in UK	
1956		Ampex Corp. demonstrates V/T recording	
		1st TV broadcast in Australia (TCN-9)	
1960		1st all-transistor TV receiver (Sony, Japan)	
1970		FCC curbs US network power	
1972		US cable TV allowed into major markets	
1982		1st cable channel in Europe (Sky)	
1995		Pay TV starts in Australia	
1998			Digital services start in US and UK
2001		BSkyB switch-off of analogue satellite	Digital TV starts in Australia

1.1 John Logie Baird and the race to broadcast

Mechanical and electronic scanning

Television wasn't invented. It developed as a succession of technical advances through two different approaches to the problem of scanning subject matter – one mechanical, the other electronic. In the analogue television system, the camera scans light reflected from the subject and converts it to electrical impulses of varying strengths for transmission to a receiver. The scanning approach that ultimately prevailed was electronic, but unfortunately for John Logie Baird he backed the wrong horse.

The first scanning devices

There was an expectation that image transmission would be possible – George du Maurier's 1878 *Punch* cartoon of a 'telephonoscope', a two-way visual system with parents in London speaking to their daughter in Ceylon, anticipated that – but no-one was sure then how the technology would achieve it. Soon after, two German inventions provided a basis for both mechanical and electronic scanning. In 1884, Paul Nipkow devised a spirally perforated disc with twenty-four small holes through which a strong light was reflected onto a photosensitive selenium cell. Rotation of the Nipkow disc scanned the subject and broke the image into small pieces. The stage was set for competing approaches to television when, thirteen years later, the cathode ray tube was invented by Karl Braun.

The first electronic TV systems

In 1907, Boris Rosing applied for a Russian patent for a television system using a cathode ray tube as receiver. Unaware of the Russian patent, A. A. Campbell-Swinton described his proposed television in *Nature* (1908). Campbell-Swinton replaced the scanning disc with an electronic Braun tube. The image on a photosensitive plate would be bombarded with sweeping electrons and transmitted as electrical impulses. At the receiver, these impulses were to be converted back to a picture on a fluorescent screen. The Scotsman, Campbell-Swinton, never put his system into practice, but the Russian demonstrated his in 1911, producing a distinct image of luminous bands.

Baird's early designs

John Logie Baird was regarded as an 'oddball'. He already had several dubious enterprises under his belt – 'undersocks' that warmed in winter and cooled in summer, chutney and jams from Trinidad, a glass razor, and resin soap – when he began experimenting with the Nipkow disc, even though it had been overtaken by then by the work of Rosing and Campbell-Swinton. Baird was a shy man, with a sense of showmanship, a competitive streak and a passionate belief in the practicality of television. He was not satisfied with just designing a system, he strived for a working model, but reputedly not good with his hands he had to hire people to build his sets for him. After some rudimentary models, Baird moved to

London. Constantly short of money, he seldom ate and never bought new clothes. He was paid, however, for a public demonstration at Selfridge's Department Store, where his images were described as 'faint and often blurred'. Baird's early efforts, then producing only about thirty lines of definition, were elsewhere described as 'a device which only sends shadows' and 'a mere smudge'. His demonstrations promoted an initial public interest in television, but while his mechanical system was struggling, across the Atlantic significant progress was being made with both mechanical and electronic scanners.

Zworykin's all-electric system

A former pupil of Rosing, Vladimir Zworykin had migrated to America in 1919 and four years later filed a US patent for an all-electric television system consisting of a camera tube with photoelectric plate and cathode ray tube receiver. Zworykin built a working system for his employers at Westinghouse Electric, but they were unimpressed and assigned him to other work. Soon after, in Russia in 1926, another former pupil of Rosing, Boris Grabovsky, claimed the first electronic broadcast in Tashkent using Rosing tubes.

Early US mechanical scanning systems

These activities were either unknown to Baird or ignored by him, but he was aware of developments in the United States with mechanical scanners. The American Telephone and Telegraph Co. (AT&T) gave a public demonstration in 1927 of its Bell Laboratories' apparatus using a Nipkow disc. Two broadcasts were received in New York City and watched by an invited audience of business executives, bankers and newspaper editors. One, by wire from Washington DC, included a speech by then Secretary of Commerce, Herbert Hoover, the world's first televised politician. The other was by radio from Whippany in New Jersey and featured comedian A. Dolan. By the next year, eighteen experimental television stations had been licensed in the United States, all using mechanical scanners. A race had started with Britain to be the first country to set up a continuing television service.

Philo T. Farnsworth

What Baird would not have known was that the Radio Corporation of America (RCA) was then secretly testing Zworykin's 'iconoscope', a Braun tube camera that stored the image before scanning, thus requiring much less light on the subject. What also probably escaped Baird's attention at the time was the application in San Francisco by Philo T. Farnsworth for a patent for a camera tube with a photoelectric plate. Farnsworth was twenty-one years old from a poor Idaho farming family, and an avid reader of popular science. By 1929, he and Harry Lubcke had built a television system with all-electric scanning and a synchronising pulse generator. There were no mechanical parts.

Baird takes on the BBC

By then, Baird was absorbed in his competition with Americans who were in his sights. He transmitted pictures of himself, first from London to Glasgow and then from London to New York. Baird's business partner, Captain Oliver Hutchinson, often wrote letters to public officials making demands based on development progress that hadn't happened. They made announcements to the press that were untrue, but drove up share prices in Baird Television Ltd, and they kept cancelling promised demonstrations to Post Office engineers for fourteen months. A great self-publicist, Baird staged many public demonstrations of his system, but night-time test broadcasts from a BBC aerial were stopped by the network's executives. Behind this act was hostility by BBC engineers, who could see limits to the mechanical system. On the other hand, Britain's Post Office engineers were more supportive and pressured the BBC to allow Baird to continue to experiment from the station. With Baird orchestrating outrage in the British popular press and the Postmaster-General (PMG) threatening to issue him with a broadcast licence (Britain had no other radio licensee at that time), the BBC relented and allowed test broadcasts to resume in 1929 during the hours radio was not on air.

Limitations of mechanical scanning

The first live transmission of the Epsom Derby, in 1931, was made with a single camera on the winning post. However, a Baird engineer at the time said, 'You wouldn't be able to tell one horse from another or one jockey from another, but you could at least tell they were horses'. As with mechanical scanning generally, the Baird system was plagued with limitations. In addition to camera immobility, studio recording required on-camera performers to work in a very small, extremely overlit space and there was a distracting flicker in the broadcast picture.

Baird's ill-fated trip to the United States

The space and lighting problems made televised dance programs a fiasco, but Zworykin's iconoscope fixed that and RCA's interlaced scanning solved flicker by dividing the frame into two intermeshed fields. Meanwhile, Baird had been invited to America by radio station owner Donald Flamm. He was to promote and set up a television service, but the federal regulators rejected Flamm's licence application following an RCA objection to a foreign company entering the US television market. In retaliation, Baird wrote to the Prince of Wales complaining that the BBC was giving 'secret encouragement to alien interests'. The English company Electrical and Musical Industries (EMI), 27% owned by RCA, had perfected the RCA/Zworykin system and was applying for a UK patent. Worse, the BBC engineers were showing considerable interest in the EMI system.

EMI system gains support

Experts who saw the EMI system in operation agreed it was far superior to Baird's. Word of this must have got through to Baird as he started looking at alternative scanners. He developed a film scanner that worked on wet film as it emerged

from the developing tank, resulting in a delay of about a minute between camera recording and transmission. He was now aware of Farnsworth's work, which had been demonstrated at the Franklin Institute in Philadelphia. Baird experimented with one of these 'image dissector' electronic cameras, now lagging technically behind the RCA 'charge storage' camera.

The Selsdon Committee

With the rivalry continuing between Baird TV and EMI–Marconi, the BBC and PMG set up a committee under Lord Selsdon to resolve the impasse. In 1935, the Selsdon Committee recommended regular BBC broadcasts as soon as possible, using a minimum 240 line scan and the Baird and EMI systems to broadcast on alternate weeks. The scan line requirement wasn't a problem for EMI–Marconi, whose system was already scanning 405 lines, but Baird's three systems were hard-pressed to scan through 240 lines.

BBC's new TV centre

The BBC converted Alexandra Palace in North London to a television centre with considerable duplication to accommodate the two different systems. A test run at the Radiolympia exhibition in August 1936 had mixed results. Baird's system, operating on the first day with its fixed camera and three types of scanner – Nipkow disc, wet film scanner and Farnsworth tube – suffered breakdowns. EMI's more mobile camera provided trouble-free broadcast the next day. Nonetheless, the service opened three months later with the alternating systems, trumpeted as the world's first 'high-definition' television service. A 405-line system was determined to be 'high definition' so that the German Reichs-Rundfunk-Gesellschaft (RRG) service that was broadcast in 1935 with 180 lines could not steal Britain's thunder. However Britain might define its triumph, the contrast between the EMI–Marconi and Baird systems was obvious from the start. By the end of the month, the Baird workshops burnt down and the following February the BBC dropped the Baird system. John Logie Baird's passion and obsession for fifteen years had come to nothing. He later worked on colour television using cathode ray technology and by 1940 had produced a 600-line colour telecast, but in the war years this went unnoticed. He died in 1946.

The lesson of John Logie Baird

There's a message in the story of John Logie Baird for anyone in the business of television production. Television is a flurry of technological change, fashion and whims of the viewing public. It doesn't stand still for very long. To stay on the front of the wave of change, the television professional must monitor developments as they appear; not necessarily responding to every one – it's an industry full of false dawns and soothsayers – but certainly assessing them and being prepared to pick up on any change that is gaining momentum. Baird, with his single-minded focus on mechanical scanning and its American practitioners, was unable to spot a parallel development that was eventually to prevail and so left himself in a sideshow that television passed by.

First American telecasts

As a footnote, NBC–RCA began making regular test broadcasts from the Empire State Building in 1937, America having lost the race for the first television service. The US service was inaugurated in 1939 at the New York World's Fair, opened by President Roosevelt. The next year, the federal regulator, the Federal Communications Commission (FCC), set up the National Television Systems Committee (NTSC) to determine standards for the service. They decided on a 525 scanning line standard for no reason other than it sat midway between the rival companies, RCA (441 line) and Philco (605 line). In 1941, the Columbia Broadcasting System (CBS) entered the television market and the National Broadcasting Company (NBC) commenced a full commercial service. The commercial approach was to prove critical in the later development of the television industry, but any momentum was lost with the bombing of Pearl Harbor.

1.2 America sets the agenda

TV during World War II

Britain's initial dominance of television would last a mere three years. The BBC closed its television service as soon as war was announced in 1939, cutting off in the middle of a Mickey Mouse cartoon and resuming from the same point in the film when peace was declared in 1945. Domestic sales of television sets were just starting to pick up in the United Kingdom when war broke out. In America, television was wound back after the bombing of Pearl Harbor. Only Germany continued transmission, providing communal television in public rooms. RRG had begun three-day-a-week broadcasts in Berlin in 1935. Because the price of home sets was so high, the German Post Office set up eleven viewing rooms in the capital, which it increased to twenty-eight during the Berlin Olympics. The rooms continued to operate during the war until the Allies bombed the Berlin transmitter in 1943.

Early US regulation

Television in the United States developed along laissez-faire lines as radio had before it. Built and operated by the private sector and supported by advertising, it was regulated to protect the public interest. However, early regulation served mostly to prevent any later shift to higher technical standards. As a result, inferior image resolution and colour quality has characterised American television; but this wouldn't become apparent until much later. RCA engineers had improved Zworykin's tube during the war, developing it for guided missiles and reconnaissance. This image orthicon camera could be used in normal room light and RCA reigned supreme in post-war television.

Origin of US networks

CBS wanted to delay the US frequency-band decision – should it be very high frequency (VHF) or ultra-high frequency (UHF)? – so it could establish a colour