



The Technology of Television

Highlights, Timeline, and Where to Find More Information

Summer 2003

THE FCC: SEVENTY-SIX YEARS OF WATCHING TV

From the Federal Radio Commission's issuance of the first television license in 1928 to today's transition to digital tv, the Federal

Communications Commission has been an integral player in the technology of television.

One of the fundamental technology standards that the FCC issued in May 1941, which still stands today, is the NTSC standard for programming to be 525 lines per frame, 30 frames per second.

When this standard was first affirmed it was called "high-definition television" because it replaced programming being broadcast at 343 lines or less.

The next big technological impact of the FCC was on the development of color tv during the 1950's. Finally settling on today's standards in December 1953, the FCC issued color television standards that still define the required intensity

and hue of red, green, and blue on the color chart.



Today the FCC continues to play a key role in defining the technology standards that must be met as the United States moves to a future of digital television. This includes decisions made in 2002 to require the inclusion of digital tuners in nearly all television sets by 2007.

For more on the FCC's standards for DTV, go to <http://www.fcc.gov/dtv>.



TELEVISION

The recent advances in radio television threaten to create serious problems. The commission has allowed a few broadcasting stations to experiment with television in the broadcast band on their assigned channels on condition that this form of communication be limited to a small amount of time per day and be so conducted as not to cause interference on adjacent channels. There is also a distinct development of television in the high-frequency band. It has been urged upon the commission that it should permit regular television service in the broadcast band as well, because of the fact that a large potential audience is already at hand and in some cases the ordinary receiver can be adapted to receive television by the addition of certain apparatus. Television signals, however, will subject the broadcast listener to objectionable noises. The International Radio Convention limits the broadcasting band to telephonic signals. The commission has not yet determined its final policy with reference to this subject.

TV TIMELINE

- Paul Nipkow shows how to send images over wires. 1884
- Campbell Swinton and Boris Rosing suggest using cathode ray tubes to transmit images. 1907
- Vladimir Zworkin patents his iconoscope - the camera tube many call the cornerstone of modern tv—based on Swinton's idea. 1923
- Charles Jenkins in the U.S. and John Baird in England demonstrate the mechanical transmission of pictures over wire circuits. 1925
- Bell Telephone and the Commerce Department conduct the 1st long distance demonstration of tv between New York and Washington, DC. 1927
- Philo Farnsworth files a patent for the 1st complete electronic television system. 1927
- The Federal Radio Commission issues the 1st tv license (W3XK) to Charles Jenkins. 1928
- Iowa State University (W9XK) provides twice weekly video programming in cooperation with radio station WSUI. 1933
- Americans were introduced to tv at the World's Fair in New York and the Golden Gate International Exposition in San Francisco. 1939

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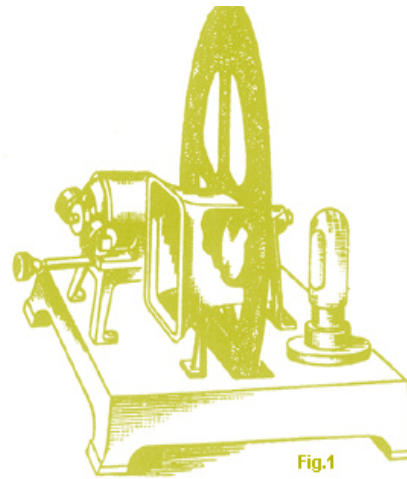
“A ROSE BY ANY OTHER NAME” - MATCH EACH EARLY NAME FOR TELEVISION WITH THE CORRECT DATE AND PERSON

(ANSWERS ON PAGE 4)



As early as 1922, hobbyists were excited by Charles Jenkins idea of “radio movies.” By 1928/1929 you could buy and make your own receiver (see ad on adjoining page)

1. Visual Telegraph
2. Selenium camera
3. Telectroscope
4. Phototelegraphy
5. Electric telescope
6. Telescopy
7. Television
8. Telautography
9. Radio movies



This drawing illustrates the Nipkow disk—the 1st design for mechanical tv . Paul Nipkow never produced any of the disks—just provided the idea.

- 1900, Constantin Perskyi
- 1876, George Carey
- 1884, Paul Nipkow
- 1881, Constantine Senlecq
- 1908, British Patent Office
- 1870’s, Unknown
- 1904, Paul Ribbe
- 1921, Charles Jenkins
- 1880, Sheldon Bidwell

TELEVISION AND TELEPHONE’S TIGHT TIES



The 1939 World’s Fair in New York is where most Americans first learned about tv. RCA sponsored an exhibit where anybody attending the fair could be “televised.” The commemorative card that those who participated in this revolutionary event received is depicted above. On the back was promotional copy for RCA products.

Ideas for what we now know as television were originally discussed at the same time that the telephone was introduced to the American public (mid-1870’s). In fact, the early conceptions of television were that it would be a way for someone to see the person they were talking to on the phone.

Even though the technology of television took much longer to develop than did the technologies of telephones, the two remained closely tied. In fact, the coaxial cable and microwave relay link infrastructure of the US’s telephone infrastructure were fundamental to television’s growth as a nationwide system in the 1950’s-1960’s.

“I am glad to welcome television as the latest product of scientific discovery. It promises that where the voice has led the way over the telephone wires, the eye will ultimately follow.”

Secretary of Commerce
Herbert Hoover
April 1927



HOW TELEVISION WORKS: IS IT BRAIN TRICKERY OR A "CONQUEST OF NATURE"?

On paper television is really quite simple. Just three steps:

1. Convert an image and its associated sound into electronic signals.
2. Send the electronic signals from the point of origin to a receiver (commonly called a television set).
3. Convert the electronic signals back into images and sound.

This process was thought about by George Carey as early as 1876 and written about as "seeing by electricity" in *Scientific American* in 1879 and 1880. By July 1894, Charles Francis Jenkins offered, in *The Electrical Engineer*, a "scheme" for solving the problem of "transmitting images to a distance by electricity."

But, there is actually more technology to television than just lights, lenses, camera tubes (today a type of integrated circuit called a charge-coupled device), amplifiers, encoders, scanners, transmitters, and receivers. Perhaps the technology most important to tv is the aspect of the human brain that allows us to assemble a series of still images shown in rapid succession into a single, moving picture. This key aspect of tv caused some early observers to think of television as a "conquest of nature" that caused "time as well as space" to be eliminated.

Or, at least, so said the *New York Times* on April 8, 1927 following the first successful long distance demonstration of television between rooms in New York and Washington, DC, using station 3XN out of Whippany, NJ. Interestingly, at this demonstration the sponsoring AT&T executives were quoted as saying that they "have no idea today whether it (tv) will ever be commercially valuable."

It Works!



JENKINS TELEVISION RECEIVER KIT
To tune in television signals, employ a Jenkins radiovisor receiver. Usual short-wave receivers are not satisfactory for good results. If you wish to build your own receiver, use Jenkins JK-28 receiver kit. Components fully machined, ready to assemble and wire in a few hours. PRICE: \$19.50.

Or if you prefer a ready-made receiver, there is Type J for use with Radiovisor on common A.C. power system for automatic synchronization. PRICE: \$118.00. Tubes Extra. Type JB, with self-synchronized power supply, is also available for those outside common power system area.

One-dial tuner, A.C. operation, highest type amplifier, ample output for brilliant picture, self-contained power pack, sturdy aluminum chassis, are features of Jenkins radiovisor receivers.

YOU can now enjoy radiovisor programs. Don't waste time, money and patience trying to work out your own equipment. Start right with Jenkins apparatus in convenient kit form or in ready-to-use form. Jenkins self-synchronous feature makes reception possible wherever signals are heard. Jenkins receivers, combined with Jenkins radiovisors, provide real television entertainment.

RK-1 JENKINS RADIOVISOR KIT
Complete kit of parts, fully machined, ready to assemble and wire. Mounting brackets, field rolls, weldless, ball-bearing shaft, rotor, complete scanning disc assembly, speed control, condenser, lamp socket and housing, wires, screws, nuts, bolts, packed in neat box as shown below, with complete instructions. Assembled in a few hours as shown at left. Choice of 48, 60 or 45-line scanning system. Magnifying lens optional. PRICE: \$42.50. Lamp, 5.00.

READY-TO-USE EQUIPMENT
If you prefer assembled equipment, ready to use, there is the Model 100 Radiovisor. Same components as RK-1 Kit, but including lens assembly and cast metal base. Finished in bronze. Ideal for laboratory or home use. Two-inch square image. Self-synchronization attachment optional. PRICE: \$49.50. Lamp extra.

Model 200 Radiovisor is intended for living-room use. Deluxe walnut cabinet. Drum scanner. Eight-inch image. A.C. synchronized. PRICE: \$108.00. Lamp extra.

Model 300 Radiovisor: Deluxe walnut cabinet. Self-synchronized by incoming signals. Five-inch image. PRICE: \$135.00. Lamp extra.



Television is here! It is ready for experimentation, service men and dealers! Television programs are steadily improving. Now is the time to get into television! Experience the thrills of pioneer broadcast days all over again! Just fill out and mail coupon below.

JENKINS

TELEVISION CORP
PASSAIC NEW JERSEY

JENKINS TELEVISION CORPORATION, Passaic, New Jersey. Check enclosed
 Send C.O.D.

Please send me the following:

<input type="checkbox"/> RK-1 Jenkins Radiovisor Kit (-line scanning)	\$ 42.50	<input type="checkbox"/> Model 300 Jenkins Radiovisor (-line scanning)	135.00
<input type="checkbox"/> Magnifying Lens for Radiovisor Kit	5.00	<input type="checkbox"/> Self-Synchronous Motor for Kit RK-1	25.00
<input type="checkbox"/> Model 100 Jenkins Radiovisor (-line scanning)	69.50	<input type="checkbox"/> 601A Television Lamp for Kit or Models 100 and 300	5.00
<input type="checkbox"/> Model 200 Jenkins Radiovisor (-line scanning)	100.00	<input type="checkbox"/> 601 Television Lamp for Model 200	7.50
		<input type="checkbox"/> Free literature on Kit, Circuits and Complete Apparatus.	

NOTE: Indicate 60, 48 or 45-line scanning system

“The problem with television is that the people must sit and keep their eyes glued on a screen; the average American family hasn't time for it...for this reason, if for no other, television will never be a serious competitor (to radio).”

New York Times

commentary after television introduced to a broad spectrum of the American public at the World's Fair in 1939



WHERE TO LEARN MORE

Find out more about television's technology by visiting the FCC library. They have several interesting historical works including Charles Jenkins 1925 work, *Vision by Radio: Radio Photographs*. You can find even more information on the Internet. In addition to any of the on-line encyclopedias, try some of these locations:

- <http://www.mzstv.com>
- <http://entertainment.howstuffworks.com/tv.htm>
- <http://www.tvhistory.tv>
- <http://www.inventorsmuseum.com/television.htm>
- http://www.rcc.ryerson.ca/rta/tvtech/the_book/chapter02/main.html
- <http://inventors.about.com/library/inventors/bltelevision.htm>
- <http://www.tvhandbook.com/History/History.htm>
- <http://www.earlytelevision.org>

Answers to Page 2 Quiz: 1-1870's; 2-1876; 3-1881; 4-1880; 5-1884; 6-1908; 7-1900; 8-1904; 9-1921

First Annual Report of the Federal Communications Commission

To the Congress of the United States
For the Fiscal Year 1935



VI. EXPERIMENTAL VISUAL BROADCAST

Although the Commission licensed no new visual broadcast (facsimile or television) stations during the past year, the general interest of the public in television has increased substantially. Interest in television has been stimulated greatly by the activities in certain European countries. Great Britain and Germany have given considerable publicity to their activities in this field. Technically, television has been as highly developed in the laboratories of the private companies of the United States as has been accomplished in Europe.

The several companies carrying on television experiments in the United States have not standardized the several essential elements of transmission. Due to the wide band width necessary (approximately 3,000 to 4,000 kilocycles) and other requirements, frequencies above 40,000 kilocycles are the only ones available for high quality television transmission. In order to transmit a picture of approximately 350 lines and 60 frames per second accompanied by voice, the wide band width is required. If this band is reduced, the detail or clearness of the pictures is reduced accordingly. No commercial receivers are at present available to receive such programs. In order to give television service it is necessary for the different manufacturing companies to standardize their transmissions and produce receivers which can receive all programs transmitted. In short, from a laboratory standpoint television programs can be satisfactorily transmitted and received locally at the present development of the art but before it is finally useful to the public there are many commercial problems to be solved.

TV TIMELINE

- The FCC approves and issues the NTSC's standards for black and white tv.* 1941
- Cable tv introduced in Pennsylvania as a way to get tv reception in rural areas.* 1948
- FCC approves 1st color tv standard. This standard was replaced with the current standard in 1953. By 1967 most tv programming in color. By 1972, half of US tv households have color tv's.* 1950
- Ampex introduces the 1st practical videotape system, which improves the visual quality of broadcasts and allows the center of tv production to move from the New York networks to Hollywood's studios.* 1956
- Robert Adler invents 1st practical remote control (Zenith's Space Commander). It was preceded by wired remotes and units that couldn't work in sunlight.* 1956
- The All Channel Receiver Act requires UHF tuners be included in all tv sets.* 1962
- AT&T launches Telstar—the first satellite to carry television* 1962
- Sony introduces the 1st home video cassette recorder (Betamax).* 1976
- PBS is the first network to switch to satellite delivery of all programs.* 1978
- NHK demonstrates their HDTV system (1,125 lines) to the Society of Motion Picture and Television Engineers at their Winter conference in San Francisco.* 1981
- Direct Broadcast Satellite operations begin with service in Indianapolis, IN.* 1983
- Stereo tv approved.* 1984
- Closed captioning required on all tv sets.* 1993
- FCC approves ATSC's HDTV standard.* 1996
- FCC issues timeline for inclusion of V-Chips in all tv sets.* 1999
- FCC issues timeline for incorporation of digital tuners in all tv sets.* 2002