

Announcements and today's schedule

- ▣ Feb. 21 & 23 -- Radio and Recorded Music
- ▣ Monday, Feb. 28 – Guest Speakers from Radio Industry
- ▣ Quiz on Wednesday, March 2.

Homework Assignment

- ▣ First of four homework assignments to be handed out on Wednesday, March 2. Will be due in class on Monday, March 14



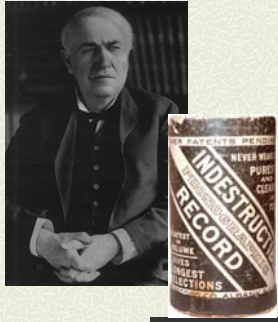
Early popular music

- ❏ Pre-industrial revolution music: Folk and classical
- ❏ Industrial revolution music: Music boxes, player pianos, nickelodeons, etc.
- ❏ **Sheet music**: performed at home; performance of music by popular performers was important for sale of sheet music (MTV!)
 - **Tin Pan Alley**: New York composers' district



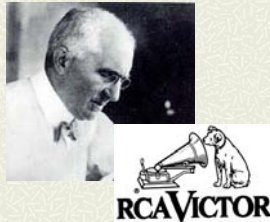
Thomas Edison

- ❏ Designed and built phonograph prototype in 1877
- ❏ Didn't see potential for music; thought it would be used as dictating machine
- ❏ Used **cylinders** covered with foil or wax



Emile Berliner

- ❏ Replaced Edison's cylinders with **flat disk**
- ❏ Victor Talking Machine Co. released the **Gramophone** in 1888; company became RCA Victor
- ❏ Competition forced Edison to improve his machine



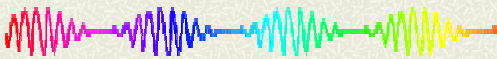
Cylinders vs. disks

- ✦ Disks easier and cheaper to reproduce than cylinders, but Edison resisted change to disks
- ✦ Flat disks allowed the *jukebox* to be developed in 1925
- ✦ 78 RPM records were standard by end of WWII
 - Collection of ten records were sold in envelopes about the size of a photo album—thus called an “album”



Discovery of radio waves

- ✦ 1888: German physicist *Heinrich Hertz* first demonstrated radio waves; transmitted and received signal over three meters
 - *Amplitude*: Height of radio wave
 - *Frequency*: Cycles completed in one second
 - *Hertz*: Measures frequency of waves



Guglielmo Marconi (pronounced Goo-li-EL-mo) Marconi

- ✦ Recognized value of radio for communication
- ✦ Wealthy Italian family supported experiments
- ✦ Improved on Hertz’s transmitter: transmitted two miles by 1896; successful transatlantic transmission, 1901
- ✦ Interested British government in radio: established British Marconi and American Marconi



Early federal regulations

- ❏ **Radio Act of 1912:** After Titanic, Congress established regulations for maritime wireless (required 24 hour wireless watch on ships)
 - Secretary of Commerce had authority to regulate radio
- ❏ During **WWI** the U.S. Navy took over *all* radio
 - Ordered all amateurs off-air, took control of privately owned stations and forced manufacturers to pool patents to improve equipment



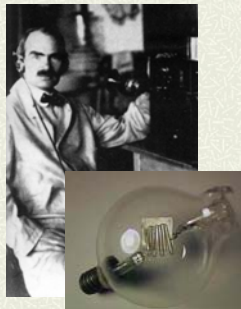
Formation of RCA

- ❏ At the end of WWI radio returned to private hands
- ❏ Government forced British interests out of US radio
 - American Marconi was purchased by General Electric, AT&T, and Westinghouse
- ❏ Formed new company: Radio Corporation of America (RCA), with pooled patents



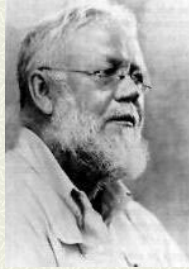
Lee de Forest

- ❏ Invented the *audion tube*
 - Vacuum tube could be used to detect radio waves and amplify weak signals
 - Sold rights for telephone use to AT&T
- ❏ Accomplished in self-promotion—called himself “father of radio”



Reginald Fessenden

- Canadian, experimented with sending voice by radio waves (over one mile in 1900)
- 1906 Christmas Eve broadcast considered first voice broadcast
 - Ship radio operators reported hearing “the voice of an angel”



Commercial sponsorship

- AT&T had always charged for long-distance phone calls
- “Toll broadcasting:” Natural next step was charging for messages broadcast for all of other people listening
 - WEAF, New York, had first “commercial:” real estate development company paid \$100 for 10-minute ad! (TEN MINUTES! ACK!)



Chaos of the airwaves!

- In Radio Act of 1912, Secretary of Commerce Herbert Hoover was given authority to allocate frequencies, *but* act wasn’t specific in granting powers
 - Courts questioned Secretary’s right to enforce allocation
- Over 500 stations by 1922, and stations used frequencies at will...imagine the headaches!



So...Radio Act of 1927!

Big theory: Public owns airwaves!!

- ✦ **Federal Radio Commission (FRC):** five members appointed by President with consent of Senate (replaced by FCC in 1934)
 - Establish standard broadcast bands
 - Allocate frequencies
 - License stations: Stations must broadcast in “public interest, convenience and necessity” (PICAN)

David Sarnoff

- ✦ Marconi Wireless operator
 - Reported to have relayed Titanic distress news (but some historians question story)
- ✦ Wrote visionary memo; foresaw radio as household utility: “Radio music box”
- ✦ Opposed commercial sponsorship—favored taxing radio sets like BBC
- ✦ Became director of RCA



Network radio: rise of the Big Three

- ✦ AT&T established first network, connecting stations via phone lines to share expenses
- ✦ RCA launches *National Broadcasting Company (NBC)* network in 1926
 - Government fears of AT&T monopoly forces AT&T to sell its radio network to NBC, so NBC establishes two networks, Red and Blue
- ✦ *Columbia Broadcasting System (CBS)*
 - William S. Paley: tobacco fortune, buys Columbia Phonograph Company and creates CBS in 1927
- ✦ FCC orders RCA to sell one of its networks—sells NBC-Blue to Edward J. Noble in 1943, which becomes *American Broadcasting Company (ABC)*



Radio days

- ❏ Radio caused decline in recording industry
 - Why buy recordings when radio was free?
- ❏ Radio used *live music*; recording fidelity was too poor to broadcast
 - Big band sound developed from jazz: Glenn Miller, Tommy Dorsey
 - Comedy shows: “Amos ‘n’ Andy” (now considered racist)
 - Drama: “War of the Worlds,” radio soap operas



Radio in the age of television

- ❏ Primetime radio audience moved to television
- ❏ Early radio would not play records, and FCC required stations to announce that program was recorded music
 - Rock ‘n’ roll was originally called race music (rhythm and blues)
- ❏ *Format radio*: limited kinds of music played on radio station to genres



Recording

- ❏ *Electromagnetic tape (next)*
- ❏ *Long-playing records (LPs)*
 - Peter Goodmark, Columbia, listened to classical music, where “Brahms Second Piano Concerto” took 12 sides
 - Proposed slowing turntable and increasing grooves per inch; could play 23 minutes per side



How magnetic tape works

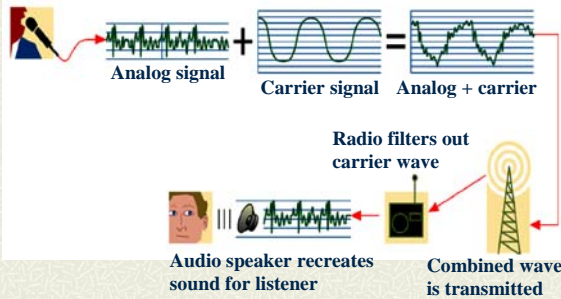
- Recording: Magnetic particles in random polarity are rearranged when they pass under recording head and correspond to variations in audio input



- Playback: Magnetic field strength changes on tape as it passes under playback head, creating weak current that reproduces original sounds



How AM radio works



Edwin Howard Armstrong: FM (frequency modulation)

- NBC engineer, supports *frequency modulation (FM)* over amplitude modulation (AM), but David Sarnoff decides to pursue TV instead
- First FM stations established by pre-existing AM stations and simulcast with AM
- FM less susceptible to interference, uses ground waves that can travel only "line of sight"



FM revolution

- ✦ Offered high-fidelity sound at shorter range: *“Line of sight”*
- ✦ First introduced in 1930s, but languished until 1960s, when FM stations simulcast material from AM stations
- ✦ Stereo sound, cleaner, no static!
- ✦ FM began distinct radio formats



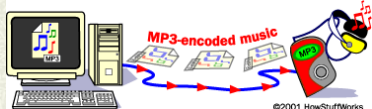
New radio networks

- ✦ In 1970s and 1980s radio almost completely local
- ✦ But 1990s brought new form of network radio
- ✦ *Syndicated programs*: talk radio, including Howard Stern, Rush Limbaugh, Dr. Laura
- ✦ Group ownership
 - *ClearChannel Communication* owns over 1,200 stations
 - Economies of scale
 - Advertisers can reach national audience across all group-owned stations



How does MP3 work?

- ✦ Compression system for music: reduce number of bytes in a song without hurting quality
- ✦ Goal is to compress CD-quality song by a factor of 10-14 without noticeably affecting CD-quality sound: a 32-megabyte (MB) song on a CD compresses down to about 3 MB
 - *“Perceptual noise shaping”*: certain parts can be eliminated without significantly hurting song quality



Music on the Internet

- ✦ Can easily “rip” copies of music to share online
 - MP3.com, Napster
 - Gnutella (Kazaa, Limewire): *P2P file-sharing protocol*
- ✦ Most music downloads were copyright violations
- ✦ Metallica and music industry group sued to stop Napster
 - Napster forced to remove songs illegally being copied



Digital audio

- ✦ **Compact disk:** sound waves converted into 1s and 0s; tiny pits in CD scatter laser light and produce sound on playback
 - Greater fidelity and longer life
- ✦ **Digital audio tape (DAT)**
 - Produces crystal clear uncensored copies
 - Removed from consumer market but has become standard for professional recording
- ✦ **MP3 players:** MP3 files can be downloaded
- ✦ **Digital audio broadcasting:** satellite radio in the car, online radio stations...



Consolidation of radio: big!

- ✦ **Telecommunication Act of 1996** deregulated ownership—removed limit on ownership of stations
 - Clear Channel Communication reached 1170 stations in 2001! Currently over 1,200
- ✦ **Permit cross-ownership:** ownership of different kinds of media
- ✦ **Some small regulations on local ownership of multiple radio stations** (can own no more than 8 in market with 45+ stations)



Consolidation of recording: Six major recording companies

- ❏ Sony (Japan)
- ❏ AOL TimeWarner (USA)
- ❏ Philips (Polygram) (Netherlands)
- ❏ Thorn/EMI (United Kingdom)
- ❏ Bertelsmann (RCA) (Germany)
- ❏ Vivendi (MCA) (Formerly owned by Seagram Canada, now France)

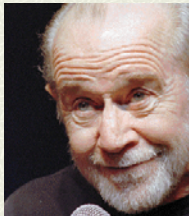


Diversity: sadly, a reduction in the number of voices

- ❏ Government regulation of broadcast
 - Scarcity of communication spectrum, PIGAN
- ❏ Concentration of ownership due to Telecom Act
 - Fewer stations are programmed locally; groups program stations from central locations
- ❏ But concentration of ownership produces *more format diversity*
 - Groups that own stations in same market program to reach different audience segments, so stations don't compete with each other

Freedom of speech?

- ❏ Print media and broadcast media have different legal standards, and print is better!
- ❏ Obscene language
 - *Parent Music Resource Center* called on record companies to label records for explicit content
- ❏ Indecent speech: George Carlin's "Seven Dirty Words"
 - Public radio station fined for playing during afternoon
 - Shock jocks routinely violate rules, see fines as cost of doing business



Issues and concerns

- **MTV: Tremendous impact on recording industry**
 - Image of recording artist becomes more important than music
 - Sexual image aimed at pre-teens
- **Copyright of music**
 - Royalty fees: fee paid to use intellectual property
 - ASCAP and BMI = 1% to 2% of gross sales
- **Online music swapping**

