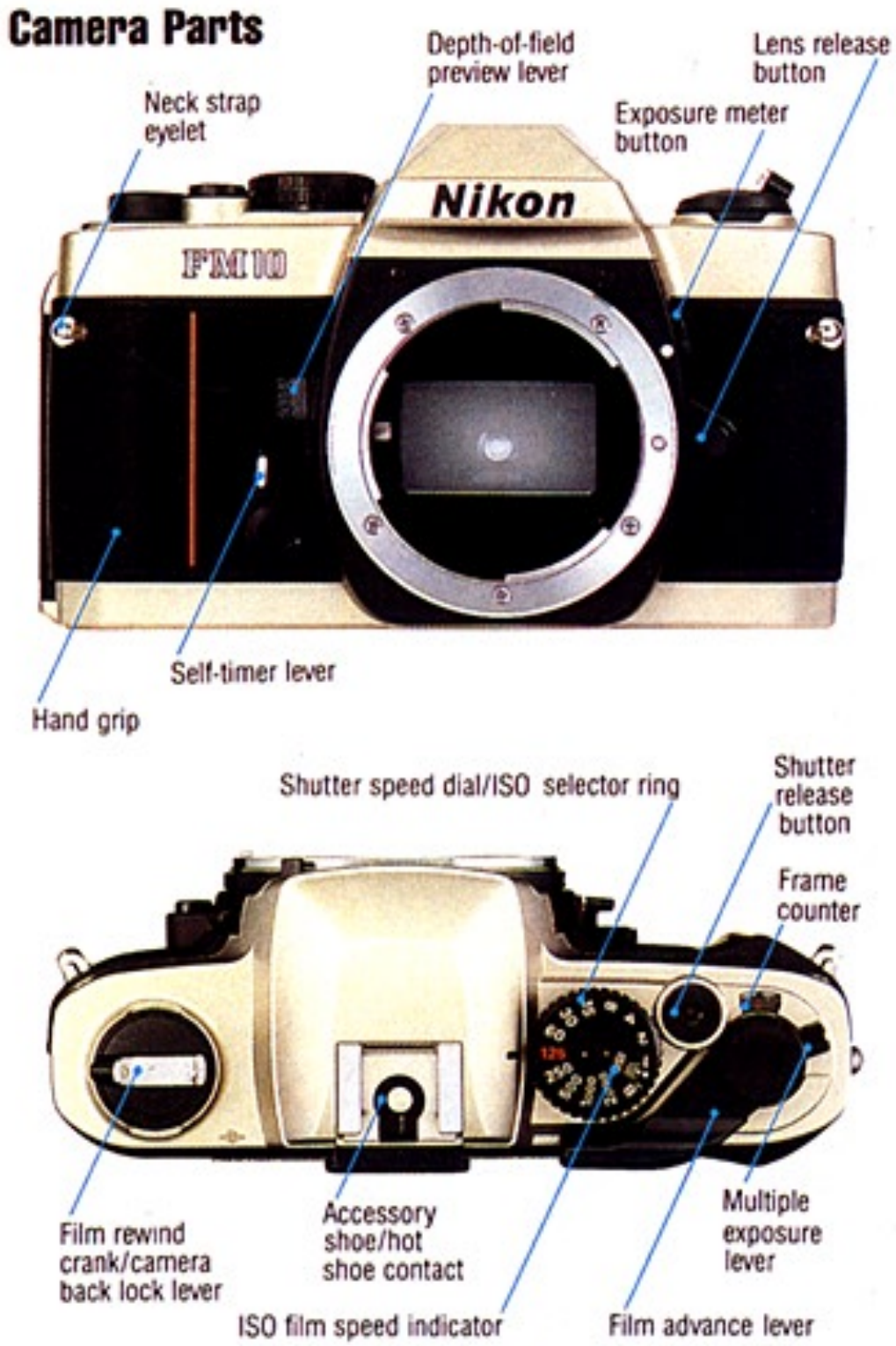
Station 1- Structure of Waves

https://www.youtube.com/watch?v=XCu6L4kQF3k

Station 2- Cameras

Film Camera


Camera Parts
Depth-of-field preview lever
Lens release button
Neck strap eyelet
Exposure meter button
Nikon
FM10
Self-timer lever
Hand grip
Shutter speed dial/ISO selector ring
Shutter release button
Frame counter
Film rewind crank/camera back lock lever
Accessory shoe/hot shoe contact
Multiple exposure lever
ISO film speed indicator
Film advance lever

Digital Camera

Digital Vs. Film Cameras
Pros and Cons

PROS

Film

- amazing lighting without having to fake it in photoshop
- what you see through the viewfinder as you take your image is exactly what you get
- a depth of field that is unique looking
- you get the excitement of seeing your images after waiting long hours
- you are careful and precise about your pictures because you only have so many
- better at capturing detail in black & whites

Digital

- so easy to adjust all settings quickly for your different lighting situations
- able to shoot more images at once and not feel bad about it
- viewing your images instantly
- lighter in weight than most film cameras
- simply more convenient and quicker

CONS

Film

- if you don't have enough film rolls with you while your out and about in an amazing place, then you have NO pictures. Sad
- long and more pricey process
- always have to be carrying around rolls
- unless you have a darkroom, then you are leaving your rolls of film in someone elses hand. Meaning if something went wrong with your film, it's out of your control once you give it to them.

Digital

- More pricey initial cost
- You don't get the same "look" as a film photo
- easily loose details in your black and whites
- nice lenses for your digital SLR are very pricey!
- digital is not always reliable

Station 3- Communicating with Waves

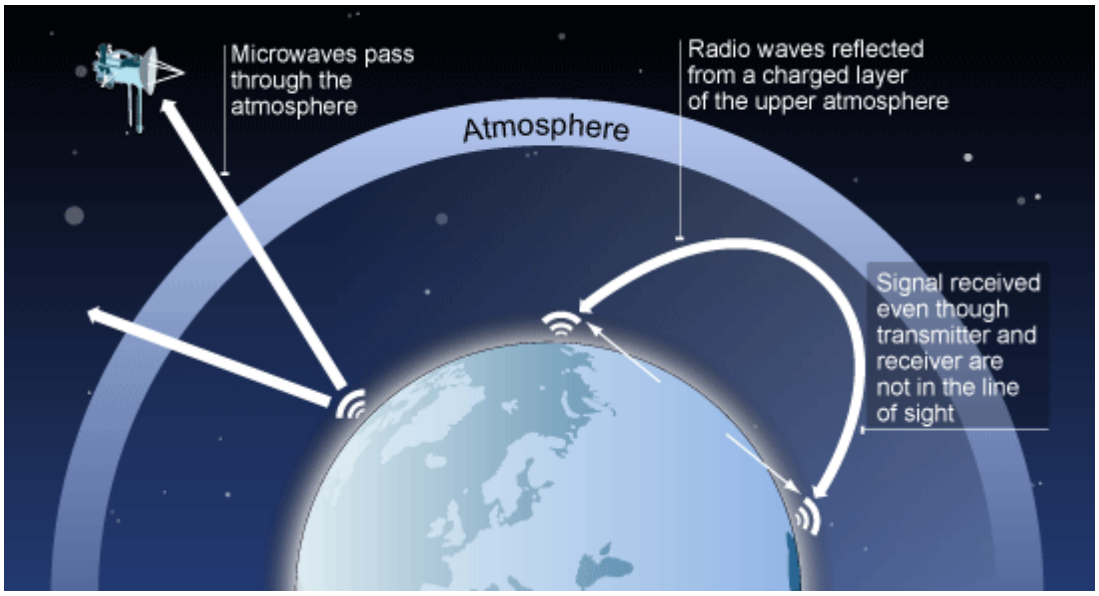
Radio waves, microwaves, visible light and infrared can all be used for communication. You should know some typical examples of these, and associated hazards.

Radio waves

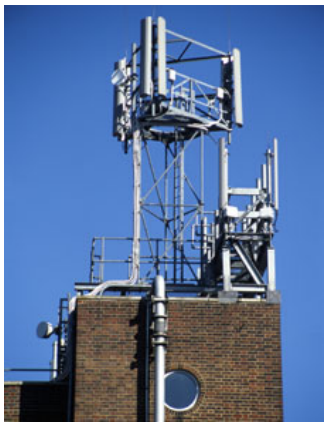
Radio waves are used to transmit television and radio programs. Television uses higher frequencies than radio.

A radio program receiver does not need to be directly in view of the transmitter to receive program signals. Diffraction allows low-frequency radio waves to be received behind hills, although repeater stations are often used to improve the quality of the signals.

The lowest frequency radio waves are also reflected from an electrically charged layer of the upper atmosphere, called the **ionosphere**. This means that they can still reach receivers that are not in the line of sight because of the curvature of the Earth's surface.



Microwaves and radio waves in the atmosphere



Microwaves

Microwave radiation can also be used to transmit signals such as mobile phone calls. Microwave transmitters and receivers on buildings and masts communicate with the mobile telephones in their range. Some people think that mobile phones, which transmit and receive microwaves, may be a health risk. This is not accepted by everyone, as the intensity of the microwaves is too low to damage tissues by heating, and microwaves are not ionizing. Certain microwave radiation wavelengths pass through the Earth's atmosphere and can be used to transmit information to and from satellites in orbit. Satellite television signals use microwaves.

Visible light

Visible light is the light we can see. It allows us to communicate with one another through books, hand signals and video, for example. The use of visible light needs the transmitter and receiver to be in the line of sight. But it is more secure against eavesdroppers than radio waves.

Cameras let us record still pictures and movies, and photography is an important use of visible light. Very bright light can damage our eyes – you should never look directly into the Sun.

Infrared

We cannot see infrared radiation, but we can feel it as heat energy. High intensity infrared is used in heaters, toasters and grills, and it can cause burns. Infrared sensors can detect heat from the body. They are used in:

- security lights
- burglar alarms.

Infrared radiation is also used to transmit information from place to place, including:

- remote controls for television sets and DVD players
- data links between computers.

Station 4- Walkie Talkies versus the Cell Phone

Imagine this: it's a gorgeous winter day and you have been snowmobiling with your family all afternoon. However, it's getting close to being dark and you have lost track of one of your family members. You retrace your path, hoping to find them where you last remember seeing them. However, they are not there. You pull out your cell phone hoping to call them, but soon realize that you don't have cell service in the mountainous terrain. You are filled with anxiety as you begin to wonder what to do next. If you had walkie talkie you could locate your missing party in a snap.

Because walkie talkies are based on radio frequencies and not cell towers for service, they are more reliable than cell phones in certain situations. If you are in a mountainous area, cell phone service may be obstructed by the trees, whereas the short-range radio frequencies walkie talkies rely on are easier to transmit and receive.

If you are planning to travel overseas, you may be interested in purchasing walkie talkies for the trip. It may be more economical for you to spend money these devices rather than using your roaming minutes from your cell phone.

If you are planning on taking the family on a luxurious cruise ship for a much needed vacation, walkie talkies could also come in, well, handy. Many cruise lines do not allow the use of cell phones except in certain areas of the ship, such as staterooms.

Walkie Talkies vs. Cell Phones

Walkie Talkie	Cell Phone
Analog	Digital
Two way communication	Multiple way communication
Uses radio waves	Uses cell phone towers
Can communicate only short distances	Can make phone calls all over the world
No monthly fee	Monthly fee
No roaming or out of country charges	Roaming and/or out of country charges
	Software applications

Station 5- Comparing Analog to Digital

COMPARISON CHART

	ANALOG	DIGITAL
Signal	Analog signal is a continuous signal which represents physical measurements.	Digital signals are discrete time signals generated by digital modulation.
Waves	Denoted by sine waves	Denoted by square waves
Representation	Uses continuous range of values to represent information	Uses discrete or discontinuous values to represent information
Example	Human voice in air, analog electronic devices.	Computers, CDs, DVDs, and other digital electronic devices.
Technology	Analog technology records waveforms as they are.	Samples analog waveforms into a limited set of numbers and records them.
Data transmissions	Subjected to deterioration by noise during transmission and write/read cycle.	Can be noise-immune without deterioration during transmission and write/read cycle.
Response to Noise	More likely to get affected reducing accuracy	Less affected since noise response are analog in nature
Flexibility	Analog hardware is not flexible.	Digital hardware is flexible in implementation.
Uses	Can be used in analog devices only. Best suited for audio and video transmission.	Best suited for Computing and digital electronics.
Bandwidth	Analog signal processing can be done in real time and consumes less bandwidth.	There is no guarantee that digital signal processing can be done in real time and consumes more bandwidth to carry out the same information.
Memory	Stored in the form of wave signal	Stored in the form of binary bit
Power	Analog instrument draws large power	Digital instrument draws only negligible power
Cost	Low cost and portable	Cost is high and not easily portable

Station 7- Evolution of Cell Phones

THE EVOLUTION OF THE MOBILE PHONE

1970

1973

1996

1965–'70: TV comedy **Get Smart** predicts the future by depicting a mobile phone, the irreverent "**shoe phone.**"

1966–'69: The **Star Trek Communicator,** said to be the inspiration for Martin Cooper's mobile phone, debuts in the late sixties.

pdt

Product Development Technologies' team has been at the forefront of many mobile innovations.

Learn more about our work at **PDT.com**

1973: **Martin Cooper** invents the **first mobile phone.**

1983: The Motorola Dynatac 8000X (the "**Zack Morris phone**") debuts, weighing nearly two pounds and retailing for almost $4,000.

1980

1999

1992: The **first text message** is sent. It reads "Happy Christmas."

1995: The film **Clueless** features teenage characters on mobile phones, helping to further the youth culture's mobile obsession.

2000

1996: The first ever clamshell/flip mobile phone, the **Motorola StarTAC,** is released.

1998: **Bluetooth** hits the market, enabling easy hands-free phone use.

1999: Mattel debuts "**Working Woman Barbie,**" who comes complete with her own mobile phone.

2003

1990

1999: The **first Blackberry,** the 850, launches, bearing little resemblance to those used today.

2001: The film

reads "Happy Christmas."

film **Clueless** features teenage characters on mobile phones, helping to further the youth culture's mobile obsession.

1996: The first ever clamshell/flip mobile phone, the **Motorola StarTAC**, is released.

1998: **Bluetooth** hits the market, enabling easy hands-free phone use.

1999: Mattel debuts "**Working Woman Barbie,**" who comes complete with her own mobile phone.

2003

1990

1999: The **first Blackberry**, the 850, launches, bearing little resemblance to those used today.

2000: Sharp Communications and J-Phone release the **first camera phone.**

2001: The film **Zoolander** satirizes the obsession with ever-smaller mobile phones by depicting a tiny device used by the title character.

2002: **American Idol** first airs, leading the trend toward mobile and entertainment integration with its call/text voting.

2004

2007

2003: The **Nokia 1100** launches, eventually becoming the top-selling phone of all time, moving over 250 million units.

2004: Motorola unveils the **Razr.** It's eventually available in custom colors like hot pink, signaling the emergence of phone personalization.

2005: Heiress/ celebrity **Paris Hilton's Sidekick** device is hacked, prompting a renewed industry focus on security.

2000

2007

2005: **Ring tones** generate over $2 billion in yearly worldwide sales.

2007

2007: The **first iPhone** launches, featuring a touchscreen and countless apps.

2008: The **first Android phone**, the HTC Dream, is released.

2008: The **iPhone App Store** launches.

2011: Google & Visa announce their **mobile wallet services,** allowing users to make payments using their mobile devices. The services will likely usher in a mainstream movement towards mobile commerce.

2008

2010

Station 9- Music

Analog vs. Digital Music Players

How does a Record Player (Turntable) Work?

The **turntable** is the circular plate on which the record sits. The turntable rotates or spins.

The **stylus**, or needle, is the smallest and perhaps the most important component of the record player. It is made from a diamond or other hard material, shaped like a cone and suspended by a flexible strip of metal. The pointed end is the only piece that touches the top of the record and it rides around the spiraling grooves of the disk, picking up the vibrations which are ultimately turned back into sound.

The stylus sits at one end of the **tone arm,** which is mounted to the side of the turntable and sits parallel to the record. With the needle or stylus placed in the outermost groove of the record, the tone arm follows the groove as it spirals inward, traveling across the record in an arc as the record spins beneath it. As this happens, the vibrations travel along a flexible metal strip and wires housed in the tone arm to the **cartridge** in the end of the tone arm. The cartridge receives the vibrations, which are converted to electrical signals through a coil in a magnetic field. The electric signals are carried along wires to the **amplifier** which enhances the power of the signal. Finally, the signals are converted back to sounds that come out through the speakers.

How does an MP3 player work?

If MP3s are computer files, it follows that MP3 players must be computers.

All computers, which are machines that process information (data), have four basic components. They have an input device (for getting the data in), a memory (for storing data), a processor (for working on the data), and an output device (for getting the data back out again).

Switch on your iPod to play your favorite track and it works just like a computer. The processor chip loads an MP3 file, reads the ID3 index cards, and displays the artist and track name on the display. Next, it works its way through the MP3 file reading each frame in turn. It reads the header, followed by the data, and turns the digital information (the binary ones and zeros) back into sound frequencies that your ears and your brain decode as music. That's pretty much all there is to it. But remember this: the real secret of a digital music player is not the plastic gadget in your hand but the clever technology behind the MP3 files it's playing!