

Characteristics of various types of organs.

Characteristic	Tracker Pipe	Electro-Pneumatic pipe	Tubular Pneumatic Pipe	Direct Electric Pipe	Analog Electronic	Digital Electronic
Still made?	yes	yes	no	yes	no	yes
Major builders, total number of companies now in business	Taylor & Boody, Noack, Fisk, Dobson, Rosales, Bond, Casavant .approx 20	Schantz, Schoenstein, Schlicker, Rufatti, Reuter, Casavant, Austin.... approx 20	Estey (out of business 30 yr) none (some trackers have part tubular, e.g. for pedal)	Wicks, Gress Miles (no longer in business) Lewis/Hitchcock, Fritzche, Dwyer- c. 15	Allen, Rodgers, Conn (out of business), Hammond none in this field now.	Allen, Rodgers, plus overseas firms. 4 companies. 2 US firms.
Churches that have this type of organ, and year built when applicable, if over 25 yrs old.	Mt. Carmel, Westminster Pres Charlottesville, St. Francis (1905), Christ Lutheran, Tinkling Spring, First Presby Waynesboro (1885), Hebron Lutheran in Madison (1802) Trinity (2000)	1 Presby S(38), 2 Presby S.*(48), Bethel(29), Faith Luth.*(70), Pleasant View Lutheran(82), Emmanuel Epis.*(41), Central Meth.(25/67*), Aug.Stone (25/75), First Baptist S* (63) W(64) Pleasant Valley & Middle Riv. Breth, EMC *=major repairs done	New Providence Presbyterian (1910) (Note: They are having it rebuilt so it will work another 90 years.)	Grace Episcopal, Cismont (63/99) First Presby, Harrisonburg Park View Mennonite?	Hebron Presbyterian, Spring Hill Presbyterian, Loch Willow Presby., Elk Run Breth. Christ United Methodist (just replaced), Marquis Memorial Methodist, Guardian Angel Academy, Bridgewater Presby.	St. Paul's Meth., Staunton Church of Brethren, Memorial Baptist, Finley Memorial, Mt. Horeb, St. John's Methodist, Fishersville UM. Christ UM.
useful life	200+ years	100+ years	90 years	unknown.. 100 yrs?	20-25 years	20 years
major repairs needed	60-80 yrs	20 yrs	60 yrs	30 yrs	5 yrs	10 yrs speakers/amps.
time until major rebuilding	75-100 years	30 years or less urban, 60 years very rural (air quality)	80 years, but most not rebuildable because of design	unknown... 40 years typical, but new design.	not rebuildable; must replace	not rebuildable; must replace.
rebuild cost as % of original cost	120% of cost assuming 2.5% inflation over 75 years	300% of cost assuming 2.5% inflation over 30 yr.	500% of cost assuming 2.5% inflation over 60 yr	200% of cost with same economic assumptions, if parts available.	replace only. Replacement 163% of orig. cost every 20 yr.	replace only. Replacement 163% of orig. cost every 20 yr.
rebuild cost as % of replacement cost.	30% of repl. cost restoration.	50% of repl. cost releather	80% --. mechanism must be replaced.	40% of repl. cost major elect. parts.	replace only depends on inflation	replace only depends on inflation
Tone source	Air passing through metal or wood pipes transfers sound to air in the room. Sound disperses spherically.	Air passing through metal or wood pipes transfers sound to air in the room. Sound disperses spherically.	Air passing through metal or wood pipes transfers sound to air in the room. Sound disperses spherically.	Air passing through metal or wood pipes transfers sound to air in the room. Sound disperses spherically.	Electronic circuit. "LC" synthesized using coil, condenser and tube or transistor. Loudspeakers. Conical dispersion.	Pipe organ tones "sampled" with microphone and encoded on a computer chip. Digital computer plays tones. Loudspeakers.
Tone dispersion in the room	Tone spreads uniformly in room because of "Huygens' Principle" and because much of the sound is reflected several times before leaving the organ.	Tone spreads uniformly in room because of "Huygens' Principle" and because much of the sound is reflected several times before leaving the organ.	Tone spreads uniformly in room because of "Huygens' Principle" and because much of the sound is reflected several times before leaving the organ.	Tone spreads uniformly in room because of "Huygens' Principle" and because much of the sound is reflected several times before leaving the organ.	Tone is directional, focused by where speakers are aimed. Uneven coverage. Subject to intermodulation distortion.	Tone is directional, focused by where speakers are aimed. Uneven coverage. Subject to intermodulation and phase shift distortion.
How playing the key makes the note sound (key action)	Key hooked to "pallet" in windchest through levers, etc. Playing key pulls pallet down, admitting air to pipe. 1 pallet per key.	Playing key activates electromagnet, raising a steel disc, allowing pressure air under a leather pneumatic to exhaust to atmosphere, pulling valve down. 1 pneumatic per pipe.	Like Electropneumatic, but uses air pressure to operate an intermediate valve system.	Electric contacts under key send current to an electromagnet under the pipe, pulling the valve open. 1 valve per pipe.	Pressing key sends voltage to "keying circuit" which activates tone production.	Pressing key sends signal voltage to a specific computer chip, which activates the note in the digital computer.
Number of valves in 2 manual organ with 14 stops; Air flow.	Approx. 144 Runs depth of chest. Low turbulence	Approx 849 moderate turbulence. Some have temperature change.	Approx 950 moderate turbulence/ temperature change.	Approx 1250 high turbulence with abrupt action.	no valves... electronic Has 1 tube/transistor per note per voice.	no valves... electronic. Has 1-5 circuit boards with 20-60 chips.
How various sets of pipes are turned on or off (Stop action)	Stop knob moves a wooden slider with holes in it so that air can get to pipe or is shut off, as desired. Runs width of chest.	Stop knob or key activates electromagnet which operates a pneumatic which moves a disc inside chest allowing air to get to the key mechanism.	Stop key sends air pressure to a valve which opens air passage to the chest for that particular stop. Stop action often noisy.	Through a circuit panel, both the key current and the stop current must be "on" for the note to sound. Requires a high level of electric current.	Stop key or knob sends current to the circuit, allowing tone to sound	Stop knob or key sends signal voltage to specific computer chip, which regulates the sound made by the digital computer.
Number of stop mechanisms in 2 manual organ with 14 stops	14 (or less, down to about 12 if double draw mechanisms are used)	Approximately 850	Approximately 25	One large circuit board with approximately 860 diodes	approx. 30 with various modifier controls	Approx. 30 with various modifier controls.
Materials used in construction (assumes all use various types of hardware... screws, hinges, latches, pegs, nails, etc.)	Wood, lead, tin, trace minerals, steel, leather, bone (key caps)... commonly available materials will be available in future.	Wood, lead, tin, trace minerals, leather, bone, computer circuit board (only one manufacturer), electromagnets, plastic, copper wire, electric contacts.	Wood, leather, tin, trace elements, zinc, ivory. NOTE: some tracker builders use this system for bass pipes where space does not allow mechanical action. Can compromise lifespan.	Wood, lead, tin, zinc, trace elements, bone, leather (gaskets) copper wire, computer circuit boards, electromagnets, gypsum board, rubber, plastic.	Wood, bone or ivory, steel, copper wire, electronic circuit boards, electron tubes, transistors, other electronic parts. Loudspeakers.	Wood, steel, copper, bone, plastic, printed circuit computer boards, computer chips, wire, other electronic parts. Loudspeakers.
Floor space	small footprint, tall	varies	varies.	varies	console space plus speakers	console space plus speakers.
Playable without electric service	Yes, if hand bellows included	no	Yes, if hand bellows included	no	no	no
Player's "touch" on keyboard influences tone	Yes Makes organ more expressive.	no	no	no	no except some 1950s Baldwin & Hammond.	Some have this feature, but unreliable
Frequency of tuning	Every 4-5 years	twice a year	twice a year	twice a year	once to twice a year	never needs tuning.
Contains parts that depend on a specific manufacturer	NO. Replacement parts easily made.	Yes some parts are "sole supplier"	Most can be hand fabricated.	Yes. some parts are "sole supplier"	Yes.. some parts no longer available	Yes, including proprietary chips.
Cost / Cost per 100yrs./yr	300K /150K /1.5K	180K / 230K/ 2.3K	no longer available	160K / 230K/2.3K	no longer available	60K / 1135K / 11.35K