- Comparing Steel and Aluminum Garage Door Durability

  Comparing Steel and Aluminum Garage Door Durability Benefits of Composite Wood Garage Door Panels Understanding R Value Ratings for Energy Savings Factors That Influence Door Weight and Balance Selecting Wind Rated Doors for Coastal Regions Environmental Impact of Different Door Materials Noise Reduction Advantages of Insulated Doors Cost Analysis of Single Layer Versus Triple Layer Doors Evaluating Polyurethane Insulation for Thermal Efficiency Aesthetic Options in Carriage House Door Designs Protecting Metal Doors from Corrosion in Harsh Climates Recycling Old Garage Doors During Material Upgrades

- What to Expect from Same Day Garage Door Service

  What to Expect from Same Day Garage Door Service Preparing for After Hours Door Malfunctions Determining When a Door Issue Is an Emergency Understanding Emergency Service Fee Structures Safety Precautions During Nighttime Door Repairs Temporary Solutions While Waiting for Technicians Managing Power Outages with Manual Door Release How Weather Conditions Affect Emergency Response Communicating Door Status in Property Management Insurance Considerations for Urgent Door Repairs Coordinating Access for Emergency Repair Vehicles Post Repair Checks Following Late Night

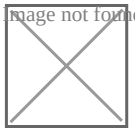
Service

- About Us

Communicating Door Status in Property Management

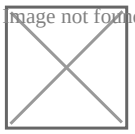
In the realm of property management, one might not immediately think of the humble door as a critical component of efficient building operations. However, the concept of Communicating Door Status has emerged as a pivotal feature in modern property management systems, enhancing security, convenience, and operational efficiency.

The term Communicating Door Status refers to the integration of technology that allows doors within a property to report their state-whether they are open, closed, locked, or unlocked-to a central management system. This communication can be facilitated through various technologies such as magnetic sensors, smart locks, or IoT (Internet of Things) devices. But why is this communication so crucial?

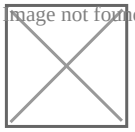


Firstly, from a security standpoint, knowing the status of each door in real-time significantly bolsters safety measures. For instance, in commercial buildings or residential complexes where security is paramount, an alert can be sent to security personnel if an unauthorized door remains open for too long or if its opened outside of scheduled hours. This immediate feedback loop can prevent potential security breaches before they escalate.

Secondly, communicating door status aids in energy management. Doors that remain ajar can lead to significant energy loss in both heating and cooling environments. By monitoring these statuses, property managers can ensure that doors are closed when necessary, reducing energy waste and thereby lowering utility costs for both the management and tenants.



Moreover, this technology brings about a level of convenience that was previously unattainable. Consider an apartment complex where residents use an app to check if theyve left their front door unlocked when theyre away from home. Or imagine a scenario in an office setting where maintenance staff can remotely verify if conference room doors are locked after hours without needing to physically check each room. Such conveniences save time and reduce human error.



In larger properties like hotels or multi-unit residential buildings, communicating door status also streamlines operations. Maintenance teams receive real-time data which helps prioritize tasks; for example,

fixing a faulty lock immediately becomes urgent if its reported that the door cannot lock properly. Similarly, housekeeping can plan their routes more efficiently by knowing which rooms have been vacated based on door status changes.

However, implementing such systems does come with its challenges. Privacy concerns must be addressed carefully; tenants need assurance that while their safety is enhanced through monitoring door statuses, their privacy isnt compromised. Furthermore, initial setup costs and ongoing maintenance for these smart systems require investment from property owners or managers.

Despite these challenges, the benefits often outweigh the cons in todays tech-driven world where connectivity is key. The integration of communicating door status into property management not only represents a step towards smarter buildings but also aligns with broader trends towards automation and data-driven decision-making in real estate.

In conclusion, the ability for doors to communicate their status within property management systems is transforming how we interact with our living and working spaces. It provides peace of mind through enhanced

security measures while fostering efficiency in daily operations and contributing to sustainable building practices through energy conservation efforts. As technology continues to evolve, we can expect this aspect of property management to become even more sophisticated, further embedding itself into the fabric of our built environments for years to come.

How Weather Conditions Affect Emergency Response

About Remote control

A remote, additionally known informally as a remote or clicker, is a digital device made use of to run an additional tool from a range, normally wirelessly. In consumer electronic devices, a push-button control can be made use of to run devices such as a television, DVD gamer or other electronic home media appliance. A remote can permit procedure of devices that run out practical grab direct procedure of controls. They function best when utilized from a brief range. This is largely a comfort feature for the user. Sometimes, remotes allow an individual to run a device that they or else would certainly not have the ability to reach, as when a garage door opener is activated from outdoors. Early television push-button controls (1956––- 1977) used ultrasonic tones. Present-day remote controls are generally consumer infrared gadgets which send out digitally coded pulses of infrared radiation. They regulate features such as power, quantity, networks, playback, track modification, energy, fan rate, and various other features. Push-button controls for these gadgets are usually small cordless portable objects with a range of buttons. They are used to readjust various setups

such as television channel, track number, and volume. The remote code, and hence the needed push-button control gadget, is typically certain to a product line. However, there are global remotes, which imitate the remote created most major brand tools. Remotes in the 2000s include Bluetooth or Wi-Fi connection, activity sensor-enabled capabilities and voice control. Remotes for 2010s onward Smart Televisions might include a standalone key-board on the rear side to facilitate keying, and be functional as an aiming tool.

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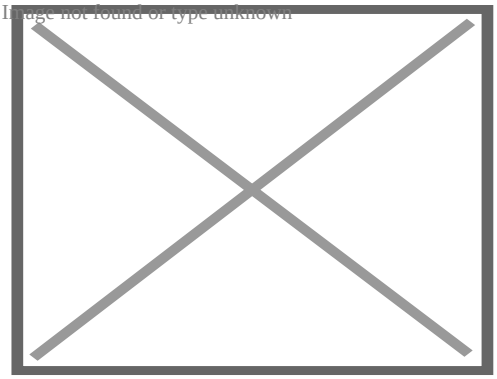
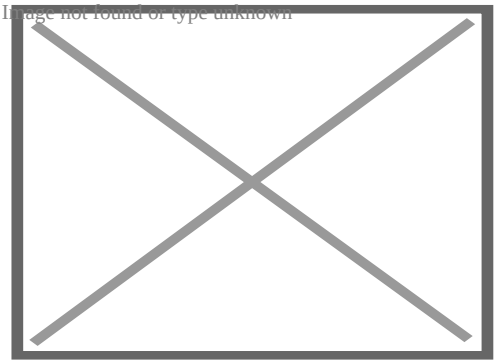
About Maintenance

"Repair" and "repairman" redirect here. For home repair, see Home repair.
For the Wikipedia administrative page, see Wikipedia:Maintenance.
For other topics about maintenance, see Maintenance (disambiguation).



A tractor being mechanically repaired in Werneuchen, 1966



Field repair of aircraft engine (1915–1916)

The technical meaning of **maintenance** involves functional checks, servicing, repairing or replacing of necessary devices, equipment, machinery, building infrastructure and supporting utilities in industrial, business, and residential installations.[1][2] Terms such as "predictive" or "planned" maintenance describe various cost-effective practices aimed at keeping equipment operational; these activities occur either before[3] or after a potential failure.

Definitions

[edit]

Maintenance functions can be defined as **maintenance, repair and overhaul** (**MRO**), and MRO is also used for **maintenance, repair and operations**.[4] Over time, the terminology of maintenance and MRO has begun to become standardized. The United States Department of Defense uses the following definitions:[5]

- Any activity—such as tests, measurements, replacements, adjustments, and repairs—intended to retain or restore a functional unit in or to a specified state in which the unit can perform its required functions.[5]
- All action taken to retain material in a serviceable condition or to restore it to serviceability. It includes inspections, testing, servicing, classification as to serviceability, repair, rebuilding, and reclamation.[5]
- All supply and repair action taken to keep a force in condition to carry out its mission.[5]

- The routine recurring work required to keep a facility (plant, building, structure, ground facility, utility system, or other real property) in such condition that it may be continuously used, at its original or designed capacity and efficiency for its intended purpose.[5]

Maintenance is strictly connected to the utilization stage of the product or technical system, in which the concept of maintainability must be included. In this scenario, maintainability is considered as the ability of an item, under stated conditions of use, to be retained in or restored to a state in which it can perform its required functions, using prescribed procedures and resources.[6]

In some domains like aircraft maintenance, terms *maintenance*, *repair and overhaul*[7] also include inspection, rebuilding, alteration and the supply of spare parts, accessories, raw materials, adhesives, sealants, coatings and consumables for aircraft maintenance at the utilization stage. In international civil aviation maintenance means:

- The performance of tasks required to ensure the continuing airworthiness of an aircraft, including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or a repair.[8]

This definition covers all activities for which aviation regulations require issuance of a maintenance release document (aircraft certificate of return to service – CRS).

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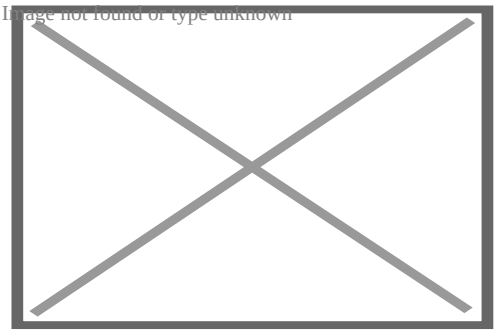


Road repair

Types

[edit]

The marine and air transportation,[9] offshore structures,[10] industrial plant and facility management industries depend on *maintenance*, *repair and overhaul* (MRO) including scheduled or preventive paint maintenance programmes to maintain and restore coatings applied to steel in environments subject to attack from erosion, corrosion and environmental pollution.[10]

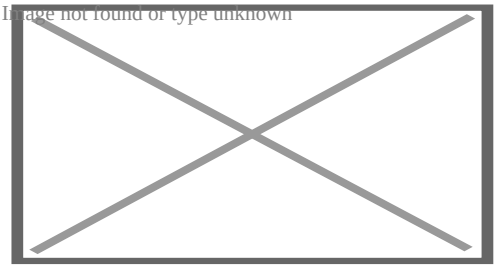
The basic types of maintenance falling under MRO include:

- Preventive maintenance, where equipment is checked and serviced in a planned manner (in a scheduled points in time or continuously)
- Corrective maintenance, where equipment is repaired or replaced after wear, malfunction or break down
- Reinforcement[11]

Architectural conservation employs MRO to preserve, rehabilitate, restore, or reconstruct historical structures with stone, brick, glass, metal, and wood which match the original constituent materials where possible, or with suitable polymer technologies when not.[12]

Preventive maintenance

[edit]



C-130J Hercules preventive cleaning at Keesler Air Force Base, Mississippi after a period of operation over the Gulf of Mexico (salt and moisture which lead to active corrosion require regular cleaning)

Preventive maintenance (**PM**) is "a routine for periodically inspecting" with the goal of "noticing small problems and fixing them before major ones develop."[13] Ideally, "nothing breaks down."[14]

The main goal behind PM is for the equipment to make it from one planned service to the next planned service without any failures caused by fatigue, extreme fluctuation in temperature(such as heat waves[15]) during seasonal changes, neglect, or normal wear (preventable items), which Planned Maintenance and Condition Based Maintenance help to achieve by replacing worn components before they actually fail. Maintenance activities include partial or complete overhauls at specified periods, oil changes, lubrication, minor adjustments, and so on. In addition, workers can record equipment deterioration so they know to replace or repair worn parts before they cause system failure.

The New York Times gave an example of "machinery that is not lubricated on schedule" that functions "until a bearing burns out." Preventive maintenance contracts are generally a fixed cost, whereas improper maintenance introduces a variable cost: replacement of major equipment.[13]

Main objective of PM are:

1. Enhance capital equipment productive life.
2. Reduce critical equipment breakdown.
3. Minimize production loss due to equipment failures.

Preventive maintenance or **preventative[16] maintenance** (**PM**) has the following meanings:

- The care and servicing by personnel for the purpose of maintaining equipment in satisfactory operating condition by providing for systematic inspection, detection, and correction of incipient failures either before they occur or before they develop into major defects.
- The work carried out on equipment in order to avoid its breakdown or malfunction. It is a regular and routine action taken on equipment in order to prevent its breakdown.[17]
- Maintenance, including tests, measurements, adjustments, parts replacement, and cleaning, performed specifically to prevent faults from occurring.

Other terms and abbreviations related to PM are:

- scheduled maintenance[18]

- planned maintenance,[19] which may include scheduled downtime for equipment replacement
- planned preventive maintenance (PPM) is another name for PM[20]
- breakdown maintenance:[20] fixing things only when they break. This is also known as "a reactive maintenance strategy"[21] and may involve "consequential damage."[22]

Planned maintenance

[edit]

"Routine maintenance" redirects here. For the album by Aaron West and the Roaring Twenties, see Routine Maintenance (album).

Planned preventive maintenance (PPM), more commonly referred to as simply **planned maintenance** (**PM**) or **scheduled maintenance**, is any variety of scheduled maintenance to an object or item of equipment. Specifically, planned maintenance is a scheduled service visit carried out by a competent and suitable agent, to ensure that an item of equipment is operating correctly and to therefore avoid any unscheduled breakdown and downtime.[23]

The key factor as to when and why this work is being done is timing, and involves a service, resource or facility being unavailable.[18][19] By contrast, condition-based maintenance is not directly based on equipment age.

Planned maintenance is preplanned, and can be date-based, based on equipment running hours, or on distance travelled.

Parts that have scheduled maintenance at fixed intervals, usually due to wearout or a fixed shelf life, are sometimes known as time-change interval, or TCI items.

Predictive maintenance

[edit]

Main article: Predictive maintenance

Predictive maintenance techniques are designed to help determine the condition of in-service equipment in order to estimate when maintenance should be performed. This approach promises cost savings over routine or time-based preventive maintenance, because tasks are performed only when warranted. Thus, it is regarded as condition-based maintenance carried out as suggested by estimations of the degradation state of an item. The main promise of predictive maintenance is to allow convenient scheduling of corrective maintenance, and to prevent unexpected equipment failures.[3] This maintenance strategy uses sensors to monitor key parameters within a machine or system, and uses this data in conjunction with analysed historical trends to continuously evaluate the system health and predict a breakdown before it happens.[24] This strategy allows maintenance to be performed more efficiently, since more up-to-date data is obtained about how close the product is to failure.[25]

Predictive replacement is the replacement of an item that is still functioning properly.[26] Usually it is a tax-benefit based [*citation needed*] replacement policy whereby expensive equipment or batches of individually inexpensive supply items are removed and donated on a predicted/fixed shelf life schedule. These items are given to tax-exempt institutions.[27][*citation needed*]

Condition-based maintenance

[edit]

Condition-based maintenance (**CBM**), shortly described, is maintenance when need arises. Albeit chronologically much older, It is considered one section or practice inside the broader and newer predictive maintenance field, where new AI technologies and connectivity abilities are put to action and where the acronym CBM is more often used to describe 'condition Based Monitoring' rather than the maintenance itself. CBM maintenance is performed after one or more indicators show that equipment is going to fail or that equipment performance is deteriorating.

This concept is applicable to mission-critical systems that incorporate active redundancy and fault reporting. It is also applicable to non-mission critical systems that lack redundancy and fault reporting.

Condition-based maintenance was introduced to try to maintain the correct equipment at the right time. CBM is based on using real-time data to prioritize and optimize maintenance resources. Observing the state of the system is known as condition monitoring. Such a system will determine the equipment's health, and act only when maintenance is actually necessary. Developments in recent years have allowed extensive instrumentation of equipment, and together with better tools for analyzing condition data, the maintenance personnel of today is more than ever able to decide what is the right time to perform maintenance on some piece of equipment. Ideally, condition-based maintenance will allow the maintenance personnel to do only the right things, minimizing spare parts cost,

system downtime and time spent on maintenance.

Challenges

[edit]

Despite its usefulness of equipment, there are several challenges to the use of CBM. First and most important of all, the initial cost of CBM can be high. It requires improved instrumentation of the equipment. Often the cost of sufficient instruments can be quite large, especially on equipment that is already installed. Wireless systems have reduced the initial cost. Therefore, it is important for the installer to decide the importance of the investment before adding CBM to all equipment. A result of this cost is that the first generation of CBM in the oil and gas industry has only focused on vibration in heavy rotating equipment.

Secondly, introducing CBM will invoke a major change in how maintenance is performed, and potentially to the whole maintenance organization in a company. Organizational changes are in general difficult.

Also, the technical side of it is not always as simple. Even if some types of equipment can easily be observed by measuring simple values such as vibration (displacement, velocity or acceleration), temperature or pressure, it is not trivial to turn this measured data into actionable knowledge about the health of the equipment.

Value potential

[edit]

As systems get more costly, and instrumentation and information systems tend to become cheaper and more reliable, CBM becomes an important tool for running a plant or factory in an optimal manner. Better operations will lead to lower production cost and lower use of resources. And lower use of resources may be one of the most important differentiators in a future where environmental issues become more important by the day.

Another scenario where value can be created is by monitoring the health of a car motor. Rather than changing parts at predefined intervals, the car itself can tell you when something needs to be changed based on cheap and simple instrumentation.

It is Department of Defense policy that condition-based maintenance (CBM) be *"implemented to improve maintenance agility and responsiveness, increase operational availability, and reduce life cycle total ownership costs".[28]*

Advantages and disadvantages

[edit]

CBM has some advantages over planned maintenance:

- Improved system reliability
- Decreased maintenance costs
- Decreased number of maintenance operations causes a reduction of human error influences

Its disadvantages are:

- High installation costs, for minor equipment items often more than the value of the equipment
- Unpredictable maintenance periods cause costs to be divided unequally.
- Increased number of parts (the CBM installation itself) that need maintenance and checking.

Today, due to its costs, CBM is not used for less important parts of machinery despite obvious advantages. However it can be found everywhere where increased safety is required, and in future will be applied even more widely.[29][30]

Corrective maintenance

[edit]

Main article: Corrective maintenance

Corrective maintenance is a type of maintenance used for equipment after equipment break down or malfunction is often most expensive – not only can worn equipment damage other parts and cause multiple damage, but consequential repair and replacement costs and loss of revenues due to down time during overhaul can be significant. Rebuilding and resurfacing of equipment and infrastructure damaged by erosion and corrosion as part of corrective or preventive maintenance programmes involves conventional processes such as welding and metal flame spraying, as well as engineered solutions with thermoset polymeric materials.[31]

See also

[edit]

Look up ***repair*** or ***revamping*** in Wiktionary, the free dictionary.

- Active redundancy – Design concept
- Aircraft maintenance – Performance of tasks which maintain an aircraft's airworthiness
- Aircraft maintenance checks – Periodic scheduled inspection performed on aircraft to keep it airworthy
- Auto maintenance – Periodic maintenance of motor vehicles
- Bicycle maintenance – tools specifically for working on bicycles
- Bus garage – Storage and maintenance facility
- Darning – Sewing technique for repairing holes or worn areas in fabric or knitting using needle and thread
- Department of Defense Dictionary of Military and Associated Terms
- Design for repair – Procedure and discipline in various fields
- Fault reporting – Maintenance concept
- Intelligent maintenance system – System that uses collected data from machinerys
- Kludge – Unmaintainable solution
- Logistics center – hub for logistics
- Maintainability – Ease of maintaining a functioning product or service
- Motive power depot – Rail yard for cleaning, repairing and maintaining locomotives
- Operational availability – Measurement of the actual versus predicted uptime of a system

- Operational maintenance – Basic maintenance done by operators of the equipment
- Predictive maintenance – Method to predict when equipment should be maintained
- Product lifecycle – Duration of processing of products from inception, to engineering, design & manufacture
- Prognostics – prediction of the time at which a system or a component will malfunction
- RAMS – Engineering characterization of a product or system
- Reliability centered maintenance – Concept of maintenance planning
- Reliability engineering – Sub-discipline of systems engineering that emphasizes dependability
- Repair shop
- Remanufacturing – Rebuilding of product to original manufactured product using combo of reused and new parts
- Right to repair – Legal right and movement
- Total productive maintenance – Maintenance management methodology
- Value-driven maintenance

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About Crown Point, Indiana

Crown Point is a city in and the area seat of Lake County, Indiana, United States. The population was 34,884 per the 2023 American Community Survey. The city was integrated in 1868. On October 31, 1834, Solon Robinson and his family became the initial settlers to an area that later on ended up being Crown Factor. As a result of its place, Crown Point is referred to as the "Center of Lake Area". The city is bordered by Merrillville to the north, Winfield to the east, Cedar Lake to the southwest, St. John to the west, and unincorporated Schererville to the northwest. The southern and southwestern parts of Crown Point border some unincorporated areas of Lake Area.

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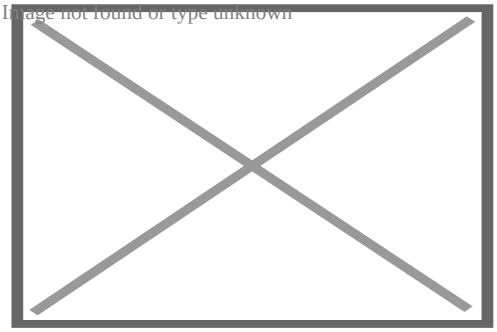
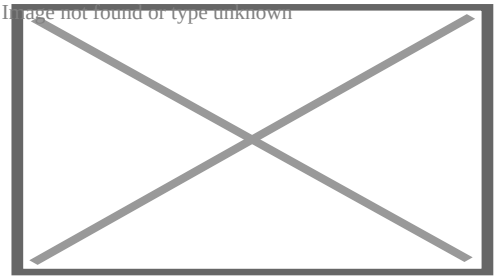
About Garage (residential)

"Garage (house)" redirects here. For the music style, see Garage house.



The Hermitage garage by Nicholas II in The State Hermitage, Saint Petersburg, Russia



Garage - in the style of the new objectivity - Frankfurt am Main

A 1901 newspaper article discussing a name for a private collection of automobiles

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A 1901 newspaper article discussing a name for a private collection of automobiles, which mentions the word "garage" as being a possible choice except that that word was already in use in the broader sense of a place to store and repair them. Today the word *garage* has both senses;

for example, *Jay Leno's Garage* is a series about his collection and other interesting collections, not merely the buildings that contain them.

A residential **garage** (UK: /Ã‚â€¹Ã‹â€Ã‚â€°Ã‚Âœ rÃ‚â€°Ã¢Â¬Ëœ Ã‚â€¹Ã‚Â Ã‚Å Ã¢â‚¬â„¢ rÃ‚â€°Ã¢Â¬Ëœ Ã‚â€¹Ã¢Â¬Å Ã¢â‚¬â„¢ rÃ‚â€°Ã‚Â¤Ã‚Å Ã¢â‚¬â„¢ *GARR-ahzh*, *-ÃƒÂ¢Ã‚Â•Ã‚Â ahj*, *-ÃƒÂ¢Ã‚Â•Ã‚Âij*

US: /Ã‚â€°Ã‚Âˆ Ã‚â€°Ã¢â€¹Ã‹â€Ã‚â€°Ã¢Â¬Ëœ Ã‚â€¹Ã¢Â¬Å Ã¢â‚¬â„¢ r Ã‚â€°Ã¢Â¬Ëœ Ã‚â€¹Ã¢Â¬Å Ã¢â‚¬â„¢ *gÃƒâ€°Ã¢â€žÂ¢-RAHZH*, *-ÃƒÂ¢Ã‚Â•Ã‚ÂRAHJ*) is a walled, roofed structure with a door for storing a vehicle or vehicles that may be part of or attached to a home ("attached garage"), or a separate outbuilding or shed ("detached garage"). Residential garages typically have space for one or two cars, although three-car garages are used. When a garage is attached to a house, the garage typically has an entry door into the house, called the *person door* or *man door*, in contrast with the wider and taller door for vehicles, called the garage door, which can be opened to permit the entry and exit of a vehicle and then closed to secure the vehicle. A garage protects a vehicle from precipitation, and, if it is equipped with a locking garage door, it also protects the vehicle(s) from theft and vandalism. Most garages also serve multifunction duty as workshops for a variety of projects, including painting, woodworking, and assembly. Garages also may be used for other purposes as well, such as storage or entertainment.

Some garages have an electrical mechanism to automatically open or close the garage door when the homeowner presses a button on a small remote control, along with a detector that stops the movement of the garage if something is in the way of closing. Some garages have enough space, even with cars inside, for the storage of items such as bicycles or a lawnmower; in some cases, there may even

be enough space for a workshop or a man cave. Garages that are attached to a house may be built with the same external materials and roofing as the house. Garages that are not connected to the home may use a different style of construction from the house. Often in the Southern and rural United States garages not attached to the home and made from a timber frame with sheet metal coverings are known as "pole barns", but usually serve the same purpose as what is called a garage elsewhere. In some places, the term is used synonymously with "carport", though that term normally describes a structure that, while roofed, is not completely enclosed. A carport protects the vehicle to some degree from inclement weather, but it does not protect the vehicle from theft or vandalism.

The word *garage*, introduced to English in 1902, originates from the French word *garer*, meaning shelter.[1] By 1908 the architect Charles Harrison Townsend was commenting in *The Builder* magazine that "for the home of the car, we very largely use the French word 'garage', alternatively with what I think the more desirable English equivalent of 'motor house'".[2] Today the word is polysemic because it can refer to a collection of vehicles as well as the building that contains them.

Residential garage insulation

[edit]

In northern climates, temperatures inside an uninsulated attached residential garage can decrease to freezing levels during the winter. Temperatures inside an uninsulated attached garage in temperate climates can reach uncomfortable levels during summer months. Extreme temperatures can be a source of energy waste and discomfort in adjoining living areas, due to heat transfer between the garage and those areas. Homes with an attached garage often experience this

"interface" problem. Insulating the outside of the building against the elements without extending the insulation to the wall separating the garage from the house, and/or the other garage walls and roof, can be a costly mistake.[3]

In Australia

[edit]

Australian homes typically have a two, one and a half or double car garage, with some newer houses having a triple garage, with one double door and one single door. Prior to the 1970s most of them were detached from the house, usually set further back with the driveway leading up past the side of the house, common with old fibreboard houses, but not uncommon with earlier brick houses. The most common doors on these garages were either two wooden barn style doors with a standard sized access door on the side of the garage or the B&D Rolla Door, which is described below.

The most common garage door to date in Australia is the B&D Rolla Door, having been around since 1956 and still in heavy use today. They are a corrugated flexible but strong sheet steel door, sliding up tracks and rolling around a drum mounted above the door opening on the inside of the garage. These come in manual and remote controlled electric (known as the Control-a-Door), with conversion kits available. Locking is provided by a key lock in the centre of the door moving two square sliding lock bars in and out of holes in the door tracks, locking and unlocking it, or by the solenoid lock in the automatic motor.

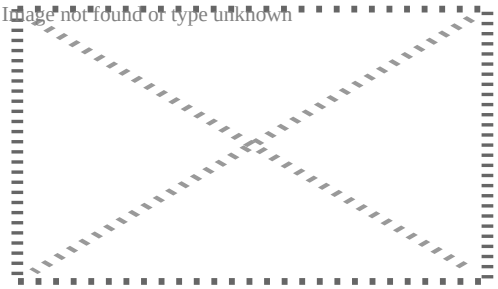
Newer homes feature more American styled tilting panel lift doors which slide up onto a track on the ceiling via a motor and chain drive. Since the late 1970s most if

not all garages are attached, and throughout the 80's it became more common to have an access door into the home from the garage where design permitted, whereas it is commonplace now. Most older unit (apartment) blocks in Australia have garages on the ground floor accessible through a common hallway and access doors, all leading into a common driveway. Newer ones now have underground parking.

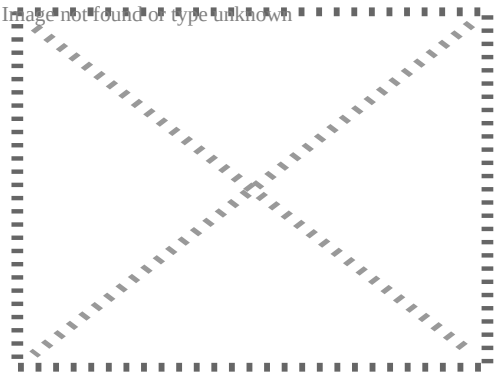
Australia has strict guidelines in place when building a home and the garage size must conform to the Australian Standards. The minimum size for a single garage is 3.0 m × 5.4 m (9.8 ft × 17.7 ft) and a double is 5.4 m × 5.4 m (17.7 ft × 17.7 ft). However, to comfortably fit two cars in a double garage it is typical to have a size of 6.0 m × 6.0 m (19.7 ft × 19.7 ft).[4]

In the United Kingdom

[edit]



Up-and-over garage door



Insulation of sectional garage door

British homes featuring a garage typically have a single or double garage either built into the main building, detached within the grounds (often in the back garden), or in a communal area.

Traditionally, garage doors were wooden, opening either as two leaves or sliding horizontally. Newer garages are fitted with metal up-and-over doors. Increasingly, in new homes, such doors are electrically operated.

Typically, a small British single garage is 8 by 16 feet (2.4 m × 4.9 m), a medium single garage is 9 by 18 feet (2.7 m × 5.5 m), and a large single garage is 10 by 20 feet (3.0 m × 6.1 m). Family sedans have become bigger than they were in the past, so the larger size has become a preferred option. A typical large family car like the Ford Mondeo is about 15 by 6 feet (4.6 m × 1.8 m), meaning that even with the larger size garage, it is necessary to park to one side to be able to open the driver's door wide enough to enter or exit the vehicle.

In the early days of the motor car, a garage played an important role in protecting the vehicle from the weather (particularly so as to reduce rust). It was also the case that early motor cars started more easily when they were warm,[5] so that keeping them in a garage rather than outside made it easier to get the engine going in the morning. Modern motor cars, however, are very well protected against rust, and modern engines start with no difficulty even in very cold conditions.

Early history

[edit]

The common term for these structures in the first decades of the 20th century was motor house. Many garages from before 1914 were pre-fabricated, typically by companies such as Norwich manufacturer Boulton & Paul Ltd. The style was usually in keeping with that of the house and its locale, however, they were mainly of timber construction and few have survived.[6]

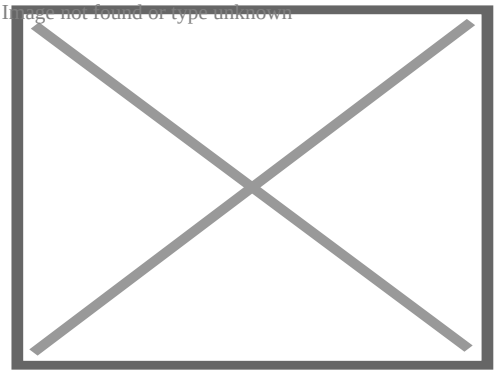
E. Keynes Purchase, "honorary architect" to what was to become the Royal Automobile Club, did a lot of work on them and recommended in *The Car Illustrated* in 1902, that they be of brick construction with cement floor, an inspection pit, good electric lighting and a pulley system for removing parts of the car (in the early days of motoring many car owners were mechanical and engineering enthusiasts).[7]

The architecture of garages was ignored in the architectural journals despite famous architects such as Edwin Lutyens, Richard Barry Parker and Edgar Wood all designing garages for their wealthy clients. Charles Harrison Townsend was one of the few architects who put pen to paper (in *The Builder* in 1908) on the subject and recommended that the walls be glazed brick for ease of washing, air gratings to be low (petrol fumes are heavier than air), and drains half open to avoid build-up of gases.[8]

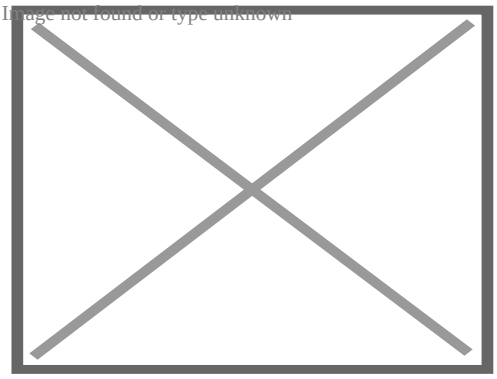
By 1910 corrugated iron and asbestos were being used instead of wood and garages became less imposing. From 1912 speculatively built houses in London were being built with motor houses.[9]

In North America

[edit]



Mobile homes with detached single car garages



Circa 1955 detached residential garage seen in Toledo, Ohio

Many garage doors open upward using an electric chain drive, which can often be automatically controlled from inside the resident's vehicle with a small radio transmitter.[10] Garages are connected to the nearest road with a driveway. Interior space for one or two cars is normal, and garages built after 1950 usually have a door that connects the garage directly to the interior of the house (an "attached garage"). Earlier garages were often detached and located in the back yard of the house, accessed either via a long driveway or from an alley.

In the past, garages were often separate buildings from the house ("detached garage"). On occasion, a garage would be built with an apartment above it, which could be rented out. As automobiles became more popular, the concept of

attaching the garage directly to the home grew into a common practice. While a person with a separate garage must walk outdoors in every type of weather, a person with an attached garage has a much shorter walk inside a building.

Around the start of the 21st century, companies began offering "portable garages" in the United States. Typically, these garages are made of metal, wood or vinyl and do not connect to the house or other structure, much like the garage built before 1950. This portable garages usually have a strongly reinforced floor to hold a heavy vehicle. Garages are also produced as composite fabric garages with metal frames that are lightweight and portable garage compared to traditional brick-and-mortar or metal garage structures.[11]

Over the past fifteen years, the portable garage has further evolved into a modular garage or a partially prefabricated structure. The modular garage comes from a factory that assembles the garage in two sections and combines the two sections on location. Partially prefabricated garages are often larger and might even include an attic space or a second floor. Sections of the garage are preassembled and then setup on site over a few days time.[12] The Amish have become popular builders of portable, modular and partially prefabricated garages.

Common Garage Sizes in the United States

[edit]

Garage sizes in the United States vary depending on the number of vehicles they are designed to accommodate. While dimensions can differ based on specific needs and local building codes, typical sizes are as follows:

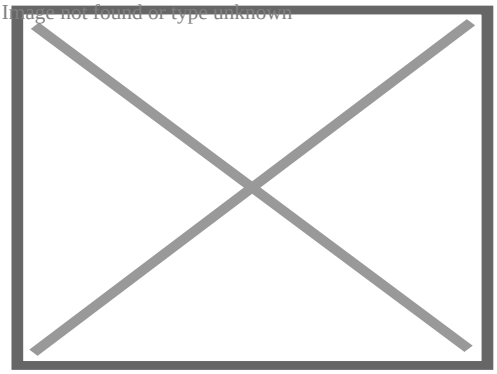
- One-car garage: Usually 12 to 18 feet wide and 20 to 30 feet deep, with a total area of 240 to 540 square feet.
- Two-car garage: Commonly 20 to 24 feet wide, maintaining the same depth, and covering 360 to 660 square feet.
- Three-car garage: Typically 30 to 36 feet wide, providing 600 to 1,260 square feet of space.
- Four-car garage: The largest standard size, ranging from 40 to 48 feet wide, with a total area of 800 to 1,600 square feet.

These dimensions offer enough space not only for vehicles but also for storage and accessibility. Garage sizes may vary depending on design preferences, vehicle types, and additional space requirements.[13]

Post frame garages

[edit]

See also: Barndominium



Post frame garage attached to traditional frame house

Often in more rural settings, detached post-frame garages are used to store farm and workshop equipment and can either be cold storage[14] or insulated for warm

storage.[15][16]

Notable garages

[edit]

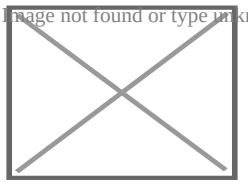
The first planned private garages appeared long before 1900. Early examples of planned public garages appeared at the same time. The first recorded public parking garage in the US (*Electric Vehicle Company Garage*,[17] Chicago) was built in 1898, in the UK (*Christal Palace Garage*,[18] London) in 1900 and in Germany (*Großgarage der Automüller G.m.b.H.*,[19] Berlin-Wilmersdorf) in 1901.

Possibly the oldest existing garage in the United Kingdom is in Southport Lancashire. It was the first motor house or garage to be depicted in an English motoring journal and was in The Autocar of 7 October 1899. It was owned by Dr W.W. Barratt, a local doctor and motoring pioneer and specially designed for his house at 29 Park Crescent Hesketh Park. A two-storey building that matched the style of the house; the ground floor garage having a concrete floor, heating, electric lighting, an engine pit and was fully equipped. The motor house is now in residential use.[20]

One of the oldest surviving private garages in Germany today is the 1903 finished *Automobil-Remise* (automobile carriage house) of Villa Esche by Henry van de Velde in Chemnitz. Carl Benz, the inventor of the automobile, had a tower built for himself in 1910, on the first floor a room for studying, on the ground floor car parking space. It still exists in Ladenburg, Germany.

Gallery of notable garages

[edit]

- Image not found or type unknown 

1919

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1919

1938

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1938

Garage of HÃ‘Æ’Ã‚Â´tel Brion (1904)

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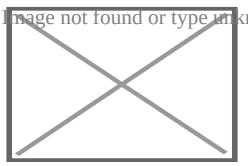
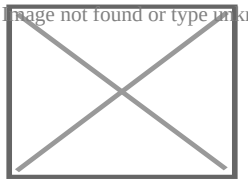
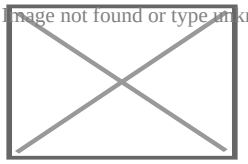
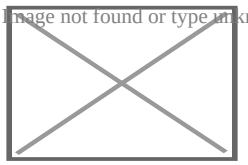
Garage of Hôtel

Brion (1904)

- Image not found or type unknown 
- Image not found or type unknown 
- Image not found or type unknown 
- Image not found or type unknown 

Garages in Nizhny Novgorod

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Garages in
Nizhny Novgorod
Old garages in Mannheim

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Old garages in
Mannheim

Carhouses

[edit]

Garages in the United States and Canada used to store streetcars and buses are often referred to as carhouses or car barns. These storage facilities are either metal or brick structures used to store streetcars or buses away from the elements. In Britain they are referred to as bus depots or depots.

See also

[edit]

- Carport
- Carriage house
- Parking
- Proof-of-parking

References

[edit]

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3. ^ "How to make your home energy efficient"; Howstuffworks.com
4. ^ *Berenice O. (17 August 2018). "Single & Double Garage Size (How Much Do You Need?)". BuildSearch. Retrieved 2018-12-13.*
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15. ^ *"Post-Frame Buildings".*
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20. **^** Minnis 2010, pp. 75–76.

- *Minnis, John (2010). "Practical yet Artistic: The Motor House 1895–1914". In Brandwood, Geoffrey K. (ed.). Living Leisure and Law: Eight Building Types in England 1800–1914. Reading: Spire Books in association with the Victorian Society. ISBN 9781904965-27-5. OCLC 835667261.*

External links

[edit]

- The dictionary definition of *garage* at Wiktionary
- Media related to Garages at Wikimedia Commons

- v
- t
- e

Rooms and spaces of a house

Shared rooms

- Bonus room
- Common room
- Den
- Dining room
- Family room
- Garret
- Great room
- Home cinema
- Keeping room
- Kitchen
  - dirty kitchen
  - kitchenette
- Living room
- Gynaeceum
  - harem
- Andron
  - man cave
- Recreation room
  - billiard room
- Shrine
- Study
- Sunroom

Private rooms	○ Bathroom ○ ○ toilet ○ Bedroom / Guest room ○ ○ closet ○ Bedsit / Miniflat ○ Boudoir ○ Cabinet ○ Nursery

Spaces

- Atrium
- Balcony
- Breezeway
- Conversation pit
- Cubby-hole
- Deck
- Elevator
    - dumbwaiter
- Entryway/Genkan
- Fireplace
    - hearth
- Foyer
- Hall
- Hallway
- Inglenook
- Lanai
- Loft
- Loggia
- Overhang
- Patio
- Porch
    - screened
    - sleeping
- Ramp
- Secret passage
- Stairs/Staircase
- Terrace
- Veranda
- Vestibule

Technical, utility and storage	○ Attic ○ Basement ○ Carport ○ Cloakroom ○ Closet ○ Crawl space ○ Electrical room ○ Equipment room ○ Furnace room / Boiler room ○ Garage ○ Janitorial closet ○ Larder ○ Laundry room / Utility room / Storage room ○ Mechanical room / floor ○ Pantry ○ Root cellar ○ Semi-basement ○ Storm cellar / Safe room ○ Studio ○ Wardrobe ○ Wine cellar ○ Wiring closet ○ Workshop

Great house areas

- Antechamber
- Ballroom
- Kitchen-related
  - butler's pantry
  - buttery
  - saucery
  - scullery
  - spicery
  - still room
- Conservatory / Orangery
- Courtyard
- Drawing room
- Great chamber
- Great hall
- Library
- Long gallery
- Lumber room
- Parlour
- Sauna
- Servants' hall
- Servants' quarters
- Smoking room
- Solar
- State room
- Swimming pool
- Turret
- Undercroft

Other	○ Furniture
	○ Hidden room
	○ House
	  ○ house plan
	  ○ styles
	  ○ types
	○ Multi-family residential
	○ Secondary suite
	○ Duplex
	○ Terraced
	○ Detached
	○ Semi-detached
	○ Townhouse
	○ Studio apartment

Architectural elements	○ Arch
	○ Balconet
	○ Baluster
	○ Belt course
	○ Bressummer
	○ Ceiling
	○ Chimney
	○ Colonnade / Portico
	○ Column
	○ Cornice / Eaves
	○ Dome
	○ Door
	○ Ell
	○ Floor
	○ Foundation
	○ Gable
	○ Gate
	  ○ Portal
	○ Lighting
	○ Molding
	○ Ornament
	○ Plumbing
	○ Quoins
	○ Roof
	  ○ shingles
	○ Roof lantern
	○ Sill plate
	○ Style
	  ○ list

Related

- Backyard
- Driveway
- Front yard
- Garden
  - roof garden
- Home
- Home improvement
- Home repair
- Shed
- Tree house

- Image not found or type unknown Category: Rooms

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- Israel

Other

- NARA

About Garage door opener

A garage door opener is a mechanized gadget that opens and closes a garage door regulated by activate the garage wall. Many likewise consist of a handheld radio remote brought by the proprietor, which can be utilized to open and shut the door from a short distance.

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About Torsion spring

A torsion spring is a spring that works by twisting its end along its axis; that is, a flexible elastic item that shops power when it is turned. When it is turned, it puts in a torque in the contrary instructions, proportional to the amount (angle) it is twisted. There are different types: A torsion bar is a straight bar of steel or rubber that is subjected to twisting (shear stress and anxiety) about its axis by torque used at its ends. A more fragile type used in sensitive tools, called a torsion fiber consists of a fiber of silk, glass, or quartz under tension, that is twisted about its axis. A helical torsion spring, is a steel rod or wire in the form of a helix (coil) that goes through turning about the axis of the coil by sideways pressures (bending minutes) related to its ends, twisting the coil tighter. Clocks use a spiral wound torsion springtime (a form of helical torsion spring where the coils are around each other rather than accumulated) occasionally called a "clock springtime" or informally called a mainspring. Those kinds of torsion springtimes are additionally used for attic staircases, clutches, typewriters and various other tools that require near consistent torque for big angles and even several changes.

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About Coil spring

A coil spring is a mechanical gadget that normally is used to keep energy and ultimately launch it, to absorb shock, or to preserve a pressure between calling surface areas. It is made of a flexible product developed into the form of a helix that returns to its natural length when unloaded. Under stress or compression, the product (wire) of a coil springtime undergoes torsion. The springtime qualities therefore depend on the shear modulus. A coil springtime might additionally be used as a torsion spring: in this case the springtime in its entirety undergoes torsion concerning its helical axis. The material of the spring is therefore based on a flexing minute, either reducing or enhancing the helical distance. In this setting, it is the Young's modulus of the material that determines the spring attributes.

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About Lake County, Indiana

Not to be confused with Lake County, Illinois.

Lake County, Indiana

County

Former Lake County Courthouse in Crown Point, Indiana

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Former Lake County Courthouse

in Crown Point, Indiana

Official seal of Lake County, Indiana

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Seal

Location in the state of Indiana

Image not found or type unknown

Location in the state of Indiana

Indiana's location in the U.S.

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Indiana's location in the U.S.

Coordinates: 41°25⍰N 87°22⍰WÃ⍰Â¯Ã‚Â»Ã‚Â¿ / Ã⍰Â¯Ã‚Â»Ã‚Â¿41.417°N 87.367°W

Country	Image not found or type unknown United States
State	Image not found or type unknown Indiana

Region	Northwest Indiana
Metro area	Chicago Metropolitan
Settled	October 1834[1]
Established	February 16, 1837[2]
Named after	Lake Michigan
County seat	Crown Point
Largest city	Hammond (population) Gary (total area)

Incorporated municipalities	**19 cities and towns** Cedar Lake (town) Crown Point (city) Dyer (town) East Chicago (city) Gary (city) Griffith (town) Hammond (city) Highland (town) Hobart (city) Lake Station (city) Lowell (town) Merrillville (town) Munster (town) New Chicago (town) Schererville (town) Schneider (town) St. John (town) Whiting (city) Winfield (town)
	Government[3]
• **Type**	County
• **Body**	Board of Commissioners
• **Commissioner**	Kyle W. Allen, Sr. (D, 1st)

• **Commissioner**	Jerry J. Tippy (R, 2nd)
• **Commissioner**	Michael C. Repay (D, 3rd)
• **County Council**	**Members** David Hamm (D, 1st) Clorius Lay (D, 2nd) Charlie Brown (D, 3rd) Pete Lindemulder (R, 4th) Christine Cid (D, 5th) Ted F. Bilski (D, 6th) Randy Niemeyer (R, 7th)

Area

• **County**	626.5 sq mi (1,623 km^2)
• **Land**	498.9 sq mi (1,292 km^2)
• **Water**	127.6 sq mi (330 km^2)
• **Metro**	10,874 sq mi (28,160 km^2)
• **Rank**	12th largest county in Indiana
• **Region**	2,726 sq mi (7,060 km^2)

Dimensions

[4]

• **Length**	36 mi (58 km)
• **Width**	16 mi (26 km)

Elevation [5] *(mean)*	663 ft (202 m)
Highest elevation [6]*—NE Winfield Twp*	801 ft (244 m)
Lowest elevation [7]*—at Lake Michigan*	585 ft (178 m)
	Population (2020)
• County	498,700
• Estimate (2023)	500,598 Image not found or type unknown Increase
• Rank	2nd largest county in Indiana 131st largest county in U.S.[8]
• Density	800/sq mi (310/km^2)
• Metro	9,522,434
• Region	819,537
Time zone	UTC-6 (Central)
• Summer (DST)	UTC-5 (Central)
ZIP Codes	46303, 46307–08, 46311–12, 46319–25, 46327, 46341–42, 46355–56, 46373, 46375–77, 46394, 46401–11
Area code	219

Congressional district	1st
Indiana Senate districts	1st, 2nd, 3rd and 6th
Indiana House of Representatives districts	1st, 2nd, 3rd, 11th, 12th, 14th, 15th and 19th
FIPS code	18-089
GNIS feature ID	0450495
Interstates	Image not found or type unknown
U.S. Routes	Image not found or type unknown Image not found or type unknown
State Routes	Image not found or type unknown Image not found or type unknown
Airports	Gary/Chicago International Griffith-Merrillville
Waterways	Grand Calumet River Indiana Harbor and Ship Canal Kankakee River Lake Michigan
Amtrak stations	Dyer – Hammond-Whiting
South Shore Line stations	Hammond Gateway – East Chicago Adam Benjamin Metro Center Gary/Chicago Airport – Miller

Public transit	East Chicago Transit Gary Public Transportation *Broadway Metro Express*
Website	www.lakecountyin.org

- Indiana county number 45
- Second most-populous county in Indiana

Lake County is a county located in the U.S. state of Indiana. In 2020, its population was 498,700,[9] making it Indiana's second-most populous county. The county seat is Crown Point.[10] The county is part of Northwest Indiana and the Chicago metropolitan area, and contains a mix of urban, suburban and rural areas. It is bordered on the north by Lake Michigan and contains a portion of the Indiana Dunes.[11][12] It includes Marktown, Clayton Mark's planned worker community in East Chicago.[13]

History

[edit]

Early settlement

[edit]

Originally inhabited by the Potawatomi and generations of indigenous ancestors, Lake County was established by European Americans on February 16, 1837.[2] From 1832 to 1836 the area that was to become Lake County was part of La Porte County.

[14] From 1836 to 1837 it was part of Porter County.[14] It was named for its location on Lake Michigan.[15] The original county seat was Liverpool, but in 1840 Lake Court House, later renamed as Crown Point, was chosen.[16]

Lake County's population grew slowly before the 1850s. Construction of railroads to link Chicago to the rest of the country stimulated rapid development, and tens of thousands of settlers and immigrants bought land in the region. Small-scale industrialization began, but was primarily relegated to the northern coast of the county, where it could take advantage of the railroads along the coast and shipping on the Great Lakes. The 1900 Census gives a population of 37,892 residents.

Industrialization and immigration

[edit]

Inland Steel Company established a plant in East Chicago in 1903 and U.S. Steel founded one in Gary in 1906; with industrial jobs the demand for labor associated with industrial jobs, the county's population exploded. Immigrants poured into the area from all over Central and Eastern Europe (there was also a smaller Mexican immigrant community). In addition, both black and white migrants came from many regions of the United States, particularly Appalachia and the South. Mostly rural blacks went north in the Great Migration, seeking both industrial jobs and escape from Jim Crow violence and disenfranchisement in the South.

By 1930, Lake County's population surpassed 260,000, with first- and second-generation Americans constituting a majority of the population. The second wave of the Ku Klux Klan gained a large following here in the 1920s, as it did for a time in the rest of Indiana. The KKK organized against the numerous European immigrants, who were mostly Catholic. While the steel industry reigned supreme, other industries also found the county to be an ideal location for cheap land and well-developed transportation networks, such as automobiles, oil, chemicals, consumer goods, food processing, and construction supply companies.[17]

The Great Depression was devastating to Lake County, as it was to other areas with economies based on heavy industry. The Depression, combined with industrial strife, changing demographics, and unionization, caused a realignment of politics in Lake County. It became a stronghold of the Democratic Party; Lake County has supported the Democratic nominee for president in every election since 1932 (exceptions occurred in 1956 and 1972). Indiana's 1st congressional district has elected Democratic candidates in every election since 1930.

World War II restored prosperity, as industry revived to support the war effort. Good economic times continued into the 1970s. During this period, unions helped industrial workers gain middle-class wages. In addition to attracting refugees and immigrants from Europe, black Americans and Mexicans migrated here in the postwar period in even higher numbers than in the 1910-1930 period. As minority populations exploded in such industrial cities as East Chicago and Gary, racial tensions surfaced again. Following construction of state and federal highways, development of cheaper land provided newer housing to middle-class people who could afford it. Both whites and established black families moved out of the aging industrial cities.[17]

Recent history

[edit]

Lake County's population peaked at 546,000 in 1970. Severe industrial decline took place during the 1973-1991 period, brought on by foreign competition, new management philosophies that called for major workforce reductions, and productivity gains from technology. The decline was particularly intense in the steel industry: steel employment exceeded 60,000 in the 1960s, and declined progressively to just 18,000 by 2015. Lake County's population declined 13% to bottom out at 475,000 in 1990.

The industrial decline of the 1980s cast a long shadow over Lake County: the county did not regain the level of employment it had in 1980 until 1996, after which the employment level roughly flatlined. The county's economic output peaked in 1978, and has not since recovered, remaining 15-20% below the peak after adjusting for inflation. As prosperity declined, so did the immigration that powered the county's explosive population growth before 1950: per the 2000 census, only 5.3% of Lake County's residents were foreign-born, compared to over 11% for the United States as a whole.[18]

The population recovered somewhat during the 1990s and 2000s, as the local economy adjusted. Suburban growth has also been driven by commuter populations of workers who are employed in Chicago and commute via expressways or the South Shore Line. In 2007, it was estimated that 44,000 workers commuted from Lake County, Indiana, to Chicago for work.[18] The decline of

industrial cities and growth of suburbs has been so sharp, that by 1990 a majority of the county's population lived outside of the four traditional industrial cities. Lake County still continues to struggle with urban decline and poverty, suburban sprawl and traffic jams, and a stagnating population.[17]

Geography

[edit]

According to the 2010 census, the county has a total area of 626.56 square miles (1,622.8 km^2), of which 498.96 square miles (1,292.3 km^2) (or 79.63%) is land and 127.60 square miles (330.5 km^2) (or 20.37%) is water. It is the second-largest county in total area in Indiana, but has the largest water area of all 92 counties.[19]

The northern and southern portions of the county (north of U.S. 30 and south of Lowell) are mainly low and flat, except for a few sand ridges and dunes and were both once very marshy and had to be drained. The lowest point, at 585 feet (178 m),[7] is along the Lake Michigan shoreline.

The central part of the county is higher and hillier. As you travel south from the low and relatively flat lake plain in the northern part of the county, the land gradually rises in elevation until the peak of the Valparaiso Moraine. The highest point, at 801 feet (244 m),[6] is in northeastern Winfield Township near 109th Street and North Lakeshore Drive in Lakes of the Four Seasons. From here the land descends south into the Kankakee Outwash Plain until the Kankakee River is reached.

The geographic center of Lake County is approximately 200 feet (60 m) northwest of Burr Street and West 113th Avenue in Center Township

41°24′53.8″N 87°24′14.3″W / 41.414944°N 87.403972°W.

Adjacent counties

[edit]

- Cook County, Illinois (northwest)
- Will County, Illinois (west)
- Kankakee County, Illinois (southwest)
- Porter County (east)
- Jasper County (southeast)
- Newton County (south)

National protected area

- Indiana Dunes National Park – *also in LaPorte and Porter counties*

Transit

- East Chicago Transit
- Gary Public Transportation Corporation (*Broadway Metro Express*)

Airports

- Gary/Chicago International Airport
- Griffith-Merrillville Airport

Major highways

Interstate 65 in Lake County is called the Casimir Pulaski Memorial Highway. Interstate 80/94/US 6 is the Frank Borman Expressway from the Illinois state line east to the Indiana Toll Road interchange in the eastern portion of the county. Interstate 94 has been referred to as the Chicago-Detroit Industrial Freeway. US 6 is part of the Grand Army of the Republic Highway. Broadway (Indiana 53) is also the Carolyn Mosby Memorial Highway. Indiana 51 is known for its entire length as the Adam Benjamin Memorial Highway. US 30 is part of the historic Lincoln Highway. US 12 from Gary eastward is part of Dunes Highway. Cline Avenue (Indiana 912) from US 12 north and westward is known as the Highway Construction Workers Memorial Highway.

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- U.S. Route 20
- U.S. Route 30
- U.S. Route 41
- U.S. Route 231
- State Road 2
- State Road 51
- State Road 53
- State Road 55
- State Road 130
- State Road 152
- State Road 312
- State Road 912

Railroads

- Amtrak
- Canadian National Railway
- Chicago, Fort Wayne and Eastern Railroad
- Chicago South Shore and South Bend Railroad
- CSX Transportation
- Gary Railway
- Indiana Harbor Belt Railroad
- Norfolk Southern Railway
- South Shore Line

Municipalities

[edit]

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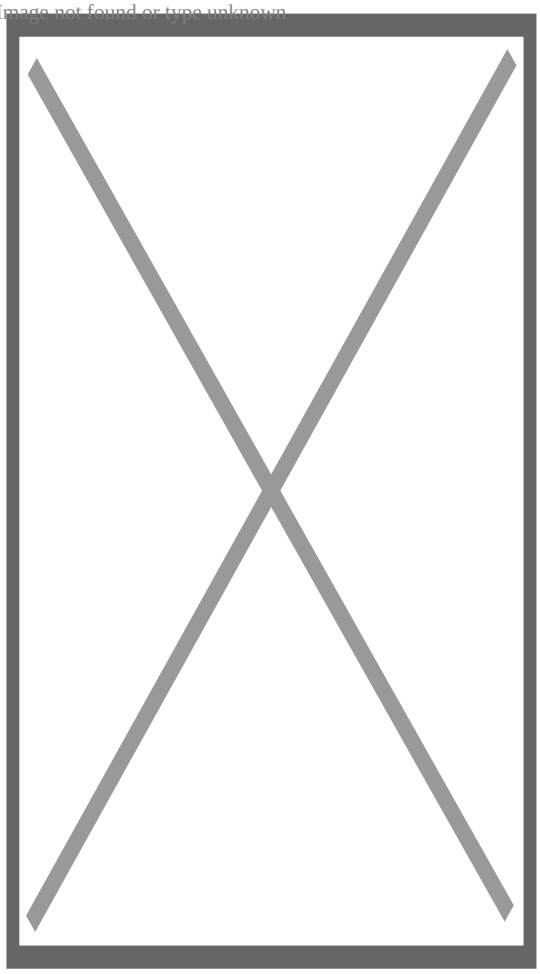

The municipalities in Lake County, and their populations as of the 2020 Census, are:

Cities

[edit]

- Crown Point – 33,899
- East Chicago – 26,370
- Gary – 69,093
- Hammond – 77,879
- Hobart – 29,752
- Lake Station – 13,235
- Whiting – 4,559

Towns

[edit]

- Cedar Lake – 14,106
- Dyer – 16,517
- Griffith – 16,528
- Highland – 23,984
- Lowell – 10,680
- Merrillville – 36,444
- Munster – 23,894
- New Chicago – 1,999
- Schererville – 29,646
- Schneider – 269
- St. John – 20,303
- Winfield – 7,181

Census-designated places

[edit]

- Lake Dalecarlia – 1,332
- Lakes of the Four Seasons – 3,936
  (7,091 including portion in Porter County)
- Shelby – 453

Unincorporated communities

[edit]

- Ainsworth
- Belshaw
- Brunswick
- Creston
- Deep River
- Deer Creek
- Dinwiddie
- Green Acres
- Klaasville
- Kreitzburg
- Leroy
- Liverpool

- New Elliott
- Orchard Grove
- Palmer
- Range Line
- Ross
- Southeast Grove

Townships

[edit]

The 11 townships of Lake County, with their populations as of the 2020 Census, are:

- Calumet – 91,970
- Cedar Creek – 12,725
- Center – 38,630
- Eagle Creek – 1,719
- Hanover – 18,214
- Hobart – 40,652
- North – 156,686
- Ross – 48,529
- St. John – 68,972
- West Creek – 7,676
- Winfield – 12,927

Economy

[edit]

Despite the decline of heavy industry, manufacturing was still the largest employment sector in Lake County in 2010 with over 45,000 workers employed, followed closely by healthcare and social assistance at 44,000 workers, public administration at 40,000 workers, retail trade at 37,000 workers, accommodation and food services at 25,000 workers, and construction at 15,000 workers.[18]

Lake County's GDP in 2010 was measured at nearly $25 billion. Manufacturing was also the largest sector of the economy in economic terms, contributing over $5.8 billion to the county's GDP in 2010. It was followed by healthcare and social assistance at $2.6 billion, public administration at $2.5 billion, and retail trade at $1.9 billion. While Lake County's average income was approximately 24% higher than the national average in 1978, in 2010 Lake County had fallen significantly behind the United States as a whole, with average income being approximately 12.9% lower. The national average surpassed Lake County sometime around 1986.

Businesses with the largest number of employees in the county are: [20]

- Americall Group, Inc. – Hobart
- Ameristar Casino – East Chicago
- BP Whiting Refinery – Whiting
- Canadian National Railway – Whiting
- Cargill – Hammond
- Cleveland-Cliffs Indiana Harbor Works – East Chicago
- Community Hospital – Munster
- Franciscan Alliance, Inc. – *locations throughout the region*
- Franciscan Health Hammond – Hammond *(closed)*

- Hard Rock Casino Northern Indiana – Gary
- Horseshoe Casino – Hammond
- Majestic Star Casino – Gary *(closed)*
- Methodist Hospitals Northlake Campus – Merrillville
- NiSource – Merrillville
- Radisson Hotel at Star Plaza – Merrillville *(closed)*
- St. Catherine Hospital – East Chicago
- St. Mary Medical Center – Hobart
- Times Media Company – Munster
- Unilever – Whiting
- U.S. Steel Gary Works – Gary

Education

[edit]

Public school districts

[edit]

The administration of public schools in Lake County is divided among 16 corporations and governing bodies,[21] more than any other Indiana county.[22]

- Crown Point Community School Corporation – Center and Winfield townships
- Gary Community School Corporation – City of Gary
- Griffith Public Schools – Town of Griffith
- Hanover Community School Corporation – Hanover Township
- Lake Central School Corporation – St. John Township

- Lake Ridge Schools Corporation – unincorporated Calumet Township
- Lake Station Community Schools – City of Lake Station
- Merrillville Community School Corporation – Ross Township
- River Forest Community School Corporation – Town of New Chicago and some portions of adjacent communities
- School City of East Chicago – City of East Chicago
- School City of Hammond – City of Hammond
- School City of Hobart – City of Hobart within Hobart Township
- School City of Whiting – City of Whiting
- School Town of Highland – Town of Highland
- School Town of Munster – Town of Munster
- Tri-Creek School Corporation – Cedar Creek, Eagle Creek and West Creek townships

Private schools

[edit]

Elementary and secondary schools operated by the Diocese of Gary:

- Andrean High School, Merrillville (9–12)
- Aquinas School at St. Andrew's, Merrillville (PK–8)
- Bishop Noll Institute, Hammond (9–12)
- Our Lady of Grace, Highland (PK–8)
- St. Casimir, Hammond (PK–8)
- St. John Bosco, Hammond (PK–8)

- St. John the Baptist, Whiting (PK–8)
- St. John the Evangelist, St. John (PK–8)
- St. Mary, Crown Point (PK–8)
- St. Mary, Griffith (PK–8)
- St. Michael, Schererville (PK–8)
- St. Stanislaus, East Chicago (PK–8)
- St. Thomas More, Munster (PK–8)

Other parochial and private schools:

- St. Paul's Lutheran School, Munster (PK–8)
- Trinity Lutheran School, Crown Point (PK–8)
- Trinity Lutheran School, Hobart (PK–8)

Colleges and universities

[edit]

- Calumet College of St. Joseph
- Hyles–Anderson College
- Indiana University Northwest
- Ivy Tech Community College
- Purdue University Northwest[23]
- University of Phoenix
- Indiana Wesleyan University

Public libraries

[edit]

The county is served by seven different public library systems:

- Crown Point Community Library has its main location with a branch in Winfield.[24]
- East Chicago Public Library has its main location and the Robart A. Pastrick branch.[25]
- Gary Public Library has its main location, the Gary Public Library and Cultural Center, and the Kennedy and Woodson branches.[26]
- Hammond Public Library[27]
- Lake County Public Library has its main location in Merrillville as well as Cedar Lake, Dyer-Schererville, Griffith-Calumet Township, Highland, Hobart, Lake Station-New Chicago, Munster and St. John branches.[28]
- Lowell Public Library has its main location with branches in Schneider and Shelby.[29]
- Whiting Public Library[30]

Hospitals

[edit]

- Community Hospital, Munster – 454 beds[31]
- Franciscan Health Crown Point, Crown Point – 203 beds *(Level III Trauma Center)* [31][32][33]
- Franciscan Health Dyer, Dyer – 223 beds[31][32]
- Franciscan Health Munster, Munster – 63 beds[31][32]
- Methodist Hospitals – 536 beds[31]

    - Northlake Campus, Gary
    - Southlake Campus, Merrillville
- NW Indiana ER and Hospital, Hammond – 6 beds[31]
- St. Catherine Hospital, East Chicago – 216 beds[31]
- St. Mary Medical Center, Hobart – 215 beds[31]
- UChicago Medicine Crown Point, Crown Point – 8 beds *(opening April 2024)*[34]

Media

[edit]

The Times, based in Munster, is the largest daily newspaper in Lake County and Northwest Indiana and the second largest in the state. Lake County is also served by the *Post-Tribune*, a daily newspaper based in Merrillville.

Lakeshore Public Television operates WYIN-TV Gary on channel 56 and is the local PBS station in the Chicago television market.

These eight broadcast radio stations serve Lake County and are part of the Chicago market:

- WJOB (1230 AM) – Hammond
- WWCA (1270 AM) – Gary
- WLTH (1370 AM) – Gary
- WLPR (89.1 FM) – Lowell
- WRTW (90.5 FM) – Crown Point
- WPWX (92.3 FM) – Hammond
- WXRD (103.9 FM) – Crown Point

- WZVN (107.1 FM) – Lowell

Climate and weather

[edit]

Climate data for Lowell, Indiana (1981–2010 normals, extremes 1963–present)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Record high °F (°C)	66 (19)	73 (23)	85 (29)	91 (33)	95 (35)	104 (40)	101 (38)	104 (40)	98 (37)	92 (33)	77 (25)	70 (21)
Mean daily maximum °F (°C)	31.2 (-0.4)	35.8 (2.1)	47.5 (8.6)	60.8 (16.0)	71.3 (21.8)	80.7 (27.1)	83.8 (28.8)	82.0 (27.8)	76.4 (24.7)	63.6 (17.6)	49.4 (9.7)	35.1 (1.7)
Daily mean °F (°C)	22.8 (-5.1)	26.7 (-2.9)	37.4 (3.0)	49.3 (9.6)	59.8 (15.4)	69.7 (20.9)	73.1 (22.8)	71.1 (21.7)	64.2 (17.9)	51.9 (11.1)	40.2 (4.6)	27.1 (-2.7)
Mean daily minimum °F (°C)	14.4 (-9.8)	17.7 (-7.9)	27.4 (-2.6)	37.9 (3.3)	48.2 (9.0)	58.7 (14.8)	62.4 (16.9)	60.3 (15.7)	52.0 (11.1)	40.2 (4.6)	31.0 (-0.6)	19.1 (-7.2)
Record low °F (°C)	-28 (-33)	-23 (-31)	-9 (-23)	7 (-14)	26 (-3)	33 (1)	41 (5)	38 (3)	28 (-2)	18 (-8)	2 (-17)	-29 (-34)
Average precipitation inches (mm)	1.96 (50)	1.75 (44)	2.57 (65)	3.78 (96)	4.38 (111)	4.69 (119)	4 (100)	3.98 (101)	3.14 (80)	3.44 (87)	3.43 (87)	2.34 (59)
Average snowfall inches (cm)	8.8 (22)	8.2 (21)	3.4 (8.6)	0.3 (0.76)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.2 (0.51)	0.7 (1.8)	7.7 (20)

Source: NOAA (normals, 1981–2010)[35]

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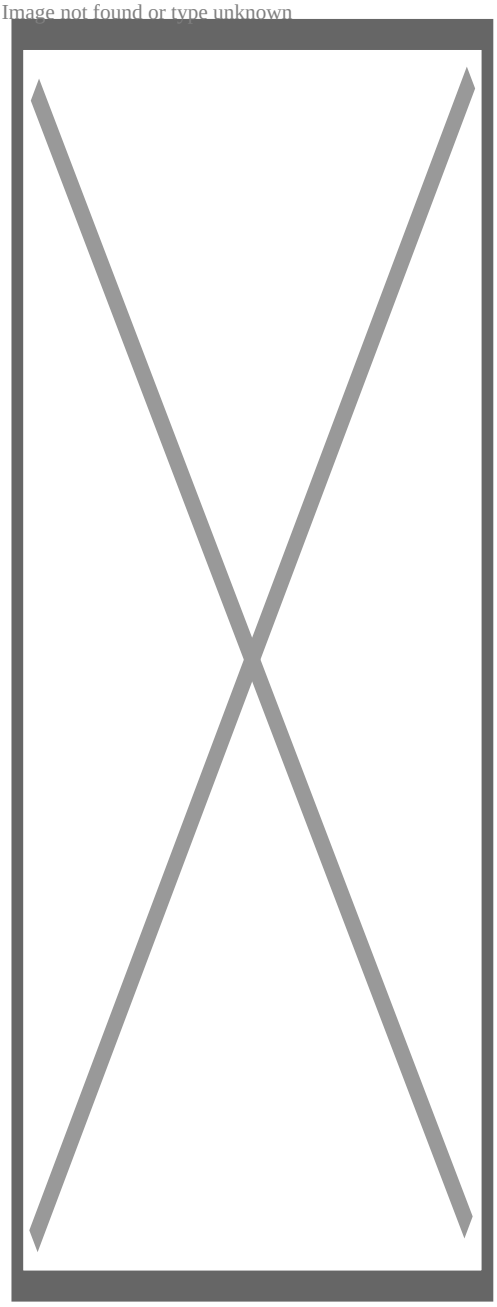

Satellite imagery of Lake County, IN

In recent years, average temperatures in Lowell have ranged from a low of 14.4 °F (-9.8 °C) in January to a high of 83.8 °F (28.8 °C) in July, although a record low of -29 °F (-34 °C) was recorded in December 1989 and a record high of 104 °F (40 °C) was recorded in June 1988. Average monthly precipitation ranged from 1.75 inches

(44 mm) in February to 4.69 inches (119 mm) in June. Temperatures at or below 0 °F (-18 °C) occur on average 11 days annually and exceed 90 °F (32 °C) degrees on 14 days.[35] In winter, lake-effect snow increases snowfall totals compared to the areas to the west.[36] In spring and early summer, the immediate shoreline areas sometimes experience lake-breeze that can drop temperatures by several degrees compared to areas further inland.[37] In summer, thunderstorms are common, occurring an average 40–50 days every year,[38] and on about 13 days, these thunderstorms produce severe winds.[39]

Government

[edit]

See also: Government of Indiana

The county government is a constitutional body, and is granted specific powers by the Constitution of Indiana, and by the Indiana Code.

County Council: The county council is the legislative branch of the county government and controls all the spending and revenue collection in the county. Representatives are elected from county districts. The council members serve four-year terms. They are responsible for setting salaries, the annual budget, and special spending. The council also has limited authority to impose local taxes, in the form of an income and property tax that is subject to state level approval, excise taxes, and service taxes.[40][41]

Board of Commissioners: The executive body of the county is made of a board of commissioners. The commissioners are elected county-wide, in staggered terms, and each serves a four-year term. One of the commissioners, typically the most

senior, serves as president. The commissioners are charged with executing the acts legislated by the council, collecting revenue, and managing the day-to-day functions of the county government.[40][41]

Court: The county maintains a small claims court that can handle some civil cases. The judge on the court is elected to a term of four years and must be a member of the Indiana Bar Association. The judge is assisted by a constable who is also elected to a four-year term. In some cases, court decisions can be appealed to the state level circuit court.[41]

County Officials: The county has several other elected offices, including sheriff, coroner, auditor, treasurer, recorder, surveyor, and circuit court clerk Each of these elected officers serves a term of four years and oversees a different part of county government. Members elected to county government positions are required to declare party affiliations and to be residents of the county.[41]

County elected officials

[edit]

Board of Commissioners:[3]

- Kyle W. Allen, Sr. (D, 1st)
- Jerry J. Tippy (R, 2nd)
- Michael C. Repay (D, 3rd)

County Council:[3]

- David Hamm (D, 1st)
- Ronald Brewer (D, 2nd)
- Charlie Brown (D, 3rd)
- Pete Lindemulder (R, 4th)
- Christine Cid (D, 5th)
- Ted F. Bilski (D, 6th)
- Randy Niemeyer (R, 7th)

Elected Officials:[3]

- Assessor: LaTonya Spearman (D)
- Auditor: Peggy Katona (D)
- Clerk: Michael Brown (D)
- Coroner: David Pastrick (D)
- Prosecutor: Bernard A. Carter (D)
- Recorder: Gina Pimentel (D)
- Sheriff: Oscar Martinez, Jr. (D)[42]
- Surveyor: Bill Emerson, Jr. (D)
- Treasurer: John Petalas (D)

*President

Politics

[edit]

While the state of Indiana is strongly Republican, having voted Republican in every election since 1964 (except in 2008), Lake County has long been a Democratic stronghold due to being part of the Chicago metropolitan area. It has given pluralities or majorities to Democrats in every presidential election since 1932 with the exceptions of 1956 and 1972. Like the rest of the Rust Belt, however, Lake County has recently trended Republican, with Donald Trump scoring the highest percentage of the vote since 1972 in the 2024 presidential election.

Lake is part of Indiana's 1st congressional district, which is held by Democrat Frank J. Mrvan.[43] In the State Senate, Lake is part of the 1st, 2nd, 3rd and 6th districts, which are held by three Democrats and one Republican. In the Indiana House of Representatives, Lake is part of the 1st, 2nd, 3rd, 11th, 12th, 14th, 15th and 19th districts, which are held by four Democrats and four Republicans.

United States presidential election results for Lake County, Indiana[44]

Year	Republican		Democratic		Third party(ies)	
	No.ÃÂ¢Ã¢â€Â¬Ã‚Â¯	%	No.ÃÂ¢Ã¢â€Â¬Ã‚Â¯	%	No.ÃÂ¢Ã¢â€Â¬Ã‚Â¯	%
2024	97,270	46.30%	109,086	**51.92%**	3,746	1.7
2020	91,760	41.65%	124,870	**56.67%**	3,700	1.6
2016	75,625	37.29%	116,935	**57.66%**	10,241	5.0
2012	68,431	33.85%	130,897	**64.75%**	2,819	1.3
2008	67,742	32.41%	139,301	**66.64%**	1,996	0.9
2004	71,903	38.24%	114,743	**61.03%**	1,376	0.7
2000	63,389	36.02%	109,078	**61.98%**	3,527	2.0
1996	47,873	29.22%	100,198	**61.15%**	15,789	9.6
1992	53,867	28.91%	102,778	**55.17%**	29,653	15.9
1988	79,929	43.03%	105,026	**56.55%**	780	0.4
1984	94,870	44.30%	117,984	**55.10%**	1,289	0.6
1980	95,408	46.02%	101,145	**48.78%**	10,786	5.2
1976	90,119	42.36%	120,700	**56.74%**	1,922	0.9
1972	115,480	**56.24%**	88,510	43.10%	1,352	0.6
1968	77,911	36.48%	99,897	**46.77%**	35,766	16.7
1964	73,722	35.19%	134,978	**64.42%**	823	0.3

1960	78,278	37.04%	132,554	**62.72%**	526	0.2
1956	92,803	**52.00%**	85,000	47.63%	657	0.3
1952	74,073	44.66%	90,721	**54.70%**	1,051	0.6
1948	51,413	38.77%	77,025	**58.09%**	4,157	3.1
1944	48,147	38.84%	75,066	**60.56%**	737	0.5
1940	45,898	38.79%	71,985	**60.83%**	447	0.3
1936	33,689	32.47%	68,551	**66.07%**	1,510	1.4
1932	42,596	46.56%	46,060	**50.34%**	2,836	3.1
1928	48,768	**59.68%**	32,321	39.55%	630	0.7
1924	30,990	**64.61%**	10,918	22.76%	6,060	12.6
1920	26,296	**69.15%**	7,136	18.77%	4,596	12.0
1916	13,262	**55.00%**	9,946	41.25%	903	3.7
1912	5,176	29.61%	5,136	29.38%	7,171	**41.0**
1908	9,499	**60.97%**	5,502	35.32%	578	3.7
1904	6,429	**64.11%**	2,933	29.25%	666	6.6
1900	5,337	**58.00%**	3,733	40.57%	131	1.4
1896	4,883	**58.11%**	3,418	40.68%	102	1.2
1892	2,958	48.02%	3,010	**48.86%**	192	3.1
1888	2,543	**54.21%**	2,068	44.08%	80	1.7

2008 presidential primary

[edit]

In the 2008 Democratic presidential primary on May 6, 2008, Lake County was one of the last counties to report results.[45] Lake County had reported no results at 11 p.m. ET,[46] and at midnight ET, only 28% of Lake County's vote had been reported.[47] A large number of absentee ballots and a record turnout delayed the tallies, and polls closed an hour later than much of the state because Lake County is in the Central Time Zone.[46] Early returns showed Senator Barack Obama leading by a potentially lead-changing margin, leaving the race between Senator Hillary Clinton and Obama "too close to call" until final tallies were reported.

Crime

The NWI Times reported that over 800 registered sex offenders live in Lake and Porter Counties of Indiana in 2021.[48]

Culture and contemporary life

[edit]

Entertainment and the arts

[edit]

- Northwest Indiana Symphony Orchestra, concerts held at Living Hope Church – Merrillville
- Theatre at the Center, located at the Center for Visual and Performing Arts – Munster

Major attractions

[edit]

- Ameristar Casino – East Chicago
- Horseshoe Casino – Hammond
- Majestic Star Casino – Gary
- Majestic Star Casino II – Gary
- Pierogi Fest – Whiting
- Southlake Mall – Hobart
- Three Floyds Brewing – Munster

Professional sports teams

[edit]

- Gary SouthShore RailCats, an American Association professional baseball team, play their games at U.S. Steel Yard in Gary.

Recreation

[edit]

List of parks and recreational facilities – Lake County Parks and Recreation

- Bellaboo's Play and Discovery Center – Lake Station

- Buckley Homestead – Lowell
- Cedar Creek Family Golf Center – Cedar Lake
- Deep River County Park – Hobart
- Deep River Waterpark – Crown Point
- Gibson Woods Nature Preserve – Hammond
- Grand Kankakee Marsh – Hebron
- Lake Etta – Gary
- Lemon Lake – Crown Point
- Oak Ridge Prairie & Oak Savannah Trail – Griffith
- Stoney Run County Park – Hebron
- Three Rivers County Park – Lake Station
- Turkey Creek Golf Course – Merrillville
- Whihala Beach – Whiting

List of recreational facilities – Indiana Dunes National Park

- Calumet Prairie State Nature Preserve – Lake Station
- Hobart Prairie Grove – Hobart
- Hoosier Prairie State Nature Preserve – Griffith
- Paul H. Douglas Center for Environmental Education – Gary

Demographics

[edit]

Historical population

Census	Pop.	Note	%±
1840	1,468		—
1850	3,991		171.9%

1860	9,145	129.1%
1870	12,339	34.9%
1880	15,091	22.3%
1890	23,886	58.3%
1900	37,892	58.6%
1910	82,864	118.7%
1920	159,957	93.0%
1930	261,310	63.4%
1940	293,195	12.2%
1950	368,152	25.6%
1960	513,269	39.4%
1970	546,253	6.4%
1980	522,965	-4.3%
1990	475,594	-9.1%
2000	484,564	1.9%
2010	496,005	2.4%
2020	498,700	0.5%
2023 (est.)	500,598 [49]	0.4%

U.S. Decennial Census[50]
1790-1960[51] 1900-1990[52]
1990-2000[53] 2010-2019[9]

2020 census

[edit]

Lake County, Indiana – Racial and ethnic composition

Note: the US Census treats Hispanic/Latino as an ethnic category. This table excludes Latinos from the racial categories and assigns them to a separate category. Hispanics/Latinos may be of any race.

Race / Ethnicity (*NH = Non-Hispanic*)	**Pop 2000[54]**	**Pop 2010[55]**	**Pop 2020[56]**	**% 2000**	**% 2010**	**% 2020**
White alone (NH)	293,457	274,162	251,106	60.56%	55.27%	50.35%
Black or African American alone (NH)	121,372	125,506	121,048	25.05%	25.30%	24.27%
Native American or Alaska Native alone (NH)	854	913	691	0.18%	0.18%	0.14%
Asian alone (NH)	3,862	5,981	7,334	0.80%	1.21%	1.47%
Pacific Islander alone (NH)	106	63	95	0.02%	0.01%	0.02%
Other race alone (NH)	450	463	1,682	0.09%	0.09%	0.34%
Mixed race or Multiracial (NH)	5,335	6,254	16,817	1.10%	1.26%	3.37%
Hispanic or Latino (any race)	59,128	82,663	99,927	12.20%	16.67%	20.04%
Total	**484,564**	**496,005**	**498,700**	**100.00%**	**100.00%**	**100.00%**

As of the 2010 United States Census, there were 496,005 people, 188,157 households, and 127,647 families residing in the county.[57] The population density was 994.1 inhabitants per square mile (383.8/km^2). There were 208,750 housing units at an average density of 418.4 per square mile (161.5/km^2).[19] The racial makeup of the

county was 64.4% white, 25.9% black or African American, 1.2% Asian, 0.3% American Indian, 5.8% from other races, and 2.4% from two or more races. Those of Hispanic or Latino origin made up 16.7% of the population.[57] In terms of ancestry, 16.1% were German, 11.1% were Irish, 9.6% were Polish, 5.4% were English, 4.8% were Italian and 3.7% were American.[58]

Of the 188,157 households, 34.3% had children under the age of 18 living with them, 44.7% were married couples living together, 17.4% had a female householder with no husband present, 32.2% were non-families, and 27.4% of all households were made up of individuals. The average household size was 2.60 and the average family size was 3.19. The median age was 37.4 years.[57]

The median income for a household in the county was $47,697 and the median income for a family was $58,931. Males had a median income of $50,137 versus $33,264 for females. The per capita income for the county was $23,142. About 12.2% of families and 16.1% of the population were below the poverty line, including 25.3% of those under age 18 and 8.4% of those age 65 or over.[59]

Places by population and race[60]

Place	Population (2010)	White	Black or African American	Asian	Other [note 1]	Hispanic or Latino (of any race)
Lake County	496,005	64.4%	25.9%	1.2%	8.5%	16.7%
Cedar Lake, *town*	11,560	94.9%	0.5%	0.4%	4.2%	6.5%
Crown Point, *city*	27,317	88.2%	6.3%	1.8%	3.7%	8.1%
Dyer, *town*	16,390	90.1%	2.5%	2.9%	4.5%	9.3%
East Chicago, *city*	29,698	35.5%	42.9%	0.1%	21.5%	50.9%

Gary, *city*	80,294	10.7%	84.8%	0.2%	4.3%	5.1%
Griffith, *town*	16,893	75.8%	16.9%	0.8%	6.5%	13.3%
Hammond, *city*	80,830	59.4%	22.5%	1.0%	17.1%	34.1%
Highland, *town*	23,727	88.6%	4.2%	1.6%	5.6%	12.8%
Hobart, *city*	29,059	85.3%	7.0%	1.0%	6.7%	13.9%
Lake Dalecarlia, *CDP*	1,355	97.3%	0.2%	0.1%	2.4%	3.4%
Lake Station, *city*	12,572	79.7%	3.6%	0.3%	16.4%	28.0%
Lakes of the Four Seasons, *CDP*[note 2]	7,033	93.4%	1.2%	1.0%	4.4%	8.5%
Lowell, *town*	9,276	95.9%	0.5%	0.3%	3.3%	6.9%
Merrillville, *town*	35,246	46.4%	44.5%	1.2%	7.9%	12.9%
Munster, *town*	23,603	85.6%	3.5%	5.8%	5.1%	10.2%
New Chicago, *town*	2,035	81.0%	2.2%	0.7%	16.1%	27.4%
St. John, *town*	14,850	93.5%	1.3%	1.3%	3.9%	8.2%
Schererville, *town*	29,243	86.8%	5.4%	2.8%	5.0%	10.6%
Schneider, *town*	277	97.1%	0.0%	1.1%	1.8%	2.5%
Shelby, *CDP*	539	95.5%	1.7%	0.2%	2.6%	0.9%
Whiting, *city*	4,997	76.3%	3.5%	0.7%	19.5%	40.7%
Winfield, *town*	4,383	88.5%	3.7%	3.5%	4.3%	8.9%

Places by population and standard of living[61][62]

Place	Population (2010)	Per capita income	Median household income	Median home value
Lake County	496,005	$23,792	$49,315	$137,400

Cedar Lake, *town*	11,560	$25,477	$59,090	$151,400
Crown Point, *city*	27,317	$31,454	$64,876	$174,900
Dyer, *town*	16,390	$35,020	$78,881	$197,500
East Chicago, *city*	29,698	$13,457	$27,171	$86,800
Gary, *city*	80,294	$15,764	$26,956	$66,900
Griffith, *town*	16,893	$26,548	$53,225	$141,600
Hammond, *city*	80,830	$18,148	$38,677	$94,800
Highland, *town*	23,727	$30,036	$61,930	$155,200
Hobart, *city*	29,059	$24,740	$54,468	$134,400
Lake Dalecarlia, *CDP*	1,355	$25,035	$52,321	$165,400
Lake Station, *city*	12,572	$16,953	$36,955	$82,400
Lakes of the Four Seasons, *CDP*[note 2]	7,033	$32,908	$84,242	$182,600
Lowell, *town*	9,276	$23,619	$60,549	$146,500
Merrillville, *town*	35,246	$23,605	$53,470	$132,600
Munster, *town*	23,603	$34,735	$70,708	$197,600
New Chicago, *town*	2,035	$18,083	$38,672	$97,700
St. John, *town*	14,850	$36,490	$97,868	$254,600
Schererville, *town*	29,243	$33,984	$68,004	$204,300
Schneider, *town*	277	$18,774	$50,972	$89,500
Shelby, *CDP*	539	$29,700	$61,667	$89,700
Whiting, *city*	4,997	$21,427	$44,368	$111,500
Winfield, *town*	4,383	$23,792	$49,315	$137,400

See also

[edit]

- Lake County Indiana Sheriff's Department
- List of public art in Lake County, Indiana
- National Register of Historic Places listings in Lake County, Indiana

Wikimedia Commons has media related to ***Lake County, Indiana***.

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Notes

[edit]

1. **^** Other = Combined percentages for American Indian or Alaska Native; Native Hawaiian or Pacific Islander; other races; and two or more races
2. ^ ***a b*** Population is 3,936 within Lake County; 3,097 reside in Porter County

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External links

[edit]

- Lake County official website
- Lake County Parks
- South Shore Convention & Visitors Authority

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Places adjacent to Lake County, Indiana

Cook County, Illinois Lake Michigan

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Will County, Illinois **Lake County, Indiana** Porter County

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Kankakee County, Illinois Newton County Jasper County

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Municipalities and communities of Lake County, Indiana, United States

County seat: **Crown Point**

Cities

- Crown Point
- East Chicago
- Gary
- Hammond
- Hobart
- Lake Station
- Whiting

Towns

- Cedar Lake
- Dyer
- Griffith
- Highland
- Lowell
- Merrillville
- Munster
- New Chicago
- St. John
- Schererville
- Schneider
- Winfield

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Map of Indiana highlighting Lake County

Townships	○ Calumet ○ Cedar Creek ○ Center ○ Eagle Creek ○ Hanover ○ Hobart ○ North ○ Ross ○ St. John ○ West Creek ○ Winfield
CDPs	○ Lake Dalecarlia ○ Lakes of the Four Seasons ○ Leroy ○ Ross ○ Shelby

Other communities	○ Ainsworth ○ Belshaw ○ Brunswick ○ Creston ○ Deep River ○ Deer Creek ○ Dinwiddie ○ Green Acres ○ Klaasville ○ Kreitzburg ○ Liverpool ○ New Elliott ○ Orchard Grove ○ Palmer ○ Range Line ○ Southeast Grove
Ghost town	○ Indiana City
Footnotes	⊠This populated place also has portions in an adjacent county or counties.

- Indiana portal
- United States portal

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Chicago metropolitan area

Major city

- **Chicago**

Chicago landsat ir

Cities **(over 30,000 in 2020)**	○ Aurora ○ Berwyn ○ Calumet City ○ Crown Point ○ Crystal Lake ○ DeKalb ○ Des Plaines ○ Elgin ○ Elmhurst ○ Evanston ○ Gary ○ Hammond ○ Highland Park ○ Joliet ○ Kenosha ○ Naperville ○ North Chicago ○ Park Ridge ○ Portage ○ St. Charles ○ Valparaiso ○ Waukegan ○ Wheaton

Towns and villages (over 30,000 in 2020)	○ Addison ○ Arlington Heights ○ Bartlett ○ Bolingbrook ○ Buffalo Grove ○ Carol Stream ○ Carpentersville ○ Cicero ○ Downers Grove ○ Elk Grove Village ○ Glendale Heights ○ Glenview ○ Grayslake ○ Gurnee ○ Hanover Park ○ Hoffman Estates ○ Lombard ○ Merrillville ○ Mount Prospect ○ Mundelein ○ Niles ○ Northbrook ○ Oak Lawn ○ Oak Park ○ Orland Park ○ Oswego ○ Palatine ○ Plainfield ○ Romeoville

Counties	○ Cook ○ DeKalb ○ DuPage ○ Grundy ○ Jasper ○ Kane ○ Kankakee ○ Kendall ○ Kenosha ○ Lake, IL ○ Lake, IN ○ McHenry ○ Newton ○ Porter ○ Will
Regions	○ Great Lakes ○ Northern Illinois ○ Northern Indiana

Sub-regions	○ Chicago Southland ○ Eastern Ridges and Lowlands ○ Fox Valley (Illinois River) ○ Golden Corridor ○ Illinois Technology and Research Corridor ○ North Shore (Chicago) ○ Northwest Indiana

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State of Indiana

Indianapolis (capital)

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Largest towns	○ Avon ○ Brownsburg ○ Clarksville ○ Highland ○ Merrillville ○ Munster ○ Plainfield ○ Saint John ○ Schererville ○ Zionsville

- Adams
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- Clay
- Clinton
- Crawford
- Daviess
- Dearborn
- Decatur
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- Southern Indiana
  - Indiana Uplands
  - Kentuckiana
  - Southwestern Indiana

Regions

Indiana portal flag

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International	VIAF WorldCat
National	United States Israel
Geographic	MusicBrainz area
Other	NARA

About Garage door

A garage door is a big door to permit accessibility to a garage that opens up either by hand or by an electric motor (a garage door opener). Garage doors are frequently large sufficient to accommodate cars and other cars. The operating mechanism is generally spring-loaded or counteracted to offset the door's weight and lower the human or electric motor initiative needed to operate the door. Less frequently, some garage doors slide or swing flat. Doors are made from wood, steel, or fiberglass, and might be shielded to prevent heat loss.

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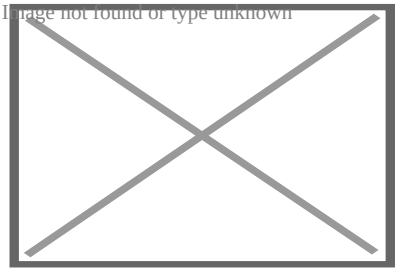
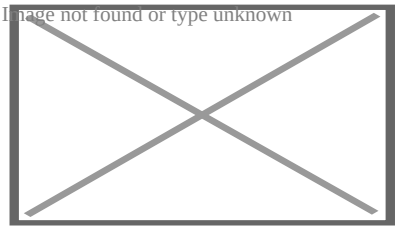
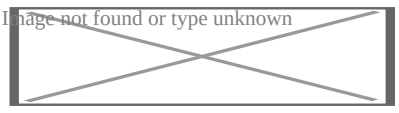
About Spring (device)



Helical coil springs designed for tension



A heavy-duty coil spring designed for compression and tension



The English longbow – a simple but very powerful spring made of yew, measuring 2 m (6 ft 7 in) long, with a 470 N (105 lbf) draw weight, with each limb functionally a cantilever spring.

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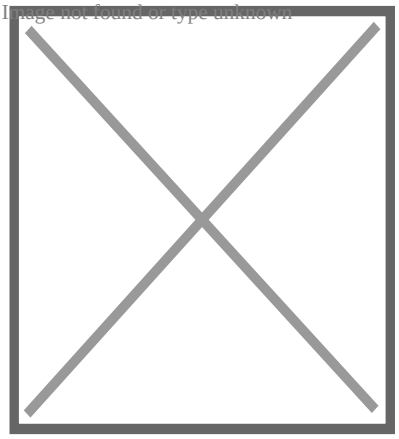

Force (F) vs extension (s).[*citation needed*] Spring characteristics: (1) progressive, (2) linear, (3) degressive, (4) almost constant, (5) progressive with knee

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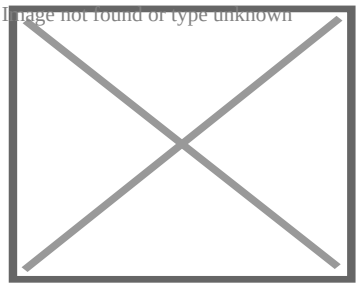

A machined spring incorporates several features into one piece of bar stock

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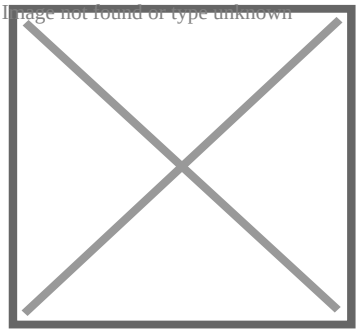

Military booby trap firing device from USSR (normally connected to a tripwire) showing spring-loaded firing pin

A **spring** is a device consisting of an elastic but largely rigid material (typically metal) bent or molded into a form (especially a coil) that can return into shape after being compressed or extended.[1] Springs can store energy when compressed. In everyday use, the term most often refers to coil springs, but there are many different spring designs. Modern springs are typically manufactured from spring steel. An example of a non-metallic spring is the bow, made traditionally of flexible yew wood, which when drawn stores energy to propel an arrow.

When a conventional spring, without stiffness variability features, is compressed or stretched from its resting position, it exerts an opposing force approximately proportional to its change in length (this approximation breaks down for larger deflections). The *rate* or *spring constant* of a spring is the change in the force it exerts, divided by the change in deflection of the spring. That is, it is the gradient of the force versus deflection curve. An extension or compression spring's rate is expressed in units of force divided by distance, for example or N/m or lbf/in. A torsion spring is a spring that works by twisting; when it is twisted about its axis by an angle, it produces a torque proportional to the angle. A torsion spring's rate is in units of torque divided by angle, such as N·m/rad or ft·lbf/degree. The inverse of spring rate is compliance, that is: if a spring has a rate of 10 N/mm, it has a compliance of 0.1 mm/N. The stiffness (or rate) of springs in parallel is additive, as is the compliance of springs in series.

Springs are made from a variety of elastic materials, the most common being spring steel. Small springs can be wound from pre-hardened stock, while larger ones are made from annealed steel and hardened after manufacture. Some non-ferrous metals are also used, including phosphor bronze and titanium for parts

requiring corrosion resistance, and low-resistance beryllium copper for springs carrying electric current.

History

[edit]

Simple non-coiled springs have been used throughout human history, e.g. the bow (and arrow). In the Bronze Age more sophisticated spring devices were used, as shown by the spread of tweezers in many cultures. Ctesibius of Alexandria developed a method for making springs out of an alloy of bronze with an increased proportion of tin, hardened by hammering after it was cast.

Coiled springs appeared early in the 15th century,[2] in door locks.[3] The first spring powered-clocks appeared in that century[3][4][5] and evolved into the first large watches by the 16th century.

In 1676 British physicist Robert Hooke postulated Hooke's law, which states that the force a spring exerts is proportional to its extension.

On March 8, 1850, John Evans, Founder of John Evans' Sons, Incorporated, opened his business in New Haven, Connecticut, manufacturing flat springs for carriages and other vehicles, as well as the machinery to manufacture the springs. Evans was a Welsh blacksmith and springmaker who emigrated to the United States in 1847, John Evans' Sons became "America's oldest springmaker" which continues to operate today.[6]

Types

[edit]

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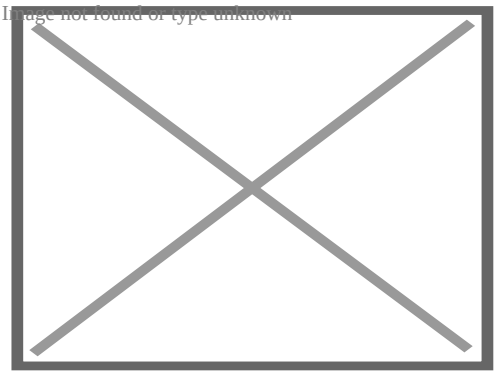

A spiral torsion spring, or hairspring, in an alarm clock.

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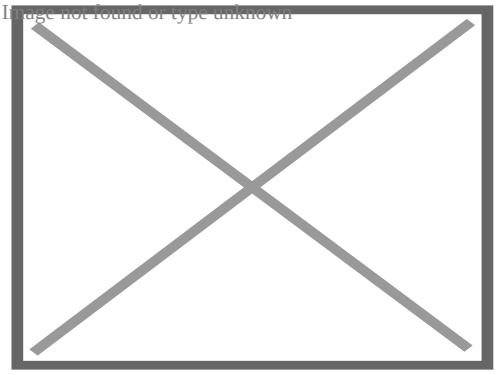

Battery contacts often have a variable spring

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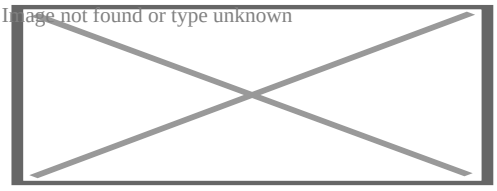

A volute spring. Under compression the coils slide over each other, so affording longer travel.

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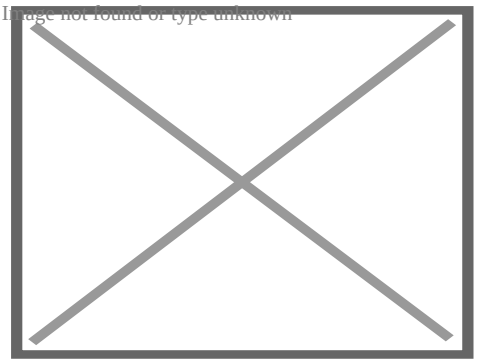
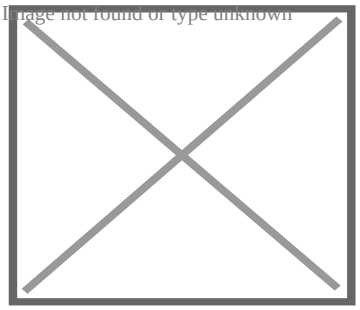
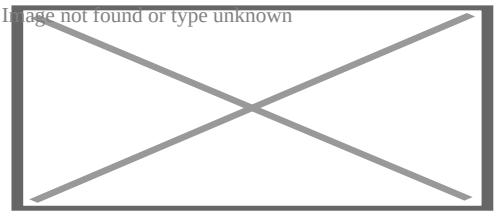


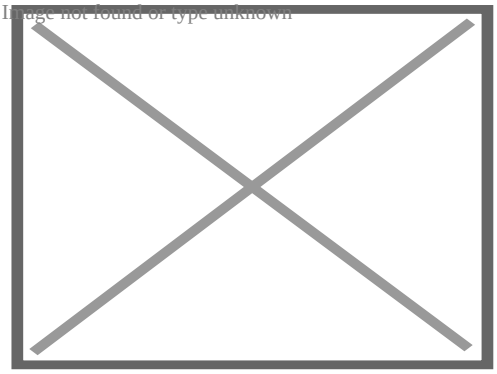
Vertical volute springs of Stuart tank



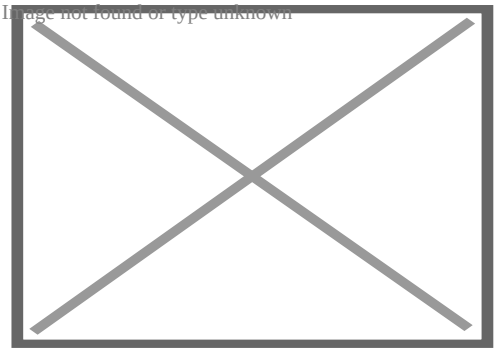
Selection of various arc springs and arc spring systems (systems consisting of inner and outer arc springs).



Tension springs in a folded line reverberation device.



A torsion bar twisted under load



Leaf spring on a truck

Classification

[edit]

Springs can be classified depending on how the load force is applied to them:

Tension/extension spring
: The spring is designed to operate with a tension load, so the spring stretches as the load is applied to it.

Compression spring
: Designed to operate with a compression load, so the spring gets shorter as the load is applied to it.

Torsion spring
: Unlike the above types in which the load is an axial force, the load applied to a torsion spring is a torque or twisting force, and the end of the spring rotates through an angle as the load is applied.

Constant spring
: Supported load remains the same throughout deflection cycle[7]

Variable spring
: Resistance of the coil to load varies during compression[8]

Variable stiffness spring
: Resistance of the coil to load can be dynamically varied for example by the control system, some types of these springs also vary their length thereby providing actuation capability as well [9]

They can also be classified based on their shape:

Flat spring

: Made of a flat spring steel.

Machined spring

: Manufactured by machining bar stock with a lathe and/or milling operation rather than a coiling operation. Since it is machined, the spring may incorporate features in addition to the elastic element. Machined springs can be made in the typical load cases of compression/extension, torsion, etc.

Serpentine spring

: A zig-zag of thick wire, often used in modern upholstery/furniture.

Garter spring

: A coiled steel spring that is connected at each end to create a circular shape.

Common types

[edit]

The most common types of spring are:

Cantilever spring

: A flat spring fixed only at one end like a cantilever, while the free-hanging end takes the load.

Coil spring

: Also known as a helical spring. A spring (made by winding a wire around a cylinder) is of two types:

- *Tension* or *extension springs* are designed to become longer under load. Their turns (loops) are normally touching in the unloaded position, and they have a

hook, eye or some other means of attachment at each end.

- *Compression springs* are designed to become shorter when loaded. Their turns (loops) are not touching in the unloaded position, and they need no attachment points.
- *Hollow tubing springs* can be either extension springs or compression springs. Hollow tubing is filled with oil and the means of changing hydrostatic pressure inside the tubing such as a membrane or miniature piston etc. to harden or relax the spring, much like it happens with water pressure inside a garden hose. Alternatively tubing's cross-section is chosen of a shape that it changes its area when tubing is subjected to torsional deformation: change of the cross-section area translates into change of tubing's inside volume and the flow of oil in/out of the spring that can be controlled by valve thereby controlling stiffness. There are many other designs of springs of hollow tubing which can change stiffness with any desired frequency, change stiffness by a multiple or move like a linear actuator in addition to its spring qualities.

Arc spring

A pre-curved or arc-shaped helical compression spring, which is able to transmit a torque around an axis.

Volute spring

A compression coil spring in the form of a cone so that under compression the coils are not forced against each other, thus permitting longer travel.

Balance spring

Also known as a hairspring. A delicate spiral spring used in watches, galvanometers, and places where electricity must be carried to partially rotating devices such as steering wheels without hindering the rotation.

Leaf spring

A flat spring used in vehicle suspensions, electrical switches, and bows.

V-spring

Used in antique firearm mechanisms such as the wheellock, flintlock and percussion cap locks. Also door-lock spring, as used in antique door latch mechanisms.[10]

Other types

[edit]

Other types include:

Belleville washer

A disc shaped spring commonly used to apply tension to a bolt (and also in the initiation mechanism of pressure-activated landmines)

Constant-force spring

A tightly rolled ribbon that exerts a nearly constant force as it is unrolled

Gas spring

A volume of compressed gas.

Ideal spring

An idealised perfect spring with no weight, mass, damping losses, or limits, a concept used in physics. The force an ideal spring would exert is exactly proportional to its extension or compression.[11]

Mainspring

A spiral ribbon-shaped spring used as a power store of clockwork mechanisms: watches, clocks, music boxes, windup toys, and mechanically

powered flashlights

Negator spring

A thin metal band slightly concave in cross-section. When coiled it adopts a flat cross-section but when unrolled it returns to its former curve, thus producing a constant force throughout the displacement and *negating* any tendency to re-wind. The most common application is the retracting steel tape rule.[12]

Progressive rate coil springs

A coil spring with a variable rate, usually achieved by having unequal distance between turns so that as the spring is compressed one or more coils rests against its neighbour.

Rubber band

A tension spring where energy is stored by stretching the material.

Spring washer

Used to apply a constant tensile force along the axis of a fastener.

Torsion spring

Any spring designed to be twisted rather than compressed or extended.[13]

Used in torsion bar vehicle suspension systems.

Wave spring

various types of spring made compact by using waves to give a spring effect.

Main article: Wave spring

Physics

[edit]

Hooke's law

[edit]

Main article: Hooke's law

An ideal spring acts in accordance with Hooke's law, which states that the force with which the spring pushes back is linearly proportional to the distance from its equilibrium length:

$$\displaystyle F=-kx$$

where

- $\displaystyle x$ is the displacement vector – the distance from its equilibrium length.
- $\displaystyle F$ is the resulting force vector – the magnitude and direction of the restoring force the spring exerts
- $\displaystyle k$ is the **rate**, **spring constant** or **force constant** of the spring, a constant that depends on the spring's material and construction. The negative sign indicates that the force the spring exerts is in the opposite direction from its displacement

Most real springs approximately follow Hooke's law if not stretched or compressed beyond their elastic limit.

Coil springs and other common springs typically obey Hooke's law. There are useful springs that don't: springs based on beam bending can for example produce forces that vary nonlinearly with displacement.

If made with constant pitch (wire thickness), conical springs have a variable rate. However, a conical spring can be made to have a constant rate by creating the spring with a variable pitch. A larger pitch in the larger-diameter coils and a smaller pitch in the smaller-diameter coils forces the spring to collapse or extend all the coils at the same rate when deformed.

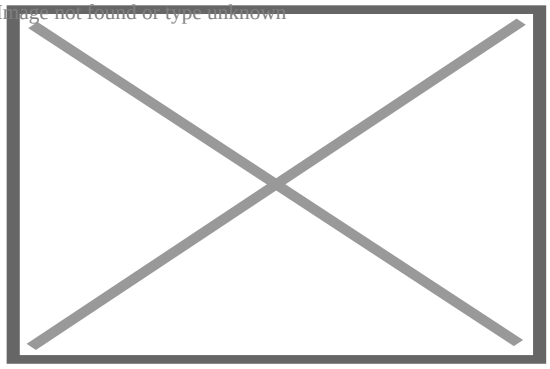
Simple harmonic motion

[edit]

Main article: Harmonic oscillator

Since force is equal to mass, *m*, times acceleration, *a*, the force equation for a spring obeying Hooke's law looks like:

$$\displaystyle F=ma\quad \Rightarrow \quad -kx=ma.\,$$



The displacement, *x*, as a function of time. The amount of time that passes between peaks is called the period.

The mass of the spring is small in comparison to the mass of the attached mass and is ignored. Since acceleration is simply the second derivative of x with respect to time,

$$\displaystyle -kx=m\frac d^2xdt^2.\,$$

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This is a second order linear differential equation for the displacement as a function of time. Rearranging:

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$$\displaystyle \frac d^2xdt^2+\frac kmx=0,\,$$

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the solution of which is the sum of a sine and cosine:

$$\displaystyle x(t)=A\sin \left(t\sqrt \frac km\right)+B\cos \left(t\sqrt \frac km\ri$$

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and are arbitrary constants that may be found by considering the initial displacement and velocity of the mass. The graph of this function with (zero initial position with some positive initial velocity) is displayed in the image on the right.

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Energy dynamics

[edit]

In simple harmonic motion of a spring-mass system, energy will fluctuate between kinetic energy and potential energy, but the total energy of the system remains the same. A spring that obeys Hooke's law with spring constant *k* will have a total system energy *E* of:[14]

$$\displaystyle E=\left(\frac 12\right)kA^2$$

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Here, A is the amplitude of the wave-like motion that is produced by the oscillating behavior of the spring.

The potential energy *U* of such a system can be determined through the spring constant *k* and its displacement *x*:[14]

$$\displaystyle U=\left(\frac 12\right)kx^2$$

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The kinetic energy *K* of an object in simple harmonic motion can be found using the mass of the attached object *m* and the velocity at which the object oscillates *v*:[14]

$$\displaystyle K=\left(\frac 12\right)mv^2$$

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Since there is no energy loss in such a system, energy is always conserved and thus:[14]

$$\displaystyle E=K+U$$

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Frequency & period

[edit]

The angular frequency ω of an object in simple harmonic motion, given in radians per second, is found using the spring constant *k* and the mass of the oscillating object *m*[15]*:*

$$\displaystyle \omega =\sqrt \frac km$$

Image not found or type unknown [14]

The period *T*, the amount of time for the spring-mass system to complete one full cycle, of such harmonic motion is given by:[16]

$\displaystyle T=\frac{2\pi}{\omega}=2\pi\sqrt{\frac{m}{k}}$[14]

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The frequency *f*, the number of oscillations per unit time, of something in simple harmonic motion is found by taking the inverse of the period:[14]

$\displaystyle f=\frac{1}{T}=\frac{\omega}{2\pi}=\frac{1}{2\pi}\sqrt{\frac{k}{m}}$[14]

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Theory

[edit]

In classical physics, a spring can be seen as a device that stores potential energy, specifically elastic potential energy, by straining the bonds between the atoms of an elastic material.

Hooke's law of elasticity states that the extension of an elastic rod (its distended length minus its relaxed length) is linearly proportional to its tension, the force used to stretch it. Similarly, the contraction (negative extension) is proportional to the compression (negative tension).

This law actually holds only approximately, and only when the deformation (extension or contraction) is small compared to the rod's overall length. For deformations beyond the elastic limit, atomic bonds get broken or rearranged, and a spring may snap, buckle, or permanently deform. Many materials have no clearly defined elastic limit, and Hooke's law can not be meaningfully applied to these materials. Moreover, for the superelastic materials, the linear relationship

between force and displacement is appropriate only in the low-strain region.

Hooke's law is a mathematical consequence of the fact that the potential energy of the rod is a minimum when it has its relaxed length. Any smooth function of one variable approximates a quadratic function when examined near enough to its minimum point as can be seen by examining the Taylor series. Therefore, the force – which is the derivative of energy with respect to displacement – approximates a linear function.

The force of a fully compressed spring is:

$$\displaystyle F_max=\frac Ed^4(L-nd)16(1+\nu)(D-d)^3n\$$

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where

E – Young's modulus

d – spring wire diameter

L – free length of spring

n – number of active windings

Image not found or type unknown – Poisson ratio

D – spring outer diameter.

Zero-length springs

[edit]

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Simplified LaCoste suspension using a zero-length spring

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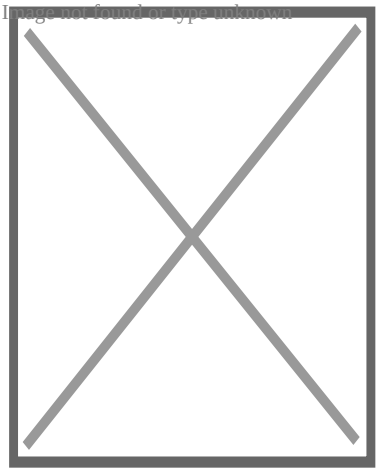

Spring length *L* vs force *F* graph of ordinary (+), zero-length (0) and negative-length (-) springs with the same minimum length L_0 and spring constant

Zero-length spring is a term for a specially designed coil spring that would exert zero force if it had zero length. That is, in a line graph of the spring's force versus its length, the line passes through the origin. A real coil spring will not contract to zero length because at some point the coils touch each other. "Length" here is defined as the distance between the axes of the pivots at each end of the spring, regardless of any inelastic portion in-between.

Zero-length springs are made by manufacturing a coil spring with built-in tension (A twist is introduced into the wire as it is coiled during manufacture; this works because a coiled spring *unwinds* as it stretches), so if it *could* contract further, the equilibrium point of the spring, the point at which its restoring force is zero, occurs at a length of zero. In practice, the manufacture of springs is typically not accurate enough to produce springs with tension consistent enough for applications that use zero length springs, so they are made by combining a *negative length* spring, made with even more tension so its equilibrium point would be at a *negative* length, with a piece of inelastic material of the proper length so the zero force point would

occur at zero length.

A zero-length spring can be attached to a mass on a hinged boom in such a way that the force on the mass is almost exactly balanced by the vertical component of the force from the spring, whatever the position of the boom. This creates a horizontal pendulum with very long oscillation period. Long-period pendulums enable seismometers to sense the slowest waves from earthquakes. The LaCoste suspension with zero-length springs is also used in gravimeters because it is very sensitive to changes in gravity. Springs for closing doors are often made to have roughly zero length, so that they exert force even when the door is almost closed, so they can hold it closed firmly.

Uses

[edit]

- Airsoft gun
- Aerospace
- Retractable ballpoint pens
- Buckling spring keyboards
- Clockwork clocks, watches, and other things
- Firearms
- Forward or aft spring, a method of mooring a vessel to a shore fixture
- Gravimeters
- Industrial Equipment
- Jewelry: Clasp mechanisms
- Most folding knives, and switchblades

- Lock mechanisms: Key-recognition and for coordinating the movements of various parts of the lock.
- Spring mattresses
- Medical Devices[17]
- Pogo Stick
- Pop-open devices: CD players, tape recorders, toasters, etc.
- Spring reverb
- Toys; the Slinky toy is just a spring
- Trampoline
- Upholstery coil springs
- Vehicle suspension, Leaf springs

See also

[edit]

- Shock absorber
- Slinky, helical spring toy
- Volute spring

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External links

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- Smart Springs and their Combinations (patent)

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Machines

Classical simple machines	○ Inclined plane ○ Lever ○ Pulley ○ Screw ○ Wedge ○ Wheel and axle
Clocks	○ Atomic clock ○ Chronometer ○ Pendulum clock ○ Quartz clock
Compressors and pumps	○ Archimedes' screw ○ Eductor-jet pump ○ Hydraulic ram ○ Pump ○ Trompe ○ Vacuum pump

External combustion engines	○ Steam engine ○ Stirling engine
Internal combustion engines	○ Gas turbine ○ Reciprocating engine ○ Rotary engine ○ Nutating disc engine
Linkages	○ Pantograph ○ Peaucellier-Lipkin
Turbine	○ Gas turbine ○ Jet engine ○ Steam turbine ○ Water turbine ○ Wind generator ○ Windmill
Aerofoil	○ Sail ○ Wing ○ Rudder ○ Flap ○ Propeller

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Vehicles	○ Automobile
Miscellaneous	○ Mecha ○ Robot ○ Agricultural ○ Seed-counting machine ○ Vending machine ○ Wind tunnel ○ Check weighing machines ○ Riveting machines
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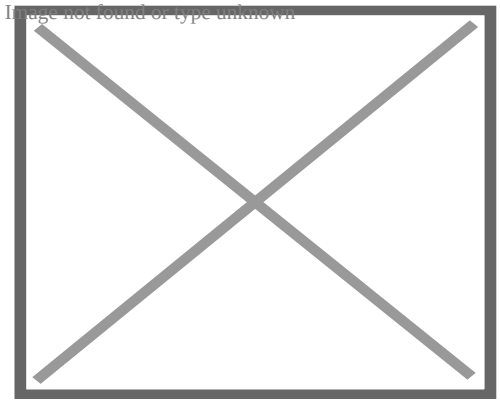
About Keypad



A telephone keypad using the ITU E.161 standard.

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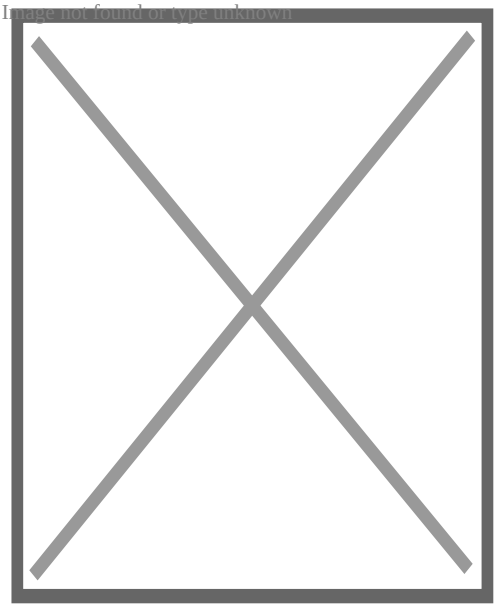

Numeric keypad, integrated with a computer keyboard

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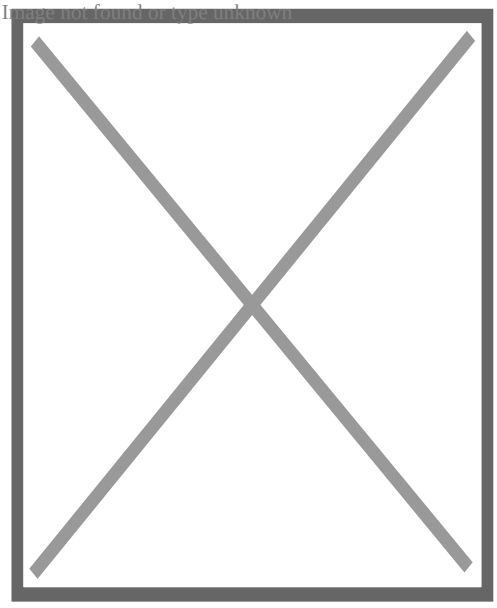

A calculator

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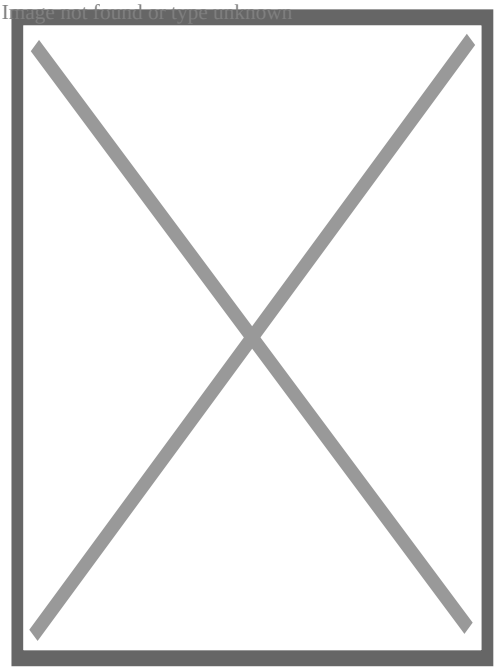

1984 flier for projected capacitance keypad

A **keypad** is a block or pad of buttons set with an arrangement of digits, symbols, or alphabetical letters. Pads mostly containing numbers and used with computers are numeric keypads. Keypads are found on devices which require mainly numeric input such as calculators, television remotes, push-button telephones, vending machines, ATMs, point of sale terminals, combination locks, safes, and digital door locks. Many devices follow the E.161 standard for their arrangement.

Uses and functions

[edit]

A computer keyboard usually has a small numeric keypad on the side, in addition to the other number keys on the top, but with a calculator-style arrangement of buttons that allow more efficient entry of numerical data. This number pad (commonly abbreviated to *numpad*) is usually positioned on the right side of the keyboard because most people are right-handed.

Many laptop computers have special function keys that turn part of the alphabetical keyboard into a numerical keypad as there is insufficient space to allow a separate keypad to be built into the laptop's chassis. Separate external plug-in keypads can be purchased.

Keypads for the entry of PINs and for product selection appear on many devices including ATMs, vending machines, point of sale payment devices, time clocks, combination locks and digital door locks.

Keypad technologies

[edit]

Apart from mechanical keypads,[1][2][3] there are a wide range of technologies that can be used as keypads, each with distinctive advantages and disadvantages. These include Resistive,[4] Capacitive,[5] Inductive,[6] Piezoelectric,[7] and Optical.[8]

Key layout

[edit]

Further information: Telephone keypad § Layout

The first key-activated mechanical calculators and many cash registers used "parallel" keys with one column of 0 to 9 for each position the machine could use. A smaller, 10-key input first started on the Standard Adding Machine in 1901.[9] The calculator had the digit keys arranged in one row, with zero on the left, and 9 on the right. The modern four-row arrangement debuted with the Sundstrand Adding Machine in 1911.[10]

There is no standard for the layout of the four arithmetic operations, the decimal point, equal sign or other more advanced mathematical functions on the keypad of a calculator.

The invention of the push-button telephone keypad is attributed to John E. Karlin, an industrial psychologist at Bell Labs in Murray Hill, New Jersey.[11][12] On a telephone keypad, the numbers 1 through 9 are arranged from left to right, top to bottom with 0 in a row below 789 and in the center. Telephone keypads also have the special buttons labelled * (star) and # (octothorpe, number sign, "pound", "hex" or "hash") on either side of the zero key. The keys on a telephone may also bear letters which have had several auxiliary uses, such as remembering area codes or whole telephone numbers.

The layout of calculators and telephone number pads diverged because they developed at around the same time. The phone layout was determined to be fastest by Bell Labs testing for that application, and at the time it controlled all the publicly connected telephones in the United States.

Origin of the order difference

[edit]

Although calculator keypads pre-date telephone keypads by nearly thirty years, the top-to-bottom order for telephones was the result of research studies conducted by a Bell Labs Human Factors group led by John Karlin. They tested a variety of layouts including a Facit like the two-row arrangement, buttons in a circle, buttons in an arc, and rows of three buttons.[11] The definitive study was published in 1960: "Human Factor Engineering Studies of the Design and Use of

Pushbutton Telephone Sets" by R. L. Deininger.[13][14] This study concluded that the adopted layout was best, and that the calculator layout was about 3% slower than the adopted telephone keypad.

Despite the conclusions obtained in the study, there are several popular theories and folk histories explaining the inverse order of telephone and calculator keypads.

- One popular theory suggests that the reason is similar to that given for the QWERTY layout, the unfamiliar ordering slowed users to accommodate the slow switches of the late 1950s and early 1960s.[15]
- Another explanation proposed is that at the time of the introduction of the telephone keypad, telephone numbers in the United States were commonly given out using alphabetical characters for the first two digits. Thus 555-1234 would be given out as KL5-1234. These alpha sequences were mapped to words. "27" was given out as "CRestview", "28" as "ATwood", etc. By placing the "1" key in the upper left, the alphabet was arranged in the normal left-to-right descending order for English characters. Additionally, on a rotary telephone, the "1" hole was at the top, albeit at the top right.

Keypad track design

[edit]

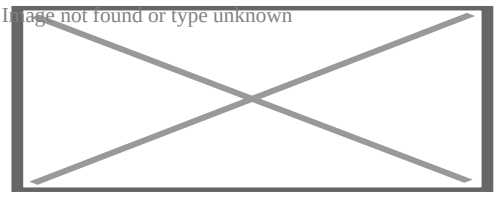

Figure 1. Keypad wiring methods: separate connections (left), x/y multiplexing (center), Charlieplexing (right).

Separate connections

[edit]

A mechanically-switched 16-key keypad can be connected to a host through 16 separate connecting leads, plus a ground lead (Figure 1, left). Pressing a key will short to ground, which is detected by the host. This design allows any number or combination of keys can be pressed simultaneously. Parallel-in serial-out shift registers may be used to save I/O pins.

X/Y multiplexing

[edit]

See also: Keyboard matrix circuit

These 16 + 1 leads can be reduced to just 8 by using x/y multiplexing (Figure 1, center). A 16-key keypad uses a 4 × 4 array of 4 I/O lines as outputs and 4 as inputs. A circuit is completed between an output and an input when a key is pressed. Each individual keypress creates a unique signal for the host. If required, and if the processor allows, two keys can be pressed at the same time without ambiguity. Adding diodes in series with each key prevents key ghosting, allowing multiple simultaneous presses.

Charlieplexing

[edit]

Main article: Charlieplexing

8 leads can detect many more keys if tri-state multiplexing (Figure 1, right) is used instead, which enables (n-1) × (n/2) keys to be detected with just n I/O lines. 8 I/O can detect 28 individual keys without ambiguity. Issues can occur with some combinations if two keys are pressed simultaneously. If diodes are used, then the number of unique keys detectable is doubled.[16]

See also

[edit]

- Arrow keys
- Charlieplexing
- Digital door lock
- Keyboard (computing)
- Keyboard matrix circuit
- Keyboard technology
- Key rollover
- Mobile phone
- Numeric keypad
- Push-button telephone
- Rotary dial
- Silicone rubber keypad
- Telephone keypad

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External links

[edit]

Look up ***keypad*** in Wiktionary, the free dictionary.

- Interfacing Matrix Keypad to 8051 Controller

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