In the Beginning…
…a (very) Brief Historical Review of Fire Alarm Monitoring

Like many of the great inventions of the latter nineteenth century, the fire alarm transmitter was born of necessity and was the product of contributions from many individuals. It is interesting to see how one breakthrough is linked to another and how coincidence can lead us along the path of innovation. We will see for example, how today's modern Alarm Signal Receiving Centre is linked to the hoop skirt, that fashionable piece of ladies apparel from the mid 1800's, and how a small, notched disc was incorporated into a life safety system that became the pride of Boston.

The story of alarm monitoring starts with the discovery of electric current. In 1799, Italian inventor Allessandro Volta made a device which could supply a constant flow of electrical current as a result of converting chemical energy into electrical energy. He had invented the battery. It was battery-supplied power, a new form of energy whose remarkable adaptability as a signaling medium was dramatized by Samuel Morse's development of the telegraph in 1844.

Coincidentally, this was a perfect time for England's Alexander Baine to present his recently patented "telegraph-compatible" code wheel that he had developed the year before, a round disc with tooth-like projections that would rotate against a pair of open contacts. The energy to turn the code wheel was supplied by falling weights, similar to the mechanism in a grandfather clock. This code wheel and falling weights device was enclosed in a signal box that was connected by wires to a "Principal Station". The intention was that each signal box would send its own distinct code identifying a building or intersection that required Fire Brigade response.

The system was refined by two engineer-inventors, W.F. Channing and Moses G. Farmer who used it to develop a system of fire alarm signaling for the city of Boston in 1845. Further refinements replaced the falling weights with a hand crank, and the central station recorded the code wheel transmissions on a moving paper ribbon mechanism called a tape register.
The code wheel pulses could also be re-transmitted to electric solenoids attached to 22 church, school and fire house bells, the earliest form of "bell coding". Soon 42 of these coded call boxes were installed in the city.
The call box system was so successful that many other cities adopted it. The basic design of the call box has remained unchanged to present day.

Channing and Farmer introduced the Municipal Fire Call Box to Boston in 1845

While fire alarm signaling held centre stage, Edwin Holmes, a New England business man who owned a sewing supplies store that also manufactured hoop skirts, developed an interest in a battery powered burglar alarm system patented by Augustus Pope in 1853. He bought the patent, moved to New York, refined the primitive window and door switches and experimented with remote burglary signaling from nearby merchants who needed protection from attack on their safes. The safe protection consisted of a fine-wired enclosure connected to Holmes' central station by wires strung across rooftops. The available wire was of poor quality and unprotected from shorting and damage. Holmes used his hoop skirt experience to solve the problem. He had the bare copper wire braided with cotton by the same plant that braided his skirt hoops. A covering of the braid with a durable green paint provided the insulation he needed in order to conduct alarm signals reliably.

The "silent alarm" grew in popularity however line tampering became an ever increasing problem. In 1875, the galvanometer was added to the central station equipment. It would annunciate the increase or decrease of current levels beyond pre-determined levels, a rudimentary form of line security. In the same year, Edward J. Callahan refined his stock market telegraph system in such a way that the wealthy homeowner could install a call box in his home to summon a messenger boy, the police or fire brigade

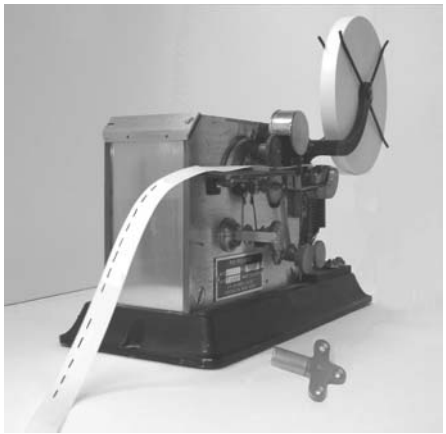
by transmitting one of three code wheel signals to the central station. Residential alarm monitoring was now a reality.

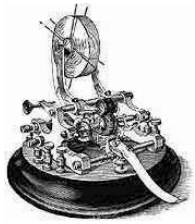
We should remember that at this point in time, the telephone is nowhere to be seen, the light bulb would not be a commercially successful product for another four years and Henry Ford's first Model T wouldn't happen until the next century. Central station operators worked the night shift under oil lamps and went home in a cab – drawn by a horse.

Then came the next step along the path of innovation. In 1876 Alexander Graham Bell and his assistant, Thomas Watson (who, by the way was an employee of Holmes) invented the telephone at the Bell home in Brantford, Ontario. Holmes' central station, with all of its wire circuits running across rooftops and into homes, businesses and shops was a perfect site for testing this new device. Over a very short period of time, Holmes' Central Station, operating as the American District Telegraph Company (ADT for short) became the first telephone exchange, and Holmes himself became the first President of the Bell Telephone Company of New York. A Central Station spawning the Phone Company? The irony will not be wasted on many of our readers.

The next breakthrough in alarm signaling came in 1882 when a patent was awarded to C.F. McCulloh for his circuit which allowed several code wheel movements to share one pair of lines. In later years, this configuration consisted of a pair of wires leaving a central station or fire department, that were in turn connected to a "bunching block" in the phone company's switching centre. The block accommodated 19 pairs of wires that would go out to the fire alarm call boxes (or protected premises). Each pair would serve a code wheel mechanism with each wheel having a different self-identifying code. These pairs were connected in series on the bunching block forming one large closed loop, energized at the monitoring centre. Signals were recorded on the moving paper ribbon of a tape register. This provided a drastic reduction in cabling costs and the McCulloh Loop as it was called, has remained in active service as a signal channel to present day.

Most recently of course these older technologies are being phased out in favour of data communication networks, the internet, cellular and long range radio communication. In recognition of these advances, ULC has recently published two new standards S559 and S561, dealing with the manufacture and operation of Fire Alarm signaling systems and communication pathways.





Until 1976, call Box Number 58 faithfully served the City of Toronto as a Fire Alarm Transmitter from its location in front of 354 Jarvis Street, the CBC building. To operate the transmitter, one would open the small door on the front of the cast iron enclosure and turn a latch. The front door would swing open exposing a blank plate with a lever protruding through the plate. Pulling down on the lever started the spring wound code wheel to turn and the teeth, a group of 5 and a group of 8, operated a set of contacts (inset). The contacts were connected to a dedicated closed loop connecting the Call Box to the local TFD hall where the code "5-8" would be repeated several times, perhaps recorded on a tape register (centre) as well as operating a solenoid striking a bell giving the code 5-8 to the responding fire fighters.

With the exception of an electric power supply to run the unit, there is virtually no difference in operation of an early tape register circa 1850 (top right) and the most recent device (bottom right) which saw service in many Toronto Central Stations as late as 1980. *Photos courtesy Electronic Surveillance Corporation Ltd.*