



A London traffic signal, circa 1868

Signalling intentions



by Roger Shaffer, Advanced Traffic Control, Inc, USA

The TTi Annual Review is not necessarily the first place you'd think of as a source of automotive history. Think again. All you ever wanted to know about traffic signals but were too afraid to ask...

In my youth I made cars out of clay at Ford's Mustang Studio in Dearborn. My first project was the 1969 Mustang. I was only a bit player in a large cast, but it was exciting and I loved that car. In another youthful occupation I was a police officer. As a cop, in addition to the usual suspects, I had to deal with traffic accidents. Drivers have been injuring or killing each other (and bending my beautiful cars) for a long time now. The search for innovative methods of controlling traffic has been going on longer than many people realize.

In 45 BC, Caesar dealt with traffic issues in Rome by banning all vehicles, including horses, from the city. He allowed them back in only at night. Having driven through Rome some years ago, during the

day, I can understand why that dramatic solution would be so appealing to Caesar, but it has not stood the test of time. Generally, successful traffic control solutions rely upon solutions founded in the disciplines of engineering, education and enforcement.

Two 'pre-automobile' engineering innovations are worthy of our notice. In December 1791, New York City established its first one-way street. That simple technique still enjoys wide acceptance in city streets today, and has evolved into the divided highways used all over the world. London tried an early high tech solution to its traffic problems, but got off to a rocky start. In 1868, recognizing that street traffic (wagons, buggies and pedestrians) was getting out of hand; London installed what is believed to be the world's first documented traffic signal. Invented by J.P. Knight, it was installed in Parliament Square at the intersection of George and Bridge Streets.

The semaphore arm device was operated by a constable, and had a revolving gas lantern with red and green lights for night use. Unfortunately, a month after its installation the signal light exploded and injured the officer.

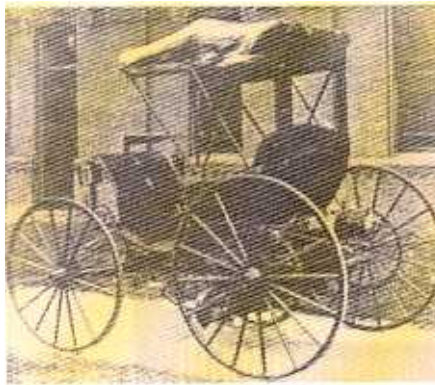
And so it goes on

Enforcement solutions for the issues raised by automobile traffic in America may have had their beginnings in New York City. In 1895, 27 years after London's first traffic light exploded, the Duryea Motor Wagon Company went into business in Springfield, Massachusetts. Duryea managed to build 13 of its '1896' model Motor Wagons. On Memorial Day 1896, Frank Duryea entered and won the Cosmopolitan Automobile Race in the Big Apple. But Frank's win was not the whole story of race day.

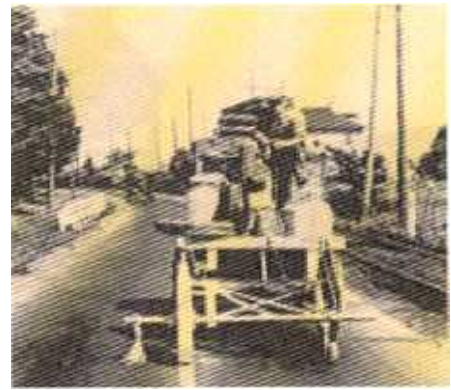
Henry Wells, also driving a new Duryea Motor Wagon, was another entrant in the Cosmopolitan. Wells and a charming young cyclist, Miss Evelyn Thomas, chanced to meet unexpectedly and dramatically in the middle of a New York intersection. Miss Thomas was hospitalized with a broken leg and, in a New York minute, Wells became the first person arrested for a traffic accident. Miss Thomas became the first (recorded) person hospitalized because of an automobile accident. And, of course, Wells gained the dubious distinction of having the first recorded automobile injury accident in the City.

In those early days New York had a citywide speed limit of eight miles per hour and it did not tolerate speeders. In December 1895, Police Commissioner Theodore Roosevelt, still a few years away from his 1898 date with the Rough Riders on San Juan Hill, created a 29 member Bicycle Squad (later nicknamed the 'Scorcher Squad') to combat speeding carriage drivers, and the new bicycle craze, in which many cyclists were characterized as 'speed-demon wheelmen'. The Scorchers made 1,366 arrests in their first year. When automobiles appeared on the City's streets, the Scorchers also shouldered the job of enforcing the speed limits on them too; which brings us to a Jacob German.

Jacob German was a New York taxi driver working for the Electric Vehicle Co. On 20 May 1899 German was observed 'whipping' his electric cab at



Left: An 1896 Duryea Motor Wagon. Right: The world's first centerline was painted onto a highway in Detroit, Michigan in 1911



'breakneck speed' (later determined to be 12 miles per hour) all over Lexington Avenue. A Scorcher, outraged at the cabby's audacity started in pursuit. After a breathtaking chase (certainly on the part of the policeman pumping his two-wheeler) the officer was able to overtake and arrest the speeding cabby. And so German enjoys the recognition of being the first (recorded) automobile driver arrested for speeding.

By 1911, automobiles were in New York to stay and they were now too fast for the intrepid Scorchers. Police Commissioner Rhineland formed the new Office of Street Traffic Regulation Bureau, and, within it founded the Motor-cycle Squad. Mounted on new Indian motorcycles, the Squad took to the streets. The zeal of the Motor-cycle Squad Officers, the speed and agility of the motorcycles, the Legislature's 1910 authorization permitting New York police officers to issue a summons for traffic offenses (as an alternative to the physical arrest of an errant driver) and, I suspect, the sheer exhilaration of riding their new bikes, all combined to make the Motor-cycle Squad very productive. They wrote 3,710 summons in the last half of 1911.

Detroit, motor city

Of course New York wasn't the only city learning to cope with traffic problems. Detroit made significant contributions to the world of traffic control. For example,

in 1911 they gave us the concept of painting a centerline on the street. It was pretty low tech. An early iteration was merely a paint brush strapped to an arm on the back of a truck. Later, paint was dribbled onto a painting wheel that marked the line as the truck moved slowly along. And, since it worked so well, we recognize it as the precursor to the multiple lane delineation found on all our major roadways.

I suspect that the universal success of marked lanes reminding each driver that the other drivers are entitled to a specific part of the road too is instinctively accepted by drivers since it is in harmony with their territorial instincts. Staying in your 'own' lane is not unlike neighbours respecting each other's fenced property; for the most part it works without incident. Of course some motorists will stray from their own lane and need to be reminded from time to time. When this occurs, the territorial instincts of the party being encroached upon come into play and the encroached upon party is usually not shy in protecting their lane rights against a trespasser (employing horn, hand signals and heated words). In egregious cases we characterize that territorial interplay as road rage.

Detroit (or rather the Wayne County Road Commission) also claims responsibility for the first mile of concrete road when it paved Woodward Avenue from McNichols to Seven Mile Road in 1909. To keep that new concrete road clear in



"Cleveland inventor Garret A. Morgan was motivated to design an electric light and semaphore arm traffic signal"



Various examples of early traffic signals

winter, they also claim the first snow plow in 1912. Detroit also boasts of the first stop sign. Printed on a sheet of metal in black letters on a white background, it was installed in Detroit in 1915. Stop signs became so popular that, in 1922, a committee was established to develop common designs for them and other road signs. One of their recommendations was the octagon shape for the stop sign that is so familiar in America today. The red background with white lettering wasn't set until 1954.

Potts of gold

Detroit is also proud that one of their police officers, William Potts, invented the first four-way automatic traffic light in 1920. Potts used red, amber and green railroad lights, electrical wire and controls. The light was installed on the corner of Woodward and Fort Street in 1920. Deemed a success, Detroit added 14 more of the new automatic lights within a year.

The saga of American traffic signals requires a little fortitude, but it's interesting. The first ones, just as London's first, were operated manually by a police officer rotating them 90 degrees to show the 'Stop or Go' to the motorists in four-way intersections. Cleveland is recognized as having the first signalized intersection in about 1908, 1913, or 1914 depending on which account you wish to believe.

This you can believe, after witnessing a collision between an automobile and a horse drawn wagon, Cleveland inventor Garret A. Morgan was motivated to design an electric light and semaphore arm traffic signal. The first to actually apply for a patent on a traffic signal, Morgan's patent was granted in 1923. The next year Morgan sold his rights to General Electric for forty thousand

dollars. My 'Relative Value' guru says that in today's dollars, Morgan's US\$40,000 payment from GE was worth between US\$350,000 and US\$5,030,000 (depending on which economic indicators you like).

New York erected its first traffic signal tower in the middle of the intersection of Fifth Avenue and 42nd Street in New York in 1916. Standing inside a booth 16 feet above the roadway, an officer regulated traffic by operating 16-inch electric lamps on top of the booth. The four hundred watt lamps were red, amber, and green. Here's the tricky bit; at that time a 'New York' red light meant traffic in all directions had to stop. An amber light meant cross-town traffic had to stop so that north and south-bound traffic could pass. Then green lights stopped north and south bound lanes of traffic so that cross-town traffic could proceed. This already confusing light system was exacerbated by the fact that, outside of New York City, the railroad signal light designation sequence of red for stop, green for go, and amber for slow, had been adopted almost universally. Visitors to New York were not happy to receive tickets for running a green light.

The corner of Howmuch & Fifth

It wasn't until 1924 that New York got rid of its traffic towers (there were 50 of them, including seven towers along Fifth Avenue that had been cast in bronze at the cost of US\$200,000 each), went to mast arm automatic signal lights and adopted the color signal light system already in use in most towns and cities in the US. Fortunately, through the efforts and influence of the Federal Highway Administration's Manual Uniform Traffic Control Devices, and organizations

such as ITS America, the days of tickets for running green lights are gone forever.

Traffic congestion costs motorists a staggering US\$78 billion annually in wasted time and fuel. Today's computer controlled Intelligent Traffic Solutions—working hard to reduce the more than six million road crashes experienced annually in the U.S., while at the same time keeping traffic flowing!, place significant emphasis on communicating to the motoring public through traffic signs and signals. Moreover, many urban systems provide special traffic and weather broadcasts. Traffic conditions and weather reports are often available online for motorists planning before they start their journey. In the world of today's traffic control, real-time information rules.

Aside from the obvious technology differences such as LEDs, variable message signs and computer controlled devices (instead of a police officer hand turning exploding gas operated signals lights or waving semaphore arms), the major change is the traffic manager's ability (and responsibility) to communicate the ever-changing traffic conditions to motorists and emergency personnel. Effective communication of fluid traffic conditions requires real-time, interactive control over a system's dynamic signs and signals.

Garrett Morgan's story needs completing. Prior to patenting his electric traffic signal, Morgan was personally involved in a tunnel crisis. On July 25, 1916, workmen digging a tunnel under Lake Erie inadvertently ignited a pocket of natural gas 250ft below the lake. Eleven tunnel workers were killed and 10 rescuers were overcome. Two years earlier Morgan had patented his 'safety hood and smoke protector.' Called to the disaster scene, and using his safety hoods, Morgan and his brother rescued two men and recovered the bodies of four others before the U.S. Bureau of Mines halted further rescue and recovery efforts. Morgan's device, now called the gas mask, was later modified for use by the U.S. Army in the First World War. ■

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