

A Brief History of the John Deere Two Cylinder Tractors

The following paper was presented at "Tracking the Deere", a conference for John Deere enthusiasts held in March 1991 in Lincoln, Nebraska.

The theme of this conference is "Tracking the Deere." In this session we will discuss a brief history of evolution of the gasoline tractor from the 1892 Froelich through the two-cylinder group ending in 1960.

Mr. R.B. Gray, who was with the U.S.D.A. Agricultural Research Service (Information Series No. 107), published a treatise entitled "Development of the Agricultural Tractor Through 1950." Although there was considerable controversy on who introduced the first internal combustion engine traction machine, Mr. Gray credits John Froelich with probably the first gasoline tractor with a record of operating success. The 1892 Froelich tractor is listed as 20 HP with a 14" bore, 14" stroke, single cylinder, vertical type engine. The tractor had one forward speed (approx. 2-1/4 mph) and one reverse speed. The machine successfully completed a 50-day threshing run in Iowa and South Dakota, pulling and operating a 40 x 58 thresher.

John Froelich and a group in Waterloo, Iowa, in 1893 organized the Waterloo Gasoline Traction Engine Company. In 1912, along with their stationary engines, the Waterloo Gasoline Engine Company started to build what became known as the Waterloo Boy. Between 1912 and 1914, there were several engine arrangements. It appears that the two-cylinder horizontal engine arrangement was introduced in 1914 by the Waterloo Boy Model R, Style A, Serial No. 1026. This used a two-cylinder, horizontal, 5-1/2" x 7" engine. In 1917, the engine was revised to a 6-1/2" bore, which was retained through 1925. In the spring of 1920, the Model N Waterloo Boy was the first tractor to complete the newly formed Nebraska Tractor Test. Per Nebraska Tractor Test No. 1, a brief of the specifications and performance is as follows:

Engine 6-1/2" bore x 7" stroke, 750 r.p.m., 25.5 belt HP, travel speeds 2-1/3 and 3 mph forward, 2-1/4 mph reverse, using kerosene for fuel.

In 1912, several of the Deere branch houses and dealers wanted a tractor to sell. The St. Louis and Atlanta, Georgia, branches included the Big Four "30" gas tractor (20 draw-bar HP) in their sales catalog.

During the period of 1912 to 1917, Deere and Company at Moline, Illinois, flirted with several different tractor designs and made a few different styles of tractors – for example:

1. Designed and built, under Deere and Company sponsorship, a three-wheel, rear engined, front wheel steered tractor-only one was built before the design was abandoned.
2. A motorized two-row cultivator tractor was designed and built. For cultivating, the tractor was driven with the two-drive wheel in front. For plowing, the unit was reversed.
3. A three-wheel arrangement (two front wheels, one rear wheel, front wheel drive) – only two were built.
4. In 1914, Deere asked Joe Dain, Sr., to study the tractor situation and report back to the board. Early in 1915, Joe Dain was given the go ahead to design a tractor. This effort resulted in a tricycle (2 front

wheels, 1 rear wheel) all wheel drive tractor having 24 belt HP and 12 drawbar HP. Board of Directors action on Sept. 12, 1917 approved building 100 tractors.

While all this activity was going on, Deere and Company management was acutely aware of the activities of the Waterloo Gasoline Engine Company at Waterloo, Iowa. On March 14, 1918 Deere and Company bought the Waterloo Gasoline Engine Company for \$2,350,000.

I wanted to discuss these various facets to show you how the Dain Tractor activity related to the Waterloo Boy Tractor activity. Looking at the Waterloo Boy Model N, the two-cylinder horizontal engine, you can understand from where the basic two horizontal-cylinder design originated. This basic design was retained until August 1960.

John Deere, under Waterloo Gasoline Engine Company, continued to build the Waterloo Boy until July 7, 1925. During this period of 14 years, it is thought that more than some 30,000 units had been built and sold. The name of the Waterloo Gasoline Engine Company was changed to the John Deere Waterloo Tractor Company in 1925.

We will now discuss the unstyled two-cylinder tractor phase. In this phase, we have such models as the D, C, GP, P, AA-1 and 3, A, B, and G tractors.

Design work was started on a new tractor in 1921 which was to become the John Deere Model D introduced in 1924. Within Deere and Company management, considerable controversy existed as to whether Deere should manufacture tractors. However, after much debate, a production of 1000 Model D tractors was approved, and sales of the Waterloo Boy Model N were to be phased out in 1924.

By 1925, the sales of the John Deere Model D tractor had grown to where the John Deere tractor works profit was in the black. The Model D tractor specification and performance per Nebraska Tractor Test 102, dated April 11, 1924, was as follows:

A kerosene burning engine of horizontal two-cylinder design with a 6.5" bore x 7" stroke, and an engine rated speed of 800 r.p.m. It produced 30.4 belt HP and 22.53 drawbar HP.

After the Model D was introduced, requests for a smaller tractor were received. A smaller D was introduced in 1927. This was called the John Deere Model C.

The John Deere Model C had an engine 5-3/4" bore x 6" stroke developing 20 belt HP. This was Deere's first model that could be purchased with either a standard four-wheel tread or as what we today know – a tricycle arrangement. The Model C lasted over a year, being replaced by the GP.

The 1928 GP was a 5-1/2" bore x 6" stroke, 900 r.p.m., kerosene burning engine with about 25 belt HP. It could be purchased in either a standard four-wheel tread or a tricycle arrangement. It is thought to be the first tractor with what we call a power lift mechanically operated and 1¹/₈ diameter, six-spline PTO. It was also the first of John Deere tractors to offer an orchard version and a wide-tread version. In 1930, the Lindeman Organization, Yakima, Washington installed a set of tracks on the GP orchard tractor which was a forerunner of the small JD crawler. The GP wide-tread also had a small variation in tread arrangement by using dished rear wheels. I believe

I'm correct when I say that the GP tricycle with wide 68' rear tread was the first Deere tractor with the steering column above the engine hood, which allowed a more narrow hood and fuel tank arrangement. This was to improve the operator vision when cultivating. During the period 1930 to 1933, two other model series of Deere tractors were made out of the GP.

Farmers were looking for other improvements such as better adjustable tread width, more maneuverability, easier means to operate tractor-mounted implements, and more power. The GP tractor was the first Deere tractor to offer four sources of power: drawbar for pulling, belt pulley, power takeoff for mowers, etc., and a mechanical power lift for a variety of mounted implements. I believe you can see the requirements being developed for the next step, namely, the development of the row crop tractors, Model A and Model B, etc.

During the period we have just discussed, the D continued in production with a power change in the 1926-1927 model which increased its belt horsepower to 36.98 HP (Nebraska Test 146). In 1934, the D was changed to burn distillate or tractor fuel. The engine speed increased to 900 r.p.m., which resulted in a power increase to 41.5 HP belt pulley (Nebraska Test 236). To obtain more power and minimize detonation, the tractor was equipped with a means to inject water in the intake manifold to cool the intake fuel-air temperature. Incidentally, 100 Model D tractors were equipped in 1931 with dual rubber tires and shipped to the Montana sales area.

The theme of this meeting is "Tracking the Deere". We have now tracked the design to the introduction of the John Deere Model A. When introduced, the Model A had an engine of 5-1/2" bore x 6-1/2" stroke operating at 975 r.p.m. It produced 24.7 belt HP. Eight row crop units were released in the middle of 1933 (two with three-speed transmissions and six with four-speed transmissions). The main introduction of the Model A tractor came early in December 1933. Other arrangements, such as the AN (single front wheel), primarily for vegetable or narrow row cultivation, the AW (wide adjustable front axle), and ANH (hicrop model), all unstyled, were introduced between 1935 and the fall of 1937. The main features inaugurated in the Model A were introduction of straight thru splined axles, the first hydraulic power lift which is common on tractors today, and factory installed rubber tires as an option.

The Model A was a distillate-burning tractor enabling it to burn lower cost fuels. Distillate or tractor fuel was selling for in the range of eight cents per gallon.

If you talked with some people who were farming in the 30s, they will tell you that the Model A tractor was an important factor in their economic survival.

Application of rubber tires changed some of the fundamentals of tractor design, such as:

1. Allowed higher operating speeds and better efficiency.
2. Allowed putting more power through existing transmission design.
3. Allowed easier ride.
4. Extended the variety of uses of the tractor – e.g., transporting of agricultural products.

Problems appeared in how to develop the same tractor pull with rubber tires afforded by the lugged steel wheel design. From the period of 1931 to 1934, the industry found that additional weight over that normally used by the lugged steel wheels had to be added to the rubber tired tractor rear wheels. How to incorporate the necessary added wheel weight became a pressing problem, plus getting the tractor operators to understand the need to install the additional weight. Both the individual companies and the industry did much individual and collective work to solve this problem.

In the development work on the Model A, it was realized that both a smaller and a larger row crop tractor would be required. Consequently, the Model B with a 4-1/4" bore and 5-1/4" stroke, operating at 1150 r.p.m., was developed and introduced in February 1936. This tractor developed a 16 belt pulley HP (Nebraska Test 232), having the same features as the Model A. The Models AI and BI (industrial versions of the A and B introduced in 1935) had magneto electric lights as a kit option.

Following introduction of the Model B, design work was started on what was to become the Model G. This resulted in a 6-1/8" bore x 7" stroke, 975 r.p.m., distillate fuel engine developing 35.9 belt pulley HP (Nebraska Test 295), and was introduced in June 1938.

Late fall of 1936, the Henry Dreyfus Organization (specializing in industrial styling) was employed to style the Waterloo A and B tractors. Experimental parts were made in April 1937 with the 'styled A and B' tractors introduced in June of 1938.

The Model L and D tractors (called the 1939 models) were styled a year later than the A and B tractors. The Model G tractor was not styled until after World War II.

Need was shown for a smaller tractor. This was to become known as the Model H which was introduced in the fall of 1938. The Model H was listed as a 16" 1-bottom plow tractor. The engine was 3-9/16" bore x 5" stroke, 1400 r.p.m., distillate fueled, producing 14.8 belt pulley HP (Nebraska Test 312). It is interesting to note that the styled A, B and H tractors were the first Deere tractors to be tested at the Nebraska Tractor Test on rubber tires. They also had electric lights and starter as an option. The Model B was tested on both steel wheels and rubber tires to show both effects of tractors equipped with rubber tires, and the necessity of the use of wheel weights (Nebraska Test 305).

The Model D was styled in 1940, with the same bore and stroke, and was retested at Nebraska Test, producing 42 belt HP. It produced 4830 lbs. drawbar pull on rubber tires (Nebraska Test 350), compared with 4037 lbs. drawbar pull on steel wheels (Nebraska Test 236). The styled Model AR was introduced and tested on rubber tires.

Availability of the hydraulic power lift created an increase in the use of tractor-mounted implements. This generated the question, "Why not offer the same use of hydraulic controls to drawn implements?" This resulted in the design and 1947 introduction of the John Deere Power.

In 1941 an electric wiring option, including lights powered by an engine operated generator and battery, was offered on the Models A and B tractors. The battery was located under the hood.

World War II interrupted much of the tractor activities. Tractor production was limited to the Model A tractor. Much of the Deere tractor engineering effort was employed in finding suitable material substitutes for the previously specified materials. However, reports from the field- among other items- indicated a cooler location for the battery was required, along with increased power.

Following World War II, new models A, B, G and a new Model M (replacing the LA) were introduced. Major changes in the A, B and G were:

1. Increases in power.
2. Battery located under the seat support.
3. A new cushion seat with a backrest.
4. Power.
5. 1-3/8" diameter 6-splined PTO stub.
6. Electric lights and starter standard.
7. Roll-o-matic front wheel arrangement.

Model A – had a four or six speed transmission with an engine of 5-1/2" bore x 6-3/4" stroke, 975 r.p.m., and produced 38 belt pulley HP with gasoline (Nebraska Test 384).

Model B – had a four or six speed transmission with an engine of 4.69" bore and 5.5" stroke, 1250 r.p.m., produced 27.5 belt pulley HP with gasoline, and 23.5 belt pulley HP with distillate (Nebraska Test 380 and 381).

Model G – with a six speed transmission, an engine with a 6-1/8" bore x 7" stroke, 975 r.p.m., distillate fueled, producing 38 belt pulley HP. Cast disk wheels were made available to reduce the number of wheel weights required.

The Model M, replacing Models H, L, and LA, was introduced with a 2-cylinder vertical, 4" bore x 4" stroke, 1650 r.p.m. engine, with 20.4 belt pulley HP, four travel speeds, and a position-responsive hydraulic power lift control; lighting and belt pulley were optional on the M tractor (Nebraska Test 387).

New tractor designs began to appear at the end of World War II. Some of the important facets of the design were:

1. Introduction of rubber tractor tires allowed higher operating and travel speeds. This results in the need for more powerful tractors. Power is the combination of draft times speed. However, the draft requirement vs. speed characteristics for each shape of soil working element is not a

straight constant but increases with working speed. This means the percentage of power requirements increases faster than the percentage increase in speed.

2. Many returning World War II veterans who returned to farming had increased training in machine operation and mechanics.
3. The operator desire for more comfort in vehicle ride, reduction of tractor noise, easier operation of the tractor and implements.
4. Improvement in tractor safety.

For the two-cylinder tractor, improvement began appearing in more effective noise-reducing mufflers, increased available hydraulic pressures, power steering, more power, increase in compression ratio, and increase in fuel tank capacity. To minimize the increase in front-end width, the replacement of the thermo syphon cooling system with use of the water pump cooling and pressurized radiators occurred. Diesel fueled engines, rack and pinion rear wheel tread adjustment, and continuous hydraulic power independent of power take-off operation were incorporated.

I believe, if you stop and review some of the tractors you have or are restoring, you will see these features. Much of this was the launching pad for improvements to come, not only in the two-cylinder version but the New Generation.

The John Deere Model R diesel tractor was scheduled to be introduced in August of 1947, but breaking the crankshaft about six months before that scheduled introduction date delayed the introduction date to August 1948. The Model R was the highest horsepower tractor Deere made, and was advertised "King of the Heavy Weights." Within eight months after its introduction, the Montana and California areas were calling for more power. The tractor couldn't operate the implements and go over the rises or short hills in the fields. This was the first Deere tractor to operate implements pulled by the crawler tractors; however, the operator, instead of operating 3-1/4"-3-1/2" mph, wanted to operate at 4-1/4 mph. Because of easier ride, less dust and less noise, many owners were trading their crawlers for wheel tractors. The Model R, in April 1949 (Nebraska Test 406), produced 51 belt pulley HP at 1000 r.p.m. Although the Model R developed 6644 lbs. drawbar pull on the tractor test course, the operators were trying to pull implements in the field which were demanding 6000 lbs. or better drawbar pull. Over fueling and over weighting were common.

Other important facets were receiving engineering attention, e.g., tractor stability as indicated in tractor overturns. Many schemes were tried to either minimize or prevent this type of accident. Schemes such as shutting off the engine after the tractor had reached a preset rearward upset angle; schemes of disengaging the clutch after reaching a preset upset angle. None proved effective. Increasing the tractor front weight materially helped. As the percentage of rubber tired tractors increased, this further helped.

Production of the Model A, B and M ceased in August 1951. At that time, terminal serial numbers were:

Model A, serial No. 703383, with approximately 327,460 of all variations having been manufactured.

Model B, serial No. 310775, with approximately 318,280 of all variations having been manufactured.

Model M, serial No. 50580, with approximately 49,580 of all variations having been manufactured.

Models 40, 50 and 60 replaced the A, B and M series tractors.

Production of the Model G ceased in August 1952. At that time, the terminal serial number was 64530, with approximately 63,530 units of all types having been manufactured. The Model G was replaced by the Model 70.

Production ceased in March of 1954 on the Model D, terminal serial number 191,670, with approximately 161,270 units of all types having been manufactured. Power of the Model 70 was to replace the Model D tractor.

The 1952 model tractors, namely the 50, 60 and 70, were introduced in August 1951. These models offered engines fueled by either tractor fuel (distillate), gasoline, L.P. and diesel in the Model 70. The power available depended on the fuel used.

The distillate and diesel versions had 6-1/8" bore x 6-3/8" stroke, 975 r.p.m. engines compared with 5-7/8" bore x 7" stroke, 975 r.p.m. engine for the gasoline and L.P. engine. The L.P. and diesel engines were introduced in 1953. The 1952 model tractors had live PTO and continuous hydraulic power. The air intake was normally under the hood in front of the radiator, however provision was available where the above hood high air intake was available. The 2000 (also known as the ABG 2000) hitch was available for hitch mounted tools. Easier adjustable wheel tread arrangement was accomplished by rack and pinion style axles instead of the old splined axle. The axle diameter was increased to better carry the added loads from the integral implements. In 1953, the Model 800 hitch, using the Category II three-point hitch style, became available for the 50, 60 and 70 tractors. The conventional Category I three-point hitch with 'load and depth' control became available on Model 40 series tractors in August 1952. Availability of the three-point hitch for these tractors allowed many short line manufactured implements to be used with Deere tractors. Use of integral tillage implements with the three-point hitch made it possible to take traction advantage of the downward component force from the implement line of draft.

The Model R tractor was changed to the Model 80 in August 1955. The power was increased to 67 belt pulley HP accomplished by increasing the bore to 6-1/8", stroke remained at 8", r.p.m. increased to 1125. An interesting side comment, in the fall of 1953 and the spring of 1954, we measured in Kansas, western Nebraska, Montana and North Dakota the draft generated and power required to operate the implements farmers were operating behind the Model R tractor in the manner in which the farmers wished to do. We found it took in the order of 100 PTO power. The more popular speed was 5-1/2 mph. Similar work with the 2-3-4 x 14" bottom plows at 4-

3/4 mph required about 18-20 PTO HP per bottom. The longer the field, the faster the operator wanted to operate. Desired plowing speeds in the order of 5 to 5-1/4 mph were not uncommon.

The 20 series – 320, 420, 520, 620 and 720 – were introduced in August 1956, all with increased power. Some models had increased engine speed. Others had changes in bore and stroke. All had load and depth control and the standard three-point hitch category consistent with the PTO power class.

The 30 series was introduced in August 1957 with no increase in power, but with modifications in styling.

We have spent this time period tracking the Deere-mainly the two-cylinder Deeres. We have hit only the high spots. For more complete information, e.g., serial numbers, Nebraska Tractor Test report numbers, pictures, etc., the following books are recommended:

1. *Development of the Agricultural Tractor in the United States, Parts 1 and 2*, by R.B. Gray. Published by the American Society of Agricultural Engineers.
2. *Farm Tractors*, by Lester Larsen. Published by the American Society of Agricultural Engineers.
3. *John Deere Tractors 1918-1976 Catalog S P 223*, John Deere Distribution Service Center, 1400 Third Ave., Moline, IL 61265.
4. *Memories - John Deere Waterloo Operations, 150th Anniversary of John Deere*.
5. *John Deere Tractor and Equipment, Volume 1, 1837-1959*. Published by American Society of Agricultural Engineers.
6. *John Deere's Company*, by Wayne G. Broehl, Jr. Published by Doubleday 6k Co., Inc.
7. *Farm Tractor Tune-up and Service Guide*, American Association of Agricultural Engineering and Vocational Agriculture, Athens, Georgia.