

# Story of Harold Brock (1914 to 2011)

Compiled by Robert Dougherty – Oct 2015

Last summer I attended the Ford-Fordson show in Canandaigua, NY. Although I was aware that Harold Brock was an engineer involved with Ford tractors, in conversations with Ford-Fordson club members, I realized the significant role he played in development of iconic farm tractors for both at Ford and John Deere. Since this show, I have talked with a number of the members of the Ford-Fordson club who had the pleasure of meeting and hearing presentations at their meetings by Harold Brock. In addition, I reviewed a number of books he co-authored primarily with Robert Pripps, a noted tractor historian. The following are excerpts from these sources, some of my thoughts along with the attached appendix "From a Clean Sheet of Paper to the 9N" written by Harold Brock. To members of Henry Ford's Dreams, this info will hopefully provide some insight into the outstanding career of this individual who designed the famous N series, Jubilee and 600 / 800 series, tractors that so many of us have in our collections.

Harold Brock started his career at Ford Motor Company (FMC) in 1929; at the age of 15 he enrolled in the Ford Trade and Apprentice School. The education included typical high school curriculum as well as shop subjects with hands-on experience in the machine shop, foundry, pattern making, drafting, etc. He became very good as a draftsman, capable of putting his ideas and those of others onto paper. Later in life, he took college level courses in mathematics, metallurgy and mechanical engineering.

Initially, working under the direct supervision of Henry Ford, he resolved drive train problems mainly on the Model A. In 1938, after the famous handshake agreement between Ford and Ferguson, Ford agreed to design and produce a tractor with the Ferguson 3 point hitch system. Ferguson was to market and distribute these tractors. Ford's chief engineer, Larry Sheldrick, chose Brock, who at the time was in charge of car rear axle and transmission design, to be head of a small design team that would develop the new tractor along with Ferguson's engineers. At the age of 24, Harold Brock was given the assignment to design a new tractor. Six months later, the 9N tractor was introduced, an outstanding achievement. This tractor is considered by many to be the most significant and influential farm tractor of the twentieth century.

He achieved this remarkable feat by utilizing the vast resources at FMC for design and manufacture. He utilized components already in production at FMC and reverse engineered where possible e.g. Ford V-8 engine re-engineered as 4 cylinder, truck bevel gears for final drive, car spindles for front wheels, etc. The body engineering group at Ford did the sheet metal.

Special features were designed to accommodate both Henry Ford and Harry Ferguson. As example, Henry Ford wanted to be able to lift and rotate the gearshift lever out of position so he could move his long legs across without hitting his knees. Another example on implements, Harry Ferguson insisted that the transition between the share and the mould board on the two furrow plow be perfectly smooth, resulting in Ford developing a special grinding fixture.

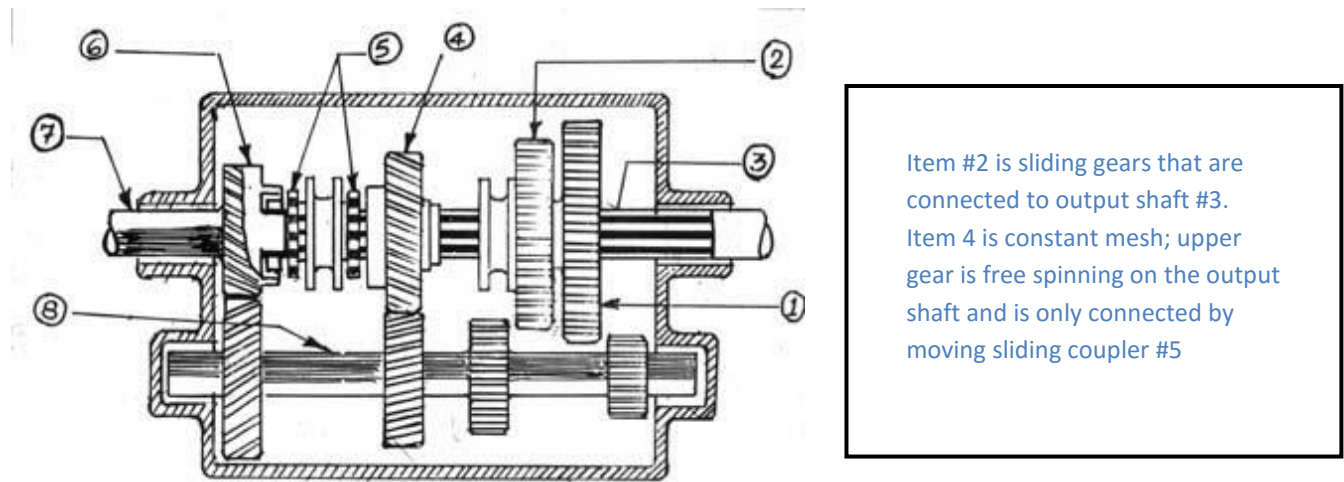


**Figure 1 - Ford - Ferguson 9N**

He acted as a mediator between the Ford and Ferguson staff where relations were often strained. Quoting from Mr. Brock "Mr. Ford was there as a chief engineer and Ferguson was there also as a chief engineer and then I reported to a man who was in charge of all car engineering. All of those people met with me almost daily on how to design the tractor. They never got together as a group so I had a little problem with pleasing them all and convincing them that I was following their advice."

After the 9N, Harold Brock led the engineering team introducing the 8N, Jubilee and 800 series, subsequent models introduced after the handshake agreement was dissolved by Henry Ford II in 1947. Ford and Ferguson went their separate ways, resulting in a famous lawsuit launched by Ferguson. By this time, Brock was the chief engineer at the Ford Tractor Division. Using the same design philosophy as used on the 9N i.e. looking

at what was in the market place and either used it or reverse engineered. As examples, the 8N introduced constant mesh transmissions with tapered roller bearings (at this time being used in Ford motor vehicles) vs. sliding gear approach that continued to be used by major competitors. Live hydraulics using an engine direct driven axial piston pump (purchased from Vickers) was introduced on the Jubilee in 1953, years before the major competitor. A five speed transmissions was developed with an improved ratio for plowing along with a pseudo semi shuttle shift for loader application.



**Figure 2 - Sliding Gear & Constant Mesh (sliding collar)**

From my background as a design engineer at Massey Ferguson (MF) thru the 70s into the 80s, individuals like Mr. Brock, few and far between, were labeled as special designers at MF. Although they were not graduate engineers, they were the most valuable and capable employees in the engineering group, who could put their ideas and those of engineers on paper. As mentioned by Mr. Brock, he would often colour his drawings to help Henry Ford and Harry Ferguson understand the design. Similarly, the special designers at MF would often colour their drawings if necessary to sell their design, often to engineers and management.

In the mid 50s, Ford Tractor Division was developing a power-shift transmission, referred to as the select-o-speed (SOS). Circa 1958, Ford management wanted to introduce the SOS transmission, contrary to Brock's strong opinion that it could not stand the durability requirements. Remember, at this time, Brock's mentor and confident was gone; Henry Ford had passed away in 1947, Edsel Ford was gone and Henry Ford II with young new management was running the company. Unbelievably and what proved to be a regretful decision by Ford management, Brock, at the age of 44 after 30 years with FMC was fired along with his transmission test engineers who documented the SOS deficiencies.

The SOS was released to production in 1959 and the rest is history. Brock was correct, the transmission failed prematurely, numerous reworks were required and eventually had to be recalled and replaced with a complete redesign. The Select-O-Speed transmissions have been labeled as being no good ever since, although some operators had no problems and loved them. Brock later wrote (although it may have been a touch of sour grapes) "In the end, Ford had to shut down the factory for eighteen months and they fired the divisional manager (who had fired me) and his chief engineer. Ford management then called me and asked me to return, but... I declined."

Almost immediately after leaving Ford, he was approached by John Deere Waterloo Product Engineering Center to help with the design of the replacements for their aging two-cylinder tractors. At the personal request by John Deere Chairman of the Board, in 1959, Mr. Brock joined the design team at the John Deere Tractor Works in Waterloo, Iowa. Brock was put in charge of the design group for the Deere 4020 tractor, which has influenced tractor design ever since.

With some of the SOS test engineers fired from FMC, Brock led the team in the development of a power shift transmission. The model 4020 was introduced in 1963 and featured the first successful full power shift transmission, along with many other improvements. The John Deere 4020 remained in the Deere lineup until 1972 and many are still earning their keep on farms today. History has shown that the new generation of tractors introduced in 1963 were very successful and probably the basis for putting John Deere in the leadership position they have in the tractor business today.



**Figure 3 - John Deere 4020**

Harold Brock eventually became the Director of Tractor Research and later the first Worldwide Manager of Product Engineering at John Deere, retiring in 1980. In his 50+ year career at both Ford and Deere, he was instrumental in the design of two of the most iconic tractors of their time, the Ford 9N and the JD 4020.

He continued to work as a consultant and assisted in a joint effort between Deere and Yanmar. Harold Brock was a past president of the prestigious Society of Automotive Engineers (SAE) and founder of the Mississippi Valley Section of SAE. He was also a member and Fellow of the American Society of Agricultural and Biological Engineers (ASABE). Harold Brock met or worked with famous men such as Henry Ford, Thomas Edison, George Washington Carver, Harvey Firestone, Luther Burbank, Harry Ferguson, Lee Iacocca, Edsel Ford, and Henry Ford II.

People who actually spoke with Harold Brock recall him as "amazingly accessible" and "humble," while generous with his time and genuine in his interest for others. Quoting Harold Brock in his twilight years "I'm just happy to give credit to all my people in both ag and automotive group that helped me accomplish what I accomplished. It didn't come by me alone."