

FORD'S WAY

“BRAKE SHOE AND LINING PRODUCTION”

A Historical View of Model A/AA Production Practices 1928-1931

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This is the seventh of a series of articles which were published in Ford Motor Companies “Ford News” which was a series of publications that came out twice a month on about the 1st and the 15th of each month through March 1931. Starting with the April 1931 edition, the Ford News was published once every month thereafter. Issues were sent to Ford dealers throughout the world and could be made available for a subscription price of fifty cents a year or about \$0.02 for each copy and \$0.04 starting with the April 1931 issue. In addition to this, special binders to store copies of the Ford News were offered and could have been had for \$1.25 each.

The following information came from the May 15th and the November 1st 1928 issues of Ford News. Other information came from Know The Ford by Murray Fahnestock and Part Releases provided by The Henry Ford---Benson Ford Research Center, Ford Service Bulletins (FSB) and Ford Service Letters.

The dates contained in this article pertain to the date for which a change was made in the Ford Engineering Department and/or as reported in the Ford Service Letters and Bulletins and not necessarily the actual production date when the change occurred on the assembly line. Please refer to the MARC/MAFCA Restoration Guidelines and Judging Standards for those dates of production.

SERVICE BRAKE SHOE ASSEMBLY

The A-2019 Brake Shoe Assembly is composed of sixteen (16) parts. One (1) A-2020: Brake Shoe; one (1) A-2021: Brake Shoe Lining; four (4) A-2022: Brake Shoe Reinforcement Lugs; and ten (10) A-22997: 9/64 x 5/16 Flat Head Countersunk Tubular (Brass) Rivets (Long) to hold the lining in place. Eight brake shoe assemblies were required for each Model A that rolled off the assembly line.

The Model A and Model AA brake shoe was made through the pressed steel process at the Ford Motor Company as were the brake shoe reinforcement lugs which were mere steel stampings. (These same steel "lugs" can be found on the front of the 1928-1929 front fenders for which attaches to the frame with a bolt, nut and lock washer). Once the brake shoe was formed and finished, it was then sent to the welding department to complete the assembly.

Contained in the May 15, 1928 issue of Ford News was an article explaining the operation in welding the A-2022: Brake Shoe Reinforcement Lugs on to the A-2020: Brake Shoe. The photo in this article clearly shows that the individual lugs were "square" before the "final finish" as seen on many brake shoe assemblies (**Fig. 1**) which have part of the original squared lug ground off.

There was also another type of reinforcement lug which was attached to the brake shoe. This was a round washer type lug (**Fig. 1**).

It is interesting to note here that according to the part releases associated with the A-2022: Brake Shoe Reinforcement Lug, on April 25, 1928, Part Release Number 8425, the lug was "Redesigned", from what to what it did not say. However on December 13, 1928, Part Release Number 11331 tells us that the lug was "*Changed from 3/4 inch diameter (indicating the diameter of the washer type lug) to 7/8 inch square (indicating the square type lug)*". That being the case, the assemblies started out with square lugs, changing to round lugs, and then went back to the square lugs. I wonder if any front fenders exist with the "round" type of lugs as I have never seen any?



Fig. 1

Ford News went on to say: *“An automatic projection welding machine for welding reinforcement lugs on brake shoes is the latest development perfected by the welding department at the Fordson plant”.*

“By means of this machine, which has recently been placed in operation in the brake shoe department, the operator is relieved of placing the lugs in position by hand. They are loaded automatically from the (brass) magazine, which kept it free from the attraction of the magnets thus not allowing the lugs to jam in the grooves, and are set in position for the weld through the use of a magnet on the upper jaw and a locating fixture on the lower”.

“The operators hand is protected from the possibility of getting caught in the machine. Besides this factor of safety, the machine makes it possible for him to turn out work much more rapidly. Under the old system, the average number of brake shoes one man could handle per hour in this operation was 200. That was when he loaded the lugs by hand”.

“This has now been more than doubled; 450 an hour is the regular number welded. That means 900 welding operations, owing to the fact that each end of the brake shoe has to be welded. Each end requires two lugs, one on either side, a total of four lugs per shoe or eighteen hundred every hour. Since each lug has four projection points, these 1,800 lugs require 7,200 projection welds during the hour”.

“Lugs are welded on brake shoes to reinforce the ends, where holes are bored. Under the old system, the operator inserted the lugs in position, placed one end of the brake shoe between them, and completed the weld. Then he removed the shoe, inserted two new lugs, set the other end of the shoe between them, and completed the weld”.

“The new machine feeds lugs into proper position along miniature tracks or grooves, so arranged that new lugs do not take position until the previous operation has been completed. They are held in position by magnets, and the position of the brake shoe between them is controlled by the machine. The shoe can be fitted readily by the operator almost without watching.”

Once the completed Model A and Model AA brake shoes were assembled, they were then conveyed to the plating department where the shoes were plated at a rate of 1,976 every 33 minutes.

This process was explained in the November 1, 1928 issue of Ford News: *“The plating of brake shoes in a cadmium solution prevents them from rusting. Rust is a great destroyer of iron and steel, costing many millions of dollars in repairs and upkeep. The plating of brake shoes with cadmium is probably three or four times as effective as zinc, which until recently was considered the best means of preventing rust”.*

“The operation takes place in a tank 40 feet long, 6 feet wide and 4-1/2 feet deep, somewhat resembling an irrigation flume. The tank contains 6,000 gallons of cadmium solution, through which the brake shoes must pass. The passage is effected by the automatic conveyor referred to”.

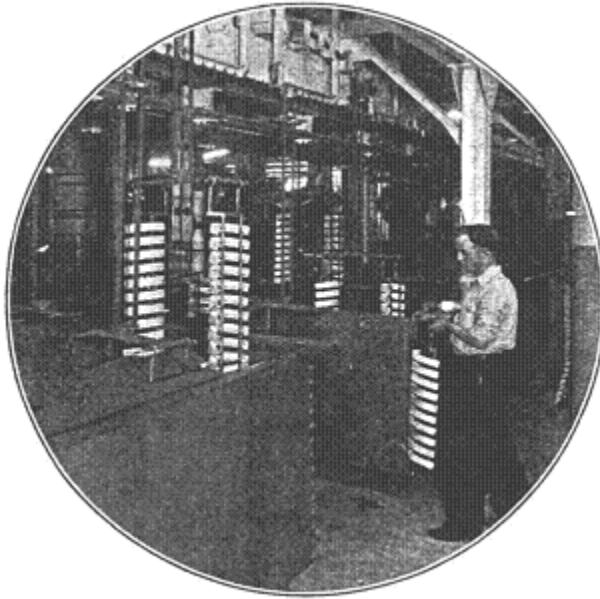


Fig. 2

“Suspended from the overhead track are seventy-six narrow rods, or hangers, each of which supports two racks on which the brake shoes are arranged. The racks will hold thirteen brake shoes each, so that so that when all the hangers are filled to capacity, a total of 1,976 brake shoes can be sent through the tank and plated at one time (Fig. 2)”.

“Slightly more than half an hour is required for the complete journey through the tank or ‘revolution’. Before entering the main tank, the materials are cleaned in muriatic acid. Then they are washed in a cleansing tank filled with a solution of tri-sodium phosphate and soda ash. After this bath, the shoes are rinsed in a second tank which holds clear water. Then they are ready to start on their journey”.

“As they pass slowly along the tank, the hangers dip the shoes in, time their period of bathing, hoist them out, re-dip them, and finally lift them out at the end of the cycle, right at the place for which they started. Simple to operate, it has enabled the department to increase its production ten times over that when the old hand methods were used”.

“Working at capacity it is possible in this compact apparatus to plate enough stock for 10,000 Model A cars in a day. The building is kept free from all fumes from the acid as large suction tubes carry off the fumes.”

Once the cadmium plated brake shoes were finished being plated, they were then sent on to be completed by attaching the brake lining to the brake shoe with brass tubular rivets. Then the ends of the lining were *“tapered on the outside at the ends”* by grinding to insure accuracy and fit in the brake drum.

In viewing a number of original brake shoes, it was discovered that the finish on most brake shoes were unfinished. However there were also a number of cadmium, black enamel and the combination of cadmium and black enamel brake shoes in the bunch.

EMERGENCY BRAKE BAND ASSEMBLY

After the Model A/AA's introduction on December 2, 1927, officials from Washington D.C. indicated to the Ford Motor Company that they were going to refuse to license the new Ford unless they were to be equipped with two sets of independently operated brakes as it did not meet with Washington's traffic rules as it was. Once the State of Pennsylvania heard of the ruling, they followed suit. On January 9, 1928, it was announced by the New York Times by the Ford Motor Company *"that the new Ford car models, when delivered, would be equipped with two independently operated braking systems. The Ford cars now on display are not intended for delivery being for exhibition purposes and not for general street use"*. The same ruling also existed in Germany and France.

There were two known styles of A-2609: Emergency Brake Band and Lining Assemblies. This part became a "New number, new part, adopted" on March 19, 1928 under Part Release Number 7725 (Supp. #5) and was of spring steel construction. However it is not immediately known as to the exact day that the new brake system actually took effect in the production period.

The first style had twenty-five parts associated with it. Each band had one (1) A-2610 (-A1): Emergency Brake Band Assembly; two (2) A-2613-14: Emergency Brake Band End Fittings, R.H. & L.H. (forged) (**Fig. 3**); two (2) A-2617: Emergency Brake Band Spring Connections plus four (4) rivets to hold them in place; one (1) A-2620: Emergency Brake (Band) Lining; and fifteen (15) A-xxxx rivets to hold the lining in place.

The two end fittings, A-2613-14, were about 4-1/4 to 4-3/8 inches in length and were "welded" to A-2610 to make up the assembly.



Fig. 3

On July 7, 1928 it was "specified" that A-2610 was to be painted. A few days later on July 19, 1928, A-2614 (L.H.), was redesigned. On March 12, 1929, the "Paint" designation was removed from A-2610.

By April 29, 1929, Part Release Number 12813, the suffix "A1" was added to the symbol number, A-2610-A1, and was "Obsolete and replaced by A-2610-A2". Thus the emergency brake band ear or so-called lug was changed from a forging to a reinforced pressed steel part. This was reported to the dealers in the Indianapolis Ford Service Letter of October 18, 1929. However the A-2610-A1 band may have continued in production with some minor changes thus becoming "Obsolete. (and) No longer necessary" on September 19, 1929.

The second style, had twenty-six parts associated with it. Each band had one (1) A-2610-A2: Emergency Brake Band Assembly; one (1) A-2615 (RH) and one (1) A-2616 (LH): Emergency Brake Band Ears (**Fig. 4**); two (2) A-2617: Emergency Brake Band Spring Connections plus four (4) rivets to hold them in place; two (2) A-2618: Emergency Brake Band Bar Reinforcing Plates (**Fig. 4**); one (1) A-2620: Emergency Brake (Band) Lining; and fifteen (15) A-xxxx rivets to hold the lining in place.



Fig. 4

On August 12, 1929, it was "Specified that the lugs (A-2615-16 and A-2618) may be cold riveted or welded to the band instead of welded only".

According to the October 18, 1929 Ford Service Letter-Indianapolis, this style was developed to provide a better and fuller contact of the brake shoe lug and the brake plate stop. The redesigning of the emergency brake band was mainly due to its wedging between the stop on the emergency carrier plate and the brake drum resulting in the locking up of the brake itself which might have been attributed to the driver starting the car in low gear without releasing the emergency brake. Abuse of this kind soon distorts and bends the brake carrier plate stop, thus permitting the brake shoe to wedge itself against the drum.

The Engineering Department then changed the angle of the brake shoe lug bearing against the stop, making it radial instead of parallel with the brake band assembly.

SERVICE AND EMERGENCY BRAKE SHOE LININGS

The A-2021: (Service) Brake Shoe Linings, according to Murray Fahnestock's *The New Ford*, were 1-1/2 inches wide, 3/16 inches thick and 14 inches long. The A-2620: Emergency Brake (Band) Linings, were 1 inch wide, 3/16 inches thick and 28-3/4 inches long.

Fahnestock indicated that the linings were made of asbestos and a special zinc alloy wire, which eliminated one of the chief causes of scoring. This zinc alloy wire was twisted into the asbestos yarn of which the lining is woven. The zinc alloy wire coats the tiny steel particles, acting as an anti-flux, which prevents fusion. The steel specks remain specks and are harmless. The zinc alloy wire coats the drum surface and fills the pores thus smoothing and polishing even a new brake drum.

In relation to the A-2021: (Service) Brake Shoe Lining, the thickness of said lining started out at being 0.170/0.180. On November 10, 1927 the thickness was changed to 0.172/0.177.

It was "specified" on December 28, 1927, Part Release Number 6078, that the "name FORD in script and trade mark be printed on unground side about 12 inches apart" on the stock coils. This was changed to "6 inches" on January 26, 1928, Part Release Number 6820 (Fig. 5). The trademark was a circle with US in the center.



Fig. 5

On June 11, 1928 the thickness once again changed to 0.172/0.182 where it remained through production.

On January 31, 1930 the counter bore in the lining for rivet heads went from 25/64 to 21/64, to allow for a change in rivets (A-22980: SIZE UNKNOWN to A-22997: 9/64 x 5/16 Flat Head Countersunk Tubular Rivet).

The February 5, 1930 Ford Service Letter-Indianapolis indicated that "We are using several types of woven (Fig. 5) and semi-moulded braking linings (rubber) (Fig. 6), which have been approved by the Engineering Department of the Ford Motor Company. About 50% of our present production is a semi-moulded lining (rubber), marked T.R.C. (Fig. 6). With these linings, it is difficult to score the brake drums and it is recommended that these linings be used on cars that demand exceptional braking performance, such as Taxi-cabs or Model A commercial units".

T. R. C. stood for the Thermoid Rubber Company in Trenton, New Jersey who were the makers of interwoven molded rubber based automotive brake linings.



Fig. 6

The use of the rubber semi-moulded brake linings was also confirmed on March 29, 1930, Part Release Number 15979, that the *“thickness be 0.162-0.172 for rubber composition linings and thickness for the woven lining remain the same (0.172-0.182)”*.

By July 1, 1930 and according to the Ford Service Letter-Indianapolis, K. R. Wilson of Buffalo, New York, had just released equipment for re-lining Model A and AA brake shoes. This included, KRW-A-374: Brake and Clutch Riveting Machine for which could be attached to complete the set-up, KRW-A-383: Brake Shoe Grinder and KRW-A-374-B: Brake Lining Drill and Countersinker. Ford, then, was able to supply brake linings drilled and counter-sunk and rivets to all dealers who acquired the machine.

DO YOU HAVE A COPY OF THE K R WILSON 1931-32 CATALOG? IF SO, AND IF THERE IS ROOM IN THIS ARTICLE TO SHOW THE MIDDLE UNIT ON PAGE 69, PLEASE DO SO, IF NOT, THAT IS OK TO.

On November 17, 1930, the service brake lining with “woven asbestos with zinc wire” became part number A-2021-A1, and the service brake lining with “rubber composition” became part number A-2021-A2.

Ford was picky on his assembling of the brake shoe linings. In the November 26, 1930 Ford Service Letter- Indianapolis (which was also stated in the November FSB), it was reported that *“When assembling “A” or “AA” Brake Shoe Linings to Shoes, it is imperative that the side of the lining having the Trade Mark stamped on it be placed down, or next to the shoe. This places the ground side of the lining next to the drum”*.

In relation to the A-2620: Emergency Brake Band Lining and according to the part release, it became a "New number, new part and adopted" on March 19, 1928, Part Release Number 7725 (Supplement # 5). By April 11, 1928, the number of holes for riveting the lining onto the band was changed from 13 to 15. This indication of a hole change in the lining was not indicated on the part release of the band itself.

It was noted in the part releases that since August, 1929, approximately half of the production linings were woven asbestos with zinc wire and the other half was of the rubber composition linings for which all used rivets for attachment to the band.

On January 31, 1930 the counter bore in the lining for rivet heads went from 25/64 to 21/64, to allow for a change in rivets (A-22980: SIZE UNKNOWN to A-22997: 9/64 x 5/16 Flat Head Countersunk Tubular Rivet).

On March 29, 1930, the "Ford" script and manufactures trade mark was added.

On November 24, 1930, Part Release Number 18201 #1, the emergency brake lining with "woven asbestos with zinc wire (including all holes for lining rivets)" became part number A-2620-A1, and the emergency brake lining with "rubber composition (including all holes for lining rivets)" became part number A-2620-A2. Included in this part release were A-2620-B1R "woven asbestos with zinc wire (without holes)", and A-2620-B2R "rubber composition (without holes)".

On January 16, 1931, A-2620-B1R was "Obsolete", however the "A1" symbol continued as "covering linings without holes" (woven asbestos) and A-2620-B2R was also "Obsolete" and the "A2" symbol continued as "covering lining without holes" (rubber composition).

The March 10, 1931 Ford Service Letter-Indianapolis specified that emergency brake shoe linings were to be supplied to dealerships for service: *"Due to the irregular spacing of rivet holes in some brake shoes (is this saying that some emergency brake shoes have "regular" spaced rivet holes?), linings will be supplied as follows for service: A-2620-A Emergency Brake Band Lining-- all holes drilled; A-2620-B Emergency Brake Band Lining—adopted for use on brake shoes having holes irregularly spaced will be without holes, and it will be necessary...to drill and counterbore these holes, locating same from the holes in the brake bands"*.

On May 2, 1931, Part Release Number 19659, the zinc wire that was used in the construction of the Emergency Brake Band Lining was changed to brass in both the "woven asbestos" and "rubber" type linings.

By May 26, 1931, Ford issued to it's dealers from Indianapolis another update on the "A" Emergency Brake Band Linings. The update went on to say *"The paractice of supplying linings for "A" emergency brakes with holes for service has been abandoned (A-2620-A), due to the large number of (emergency) brake bands in use with the rivet holes spaced not standard; therefore, linings 0.162" to 0.172" thick "without holes" (A-2620-B) only will be supplied for service to "A" emergency brakes"*. This, as described above, caused the part numbers to change thus making A-2610-A1: Emergency Brake Band Lining "Woven Asbestos" without holes; and A-2610-A2: Emergency Brake Band Lining "Rubber" without holes.

After the attachment of the lining to the service and emergency brake bands, the completed assemblies were then sent to the various assembly plants to be assembled onto the Model A and Model AA Ford car and truck.

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