REAR AXLE





Fig. 1

The Construction & Handling

The rear axle is semi-floating and the hypoid bevel gear is used for slowing down the speed. The engine power is transmitted through the transmission to the propeller shaft, then to the drive pinion and finally drives the left and right rear axle with the differential gear which is housed in the axle housing. The axle housing is made out of the pressed steel plate in the form of Banjo and is constructionally strong enough against the torsion or the bending for its light weight with its rear cover being welded.

The gear carrier is made out of light and strong alloy of aluminum and the differential gear ass'y is so constructed as to make easy dismounting and the adjustment of each gear carrier. The rear axle shaft is materially made out of molybdenum chrome steel of highly strength, and the spline is of the involute gear type.

Inside the housing, the drive pinion drives the bevel gear which is closely connected with the differential gear case. The each two pinions and side gears are fixed in this case and locked each other. The pinion locks with the pinion shaft which is supported by the gear case, while the side gear, which is so supported as to function freely inside the gear case, is connected with the spline at the top end of rear axle shaft.

Thus the construction of differential gear conbined with these gears has the function of controlling the difference of revolution of the rear wheels in case of turning to the various directions. The pinion as it stays on the pinion shaft drive equally the side gear on left and right and drives at equal speed the rear axle on the straight line. In case of turning or meeting at the resistance of some obstacles on the ground the pinion revolves itself on the pinion shaft and drives differentially the side gear, as well as the rear axle show the revolution of left and right wheels differs.

The external side of axle shaft which locks with the side gear, is inclined and fixed to axle housing with the brake disc.

The shaft is supported by the taper roller bearing to the axle tube with the brake disc fixed by the four bolts together with the adjusting shim.

It is not necessary to check the lubrication to the bearing, but need to feed the new wheel bearing grease in proper quantity when disassembled. The proper lubrication to the gear housing is also necessary, otherwise it would shorten the durability of the gear to cause the trouble.

The following points must be taken into consideration.

- Nominated Hypoid gear oil No. MP90 must be used. (Temperature over 32°C SAE. MP140)
- II. It is prohibited to use any other kinds of gear oil or any oil of different viscocity. The same brand must always be selected.

The standard capacity of oil is about 0.9. The method of feeding oil should be done by taking off the feeler plug at the rear cover of the housing and fill in full up to the feeding hole. The brake system would not work if overfeed the oil by causing it to flow out of the bath end of the rear axle housing into brake drum.

Dismounting & Disassembling of Differential Gear Carrier

- 1) Take off and drain out the gear oil.
- 2) At the time of dismounting the gear carrier, pull out the both left and right axle shaft or pull out for at least 4 inches.
- 3) Take off the joint flange from the side of propeller shaft.
- 4) Pull off the nuts of the housing and dismount forward the carrier ass'y.
- 5) Take off the side bearing cap of carrier and pry with a lever the differential gear case and the bearing.
- 6) Dismount the differential side bearing. As illustrated in Fig. 2 with the aid of side bearing puller, pull out the bearing. The puller, pull out the bearing. The puller should be handled with care in catching the hedge of bearing inner race which is hard to hook. Both the left and right bearing should be arranged separately.
- 7) Dismount the differential drive gear, by loosening the 8 vixing screws on the differential gear case, and spreading out the lock washer. Loosen them in a diagonal line considering to keep from the gear bending.



Fig. 2 Using of Side Bearing Puller

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- 8) Take out the differential pinion as well as the side gear. The pinion mate shaft should first be pulled out by striking out the pinion mate shaft locking pin which is fixed on the differential case from left side (from the side of ring gear fixed) to the right before pulling out the pinion, side gear and the thrust washer. The gear as well as the thrust washer should be arranged separately as left and right, front and rear.
- 9) After taking the nut of the carrier, pull out the companion flange. The drive pinion flange wrench should be employed, setting

its four points in the holes of flange to keep it from moving, take off the nuts with the box wrench.

10) Take out the drive pinion of gear carrier by striking out lightly to the backwards the front end (at the side of companion flange) of drive pinion with the drift of soft metal. Thus, the pinion would be taken out together with the inner race of rear bearing and roller, distance piece, and the adjusting shim and the oil seal, outer race and pinion of front and rear bearing as well as the pinion adjusting shim left in the carroer.



Fig. 3 Differential Gear Carrier

- 11) Pull out the rear bearing inner race of the drive pinion. The drive pinion rear bearing inner race replacer and the adaptor should be employed in this case. The adaptor in the round from is for fixing and the other for taking off. It is easy to handle with the vice fixing one end of replacer.
- 12) Taking out the rear bearing outer race of gear carrier.

The drive pinion bearing outer race replacer should be employed in this case. In other upon the stud so as to make the screw at the center of carrier, and set the adaptor at the lower trim of the race.

Supporting the tommy bar and screw up till the corn closely touches the adaptor, then screw the wing nut to take out the rear outer race.



Tool No. DT4782, DT4631 & DT4689 Fig. 4 Pull Out the Bearing Race



13) To pull out the front bearing outer race from the gear carrier, set the tool body pull it out with adaptor in the way of rear race.



Fig. 5 Drive Pinion Front and Rear Bearing Outer Race Replace



Fig. 6 Inner Race Replacer

Inspection & Repairing of Disassembled Parts

Every parts after they are disassembled should be cleaned and cleaned by the compressed air before making an inspection and adjustment.

- 1) Each bearing should be inspected in every unit of ass'y in regard with the defect and defacement before deciding to re-used them.
- 2) Every gear should be inspected as to the locking condition defacement or any defects on the surface to see if they can be reused. In case of insufficient stardard backlash, deformation or found, replacement is necessary.

Specially the drive pinion and drive gear should be replaced in a set whenever the locking condition gets worse and the defacement is already in progress, because it would cause the noise in later operation and be difficult to adjust even with proper adjustment is made.

The perfect driving condition at the surface of drive pinion gear should be about from 2/3 mm to 3/4 mm in unloaded driving while the gear surface should start to touch from tip to full surface in an ordinary loaded driving.

The inspection of this condition can be made as it is.

If it is hard to inspect them as it is, do otherwise by cleaning the both with the rugs before disassembling and paint thinly and evenly with the mixed with thin oil on the gear surface (drive side) then turn the pinion with hand to print the trace of it on the gear. Which shows the situations of considerably worn out gear.

In case of unloaded test, it is perfect that the gears contact for about three quarter at the center of 1/4 of whole gear length from tooth (interior tip end of the gear) on the pitch line.

3) Lock the side gear with pinion together with respective thrust in the gear case.

In case of the backlash over 0.2 mm and the clearance between the side gear and thrust washer exceeds 0.5 mm, replace the thrust washer.

The else worn out parts should also be replaced.

The contact when ring gear is too close to pinion center in case of backlash should be adjusted closely or it gives much noise.

4) Put the drive gear (ring gear) on the buoy block as it is fixed in the differential gear case, and measure with the dial indicator. Revolve the drive gear to turn around the differential gear case as the bearing do not move on the buoy block.

Measure the shake at the rear side of gear by the scale and the shake should be within 0.5 mm. In mounting the gear, clean well the fitting face and rear face (measured face) of it and fix correctly, then there should not be any shaking.

ASSEMBLING, ADJUSTMENT

Assembling Differential Gear

1) Assemble the pinion and side gear in the differential case. Every parts should be cleaned and oiled with new gear oil, then the pinion mate side gear and the thrust washer should be assembled by the mentioned in-spection and selection before pushing in the

pinion mate to shaft. Inspection should be made again in the clearance of between the washer or the backlash. Adjustment must be made in case any abnormal, is found.

Strike in the pinion shaft locking pin from the right side of the case (opposite side of drive gear) and must be fixed by setting well the striking hole of it after putting it to the required piston so as the pin should not loosen.

2) Fix the drive gear (ring gear) with the differential case.

The drive gear as well as the drive pinion should be well inspected or they must be replaced as a set whenever the replacement is required. Otherwise, they would not properly lock after assembling is completed. In mounting in the case, the fitting surface must specially be cleaned and fixed with 8 Nos. screws as well as lock washer. Bend the washer with sureness after the drive gear shake is adjusted. In tightening up the screw, it should be set and supported by vice or any other setting tools so as not to damage it and nearow up in a diagonal line with a wrench fit

screw up in a diagonal line with a wrench fit correctly with the head of the screws. The standard screwing torque for this is 35 ft/lbs. to 40 ft/lbs. Screw in for sure, striking lightly the head of screw by one quarter and pund hammer.

 Mount the side bearing in the differential case.

Press in the both side of the bearing by using the drift.

It is important in this case to assemble by putting the side bearing adjusting shim to give the bearing a proper preload in fixing with the carrier.



1.	Ass'y-carrier, gear	10.	Washer-thrust, pinion mate	19.	Ass'y-bearing, drive pinion, rear
2.	Stud-differential	11.	Shaft-pinion mate	20.	Spacer-drive pinion bearing
3.	Nut	12.	Pin-lock, pinion shaft	21.	Washer-adjusting, drive
4.	Nut	13.	Set-gear, hypoid	22.	Ass'y-flange, companion
5.	Washer-plain	14.	Bolt-drive gear	23.	Seal-oil, drive pinion
6.	Case-differential gear	15.	Strap-lock, bolt	24.	Ass'y-flange, companion
7.	Gear-side	16.	Block-thrust	25.	Washer-plain
8.	Washer-thrust, side gear	17.	Ass'y-bearing, side	26.	Nut-drive pinion
9.	Mate-pinion	18.	Shim-adjusting, drive gear		

Fig. 7 Carrier & Gear

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Assembling & Adjustment by Gear Carrier Ass'y

It is to decide the assembling & adjustment of gear which is most important in an rear axle ass'y and should be carried in accordance with the exact sample shown by the manufacture. The construction and mechanism must well be comprehended referring to Fig.10 & 12 and the adjustment & repairing exactly according to the condition of practical use based on the adjustment by exact calculation.

(A) The Preparation for Mounting the Drive Pinion in the Gear Carrier

(1) If the drive gear, drive pinion, and bearing are to the reused they are as a result of disassembling and inspection, they should be assembled in order of disassembling at the previous condition of adjusting shim.

In case any item should be replaced or required to reuse even if any item is worn out prepare the various shims as mentioned later because the position of drive pinion to be fixed with carrier must be adjusted by the adjusting shim between the carrier and pinion rear bearing outer race.

(2) There are few numbers with 0 & + or besides set number marked by an electric pen on the tip head surface of drive pinion.



Fig. 8 Adjustment of Pinion Height

They show the manufacturing error in a figure at the unit of 0.001 in. (0.025 mm)

to decide the thickness of adjusting shim for adjustment of standard position (The standard pinion height is 61.0 mm from axle center as shown if Fig. 11). If the figure is difficult to discriminate due to the corrosion, scrape off the oxidize substance on the surface by a some what narrow grind stone with care not to scrape off even the mark.

Adjust to the direction of an arrow in accordance with the pinion mark.

	Part No.	Thickness	Standard Leaf Nos.	Part No.
	38153 25660	0.75 mm (0.030 in.)	1	38127 04100
Drive	38154 35660	0.25 mm (0.010 in.)	2	38128 04100
adjusting shim	38155 25660	0.125 mm (0.005 in.)	2	38129 04100
	38156 25660	0.075 mm (0.003 in.)	2	38130 04100

(3) The thickness of drive pinion adjusting shim are arranged as following.

The use of the adjusting shim will be explained in the following paragraph of adjustment. Supposing the drive gear and the drive pinion were replaced as a new set and the height of drive pinion previously used was right, prepare the shim of thickness which equals to the difference of figures on the new and this pinion. Deduct the previously used shim in case it is plus, increase in case of minus and have the general idea of required thickness of the shim for assembling to prepare.

It is convenient to inspect the condition before disassembling in a way as mentioned later in the measurement of pinion height. Beside the condition of defacement on the carrier, the pinion bearing must be taken into consideration though it will be explained in detail later.

(B) Fixing and Adjustment of Drive Pinion

(1) Drive pinion rear bearing outer lace should be mounted in the carrier.

In this case, after inserting the properly selected adjusting shim as previously mentioned between the carrier and bearing race, mount the outer lace by the special tool of drive pinion front, rear bearing outer race replacer. For adjustment of previously mentioned pinion height, the shim at the rear side of this outer race is increased or decreased, and the race also must be taken off in each time for this adjustment, therefore the tools must be handled properly to avoid such a situation as to make the bearing hole of carrier in an oval. Referring to handling method of tool, set the adaptor ring on the corn to guide the body of tool at the small hole of carrier put the rear outer lace on the corn as bearing surface faces inside at the tip end of screw and put the split adaptor inside race. At the same time, supporting it by the bar, twist up the corn till the adaptor and lace come to the setted position then screw up the wing nut so as the race be housed properly at the setted position.

(2) Mount the front bearing outer lace in the carrier.

For mounting the front outer lace, take off at first the adaptor from the front end of the carrier and fix the tool at the side of stud in opposite side, tighten the screw as to be the center of carrier then mount it by using adaptor as in a way of mounting the rear outer race.

The race is scarcely necessary to be taken off unless damaged.

- (3) Mount the rear bearing inner race and roller to the drive pinion. By using the round adaptor attached to the drive pinion rear bearing inner race replacer which was employed at disassembling, press in the drive pinion. This might as well be done in pressing in by the use of a certain drift.
- (4) Mount the drive pinion in the carrier and adjust by measuring the position. The pinion height must be adjusted as mentioned in the previous paragraph, by mounting temporarily the pinion in the carrier and the bearing be given a

regular pre-load. On the other hand, the bearing of drive pinion should be newly oiled after the pinion is inspected from the inside of the carrier, the inserted end of pinion should be locked with front bearing corn and tightened up by the pinion nut fixing with the companion flange till the regular revolving torque is required. As this is not yet at the final assembling, the bearing spacer (distance piece), bearing adjusting shim and oil seal are not mounted.



Fig. 9



Fig. 10

At the time of inserting the front bearing, as pushing in the inner race by pulling out the drive pinion from the rear side of the carrier. Put the rear side of the carrier downward and set the tool under it, then supporting the end surface of drive pinion, press in the bearing by using the drift.

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The operation would be easier by using the drive pinion front bearing inner lace inserter as shown.



Fig. 11 Use of Drive Pinion Bearing Pre-load Gauge

Tighten up the pinion nut by turning it slowly with hands with the use of pre-load gauge as Fig. 11 to the degree that support the bearing pre-load at 7-10 kg/cm.

When the drive pinion is mounted in the previously mentioned condition, it is necessary to measure the height of rear surface of the pinion whether it is higher or lower than the standard. Make use of the special drive pinion arrangement gauge. The standard height of the pinion is 21 mm from the bottom of the side bearing fixed with the carrier. The fixing position can be measured by setting an arc of circle on both sides of arrangement gauge at the position of side bearing and insert the thickness gauge in the clearance between the tip of gauge bar and the pinion such as to push in by scraping of the carrier in diagonal, otherwise pre-load and the pinion height of the bearing would come out of order and tend to cause an unexpected trouble in future.

(5) The formal adjustment of the drive pinion, bearing and pre-load. After the fixing position of drive pinion is decided as mentioned in the previous paragraph, take off the pinion nut& companion flange to mount again the drive pinion bearing spacer (distance piece) and nut. Tighten up the nut as Fig.11 by using the torque wrench at the regular torque of 100-120 ft/lbs (1400-1680 kg-cm). The pre-load supportedly the bearing in this case is different according to the condition of the bearing adjusting shim inserted. The more of the shim inserted, much the play of pinion to the direction of axle is increased.

The less of the shims inserted, the more the bearing tightened by the previously mentioned nuts and cause it to be burned if left and turned as it is. Therefore, for readjustment of the bearing pre-load in this case, it must be adjusted by increasing or decreasing the number of four kinds of adjusting shim as shown in the following list and measuring with the use of the drive pinion bearing pre-load gauge as Fig. 4 so as to make the revolving torque of pinion at 7-10 kg/cm if there should not by any error in the pinion with the head mark at 0 and the clearance should be sealed at 0.2 mm (0.008 in.) by the feeler guage, thus pinion is regarded as at the correct position because the height of the gauge is made shorter for 0.2 mm than the standard size (21.0 mm). If it is necessary to adjust the pinion height, take off the drive pinion as well as pinion rear bearing outer lace from the carrier to adjust by increasing or decreasing the number of the adjusting shim.



Fig. 12

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In other words, read the mark on the head of the drive pinion, before adjusting by increasing or decreasing the number of device pinion adjusting shim to insert the feeler gauge which is deducted for the number of mark from 0.008 in. in case of minus side added for the number of mark to 0.008 in. in case of plus. For instance, the mark shows 2, adjust the position of drive pinion by deducting the number of shim so as to make the clearance at 0.008 in., 0.002 in., 0.010 in. It is necessary to give the bearing a right pre-load. At the time of pushing the outer lace into the carrier, it must be done in a right way, otherwise.

Remarks: When measuring the height of the pinion head, set the semicircular side portions of the gauge on the side bearing seats; insert a feeler gauge into the clearance between the tip of the gauge center rod and the pinion head, and adjust the pinion.

The gauge rod is made 0.2 mm (8/1000 in.) shorter than the standard measurement (21 mm).

Therefore, adjustment is made by selecting a feeler gauge in accordance with the plus or minus valve marked on the pinion head.

Special when the old bearing is to be used again in assembling, the adjustment should be made at the lower torque than standard in accordanced with the conditions of practical use so as not to give it an over pre-load.

(6) When the former adjustment of pre-load of the bearing is completed as in the previous paragraph, inspect the pinion height again. Unless any thing wrong is found, loosen the pinion nut, take off the flange, insert the new oil seat in the rear of the carrier and formerly fix the flange, washer and pinion nut.

The nut should be tightened up at the standard torque. In case the cotter pin hole fitted, the adjustment should be made not by tightening the nut, but by filling the washer.

(C) Mounting the Differential Gear Ass'y in the Carrier

(1) Mount the complete unit of differential gear in the carrier and fix the bearing cap. There is a engraved mark on the side of cap which should be fitted with mark on the leg of bearing housing when mounting. It is important to note that the fixing part of the cap of each bearing housing is machinerly finished up.

The differential gear case is inserted by the bearing adjusting shim with the side bearing as explained and by housing in the bearing housing of carrier, the bearing must be given the regular pre-load. The screwing torque of the fixing nut of the side bearing cap is at 30-35 ft/lbs. (420-490 kg-cm) and should be equally locked with fixing cotter pin.

So far, only the differential unit is mounted and the drive gear is locked with the drive pinion, therefore, the following adjustment must be made to acquire the regular side bearing preload & the gear backlash.

(2) Adjustment of side bearing pre-load & backlash.

To give the right pre-load on the side bearing of differential gear case and in pressing the bearing in the differential case adjust by inserting inside the bearing adjusting shim of thickness calculated in accordance with the following method of computation.

There is a marked numeral of adjusting basis on the bearing housing of the gear carrier and differential case. The numeral is the manufacturing error in a unit of 1/1000 in. against each standard measurement of A.B.C.D. in Fig.12. To measure the width of the side bearing on left and right, use the standard gauge (20.0 mm thickness) and dial gauge on a flat board. In this case, place the load on the bearing with the aid of weight block for about 2.5 kg to acquire the steady figures.

Calculate the error on minus side against the each standard measurement of 20.0mm on the unit basis of 1/1000 and assume each of them as E & F.

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Take the left side bearing, for example. When the measured width is 19.8 mm, it is -0.2 mm (-0.008 in.) against the standard measurement and the E is, by excluding the minus sign, 0.008 in.

The thickness of the shim is acquired by applying the numerals to the following method of computation.

It may as well be assembled by using the shim of thickness which is in accordance with above method of computation. The left and right bearing must be well pressed in, otherwise the pre-load changes. Measure the backlash of the drive pinion & ring gear as Fig.15 by using the dial indicator to made sure that it is within 0.1 mm-0.2 mm (0.004"-0.008"). If it is much, move to left by taking off the right shim, and a vice versa for adjustment.

The numeral marked by the electric pen on the side of the drive gear shows that of the recommended backlash besides the set number. For example, 6-6 means the backlash of 0.006 in.





Thickness of shim on left side

Left Side $T_1 = A + D - C + 0.007$ in. + E

Example of calculation:

Le

ft	$\mathbf{A}=+1$
	D = +2
	C = +2

E = +0.2 mm (0.008 in.)T1 = A + D - C + 0.007"E = 0.001" + 0.002" -0.002" + 0.007" + 0.008" = 0.016"

Thickness of shim on right side

Right Side $T_2 = B - D + 0.006$ in. + F

Example of calculation:

Right B = +2 D = +3 there fore. F = +0.25 mm (0.010 in.)

 $T_2 = B - D + 0.006"F = 0.002" - 0.003" + 0.006" + 0.010" = 0.015"$



Fig. 14

After the Operation

If it is necessary to use the bearing again at the time of repairing, the thickness of each shim of left& right must be reduced for 0.001"-0.003" on the basis of 80% or 60% against standard preload in accordance with the practical condition of use, because over pre-load is given to the bearing with the shim of thickness calculated from above method of computation.

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Fig. 15





Fig. 16 Using the Differential Side Bearing Cap Gauge

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Fig. 17 Differential Gear Carrier Section

Thus the adjustment is completed. By way of precaution, measure the L measurement which is within 198.40-198.55 mm as Fig. 10. If it is insufficient, and an additional shim of 0.002 in. (0.05 mm) in left and right. In this case, the large size of michrometer, as Fig. 10 or special gauge should be employed for scaling.

The shake of the back of drive gear which has been fixed with the carrier should be measured by dial indicator to confirm that it is within 0.1-0.2 mm.

Mounting the Gear Carrier Ass'y on the Rear Axle Housing

Interior of the axle housing should be cleaned well.

The carrier packing should also be replaced with new one.

Mount the gear carrier ass'y without mistaking it upper side with down side and through 10 studs, then fix with the lock washer & nut. The nut must be tightened in a diagonal line so as not to cause the oil leaks.





When it is mounted on the vehicle, feed the gear oil immediately. The oil of the designated hypoid gear oil No. 90 should be feed. Feed the oil till it comes up to the down side of the feeding hole.

When replacing the differential axle shart do not forget the adjust shim between the end of the axle flange and the shaft with the brake disc assembly so as to keep the end play of the axle shafts.

Axle Shaft Removal

Jack up the axle on the blocks. Unscrew and remove the brake drum using a screw driver.

If the brake linings should hold the drum when the hand brake is released, slack off the brake shoe adjuster a few notches.

Take off the fix bolts of the brake disc and remove the axle shaft assembly as shown Fig. 20. Tap out with swing hummer holding the wheel stud bolts with the rear axle shaft. Draw out the shaft and disc assembly by gripping it outside of the brake disc.

Referring to Fig. 20 assemble to the axle tube with the axle shaft with brake disc assembly (Brake disc, Grease catcher packing, Grease catcher, Bearing cage Grease seal, Spacer taper roller bearing, Lock washer and Bearing lock nut). In this case, the shaft must be given a regular end play, which is the end play of direction to the spline of shaft by the thickness of adjusting shims inserted at the time of assembling.



Fig. 19

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Fig. 20

In adjustment for this end play, select the adjusting shims for one side (Left or Right) at the first.

Insert selected shims (standard 1.5 mm) between the axle tube and the shaft assembly fit the end play of axle shaft 0.85-1.10 mm.

Secondary, attach the other side of axle shaft assembly and adjust end play 0.05-0.10 mm by selecting adjust shims.

The Inspection When the Car Stops

(1) Operating the side brake, and setting the revolving of axle shaft, the gear backlash and the defacement of the spline in the housing can be found by inspecting the motion of the propeller shaft as moving it to left and right.

Specially in case of the drive pinion comes out and in, the pinion bearing is worn out or the adjustment is necessary.

- (2) Another inspection should be carried in a way by tacking up one of the wheels and spin it back and froth.
- (3) Holding the tire of the wheels jacked up and spin and move to every direction. When the shock is felt, inspect the degree of tightness and adjust it.
- (4) Inspect and confirm the voume and quality of the oil in the housing.

Inspection in Motion

- In case of giving the high metalic noise when speeding up, the backlash is at the least or too much at the drive gear and the drive pinion.
- (2) Giving any abnormal noise in speeding up or slowing down, the drive pinion bearing is worn out or damaged.
- (3) It is the bearing that gives the constant humming noise at high speed and the gear that makes a periodic noise at low speed. In case there is any damage of the gear, it must be immediately disassembled and repaired because if it is used as it is, the broken gear cause to break the other gear and another and so forth, finally to the big accident.

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BRAKE

GENERAL DATA

Туре	
	Operated by foot
	Operated by hand
Inner dia.	of master cylinder
Inner dia.	of wheel cylinder

Residual pressure of brake oil

Four wheel braking by oil pressure

Mechanical braking for rear wheels

19.05 mm (0.77 in.)

Front wheel Rear wheel 19.05 mm 19.05 mm

0.5-0.8 kg/sq.cm

BRAKE DRUM

Inner dia. of drum (both front & rear) Degree of real circle of drum Amendment limit of dittoed degree Allowable limit of inner dia. of drum 254 mm (10 in.) Less than 0.05 mm (0.002 in.)

0.20 mm (0.008 in.)

 $0.80 \times 2 \text{ mm} (0.032 \text{ in.} \times 2)$

BRAKE SHOE

Lining dimension (both front & rear wheel) Length × Width × Thickness Lining area (per brake shoe)

Adjustment of shoe clearance

Play for pedal

244 mm \times 45 mm \times 4.5 mm

110 sq. cm

Fasten adjusting gear notch completely and them make 12 turnings back

10-14 mm

The brakes on all four wheels are hydraulically operated by foot pedal application, directly coupled to a master cylinder in which the hydraulic pressure of the brake operating fluid is originated. A supply tank cast integrally with the master cylinder provides a reservoir by which the fluid is replenished, and a pipe line consisting of tube, flexible hose and union, inter connected the master cylinder and the wheel cylinders.

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Fig. 1 Components of Front Brake

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The pressure generated in the master cylinder by application with the foot pedal is transmitted with equal and undiminished force to all wheel cylinders simultaneously. This moves the pistons outwards, which in turn expand the brake shoe thus producing automatic equalisation, and efficiency in direct proportion to the effort supplied at the pedal. When the pedal is released the brake shoe springs return the shoes which then return the wheel cylinder pistons, and therefore the fluid back into the pipe lines and master cylinder.

An independent mechanical linkage actuated by a hand brake, mounted drivers seat side (left or right side), operates the rear wheels by mechanical expanders attached to the rear wheel cylinder bodies.

Front Brakes

The front brakes are operated by each one wheel cylinder.

Each wheel cylinder consists of a body containing, spring, spring seats, pistons, piston cups, cylinder cover lock wheel cylinder cover and adjust screw.

The shoes are allowed to slide and centralise during the actual braking operation which distributes the braking force equally over the lining area ensuring high efficiency and even lining wear.

The brake shoes rest on the dimples formed in the back plate and are held in position by one return spring which connecting with the hole of shoes.



Fig. 2

Rear Brakes

The rear brake shoes are not fixed but are allowed to slide and centralise with the same effect as in the front brakes. They are hydraulically operated by wheel cylinder and independent hand brake mechanism.



Fig. 3 Rear Brake



Fig. 4

Hand Brake

The hand brake operates on the rear wheels only and is applied by a pull-up type of lever situated along-side the driver's seat. The cable from the control is attached to the toggle lever connected with the rear brake disc. The hand brake linkage is set when leaving the works and should not require any attention under normal maintenance. Only when a complete overhaul is necessary should the hand brake linkage require resetting.

When this is correct the rear shoes should be locked to the drums, the hand brake control just slightly applied and the wire rope set with the slackness just removed, by means of a nut at the center rod of the equalizer drag link.

Adjusting Brakes

Raise the truck and place stand jacks front and rear so that all four wheels rotate freely.

Disconnect the parking brake cables at the cross shaft lever. This precaution should be taken to eliminate the possibility of brake shoe drag due to mis-adjusted parking brakes.

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- 5. Lever-toggle (L.H.)
- 6. Pin-toggle lever
- 7. Washer-plain, toggle pin
- 8. Spring-lock, clevis pin
- Spring-return, rear brake, upper 9. 10.
- Spring-return, rear brake, lower 11.
- Spring-return, after shoe 12.
- 23. Ass'y-cylinder, rear wheel 24. Ass'y-housing, adjuster

18.

19.

20.

21. Nut

22.



ScrewObleeder

Washer-lock

Ass'y-adjuster

Cap-bleeder screw



Connector-rear wheel cylinder

30.

31.

32.

33.

34.

35.

36.

Spring-retaining, adjuster

Plate-lock, retaining

Seat-spring, anti-rattle

Boot-rubber

Pin-anti-rattle

Spring-anti-rattle

Retainer-anti-rattle



Fig. 6 Rear Brake Adjustment

Remove the adjuster boot and insert a screw driver through adjusting hole and engage the teeth on the wheel.

Turn the adjuster wheel down upward direction until the shoe becomes locked on the brake drum, then turn it up (approximately 12 notches) until the wheel turns lightly.

Master Cylinder

This is consits of an alloy body with a polished, finished bore, and reservoir with cap.

The inner assembly is made of the push rod, stopper plate ring, piston, secondary cap, return spring, let out valve and check valve seat.

The open end of the cylinder is protected by



Fig. 7 Front Brake Adjustment

a rubber boot as shown Fig. 8 disassembling the Brake Master Cylinder.

Disconnect the pressure pipe union from the cylinder and remove the securing bolts, then the master cylinder and fluid reservoir may withdrawn complete from the car. Remove the filler cap and drain out fluid. Pull back the rubber boot and remove the stopper ring with a pair of long-nosed pliers. The push rod has been removed the piston with the secondary cap will be exposed, therefore remove the piston assembly complete.

The assembly can be separated by taking out other small parts. Examine all parts, especially the rubber primary cap, for wear or distortion and replace with new parts where necessary.



Fig. 8 Components of Brake Master Cylinder - 132 -

Bleeding the Hydraulic System

Bleeding is necessary any time a portion of the hydraulic system has been disconnected or if the level of the brake fluid has been allowed to fall so low that air has entered the master cylinder. With all the hydraulic connections secure and the supply tank topped up with the fluid, remove the cap from the bleed valve and fit the bleed tube over the bleed valve, immersing the free end of the tube in a clean jar containing a little brake fluid.

Unscrew the bleed valve cap about threequarters of a turn and then operate the brake pedal with a slow full stroke until the fluid entering the jar is completely free of air bubbles. Then, during a downstroke of the brake pedal, tighten the bleed screw cap sufficiently to seat, remove bleed tube.

This process must now be repeated for each of the other wheel cylinder.

Always keep a careful check on the supply tank during bleeding since it is most important that a full level is maintained.

Should air reach the master cylinder from the supply tank, the whole of the bleeding operation must be repeated.

After bleeding, top up the supply tank to its correct level of approximately three-quarters full. Never use fluid that has been bleed from a brake system for topping up the supply tank, as this brake fluid may be to some extent treated. Such fluid must be allowed to stand for at least one day before it is used again. This will allow the air bubbles in the fluid time to disperse. Great cleanliness is essential when dealing with any part of the hydraulic system, and especially so where the brake fluid is concerned. Dirty fluid must never be added to the system.



