TECHNICAL MANUAL
OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, GENERAL SUPPORT AND DEPT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS INFORMATION AND SUPPLEMENTAL MAINTENANCE INSTRUCTIONS) FOR

TRUCK, DUMP, 20 TON, 6 X 4, ON-OFF HIGHWAY 71,000 GVW IHC MODEL F-5070 (CCE) (NSN 3805-00-192-7249)

H E A D Q U A R T E R S, D E P A R T M E N T O F T H E A R M Y

12 JUNE 1980

TECHNICAL MANUAL

HEADQUARTERS
DEPARTMENT OF THE ARMY

TM 5-3805-254-14&P-2

WASHINGTON, DC, 12 June 1980

Operator's, Organizational, Direct Support, General Support and Depot Maintenance Manual (Including Repair Parts Information and Supplemental Maintenance Instructions)

TRUCK, DUMP, 20 TON, 6 x 4, ON-OFF HIGHWAY 71,000 GVW IHC MODEL F-5070 (CCE) (3805-00-192-7249)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Form), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Tank-Automotive Materiel Readiness Command, ATTN: DRSTA-MBS, Warren, Michigan 48090. A reply will be furnished direct to you.

NOTE

Refer to TM 5-3805-254-14&P-1 for Dump Truck Operator's Manual, Special Parts Catalogue, Supplemental Operating, Maintenance and Repair Parts Instructions

Credit is hereby given to International Harvester Company for permission to reproduce the following manual procured under Contract No. DSA-700-72-C-9235:

Special Service Manual C-9235

This technical manual is an authentication of the manufacturers' commercial literature and does not conform with the format and content specified in AR 310-3, Military Publications. This technical manual does, however, contain available information that is essential to the operation and maintenance of the equipment.

TRUCK SERVICE MANUAL NO. C-9235

INTERNATIONAL TRUCK MODEL F-5070 PAYSTAR SERIES

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GENERAL

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CLEANING

Clean parts having ground and polished surfaces, such as knuckle pins, knuckle pin sleeves, bearings and spindles, with solvent type cleaners such as emulsion cleaners, or petroleum solvents excluding gasoline. Do not clean these parts in a hot solution tank or with water and alkaline solutions such as sodium hydroxide, orthosilicates or phosphates.

DRYING

Parts should be thoroughly dried immediately after cleaning. Use soft, clean, lintless, absorbent paper towels or wiping rags free of abrasive material, such as lapping compound, metal filings or contaminated oil. Bearings should never be dried by spinning with compressed air.

INSPECTION

It is impossible to overstress the importance of careful and thorough inspection of steering knuckle components prior to reassembly. Thorough visual inspection for indications of wear or stress and the replacement of such parts as are necessary will eliminate costly and avoidable front end difficulties.

1. Inspect the steering knuckle thrust bearing, wheel bearing cones and cups. Replace if rollers or cups are worn, pitted or damaged in any way.
2. If wheel bearing cups are to be-replaced, remove from hubs with a suitable puller. Avoid the use of drift and hammers as they may easily mutilate cup bores.
3. Inspect the steering knuckles and replace if indications of weakness or excessive wear is found.
4. Check wear of the knuckle pins; compare with correct specification.
5. Check king pin bushing wear (see Bushing Installation).

6.Check the tightness of the steering connections such as tie rod arms, steering arm, etc.

CORROSION PREVENTION

Parts that have been cleaned, dried, inspected and are to be immediately reassembled should be coated with light oil to prevent corrosion. Spindles, knuckle pins or sleeves that are to be stored for any length of time should be treated with a good rust preventative and wrapped in oiled paper and boxed to keep dry and clean.

REPAIR OF FORGED PARTS

In deciding whether to repair or scrap a damaged part, always keep in mind that we, as manufacturers, never hesitate to scrap any part which is in any way doubtful.

1. Straightening of bent parts should be done cold. Various components are heat-treated and hot straightening would destroy some of the heat treatment.

2. Axle centers (that are bent no more than 1/2") may be straightened cold; if bent more than 1/2" they should be replaced.

   Bent steering arms or knuckles should be replaced rather than straightened.

FRONT WHEEL ALIGNMENT

The alignment of chassis according to the specifications should prevent mis-adjustment, which can affect tire wear, directional stability and steering wheel alignment. Check alignment at regular intervals and particularly after front suspension has been subjected to extremely heavy service or severe impact loads. Before checking and adjusting alignment, components such as wheel bearings, tie rods, steering gear, shock absorbers and tire inflation should be inspected and corrected where necessary.

The procedure for checking and adjusting alignment should be followed; name} checking king pin inclination, camber, caster and toe-in, in the order named. A slight modification in obtaining the proper caster and toe-in has been made and is outlined.

The caster, camber and toe-in dimensions are for vehicle at design load (frame level). If frame is not level on alignment equipment, the frame angle must be considered. This is especially important when making caster check, for the frame angle must be added to or subtracted from the caster angle to obtain a true setting.

CASTER ANGLE

Caster is the amount in degrees the top of the king pin is inclined toward the front or rear of the truck, as viewed from the side of the truck. The caster angle can range from a positive angle to a negative angle.

Positive caster, Fig. 1, is the tilting of the top of the king pin toward the rear of the truck, while negative, or reverse caster, is the tilting of the top of the king pin toward the front of the truck.

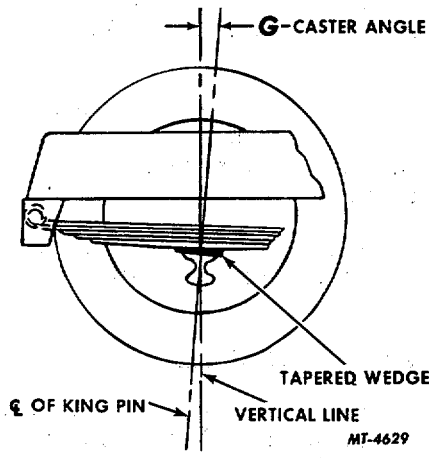

Fig. 1

Positive caster imparts a trailing action to the front wheels, while negative, or reverse caster, causes a leading action. The correct amount of caster helps to keep the front wheels in the straight-ahead position. When in a turn, caster acts as a lever, assisting the driver to return the front wheels to the straight-ahead position.

Caster specifications are based on vehicle design load, which will usually result in a level frame. If the frame is not level when alignment checks are made, this must be considered in determining whether the caster setting is correct.

With the vehicle on a smooth, level surface frame angle should be measured with a bubble protractor placed on the frame rail. See Fig. 2. The degree of tilt from the level frame position is the angle that must be used in determining a correcting caster setting. Positive frame angle is defined as forward tilt (front end down) and negative angle as tilt to rear (front end high).

The measured frame angle should be added or subtracted, as required, from the specified level frame caster setting to obtain the caster that should actually be measured on vehicle.

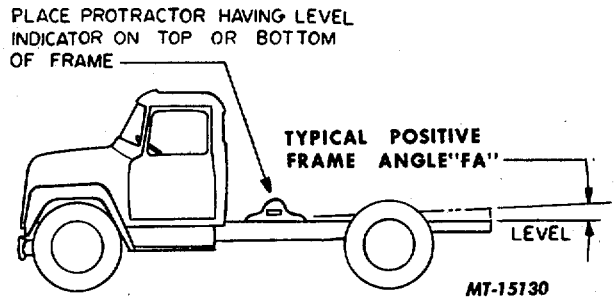

Fig. 2

1. Positive frame angle should be subtracted from specified setting.
2. Negative frame angle should be added to specified setting.

As an example, if the specified caster setting is a positive 10 and it is found that the vehicle has a positive one degree frame angle, then the measured caster should be 0 + 1/20°. This would result in the desired 10 + 1/2° caster angle when the chassis settled to level frame under load.

Possible causes of incorrect caster are sagging springs, bent or twisted axle, or unequally tightened spring U-bolts. In most cases a twisted axle would be the cause if caster varies more than the specified 1/20 between left and right side.

If caster must be corrected, taper shims can be used as required between the springs and axle. Spring U-bolts should be tightened evenly and to specified torque after the addition or removal of shims.

Caster adjustment is made by inserting a wedge between the spring and axle, Fig. 1.

To increase caster, insert the wedge so the thick parts face the rear of the truck (to front for underslung axles).

To decrease caster, place the wedge so that the thick end is toward the front of the truck (to rear for underslung axles).

If an excessively thick wedge is required for a truck that has high mileage, check the contour of the springs and replace springs if necessary. Be sure center bolt drops into I-beam.

The truck will lead to the side which has the most negative caster.

CAMBER ANGLE

Camber is the amount in degrees that the wheel inclines away from the vertical at the top, as viewed from the front of the truck, Fig. 3.

"Positive" camber is an outward tilt or inclination of the wheel at the top.

"Negative" or reverse camber is an inward tilt of the wheel at the top.

The amount of camber, used depends on the amount in degrees the king pin is inclined. An incorrect camber angle causes the side of the tread to wear, resulting in abnormal tire wear.

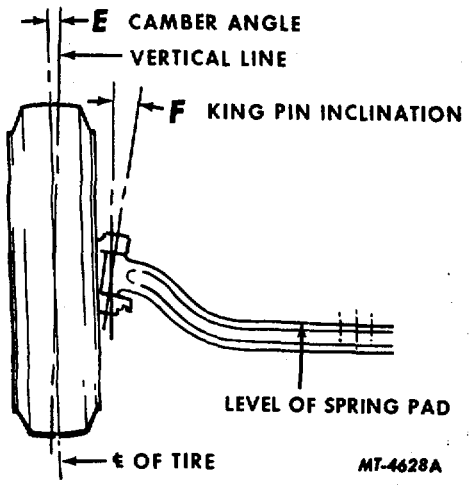

Fig. 3 King Pin Inclination and Camber Angles

Unequal camber in the front wheels will cause the truck to lead to the right-or left. The truck will lead to the side which has the most positive camber.

KING PIN ANGLE (INCLINATION)

King pin inclination (angle) is the amount in degrees that the top of the king pin inclines away from the vertical toward the center of the truck as viewed from the front of the truck, Fig. 3.

King pin inclination working together with the camber angle puts the approximate center of the tire tread in contact with the road. King pin inclination has the effect of reducing steering efforts and improves directional stability in the vehicle.

There is no means of adjusting this angle; therefore, it will not change unless the front axle has been bent. Corrections or changes to this angle are accomplished by replacement of broken, bent or worn parts.

TOE-IN

Toe-in is the amount (in fractions of an inch) that the front wheels are closer together at the front than at the back as viewed from the top of the truck, Fig. 4. With the camber on the front wheels, the left front wheel tries to steer to the left and right front wheel tries to steer to the right. This is due to the wheels wanting to turn in the same direction each wheel leans. To overcome this condition, the wheels are given a certain amount of toe-in.

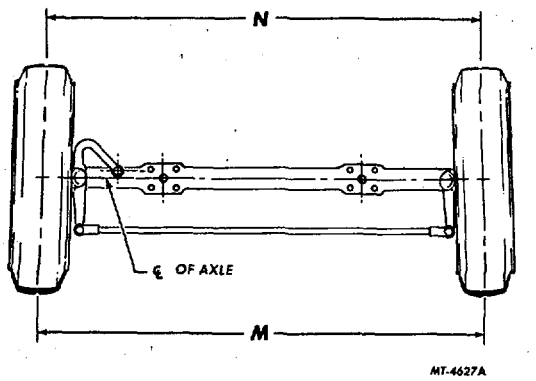

Fig. 4 Toe-In Measurement

Another reason for toe-in and the most familiar, is that when the vehicle is being driven, the forces acting on the front wheels tend to make the wheels toe out.

Incorrect toe-in will result in rapid tire wear. Excessive toe-in will produce a scuffing or "feather-edge" at the inside edge of the tire tread. Toe-out will produce a like wear but at the outside of the tire tread.

When attempting to determine the causes of excessive tire wear, first check king pin inclination, camber and caster and correct, if necessary, in the order named.

No change should be made in toe-in until the other factors of front wheel alignment are known to be within specifications.

Turn the front wheels to the exact straight-ahead position.

When setting toe-in-adjustment, the front suspension must be neutralized; that is, all component parts must be in the same relative position when making the adjustment as they will be in operation. To neutralize the suspension, the vehicle must be rolled forward 12 to 15 feet. By rolling the vehicle forward, all tolerances in the front suspension are taken up and the suspension is then in normal operating position. Neutralizing the front suspension is extremely important, especially if the vehicle has been jacked up in order to scribe the tires; otherwise, the front wheels will not return to the normal operating position due to the tires gripping the floor surface when the vehicle is lowered.

Actual toe-in measurements should be taken at hub height between the two points on the center of the tread at the rear of the tires, Fig. 4.

Mark the point and roll the truck ahead so that the points are in the front at hub height and measure the distance between the same two points on the tire treads.

The difference in the two measurements is the actual toe-in or toe-out.

1. To adjust the toe-in, turn the steeri steering wheel so that the gear is in the mid-position.
2. Loosen the clamping bolts on the tie rod.
3. Turn the tie rod in the direction necessary to bring toe-in within the specified limits.
4. Tighten the clamping bolts on the tie rod.

NOTE: Always recheck toe-in after any change in caster or camber angles or after any alteration in tie rod adjustment.

TURNING ANGLE

Turning angle is the degree of movement from a straight-ahead position of the front wheels to either an extreme right or left position. Two factors of major importance when adjusting the angle are; tire interference with chassis and steering gear travel.

To avoid tire interference or bottoming of the steering gear, adjustable stop screws are located on the steering knuckles.

To adjust the turning angle, loosen the jam nuts and turn the steering knuckle stop screws in. Position support stands under the front axle so that the wheels are off the floor. Turn the wheels to extreme right turn until the steering gear bottoms or contact of the tire to chassis is made. Then back off the steering wheel 1/4 turn or back off the steering wheel until 1/2" to 1" clearance is obtained between the tire and chassis. Be sure to check both front tires for clearance. When the proper clearance is determined, back the wheel stop screw out and tighten the jam nut.

Repeat the same procedure on the left extreme turn also and adjust the left steering knuckle stop screw.

TURNING RADIUS ANGLE (Toe-Out on Turn)

Turning radius angle is measured in degrees and is the amount one front wheel turns sharper than the other on a turn.

When a vehicle is turned either to the right or left, the inner wheel is required to turn in a smaller circle than the outside wheel, Fig. 5.

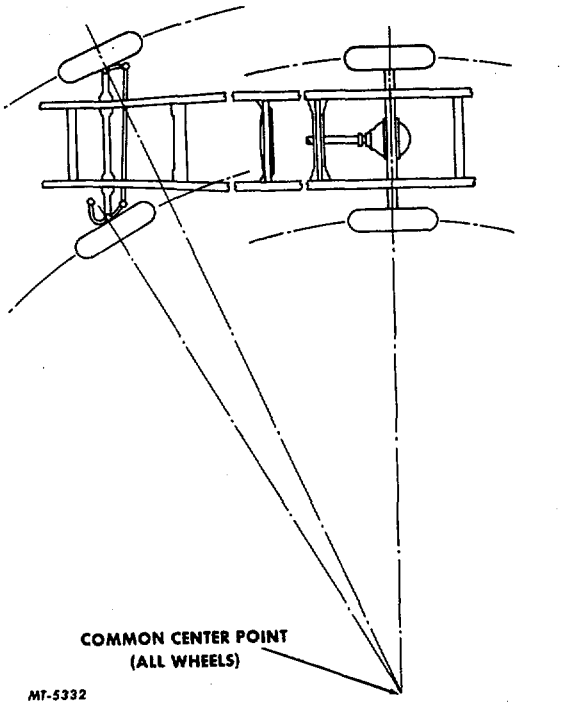

Fig. 5 Inner Wheel Turns in a Smaller Circle Than Outside Wheel

If the inner wheel is not permitted to turn in a smaller circle or greater angle, tire scuffing will result. Therefore, it is necessary for the front wheels to assume a toed-out position during a turn.

Toe-out on turns is accomplished by having the ends-of the steering arms (end at tie rod) closer together than the king pins as shown in Fig. 6. The amount of toe-out depends on the length and angle of the steering arms.

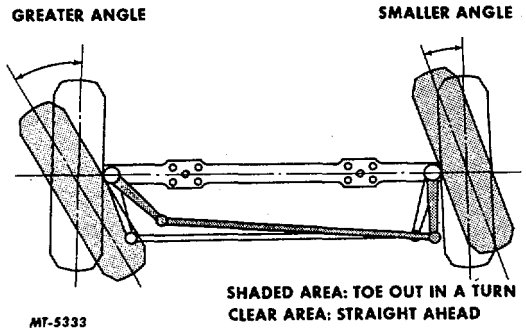

Fig. 6 Inside Wheel Turns at Greater Angle

Even though the toe-in with the wheels in the straight-ahead position may be adjusted correctly, a bent steering arm may cause the toe-out on a turn to be incorrect, causing scuffing of tires.

The turning radius angle is checked using turning radius plates SE-1447-2 or equivalent.

To check the turning radius angle, position the front wheels on the plates and in the straight-ahead position.

After removing the locking pins from each plate, adjust the scale on the edge of the plates so that the pointers read "zero." Turn the wheels to the right until the gauge at the left wheel reads 20°. Then read the angle of the right wheel. The right wheel should then be turned to an angle of 200°. The left wheel should be at the same angle as was the right wheel when the wheels were turned to the left.

STEERING KNUCKLE STOP SCREWS (I-Beam Axles)

Adjustable stop screws in the steering knuckle control the turning angle or limit the movement of the front wheels. This prevents the tires from rubbing against the nearest point on the chassis or the steering gear from bottoming.

STEERING KNUCKLE STOP SCREWS (Driving Front Axles)

There is a stop screw located on each end of the axle housing for the purpose of limiting the amount of the turning angle of the wheels. These screws are not adjusted in accordance with the frame and tire interference as in conventional front axles. Instead, these screws are provided to limit the turning angle of the universal joints in the axles.