SECTION U3 FRONT AXLE AND STEERING

STEERING BOX

Worm-and-nut steering box with 1:22.4 ratio.

REMOVAL

Remove steering box as follows:

Remove instrument panel and disconnect lighting-starting switch and horn pushbutton.

Disconnect throttle linkage.

Detach drag link (1, Fig. 12-14) or remove steering arm (8) using appropriate puller.

Remove attaching cap screws and complete steering box assembly.

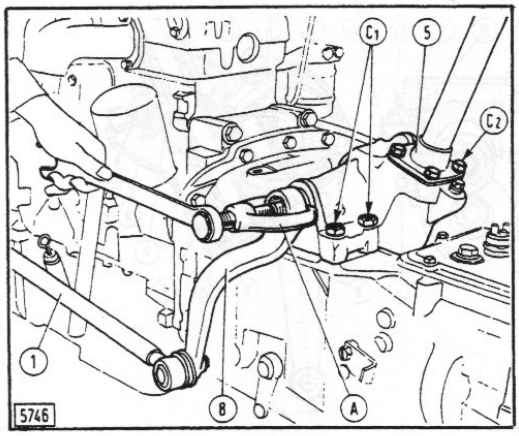


FIG. 12-14 Removing steering arm (8) from steering ring box nut shaft by puller. (C1) Steering box self-locking screws. (C2) Cover. (5) Screws. (1) Drag link. (5) Top cover with steering column.

DISASSEMBLY

Prior to disassembly drain oil by removing one of side cover lower cap screws and threaded plug.

Remove steering wheel and steering shaft key, remove cap screws (C2, Fig. 12-14) and then withdraw the cover (5) with steering column and hand throttle.

Remove cap screws (C3, Fig. 12-17), then withdraw steering box nut shaft (2) and adjuster (V), nut (V1) and side cover (9) as an assembly, using a lead hammer.

Withdraw steering shaft upwards with worm (4) and upper taper roller bearing (6).

Remove lower taper roller bearing (7) by hand.

Remove cup of the lower bearing (7) using appropriate puller (Fig. 12-15) and recover shims.

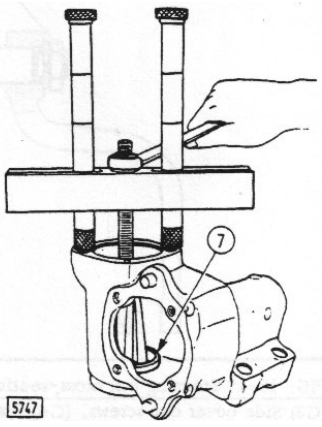


FIG. 12-15 Removing cup of lower tapered roller bearing (7) with puller.

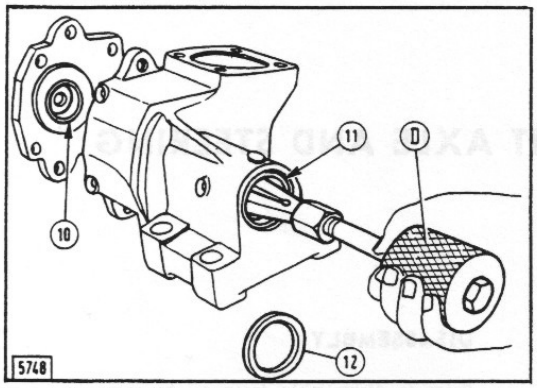


FIG. 12-16 Removing steering box nut shaft bushing (11) by means of puller. (10) Cover bushing. (12) Oil seal.

NOTE. - Inner races of both upper and lower taper roller bearings are machined directly on body of worm screw which, for service, is furnished together with steering shaft, as an assembly.

In case of replacement, remove bushings (10 and 11, Fig. 12-16) from steering box and from side cover by means of appropriate puller (D, Fig. 12-16); notice that bushing (11) is removed after oil seal (12).

INSPECTION

Check worm and nut surfaces for nicks or seizure marks.

Make sure clearance between bushings and nut shaft is within permissible limits of specifications.

Determine that nut has no end play because of worm nut thrust washers (R, Fig. 12-17); if so, replace nut shaft as an assembly.

Try worm screw roller bearings for free running and check oil seal (12, Fig. 12-16) for efficiency and reliability.

Check steering levers and tie-rods for bends and straighten.

ASSEMBLY

Assemble steering box as follows using torques outlined in Specifications. Apply appropriate sealer to all joints.

Insert shim stack (S1, Fig. 12-17) and fit cup of lower taper roller bearing (7) using drive bar.

Fit bushings (11) to steering box and ream to specifications.

Install oil seal (12, Fig. 12-16).

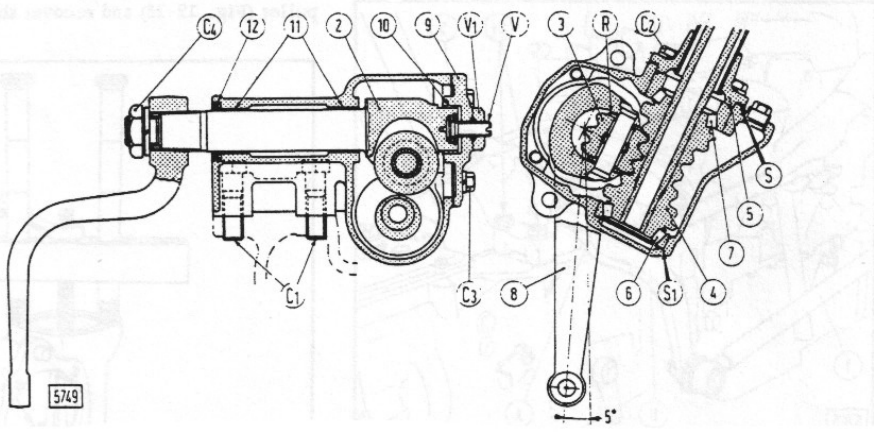


FIG. 12-17 Steering box cross-sections. (C1) Steering box self-locking screws. (C2) Upper cover cap screws. (C3) Side cover cap screws. (C4) Steering arm (8) nut. (R) Nut thrust washers. (S) Worm bearings shims. (S1) Worm-and-nut setting shims. (V) Nut adjusting screw. (V1) Nut screw (V) locknut. (2) Nut shaft. (3) Nut. (4) Worm. (5) Upper cover. (6 & 7 Tapered roller bearings. (8) Steering arm. (9) Side cover. (10 & 11) Bushings. (12) Oil Seals.

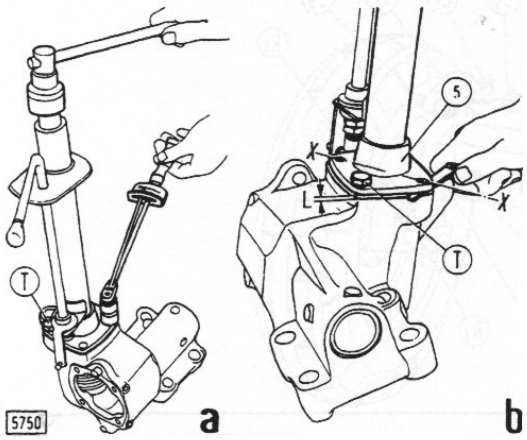


FIG. 12-18 Adjusting steering shaft tapered roller bearings. (a) Tightening cap screws (T) with torque wrench. (b) Measuring clearance (L) between cover (5) and steering box with feeler gauge. (X-X) Clearance measuring axis. (5) Top cover with steering column.

Install steering shaft in steering box and lubricate taper roller bearings.

Install top cover and steering column on steering box using two cap screws with no lock washer.

Gradually cross-tighten cap screws (T, Fig. 12-18) applying torque of 2.2 ft-lb (0.3 kgm) and simultaneously turn steering shaft(a).

Measure clearance between top cover and steering box by taking two readings with a feeler gauge opposed points on the axle X-X (b, Fig. 12-18) and find average reading.

Remove cover (5), insert a shim stack (S, Fig. 12-17), adding 0.004" (0.10 mm) to previous reading. Refit cover and torque cap screws to specifications.

Measure torque required to turn steering shaft, if it is different from 0.05 — 0.1 kgm (0.4 — 0.7 ft-lb), readjust.

To adjust worm-and-nut smear a thin film of lead oxide on nut working surface.

Install steering shaft nut with side cover in steering box. Adjusting screw (V, Fig. 12-19) should be completely backed out.

Secure side cover with two screws (C3).

Determine number of turns steering wheel makes stop to stop.

Find mid-position of steering wheel corresponding to position of steering arm (8) for straightforward motion, as shown in Fig. 12-17.

Tighten adjusting screw (V, Fig. 12-19) to take up play between worm and nut, block with jam nut (V1).

Torque required to make steering shaft turn is 1 — 1.9 ft-lb (0.15 — 0.26 kgm) through initial 30° in both directions, and 0.43 — 0.87 ft-lb (0.06 — 0.12 kgm) in proximity of stop.

Remove complete nut shaft and inspect nut; examine uniformity of contact areas on working surfaces.

To correct, if necessary, vary shim stack (S1, Fig. 12-17) if stack is increased then shims (S), should be equally increased, and vice-versa.

NOTE. - Adjustment may be used at steering box overhauls as a further check of worm-and-nut setting, if parts are reusable. In this case we suggest maintaining original factory shim stack (S1, Fig. 12-17). Alter shim stack only when one or more parts are replaced.

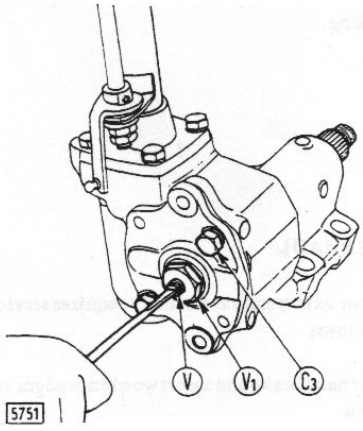


FIG. 12-19 Adjusting worm-and-nut setting. (C3) Side cover cap screws. (V) Adjusting screw. (V1) Adjusting screw (V) nut.

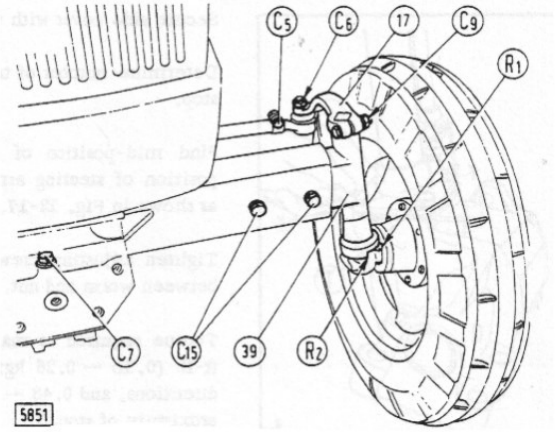


FIG. 12-20 Front axle left end. (C5) Tie-rod set screw nut. (C6) Steering lever (17) ball socket blocking nut. (C7) Trunnion pin set screw. (C9) Steering lever (17) bolt nut. (C15) Beam extension (39) set screw. (R1 and R2) Steering angle adjustable and fixed stops. (17) Steering lever. (39) Beam extension.

FRONT AXLE AND STEERING

Front axle with reversed U shaped section, is centrally pivoted and has telescopic beam extensions which allow a range of tread width adjustments.

By suitably arranging front axle beam extension it is possible to obtain eight different thread width adjustments, ranging from 52 to 80 in. with steps of 4 in.

The min. steering radius is 138 in. (3518 mm) without breaking.

OVERHAUL

If front axle trunnion assembly requires servicing, proceed as follows:

Apply hand brake and insert wooden wedges to block drive wheels.

At one axle end, remove bolt (C9, Fig. 12-20), steering lever (17) from wheel spindle and cap screws (C15).

Place a hydraulic jack under crankcase oil sump and raise front end of tractor to take weight off axle.

Remove front wheel, spindle-beam extension assembly (39, Fig. 12-20).

Remove setscrew (C7, Fig. 12-21) and trunnion pin (20) using sliding-weight puller.

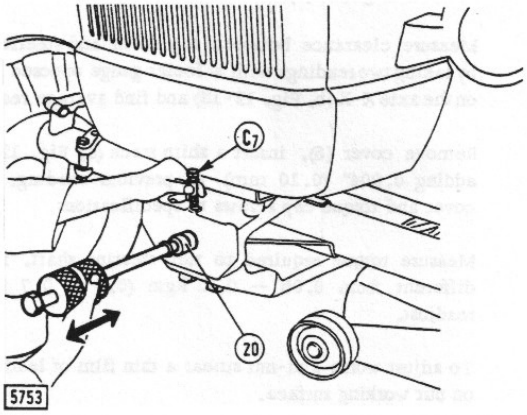


FIG. 12-21 Removing trunnion pin (20) by means of puller. (C7) Trunnion pin set screw.

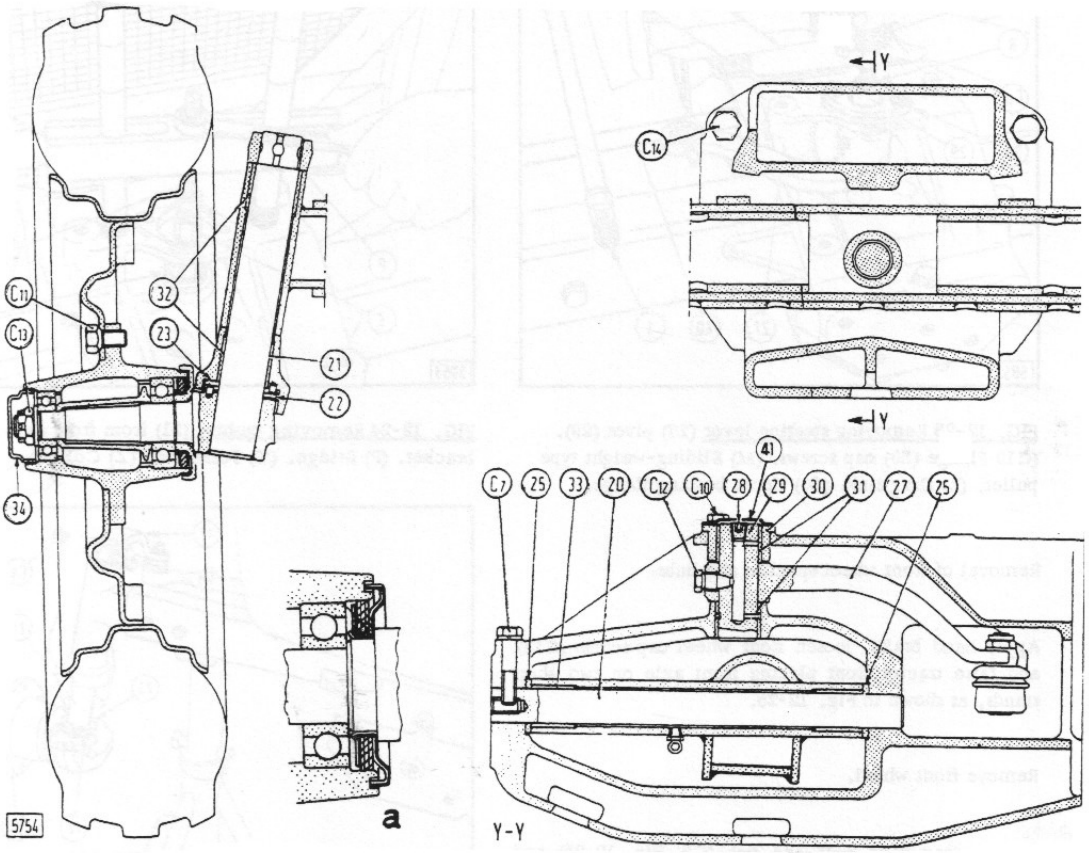


FIG. 12-22 Front axle cross-sections. (a) Detail of hub gasket. (C7) Trunnion pin (20) setscrew. (C10) Flange (30) cap screws. (C11) Front wheel disc screws. (C12) Steering lever setscrew. (C13) Front wheel hub nut. (C14) Bracket cap screws. (20) Trunnion pin. (21) Spindle. (22) Bronze thrust washer. (23) Steel thrust washer. (25) Trunnion pin end washers. (27) Steering lever. (28) Recessed-head screw. (29) Steering lever (27) pivot. (30) Upper bushing flange. (31, 32 & 33) Bushings. (34) Wheel hub cap. (41) Guard cover for pin.

Remove front axle and remaining wheel as an assembly and recover end thrust washers (25, Fig. 12-22).

Remove bushings (33).

Disassemble steering lever pivot assembly as follows:

Remove cowling and storage battery.

Remove grille and battery tray with air cleaner.

Disconnect steering lever (27, Fig. 12-23) from drag link (1) and from tie-rods (40) using appropriate puller.

Remove setscrew (C12, Fig. 12-22) and recessed head screw (28).

Withdraw pivot (29) using M 12 x 1.5 puller screw and slidingweight puller.

Remove flange (30) with bushing and, finally, the lever (27).

Remove bushings (31, Fig. 12-22) from flange (30) and axle bracket.

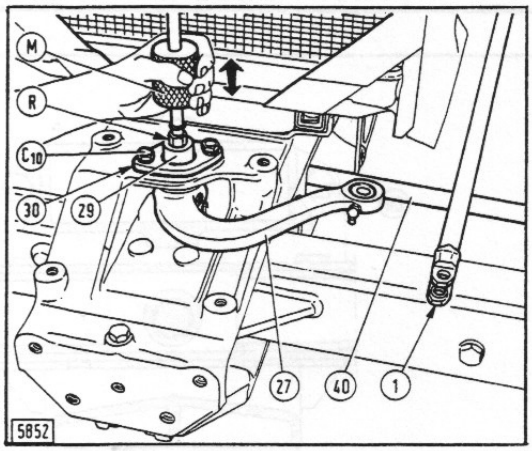


FIG. 12-23 Removing steering lever (27) pivot (29). (C10 Flange (30) cap screws. (M) Sliding-weight type puller. (1) Drag link. (30) Upper bushing flange.

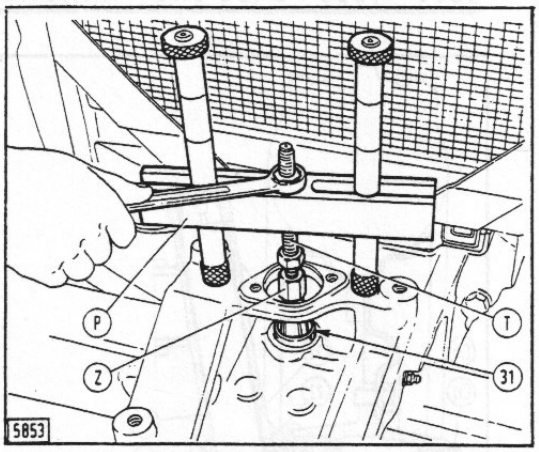


FIG. 12-24 Removing bushing (31) from front axle bracket. (P) Bridge. (T) Puller rod. (Z) Collet.

Removal of front wheel spindles and hubs:

Apply hand brake, loosen front wheel cap screws (C11) and raise tractor front placing front axle on two shop stands, as shown in Fig. 12-25.

Remove front wheel.

Remove retaining bolt and nut (C9, Fig. 12-25) and withdraw wheel spindle (21) and hub.

Remove bushings (32, Fig. 12-22) from beam extension using appropriate pullers.

Specifications section contains fits and tolerances and torque values for all mating parts.

At assembly,

Washers (22, Figs. 12-22 and 12-25) should be installed with oil grooves facing each other (23).

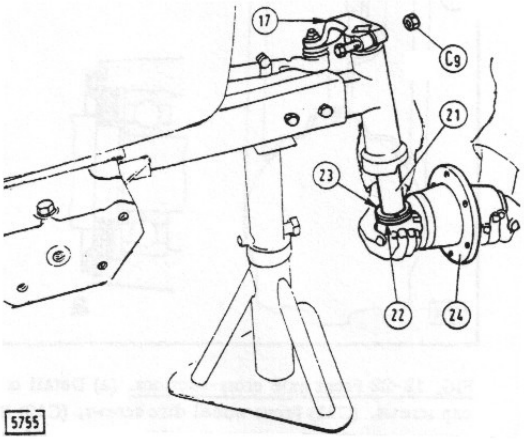


FIG. 12-25 Fitting (removing) steering spindle (21) complete with wheel hub (24). (C9) Steering lever (17) set screw. (17) Steering lever. (22) Bronze thrust washer. (23) Steel thrust washer.

Wire lock screw (C12, Fig. 12-22).

Complete assembly by lubricating axle trunnion, steering lever, wheel spindles and by filling wheel hubs with prescribed grease.

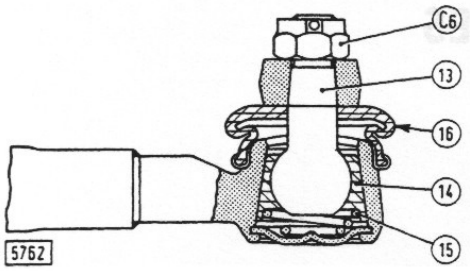


FIG. 12-26 Self-lubricating ball joint. (C6) Nut securing steering lever to ball pivot. (13) Ball pivot. (14) Tapered nylon bushing. (15) Seat (14) retaining spring. (16) Dust cap.

FRONT AXLE CHECKS

Checking front wheel alignment.

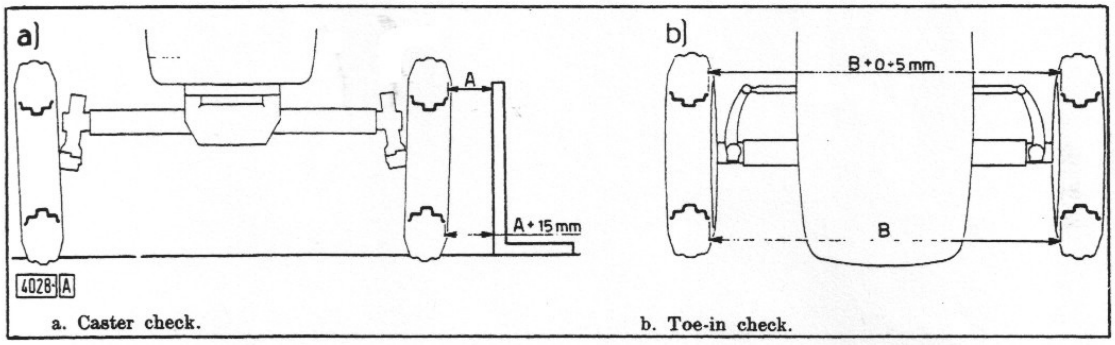
Check following every alteration of thread adjustment or if front tires show abnormal wear.

Front wheels, set for straightforward motion should be inclined 2° with respect to ground, corresponding to a difference of about 19/32" (15 mm) between wheel disc rim (a, Fig. 12-27) and parallel to tractor longitudinal axis. Maximum toe-in of 13/64" (5 mm), measured between rims is permissible (b). To correct toe-in adjust end of right-side tie-rod.

CHECKING STEERING RADIUS

Correct inside steering angle of front wheels is 53° — 55°.

If necessary, correct steering angles by removing ro adding material on beam extension (39, Fig. 12-20) at fixed stops (R2).



a. Caster check. b. Toe-in check.

FIG. 12-27 Checking front wheel alignment. (5 mm = 13/64"; 15 mm = 19/32")