

DIRECTORATE GENERAL BORDER ROADS

REPAIR INSTRUCTION No.01

RECTIFICATION OF STEERING DEFECTS – NISSAN 1 TON

GENERAL

01. This instruction lays down the procedure for checking and rectifying defects in steering of the 1 Ton Nissan and will be adopted by all Field and Base Workshops.

VEHICLES ALREADY ASSEMBLED

Road Test

02. A short road test should be given to determine if there are any defects with the steering falling under the following categories :-

- (a) The steering is too stiff or noisy.
- (b) Non – existence of self-righting action around corners.
- (c) Excessive over-steering action.

Note :- If the road test indicates that the vehicle is satisfactory, no further attention is needed in regard to steering. If however, the road test indicates defects in steering , action as given in the following paragraphs will be taken.

Front axle & steering box

03. (a) Steering main shaft end play

Check for excessive main shaft end play by watching the up and down movement of the steering wheel hub while turning the steering wheel right and left. If there is an up and down movement, it will indicate that there are too many gear housing cap shims. The number of shims required is decided by removing the shims until the main shaft cannot be rotated, after all the gear housing cap screws are tightened, and subsequent additional shims added just to make the shaft free i.e. capable of being rotated with two fingers. This adjustment is best carried out after the operation indicated in para 3 (b) below :-

- (b) (i) Jack up front axle until the wheels are free.
- (ii) Disconnect the drop arm from the sector shaft.

(c) Turn the wheels IN and OUT to make sure if the axle assembly is right, if not, set it right.

(d) Loosen by 03 or 04 turns the four steering box mounting bolts at the chassis mounting bracket in the cab. Then proceed to adjust the steering assembly.

(e) Adjustment of steering box

Holding the sector adjustment screw in a spanner or screw driver loosen the adjusting screw locking nut by one or two turns. Holding the lock nut the adjusting screw as far as it goes. Then unscrew it by about quarter turn and tighten the locking nut ensuring that the adjusting screw is held. Check that there is no end in the sector shaft and the steering wheel rotates freely.

(f) Black lash between the worm and sector

Turn the steering wheel and bring it in the mid-position (about 1/2 turn from the right or left lock). Loosen the 03 nuts of the housing cover studs on the steering box by half to one turn. Loosen the lock nut of the eccentric sleeve by one to two turns. Turn the eccentric sleeve with a spanner in either direction until there is binding and the steering wheel cannot be rotated. Then turn the sleeve in the opposite direction just enough to set the steering wheel free (not too free). Holding the sleeve in position with the spanner tighten the lock nut and the other two housing cover stud nuts uniformly. Holding the sector shaft check for back-lash, between the sector and worm with the steering wheel at mid position. There should be no back-lack. Turn the steering wheel right and left to check if it turns smoothly. Check the steering wheel play not more than 1" – 1 1/2" in mid position. Since, the steering box adjustments are vital, correct adjustment action as mentioned above cannot be cover-emphasized.

(g) Now tighten the four steering box mounting bolts on the chassis amounting bracket and examine if bolts can be inserted freely into the cab mounting bracket holes, if not, indicates that the steering column is mis-aligned.

(h) Alignment of steering column

Remove the steering box mounting bracket bolts and insert taper shims or wedges (part No.48361-41400 or 109-18366-43700) between the steering box and the chassis bracket just enough to ensure that the cab mounting bracket bolts can be freely inserted with the steering box mounting bolts tightened. Once aligned, tighten the cab mounting bracket bolts.

- (j) Now connect up the drop arm to the sector shaft with the wheels in a straight ahead position and steering wheel in the mid position with a spring balance attached to the steering wheel rim, ensure that the force required to turn the wheel is 10Kg roles.
- (k) Rotate the steering wheel left to right and vice versa and ensure that it revolves smoothly without any binding.
- (i) Test reversibility by moving the wheels from left to right lock and vice versa with two men. The steering wheel should revolve smoothly and easily. Loud grinding noise can be eliminated by adjusting the sector adjusting screw once again as explained wheel does not bind some noise is possible from steering tube bushing
- (m) Remove Jack.

Steering Geometry

04. The NISSAN Manual for the vehicle indicates the following specifications which are likely to be incorrect and need check and adjustment :-

- | | | | |
|-----|-------------------------------|---|---|
| (a) | Toe in | - | 03 - 04 mm |
| (b) | Caster | - | 40' Positive |
| (c) | Turning angles (Cremp angles) | - | 30 ⁰ IN
23 ⁰ . 30' OUT |

05. In order to be able to obtain satisfactory road performance of the front wheels and steering it is necessary/to keep their values as specified

- (a) Toe in
Ensure all the vehicles have correct Toe-in
- (b) Caster
Ensure that the Caster is positive and is approximately 40' – 10'. If the caster is incorrect fit appropriate wedges to bring the caster within the limit now specified.

Note :- (i) The spring 'U' bolts should be tightened to 60-65 its ft. After a short road run check these bolts once again and tighten, if necessary. This is also applicable to rear spring "U" bolts. Otherwise the vehicle may behave queer on the road.

- (ii) The caster is measured with the help of 'Jiffy' gauge and turn tables.

(c) Turning angles (Cramp angles)

If the vehicle tends to lock itself in extreme lock positions, check cramp angles by turn tables as used for measurement of caster and re-set the angles to following specifications :-

IN 28° to 30°

Out $21^{\circ} - 30'$ to $23^{\circ} - 30'$

These adjustments are required for both wheels and obtained by re-adjusting stops on the knuckles and locking them thereafter.

Road Test

06. The vehicles should then be prepared for road test by lubricating all lubricating points and ensuring that the tyre pressures are maintained to:-

Front - 35 lbs per sq in

Rear - 55 lbs per sq in

07. Take the vehicle out for short road test on the main roads. The vehicle should behave as follows :-

- (a) in the straight ahead position the steering wheel should come back to its position, when turned slightly right or left. The return should not be violent.
- (b) Around corners involving an increased movement of the steering wheel the vehicle should equalise itself.
- (c) Take complete turn around traffic islands (obviously at slow speeds) and ensure that the vehicle behaves as above where however the turning circle is limited by the extreme turning angles, the steering wheel should show a tendency to return. At higher speeds at extreme locking positions the vehicle will tend to further lock itself. As extreme lock positions are used only either at parking or self-centering and ease with which the wheels are brought back to a straight ahead position are considered ample.

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08. So long as the steering wheel rotates by itself or with a slight touch of the hand and is also not stiff enough to impose a strain on the driver, the steering system can be considered as fit and of acceptable standard.

09. If the steering is found to be unduly stiff or the self-righting action is absolutely absent the sector and worm adjustment as explained in paras 3 (e) & (f) above should be carried out once again.

VEHICLES NOT YET ASSEMBLED

10. In order to ensure that the steering adjustment will not be carried out on every vehicle as described in the preceding paragraphs the following methods are recommended:-

(a) Steering Box

The steering assy as received from the Makers should be fixed on a bench and the following adjustments should be carried out in details as described previously :-

(i) Gear housing cap shims to be just enough to ensure that there is no play of the worm in its bearing. The steering main shaft should just be able to be rotated with two fingers.

(ii) Sector shaft end-play adjustment by the adjusting screw.

(iii) Back-lash between worm and sector by adjusting the eccentric sleeve.

(b) Alignment of steering with cab

By installing the cab first, it will be possible to align the steering column with or without shims/wedges on the assembly line.

(c) Axles

While fitting the front and rear axles ensure that the 'U' bolts are tightened to 60-65 lbs ft.

(d) Toe-in Caster and Turning axles

These must be checked and adjusted after the chassis is able to roll on its own in the production line it self.