

SERVICE MANUAL

**S24 (6+2) GEAR DRIVE
Transmission**

SERVICE MANUAL

ITL “6+2” SPEED TRANSMISSION

INTERNATIONAL TRACTORS USA CORPORATION

2332 MT. ZION ROAD

GREEN WOOD, AR

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TRANSMISSION

F 1.0 INTRODUCTION

Gearbox housing or casing are contains in which the terminals, namely the gear, pinion shaft, bearing, oil seals, bearing covers and other component are mounted. The prerequisites for reasonably free, long lasting, non-jamming vibration free and efficient load transmitting gear drive are proper mounting and alignment of the bearing, maintenance of the correct center distance and provision of lubrication arrangement ensuring proper and regular supply of lubricants, besides other factors. As material for gearbox casting, good quality iron is used in most of the cases. Cast iron housing have good damping properties and freedom from noise. These patterns are required for such housing.

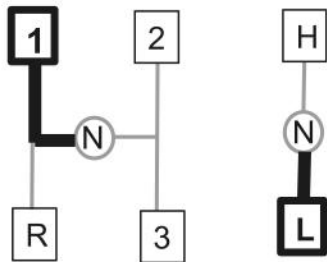
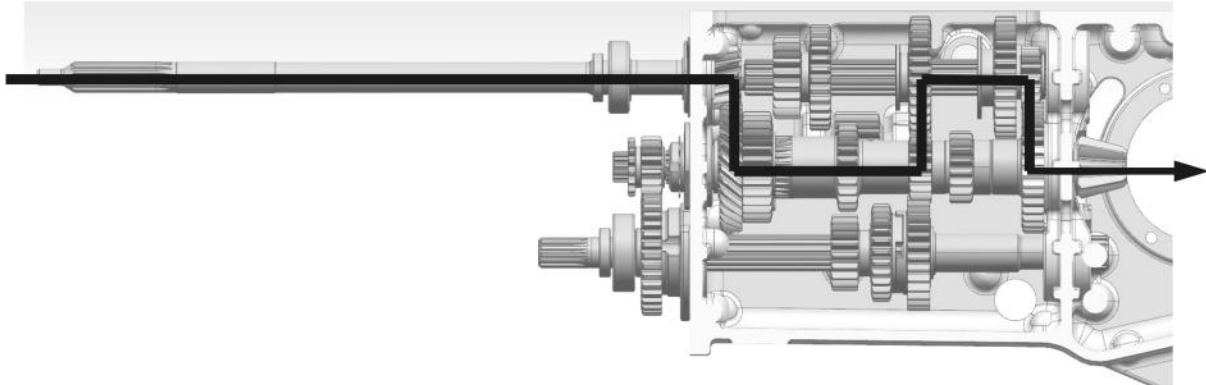
Lubrication of gear is required to ensure the smooth operation of the drive. Hence a through knowledge of the different aspect of lubrication method and nature of lubrication is imperative for a gear designer. Basically the gear lubricant is intended to serve the following purpose.

1. To reduce the wearing off of matting in general.
2. To reduce the friction and power loss.
3. To prevent pitting, welding and breakage.
4. To minimize noise, vibration and shock.
5. To act as a coolant by dissipating heat.

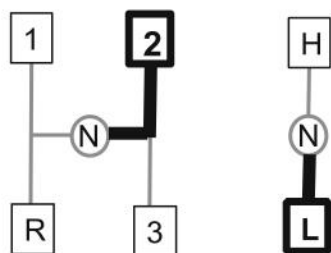
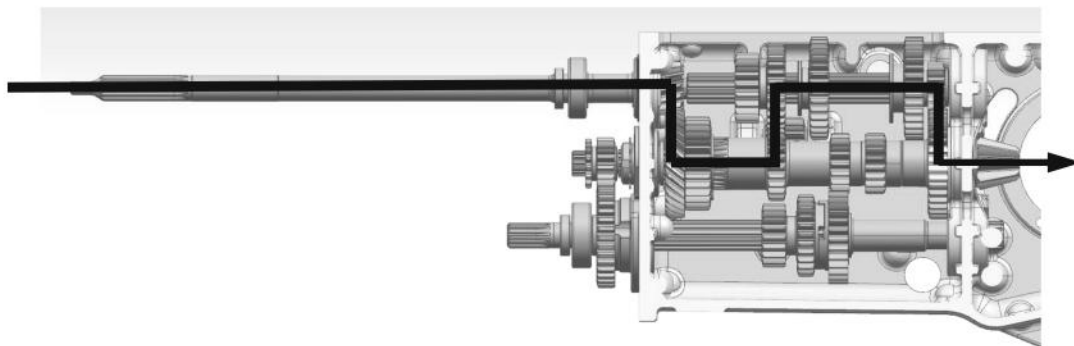
TRANSMISSION

F 2.0 POWER FLOW DIAGRAMS (FOR MODELS WITH 3 SPEED PTO)

1ST - LOW:



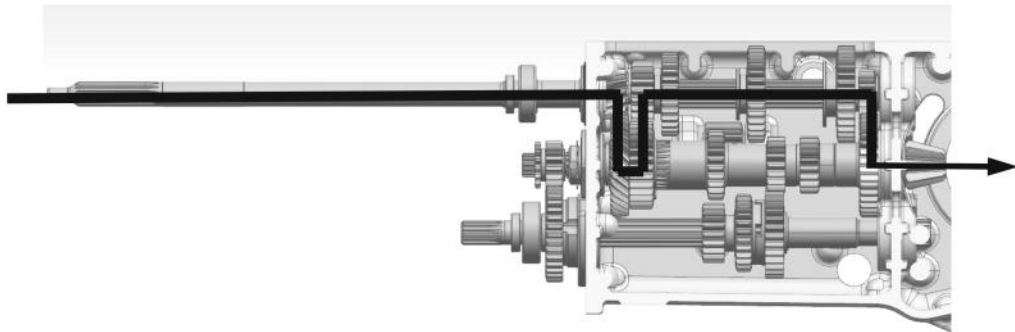
2ND - LOW:



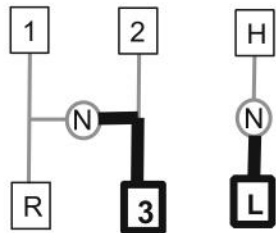
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POWER FLOW DIAGRAMS (FOR MODELS WITH 3 SPEED PTO)

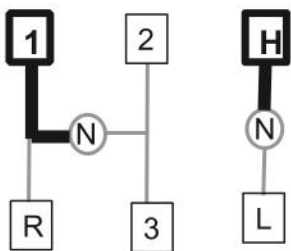
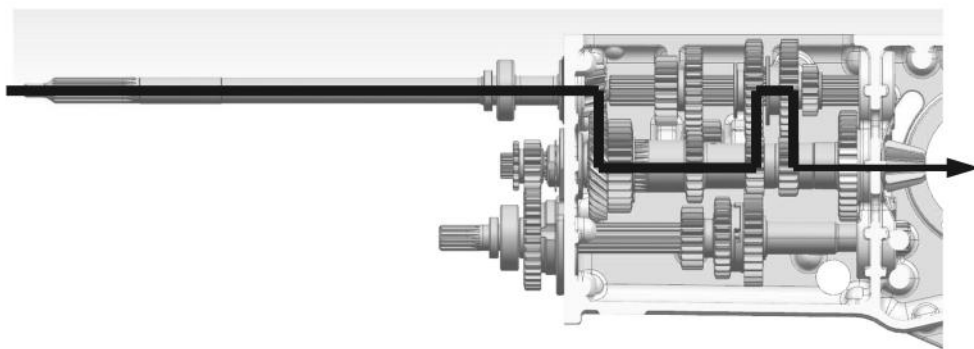
3RD - LOW



L



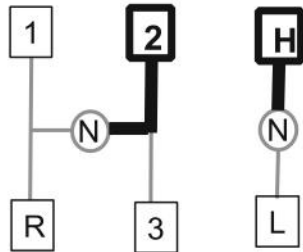
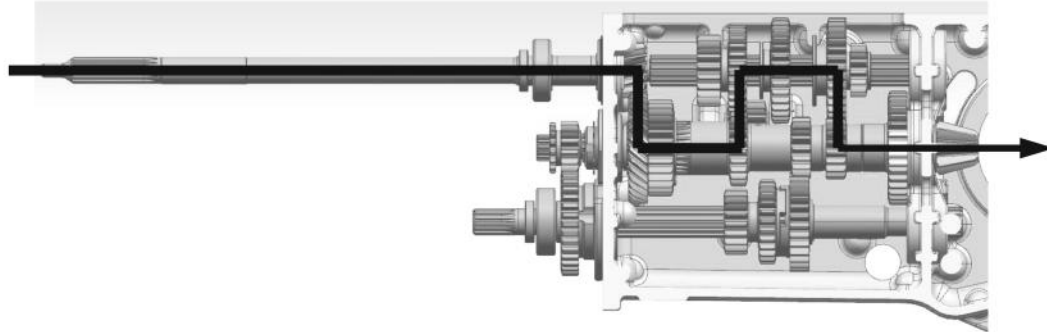
1ST - HIGH



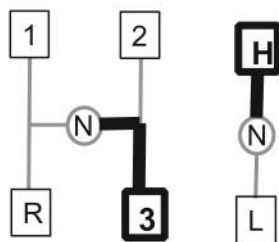
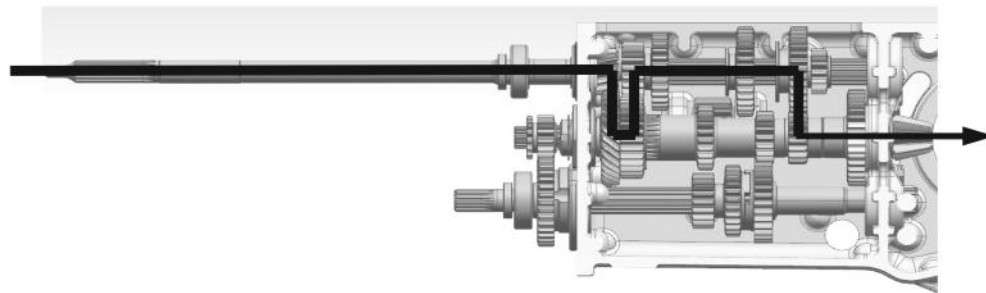
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POWER FLOW DIAGRAMS (FOR MODELS WITH 3 SPEED PTO)

2ND - HIGH:



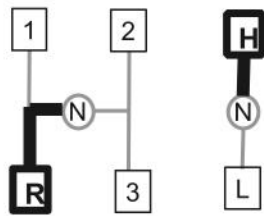
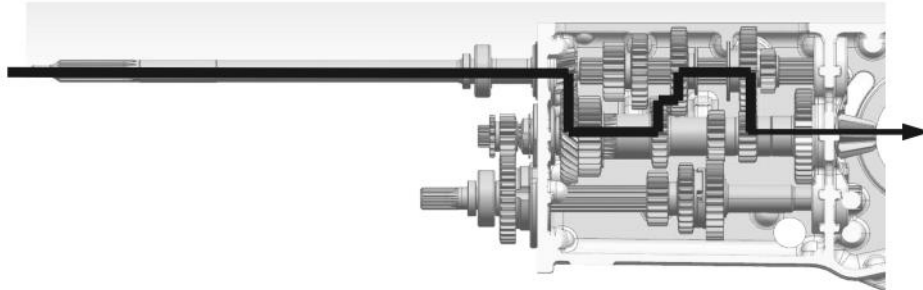
3RD - HIGH:



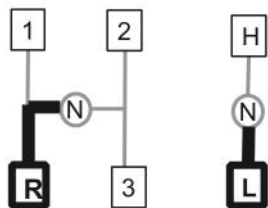
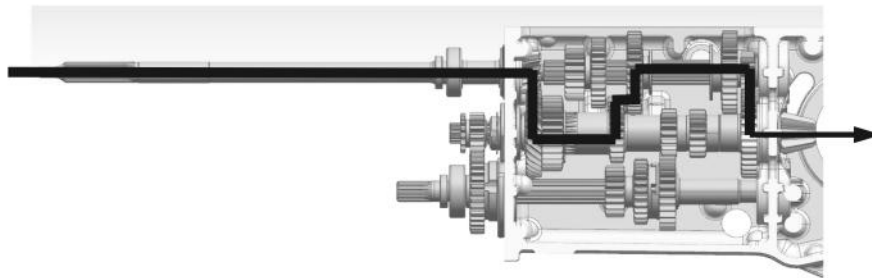
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POWER FLOW DIAGRAMS (FOR MODELS WITH 3 SPEED PTO)

REVERSE - HIGH:



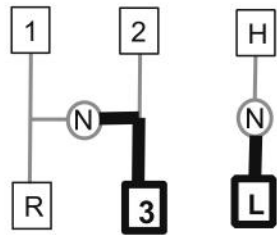
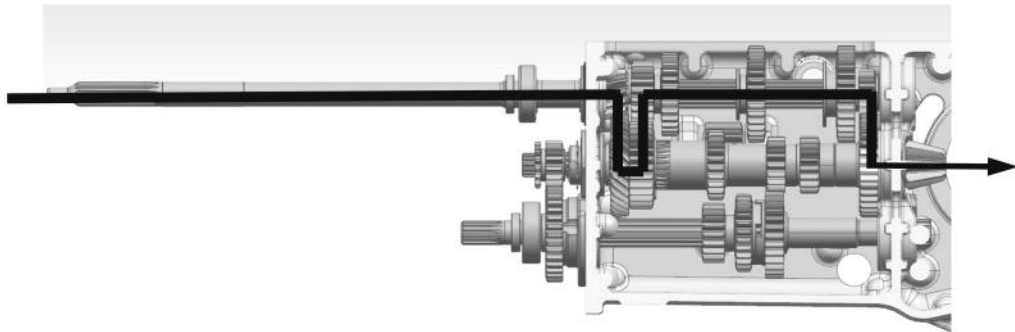
REVERSE - LOW:



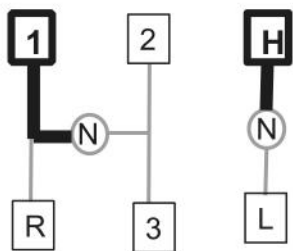
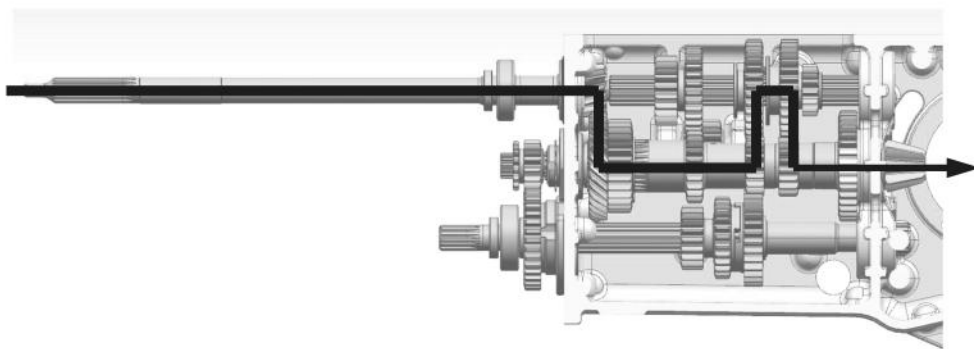
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POWER FLOW DIAGRAMS (FOR MODELS WITH 3 SPEED PTO)

3RD - LOW



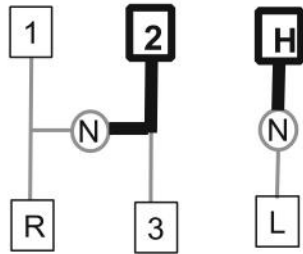
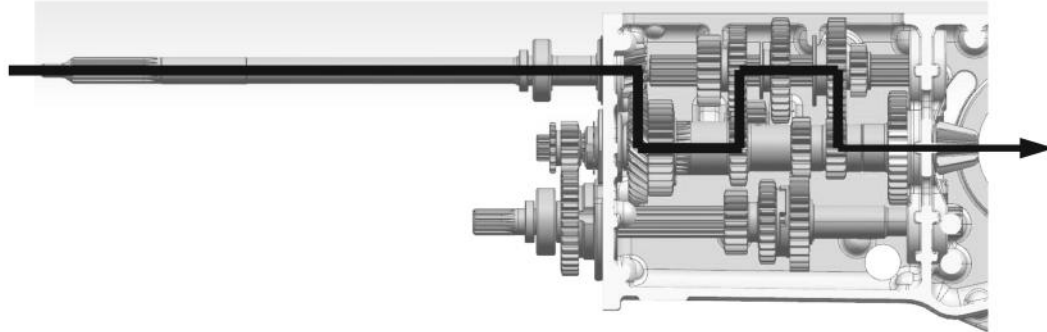
1ST - HIGH



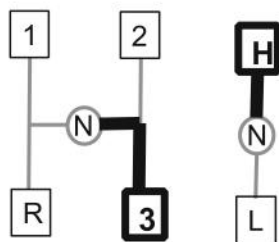
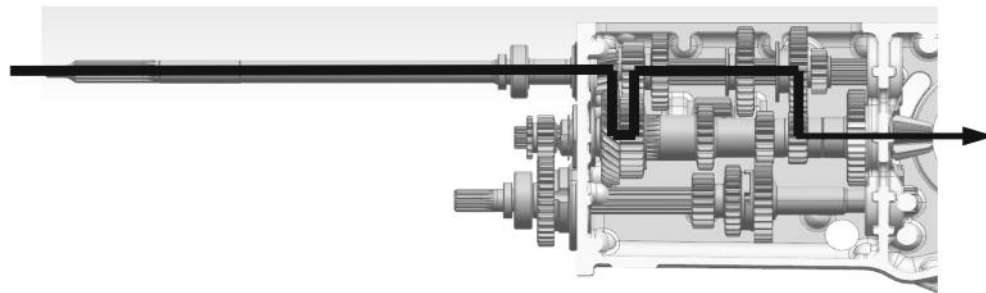
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POWER FLOW DIAGRAMS (FOR MODELS WITH 3 SPEED PTO)

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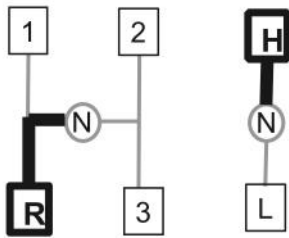
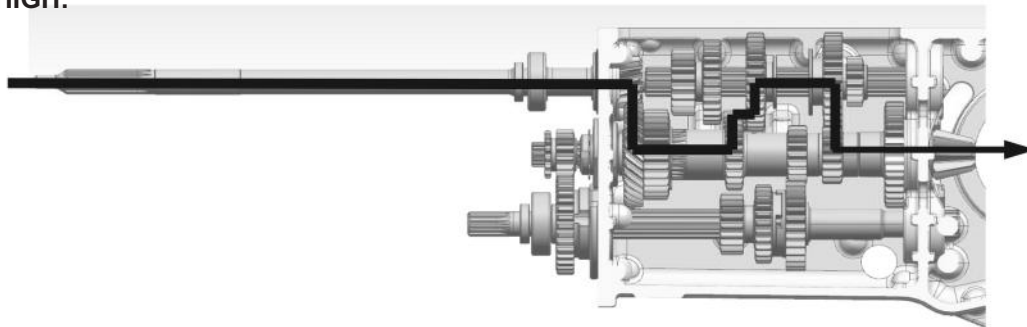
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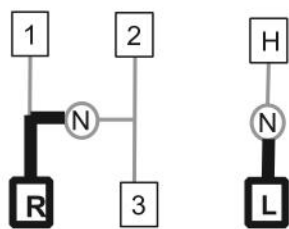
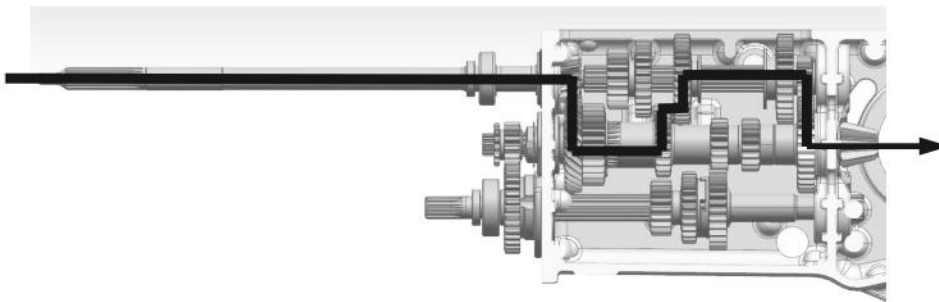
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POWER FLOW DIAGRAMS (FOR MODELS WITH 3 SPEED PTO)

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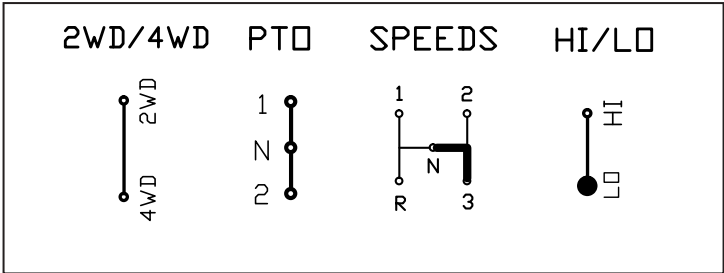
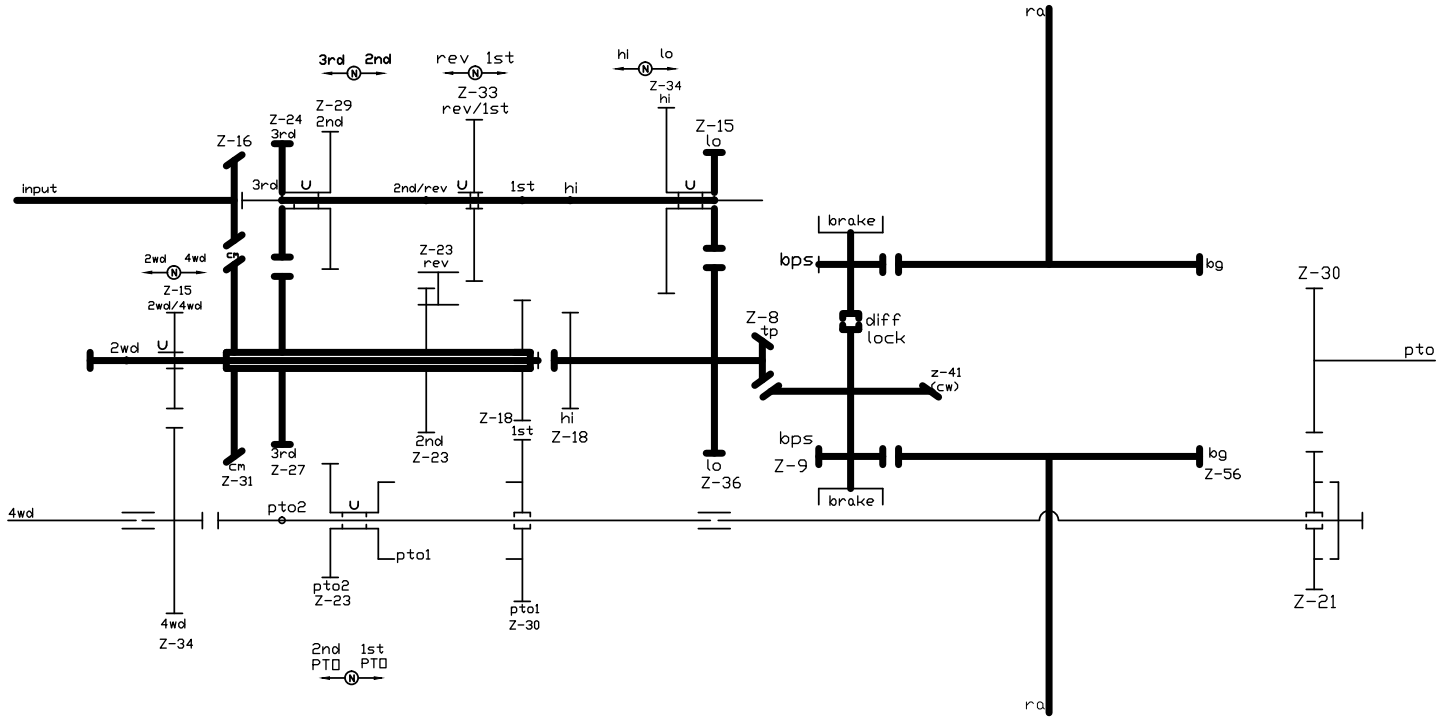
REVERSE - LOW:



TRANSMISSION

POWER FLOW DIAGRAMS (FOR MODELS WITH 2 SPEED PTO)

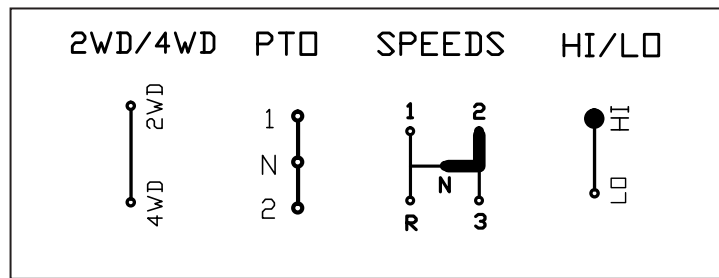
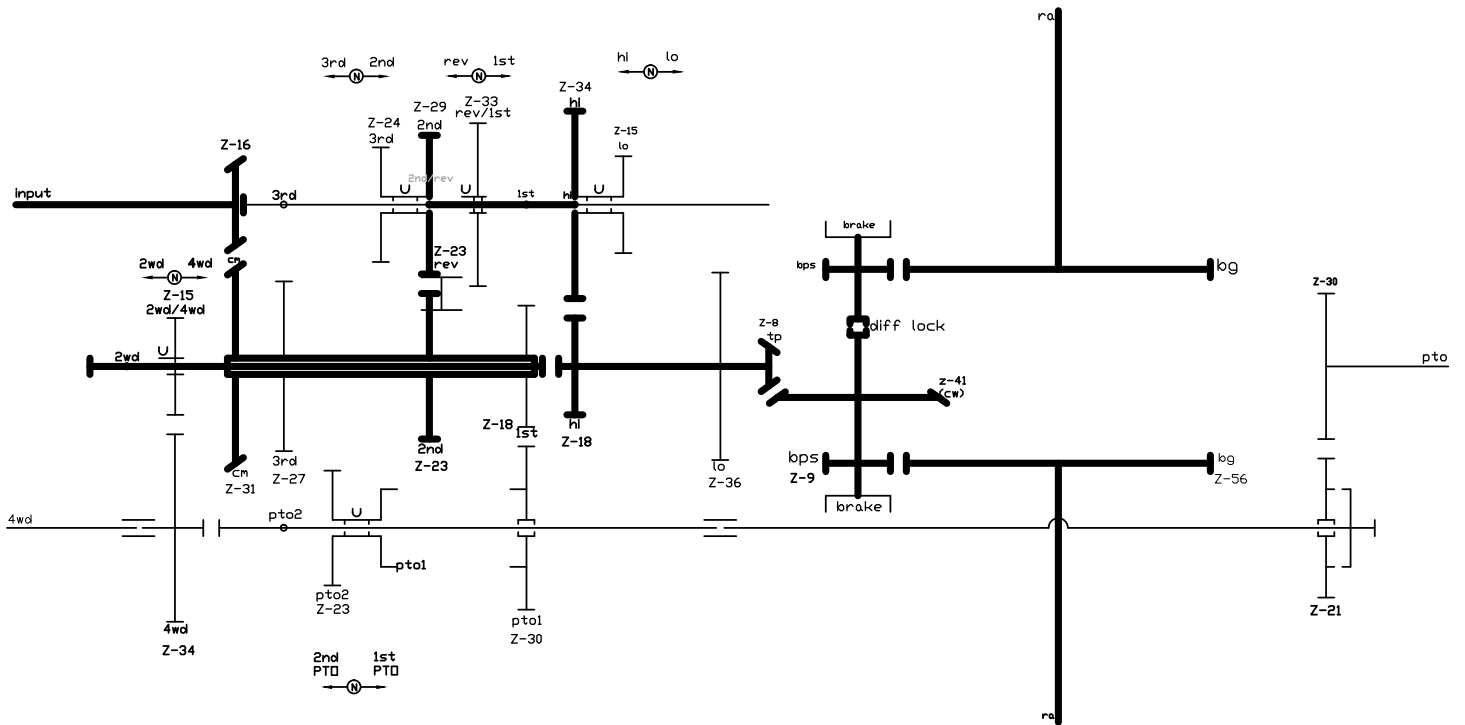
POWER FLOW IN 3rd - LOW



TRANSMISSION

POWER FLOW DIAGRAMS (FOR MODELS WITH 2 SPEED PTO)

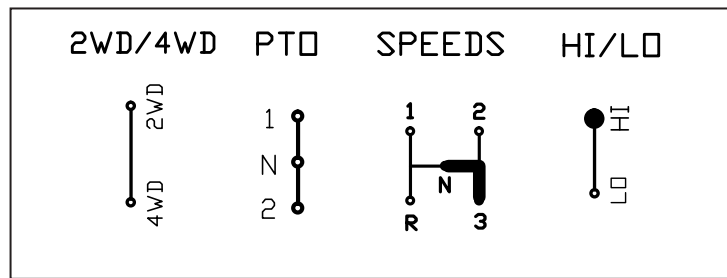
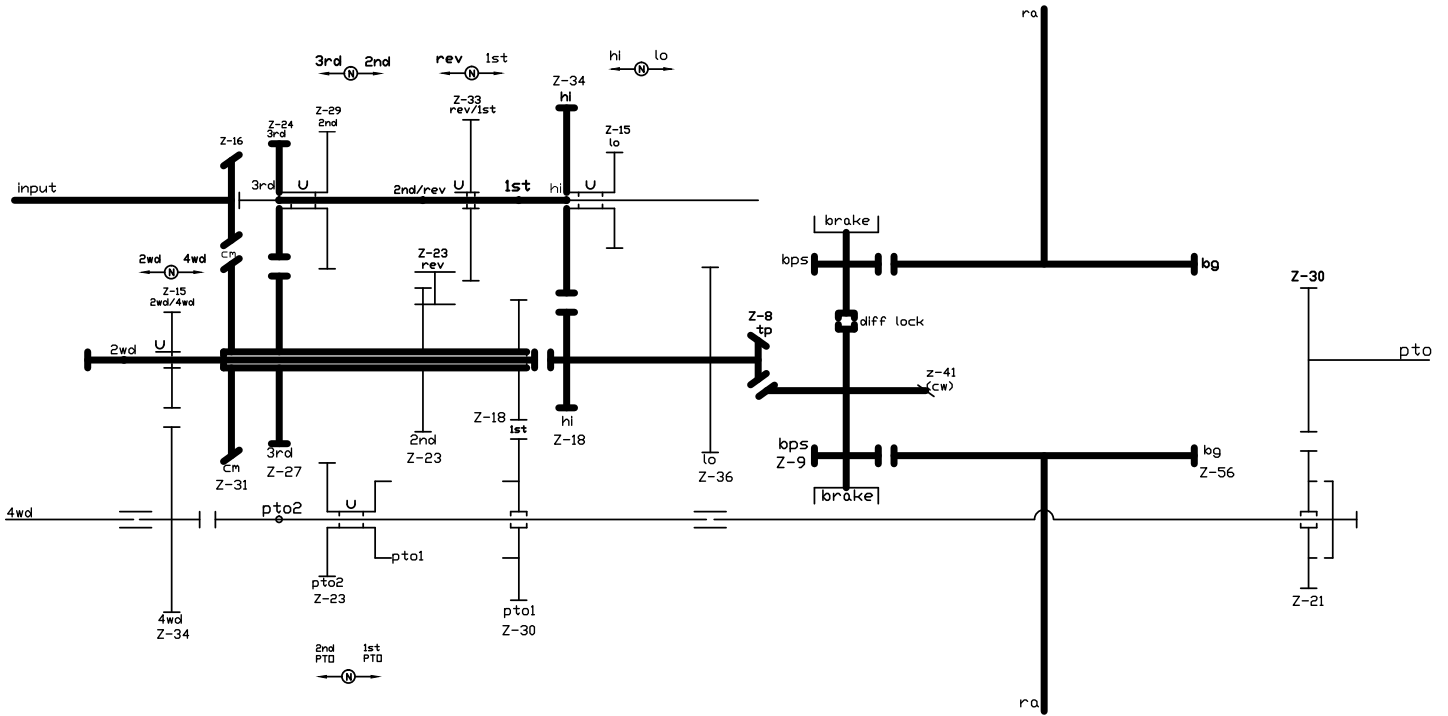
POWER FLOW IN 2nd - HI



TRANSMISSION

POWER FLOW DIAGRAMS (FOR MODELS WITH 2 SPEED PTO)

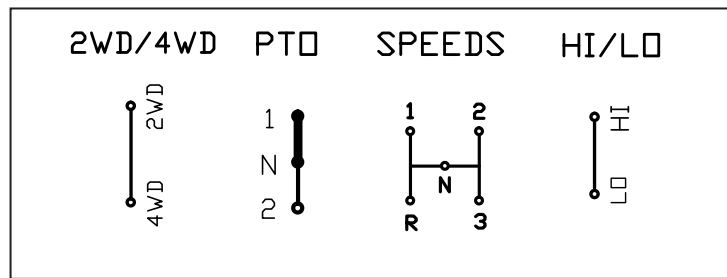
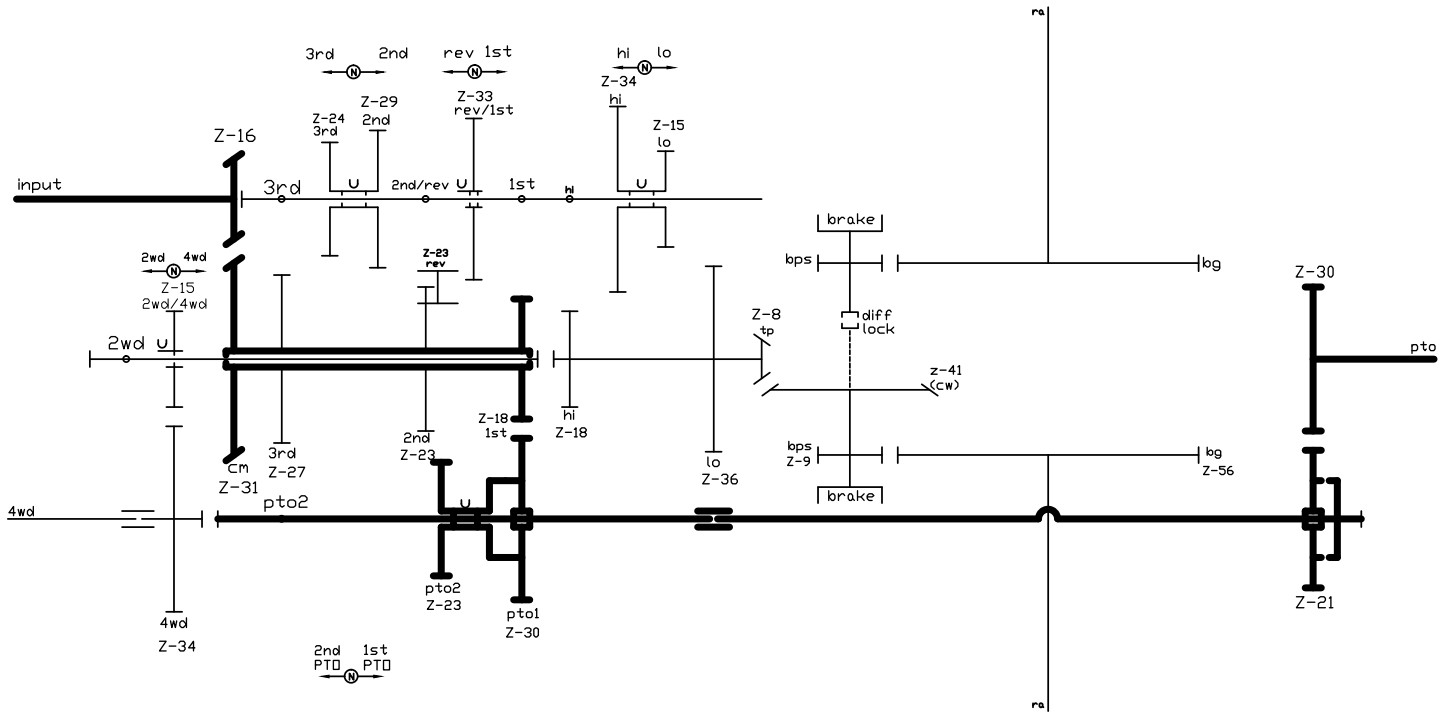
POWER FLOW IN 3rd -HI



TRANSMISSION

POWER FLOW DIAGRAMS (FOR MODELS WITH 2 SPEED PTO)

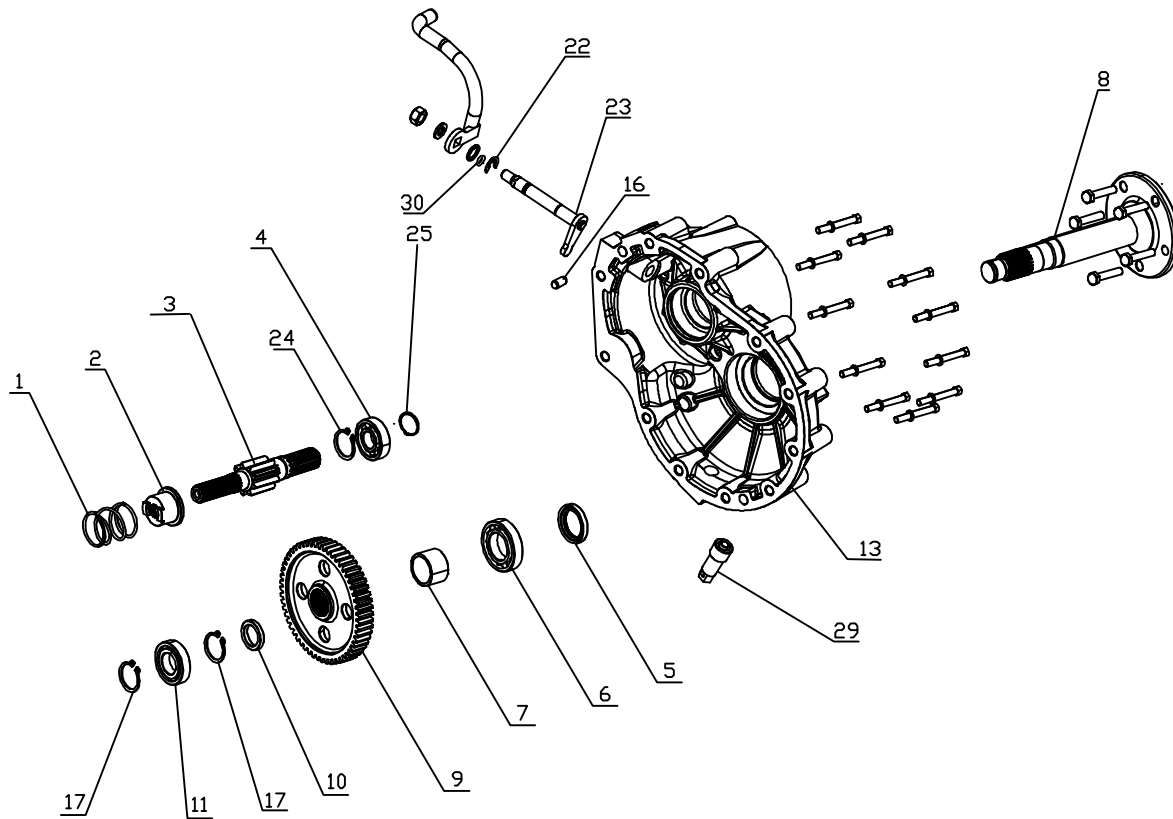
POWER FLOW IN 1ST PTO



TRANSMISSION

F 3.0 DISMANTLING OF TRANSMISSION

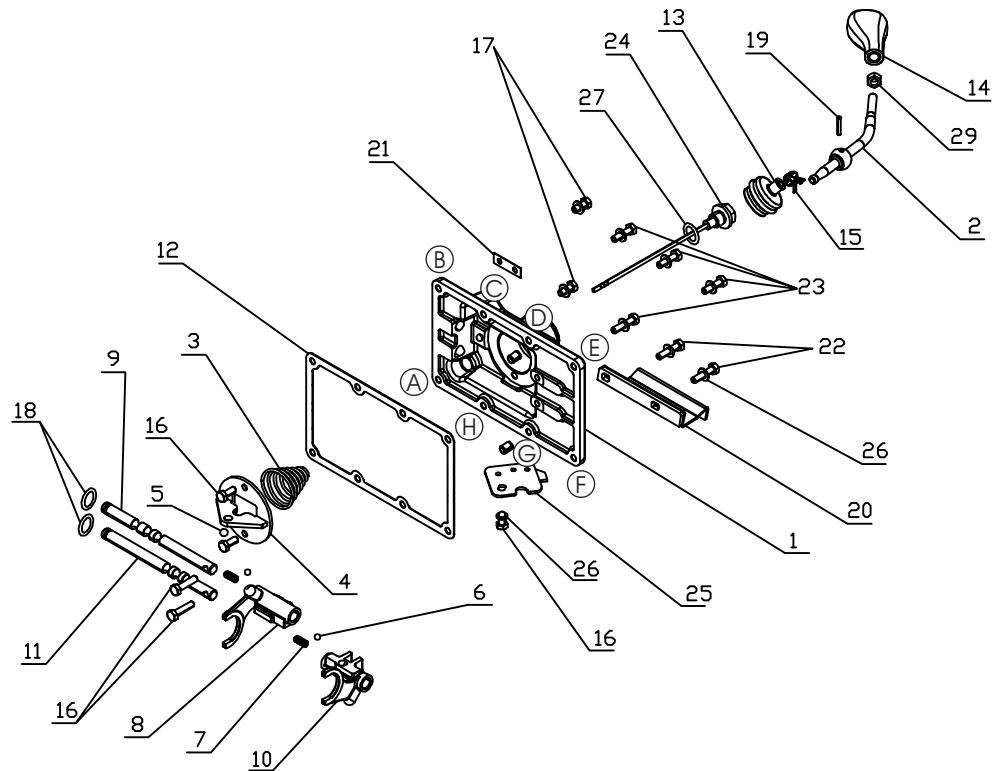
Step 1: Dismantling of B.P. Shaft and Brake Cover Sub Assembly



- Remove Spring diff lock (1) and Sleeve Diff Lock (2) (in case of RH brake housing only).
- Dismantle Lug diff lock assy (23) from Brake housing (13).
- Remove External Circlip A-28 (25) from outer side of brake housing (13) with the help of Circlip Plier.
- Unlock the Circclip C-12 (22) with the help of Circlip Plier and remove B.P. Shaft (3).
- Remove ball bearing 63/28 (4) from B.P. Shaft (3).

TRANSMISSION

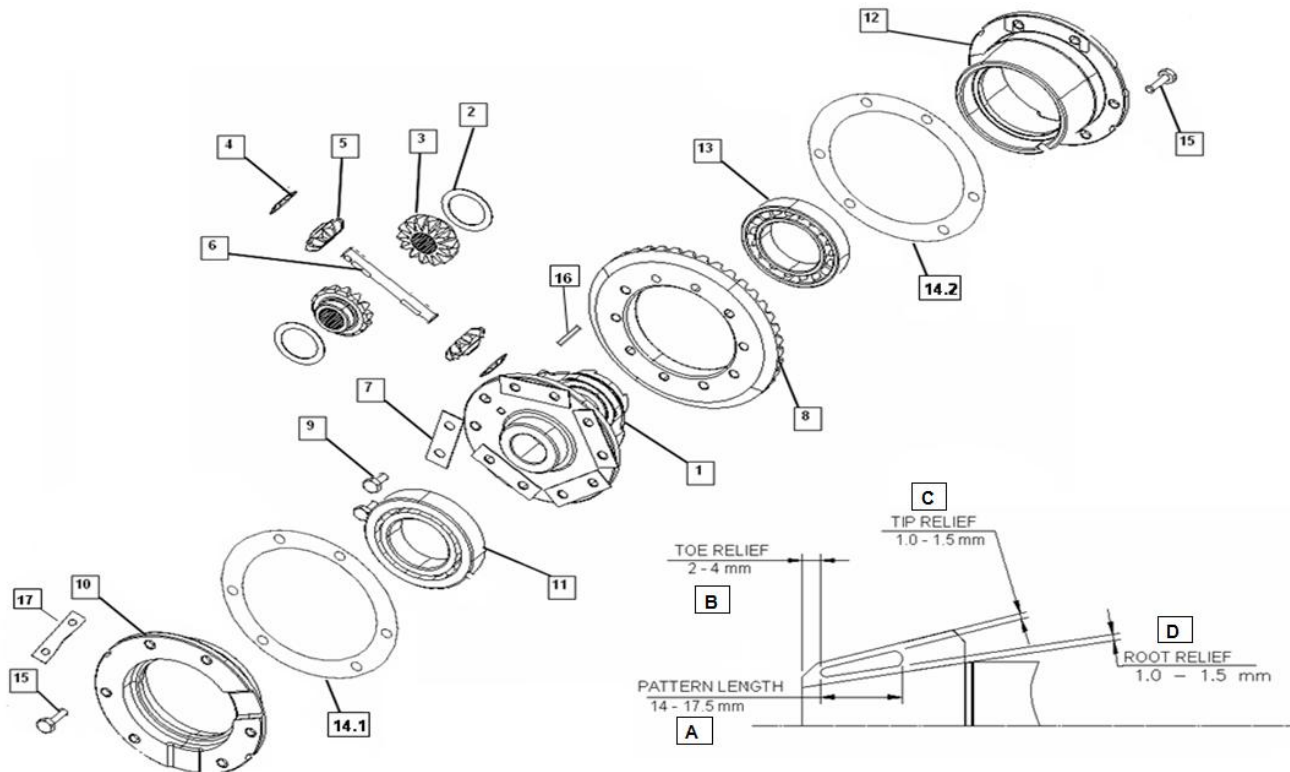
Step 2: Dismantling of Shifter Housing Assy.



- Unscrew and remove the Dipstick (24) from the top of Shifter housing, as shown.
- Remove the Shifter housing from the transmission housing by unscrewing Hex screws M8 (23), along with Guide Plate (20) from side as shown in figure.
- Remove the gasket (12) from the transmission housing.
- Unlock the Shifter rods both by unscrewing Hex screws M8x16 (17) - 2 nos from shifter housing.
- Remove the assembly of Shifter fork (8) & rod for 1st/ 2nd (11) from shifter housing along with balls (5).
- Remove shifter rod 2nd/3rd (9) from housing. Remove the Spring (7) & the ball (6) with dia 8.
- Unscrew Hex screws M8x16 (16) - 2 nos and also remove the locking plate (4) & the Conical Spring (3). Then remove the Shifter lever (2).
- Dismantle the knob (14) & the rubber boot (13) from the shifter lever.
- Remove the gear shifter lever from shifter Housing (lower side).

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Step 4: Dismantling of Differential Cage and Crown wheel Assy



Unscrew the screws (15) & locking washer for dismantling RH cage carrier (12) & LH cage carrier (10) along with shims.

Remove the Cage assy from the transmission.

Remove the bearings (11) & (13) from Differential cage assy.

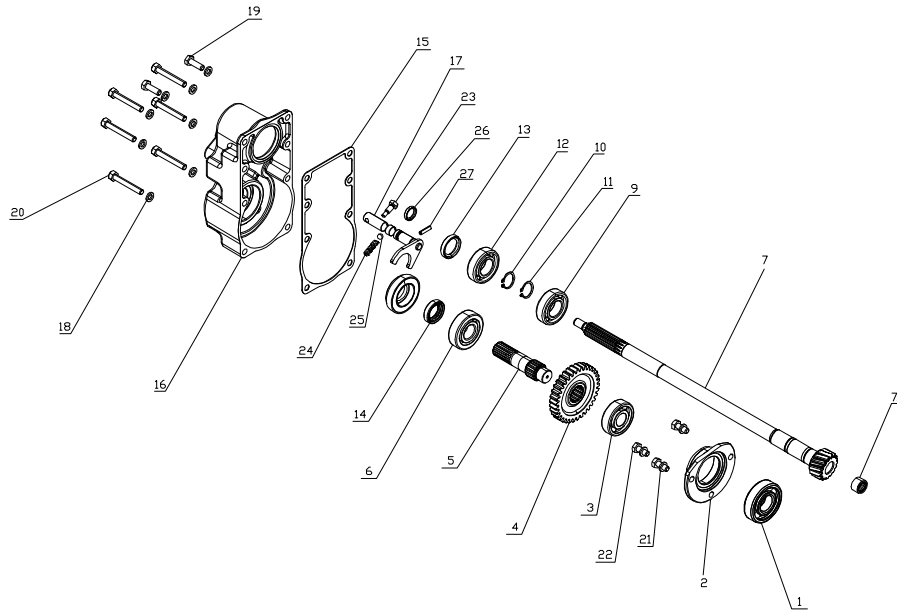
Unlock the locking washers (7) and M8 hex screw (9) to dismantle crown wheel from cage assy.

Unlock the spring cotter sleeve (16) and remove the pinion shaft from cage and gears.

Dismantle the spherical thrust washers (4) from differential side gear and gear diff. pinion (5) from cage.

Dismantle the diff. side gear liner & washer (2) from both sides.

Step 5: Dismantling of Input Shaft & 4WD Shaft Assy with Front Cover Housing



Dismantle Bearing housing (16) with gasket (15) from the main transmission housing, by unscrewing screws M18x1.25x25 (19) - 2 nos & M8x1.25x55 (20) - 6 nos.

Carefully remove the needle bush (7A) from the input shaft (7).

Dismantle the above sub-assemblies of 4WD shaft from the bearing housing (2) & sub-assy of the input shaft from the bearing housing front sub-assy (16).

Unlock the external Circlip A-25 (11) from the input shaft from the 2nd groove & remove the bearing (12).

Unlock the Circlip (10) and remove the Bearing 6205 (9) from the Input shaft.

Remove the gear (4) & bearing (6) on the gear and then remove the Ball bearing 6304 (3) from 4WD shaft (5).

Remove shifter Pin 4WD (23) from the Fork (17) and remove Gear Z-15 for 4WD (not shown).

Remove the fork (17) & Spring cotter sleeve (27) from Fork Assy and then remove the spring (24) & ball (25) from Bearing Housing Front.

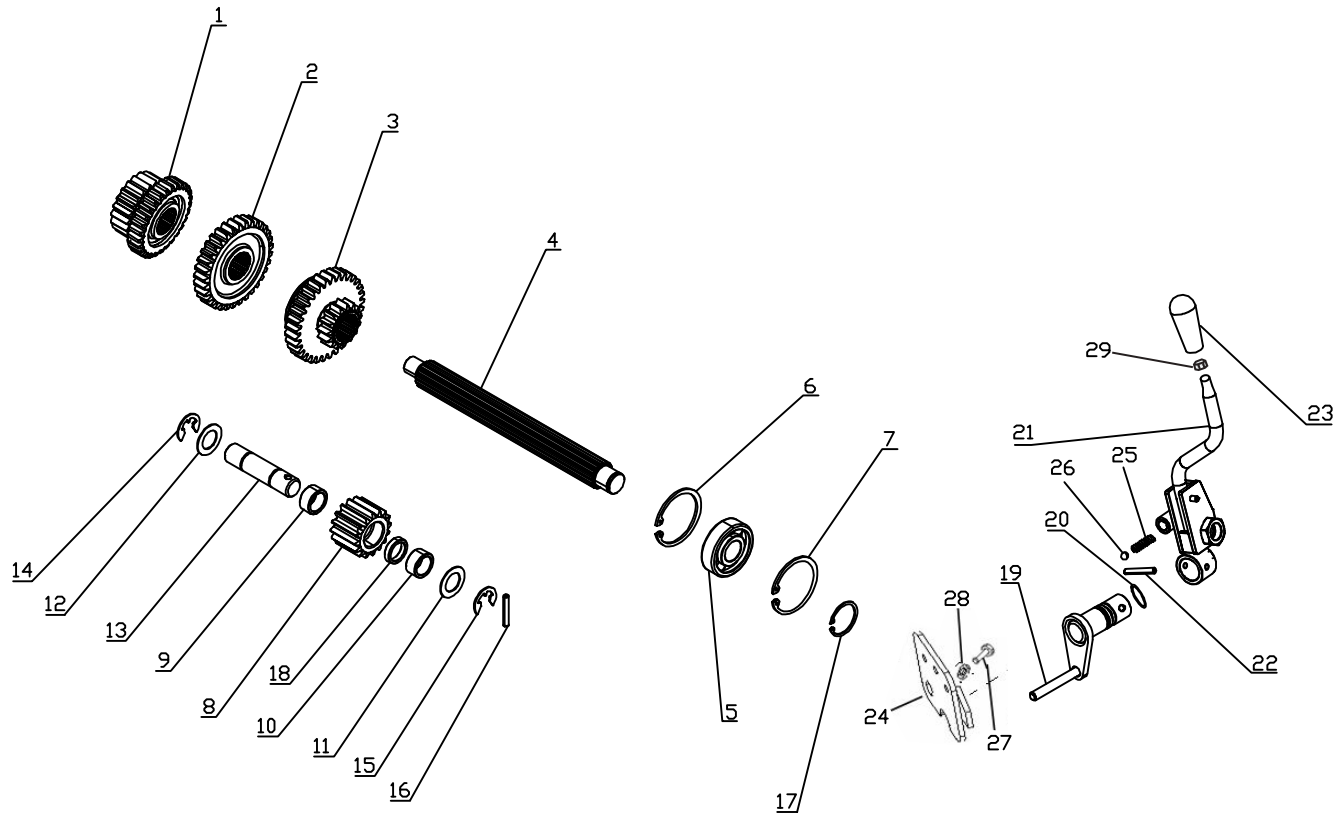
Remove Oil Seal (26) from the Bearing housing front (16).

Remove Oil seals (13) & (14) from Front bearing housing (16).

Dismantle the Bearing housing (2) by removing Hex screws M8x1.25x25 and remove the Ball bearing (1) from the housing.

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Step 6: Dismantling of Intermediate Shaft Assy, Idler Assy & Lever Hi-Lo Assy



Dismantling Intermediate Shaft Assy:

Unlock the External Circlip A-20 (17) & internal Circlip B-52 (6, 7) from transmission housing and remove the Ball bearing 6304 (5). Remove the Intermediate shaft by passing it thru Sliding gears (1), (2) & (3) from the Front Side of transmission housing. Remove the Sliding gears (1), (2) & (3) from the Transmission housing.

Dismantling Idler Assy:

Unlock the Idler shaft by removing Spring Cotter Sleeve (16).

Dismantle the sub-assy by removing External circlip E-15 (15) from the idler shaft at its end.

Unlock the another External Circlip E-15 (14) from the Idler shaft (13) from the other end.

Remove the needle cage bearings 24x18x12 (9) & (10) from the idler gear (8) along with spacer for idler gear (18) and washer (idler shaft) (11) & (12).

Hi-Lo Lever Assy:

Remove the knob (23) by unscrewing Hex Nut (29) from the Hi-Lo lever.

Unlock Spring cotter (22) to dismantle the Lever assy Hi-Lo (21) and remove the Spring (25) & Ball (26) from the hole of Lever assy Hi-Lo (21).

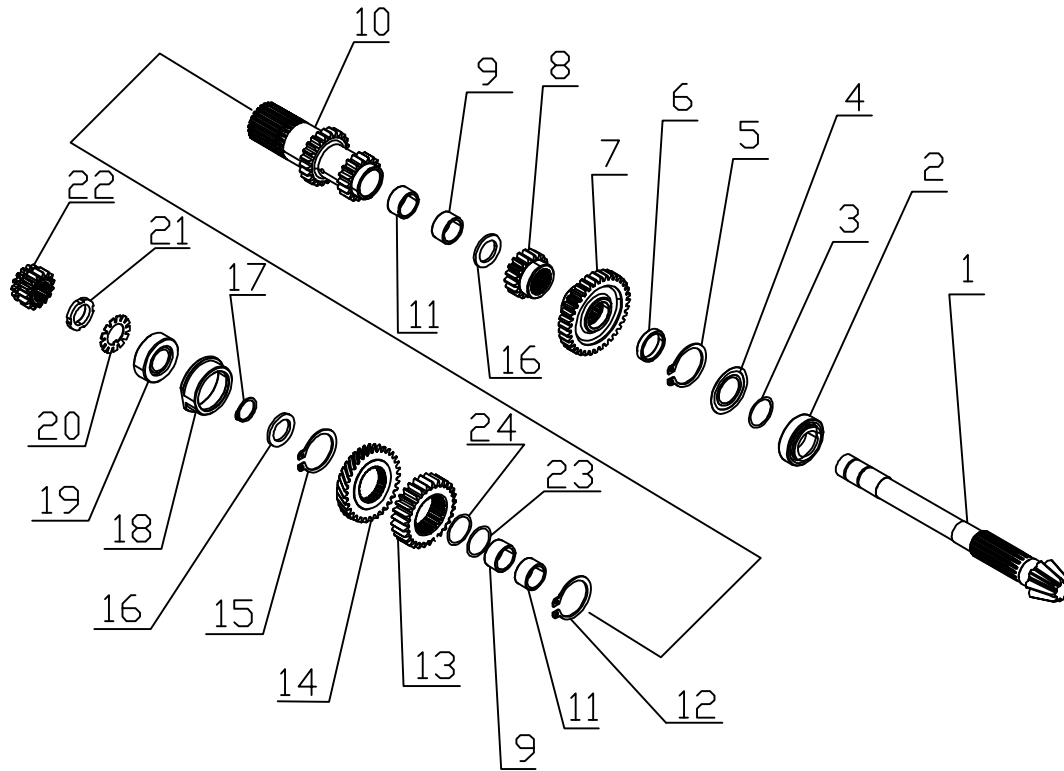
Remove the Locking Plate (24) from the outer side of housing by unscrewing spring washer (28) & hex screws M8x16 (27).

Remove the pin Assy from the groove of gear (3) and remove the plate (24).

Dismantle the Hi-Low Lever assy & all its related parts.

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Step 7: Dismantling of Tail Pinion Shaft Assy



Remove the sliding gear (22) for 4WD along with Fork rod for 4WD.

Unlock the Withdrawal nut (21) and remove the Locking washer (20).

Remove TR bearing (19).

Remove Ring (18) from the transmission Housing.

Unlock the circlip (17) and take out the T.P. Shaft from back-side bore of Transmission housing; this will free the entire assy of Spacer (6), gears (7 & 8), shim small (3), washer (16), lay-shaft sub-assy (10) & again washer (16). Remove all these components.

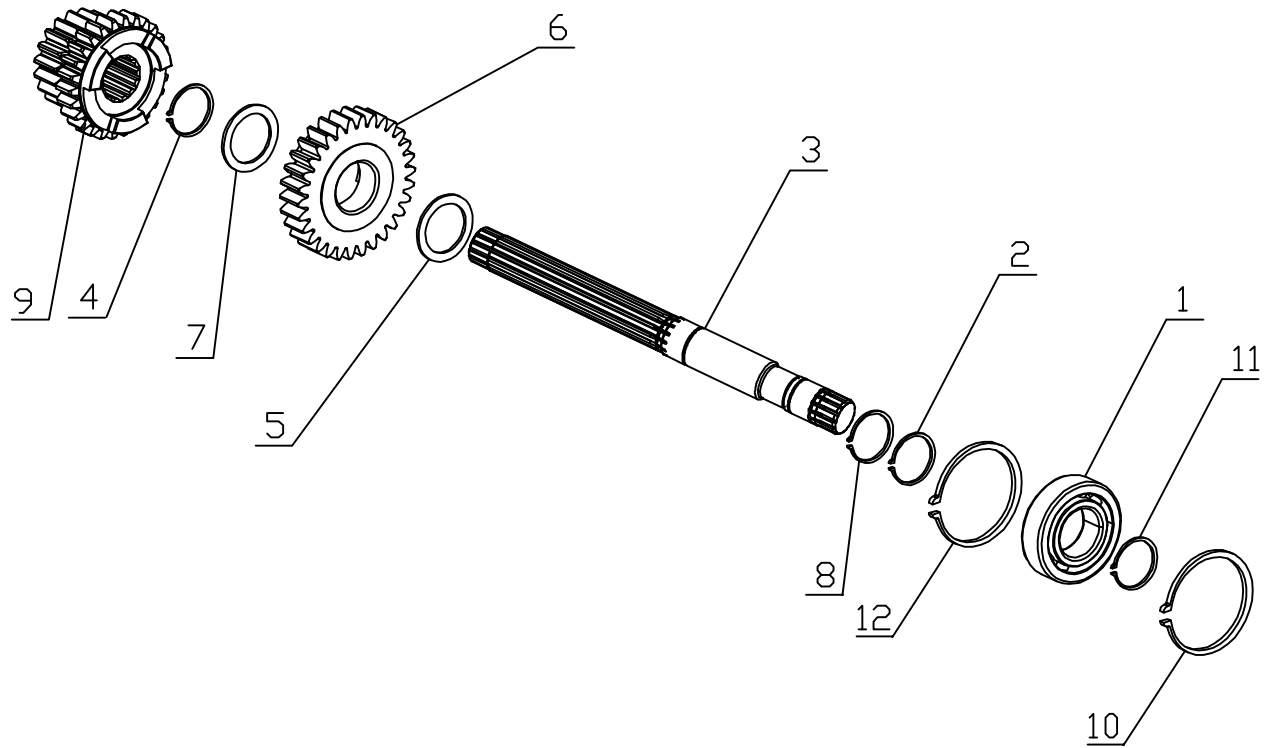
Remove the Outer cone of TR Bearing (2) from the Housing and unlock the internal Circlip (5) and dismantle the shim big (4).

Remove the Inner race of the TR Bearing (2) from the TP Shaft.

Unlock External Circlips (12) & (15) on both sides of shaft for removal of Fixed gear (13) & CM gear (14).

Dismantle sub-assy of the lay-shaft (10) by removing pairs of needle bearings (9) & (11).

Step 8: Dismantling of PTO Lay Shaft Sub-Assy



- Unlock the Internal Circlip (12) from the housing in the front groove to unlock the Bearing (1) with the help of Long Nose Plier (with tips bent 90° to its handle).
- Move the coupling sleeve (not shown) and remove the PTO lay Shaft (3).
- Remove Pin assy PTO (not shown) from the groove of PTO sliding gear (9). Dismantle the PTO sliding gear (9) from the PTO Lay shaft.
- Unlock circlip (8) from the last groove of PTO lay shaft with the help of Nose Plier. Dismantle the PTO fixed gear (6) along with Washers (5, 7).

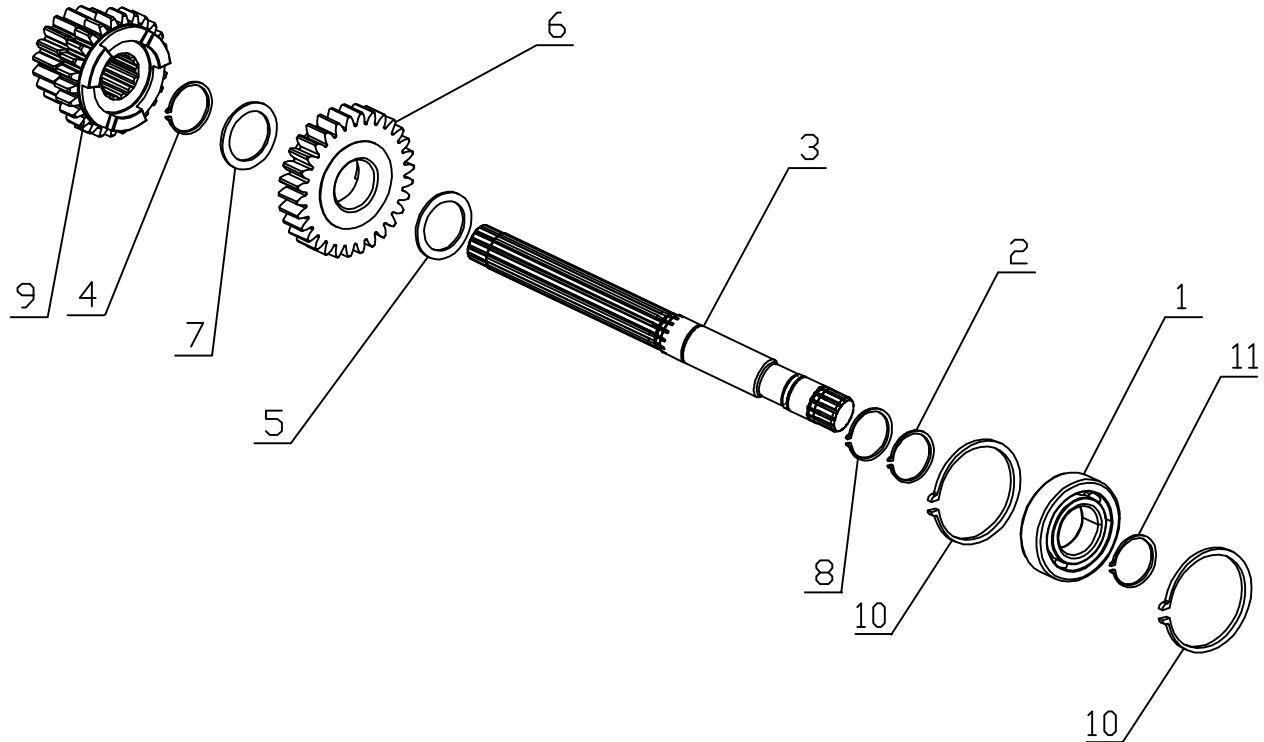
NOTE: In some earlier models, Circlip A-28 (4) is fitted. In this case, remove the external circlip A-28 (4) from the 2nd groove of the Shaft (3).

- Unlock External circlip A-25 (11) from the PTO lay shaft (3) with the help of Nose Plier.
- Remove the Ball bearing (1) and then unlock the External Circlip A-25.
- Remove the Internal Circlip (10) from the housing on the rear/ backward groove with the help of Nose Plier.

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F 4.0 RE-ASSEMBLY OF TRANSMISSION

Step 1: PTO Lay Shaft Sub-Assy



Fit the Internal Circlip (10) into the housing on the rear/ backward groove with the help of Nose Plier.

Onto the shaft (3), fit the external circlip A-25 (2) & then ball bearing (1) & again external circlip A-25 (11) to lock it - all on shaft (3) with the help of Nose Plier.

NOTE: In some earlier models, Circlip A-28 (4) is fitted. In this case, put the external circlip A-28 (4) into the 2nd groove on the shaft (3).

Assemble the PTO fixed gear (6) & washers (5, 7) held together on both sides of gear. Lock them with circlip (8) into last groove with the help of Nose Plier.

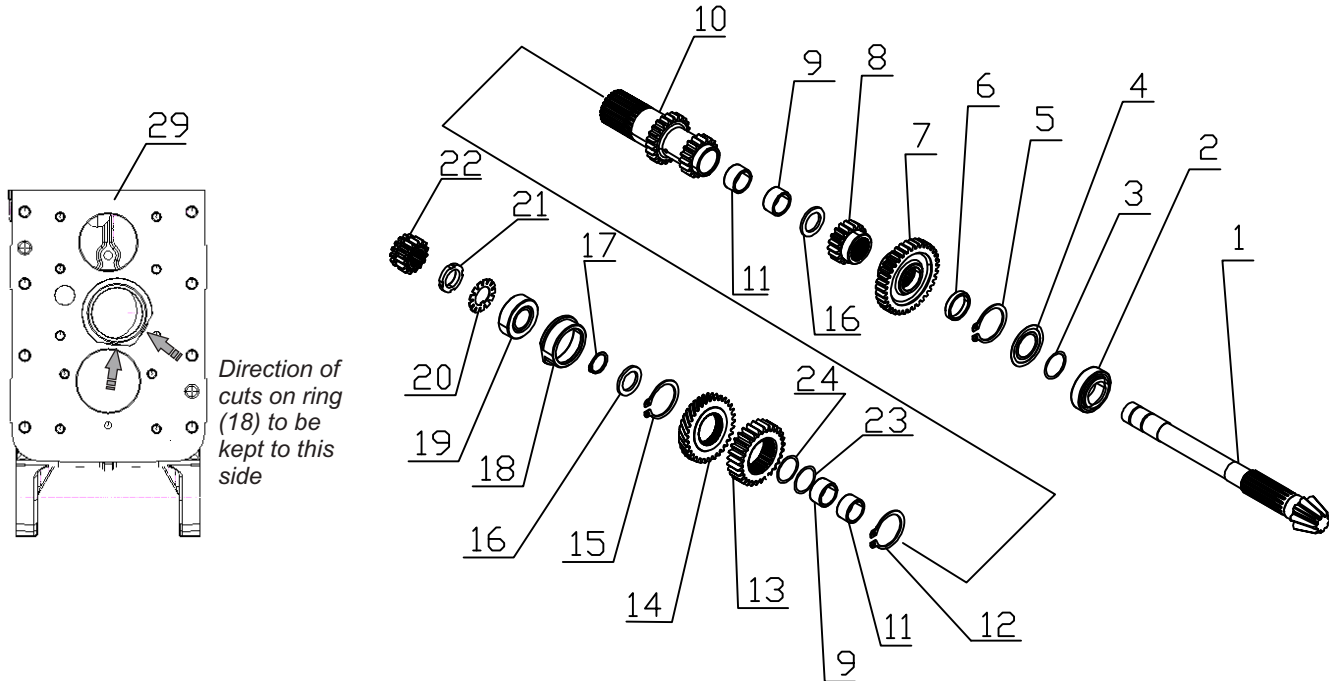
Assemble the PTO sliding gear (9) onto the shaft. Ensure that pin assy PTO rests in the groove of PTO sliding gear (9). *Note: Claws of PTO fixed gear (6) & PTO sliding gear (9) should face each-other.*

Pass the shaft from upside of housing & move it first into the front side bore & then fit the back end into the housing bore for bearing (1). Then move the coupling sleeve (already fitted). Press the shaft. *Tools used: Special Tool & Mandrel*

Finally fit the Internal Circlip (12) into the housing in the front groove to lock bearing (1). *Tools used: Long Nose Plier (with tips bent 90° to its handle).*

Fit the bearing at the front side. **Refer “Assy for 4WD shaft assy” (STEP-4 on Page No. A-27).** *Tools used: Special Tool & Mandrel.*

Step 2: Re-Assembly of Tail Pinion Shaft Assy



Refer “Step 3: Intermediate Shaft Assy, Idler Assy & Lever Hi-Lo Assy” Assy: First of all, fit the Internal Circlip (6) into Housing, fit the Ball bearing (5) into housing & lock it with Circlip (7) (Part Nos. as per view of Step 3).
Tools used: Nose Plier.

Prepare the sub-assy of the lay-shaft (10), pairs of needle bearings (9) & (11) on each-side. Also assemble on this shaft Fixed gear (13) & CM gear (14). See for any play & adjust it by using shims (0.2mm & 0.3mm). Finally lock them with the help of External Circlips (12) & (15) on both sides.

Tools used: Special mandrel 2 & Nose Plier

Notes: a) Chamfer/ Rounding side of Fixed gear (13) should be towards Diff.- side/ Back-side of G Box

b) Deep recess of CM gear (14) towards engine side

Heat up the inner race of TR bearing (2) in induction heater (70~80°C for 2 minutes) & fit it on TP shaft (1). Takeout the outer cone of TR Bearing for fitting into the Housing.

Pre-assy Out-side the Housing: Now put the Shim small (3), the Spacer (6), gears (7) & (8), then washer TP (16) and entire sub-assy of lay-shaft (10) as already prepared above. Put again the 2nd washer TP (16) & lock the ext. Circlip (17).

Check the rotation of lay shaft to be free & check the shimming value by feeler gauge. If need be unlock the circlip (17) to take the assy out & adjust the shims small (3) by value of 0.05~0.1mm.

Tools used: Feeler Gauge

After finding the right value of Shims small (3), note it down & dismantle the assy of TP shaft (except lay-shaft sub-assy - keeping it as such).

Fit the Internal Circlip (5) into the Housing & assemble the Shim Big (4) & then press Outer cone of TR Bearing (2) into Housing.

Final Assy into the Housing: Now again make the entire assy of step 22, but this time into the housing, by keeping related parts into the housing (like spacer (6), gears (7 & 8), washer (16), lay-shaft sub-assy (10) & again washer (16) and pass the TP shaft thru them from back-side bore of housing & lock the Circlip (17).

Note: Bosses/ Hub sides of Fixed gear Low (7) & Fixed gear Hi (8) should face each-other

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Fit Ring (18) into transmission Housing & a False bearing Tool in place of TR bearing (19). Fit washer (20) (without crimping). Tighten the nut.

Tools used: *Pneumatic Press, Pressing Load: Approx. 120 kg/cm²*

Check the Pre-Load of TP shaft assy. Also check the free rotation of entire assy. Adjust the Shim Big (4) - if needed. Note down the value/ No. of the Shim Big (4).

Tools used: *Spring balance, **Pre-Load: 3~4 kgf***

Check the Backlash values between gear pairs as follows:

- a) Lay shaft (10) Z-18 teeth with PTO fixed gear Z-30
- b) Lay shaft (10) z-23 teeth with PTO sliding gear z-19/26

Tools used: *Dial Indicator, backlash: **0.08~0.27mm***

After getting the exact value of Shim Big (4) for TP shaft, take the False bearing out. Induction heat the inner race of actual TR bearing (20) (70~80°C for 2 minutes) & fit it on TP shaft in place of false brg, with same amount of shims as calculated above.

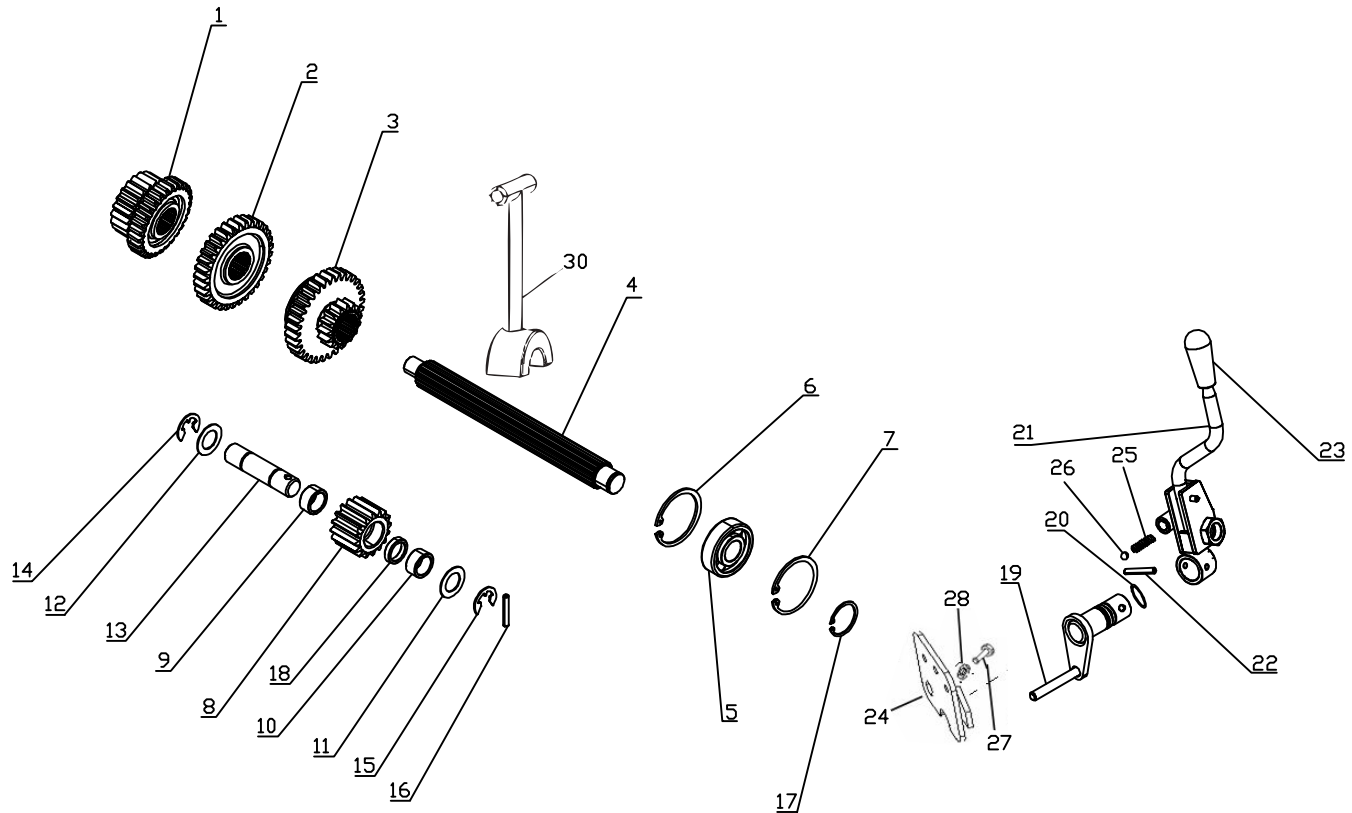
Put Locking washer (20) & Finally Tighten the Withdrawal nut (21) until the same desired Pre-Load is achieved for TP shaft. Crimp the Lock Nut in Position.

Tools used: *Special mandrel, Pre-load: 3~4 Kgf*

Apply gear oil (EP-80) 2 mL - 4-5 drops each side to both TRB bearing for lubrication purpose on the inner race and carefully rotate TP carrier either anti clock or clock wise so that oil should be applied properly.

Finally Put the sliding gear (22) for 4WD along with Fork Rod for 4WD.

Step 3: Re-Assy of Intermediate Shaft Assy, Idler Assy & Lever Hi-Lo Assy



Idler Assy: Fit the needle cage bearings 24x18x12 (9) & (10) into idler gear (8) with spacer for idler gear (18) between both NRBs (to avoid any play). *Tools used: Mandrel, Chamfer/Rounding side of Idler gear (8) should be towards Diff. side/ Backside of Gear Box.*

Pass the Idler shaft (13) into the housing & put the external circlip E-15 (14) on its one side (for seating of Idler gear sub-assy). *Tools used: Special Tool*

Drop/hang the above idler gear along with the washer (11) & (12) on each side of gear and pass the idler shaft (13) thru this sub-assy & into the housing.

Lock this sub-assy with putting another external circlip E-15 (15) on the idler shaft at its other end. *Tools used: Special Tool*

Lock the Idler shaft with Spring Cotter Sleeve (16). *Tools used: Special Tool & Soft Hammer*

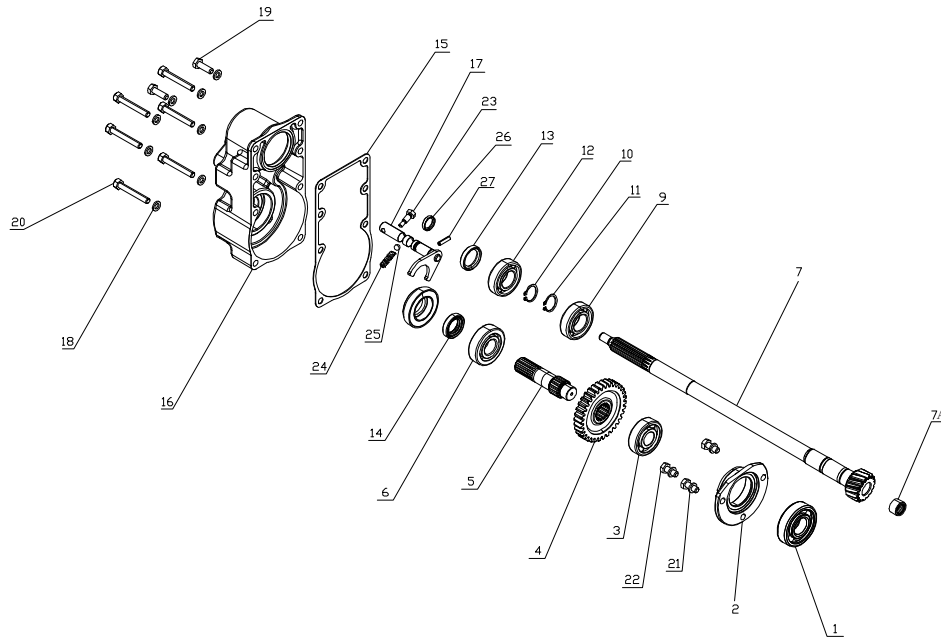
Check back-lash between Idler gear (8) & Z-23 of lay-shaft (Part (10) of Step 2). *Tools used: Dial Indicator, Backlash: 0.08~0.27mm*

Hi-Lo Lever Assy: Fit the Hi-Low Lever assy & all its related parts, before proceeding further. Take pin assy Hi-Lo (19), put O-ring (20) on it & then put pin assy hi-lo into Transmission Housing from inside. Put the special gauge (30) on the shaft (4) & press it against Internal Circlip B-52 (6). Now press the sliding gear Hi-Lo (3) against the gauge & fit the pin Assy into the groove of gear (3). In this position lock/ fit the plate (24). Fit the Locking Plate (24) on the outer side of housing using spring washer (28) & hex screws M8x16 (27). Then, put Spring (25) & Ball (26) into the hole of Lever assy Hi-Lo (21) & assemble the lever assy Hi-Lo (21) from outside & lock it with spring cotter (22), as shown. Also fit the knob (23) using Hex Nut (29) on the Hi-Lo lever. *keep Hi-Lo lever pin into slot of Sliding Gear (3), Torque: 21~23 Nm, Loctite: 243*

Shift the lever to move gear (3) forward & remove the gauge (30) out of housing.

Intermediate Shaft Assy: Drop/ hang the Sliding gears (1), (2) & (3) into the transmission housing and pass the intermediate shaft (4) thru them from the Front Side of housing & lock it with External Circlip A-20 (17) with the ball bearing 6304 (5). This shaft rest with its front end into the needle bearing inside the input shaft to be fit later. *Small gear side of gear(1) & Fork grooves of gears(2) & (3) should be towards Engine/ Front side.*

Step 4: Re-Assy of Input Shaft & 4WD Shaft Assy with Front Cover Housing



To be assembled with PTO lay shaft (Refer Step-1).

The Ball bearing (1) into the housing & onto the PTO lay shaft end. Assemble the bearing housing (2) with the help of hex screws M8x1.25x25 (22) with Loctite 542 & spring washers (21) onto the transmission housing. *Tools used: Special Mandrel & Torque Wrench, Torque: 21~23 Nm.*

Fit the oil seals (13) & (14) into the front bearing housing (16). *Tools used: Mandrel*

Fit Oil Seal (26) into the bearing housing front (16) & fit spring cotter sleeve (27) on the fork assy (17) Then fit spring (24) & ball (25) into Bearing Housing Front (16) & then assemble the fork (17) into Brg Hsg front (16). Then put sliding Gear Z-15 for 4WD (not shown) with its groove carrying the fork in it & lock it with Shifter Pin 4WD (23) with proper sealant & specified torque. *Tools used: Special tool. Note: Oil seal (26) spring/ lip side to be towards Wall of bearing housing(16) & to be greased before fitting Fork Assy 4WD (17), Torque: 21~23 Nm, Loctite: 243 (for Shifter Pin (23).*

Prepare 4WD shaft sub-assy. Fit the ball bearing 6304 (3) on 4WD shaft (5). Then fit the gear (4) & fit bearing (6) on the gear. *Tools used: Mandrel, Note: Chamfer/Rounding side (extra hub side) of Idler gear (8) should be towards Engine/ Front-side of Gear Box.*

Prepare the input shaft sub-assy. Fit bearing 6205 (9) on the input shaft & lock it with circlip (10). Again fit the external circlip A-25 (11) on the input shaft into the 2nd groove & fit 2nd bearing (12) against it.

Fit the above sub-assemblies of 4WD shaft into the bearing housing (2) & sub-assy of the input shaft into the bearing housing front sub-assy (16), already made. *Tools used: Soft hammer*

Fit the needle bush (7A) into the input shaft (7) upto depth of 1.5mm.

Assemble the gasket (15) to the Bearing Housing (16) using Anabond.

Assemble Bearing housing (16) with gasket (15) to the main transmission housing, with the help of screws M18x1.25x25 (19) - 2 nos & M8x1.25x55 (20) - 6 nos with Loctite 542 & spring washers (18). *Tools used: Torque Wrench, Torque & Check free rotation of shaft, Torque: 21~23 Nm*

After slide engaging, Check Back-lash between Sliding gear Z-15 teeth (part (3) of sheet 6) with Fixed Gear Low Z-36 [part (7) of Step-2 tail pinion shaft assy]. *Tools used: Dial Indicator, Backlash: 0.08~0.27mm*

Again after slide engaging to other position, Check Back-lash between Sliding gear Z-33 teeth (refer step 3) with Fixed Gear Hi Z-18 [part (8) of Step-2]. *Tools used: Dial Indicator, Backlash: 0.08~0.27mm*

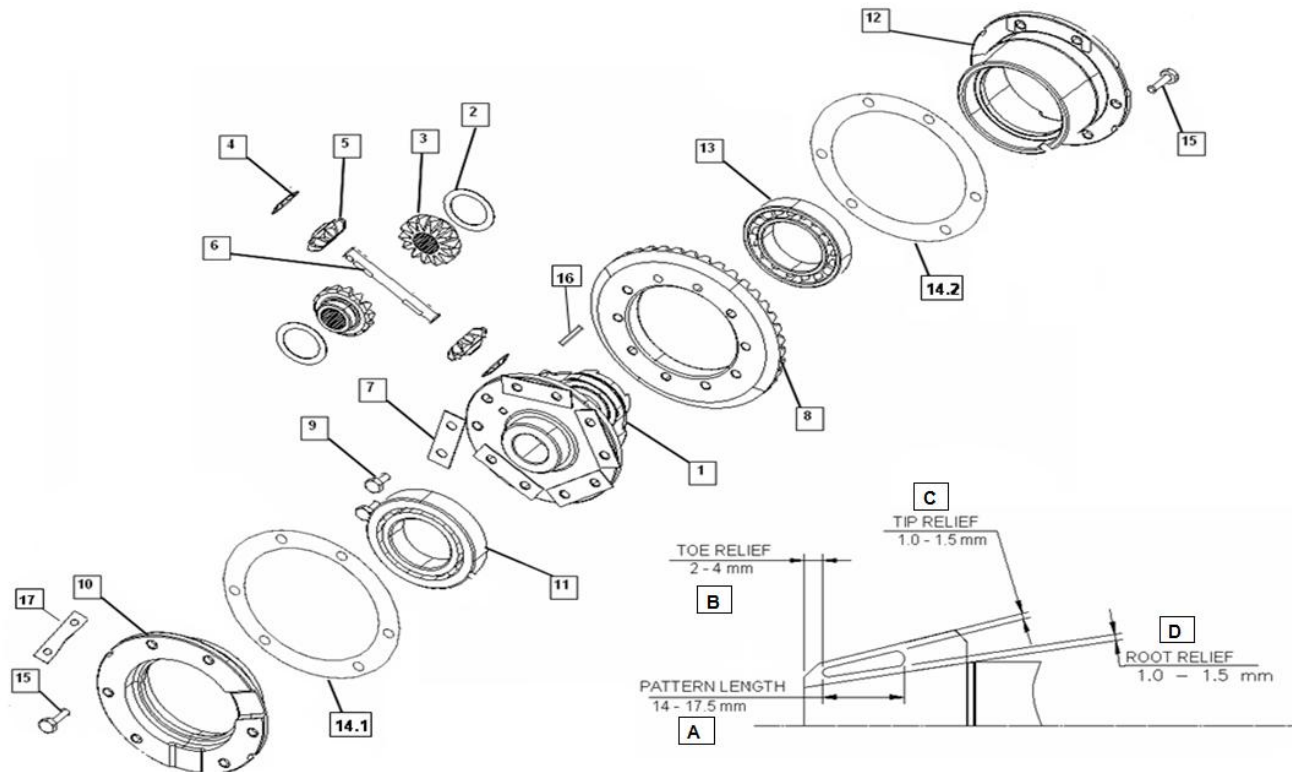
Now, after slide engaging, Check Back-lash between 1st/rev gear (refer step 3) with Lay shaft Z-18 teeth [part (10) of Step-2]. *Tools used: Dial Indicator, Backlash: 0.08~0.27mm*

After slide engaging, Check the Backlash values between following gear pairs:

- Z-28 teeth of 2nd/ 3rd sliding gear (refer step 3) with Lay shaft Z-23 teeth [part (10) of Step-2].
- Z-21 teeth of 2nd/ 3rd sliding gear (refer step 3) with Fixed gear 3rd Z-29 [part (13) of Step-2].

Tools used: Dial Indicator, Backlash: 0.08~0.27mm

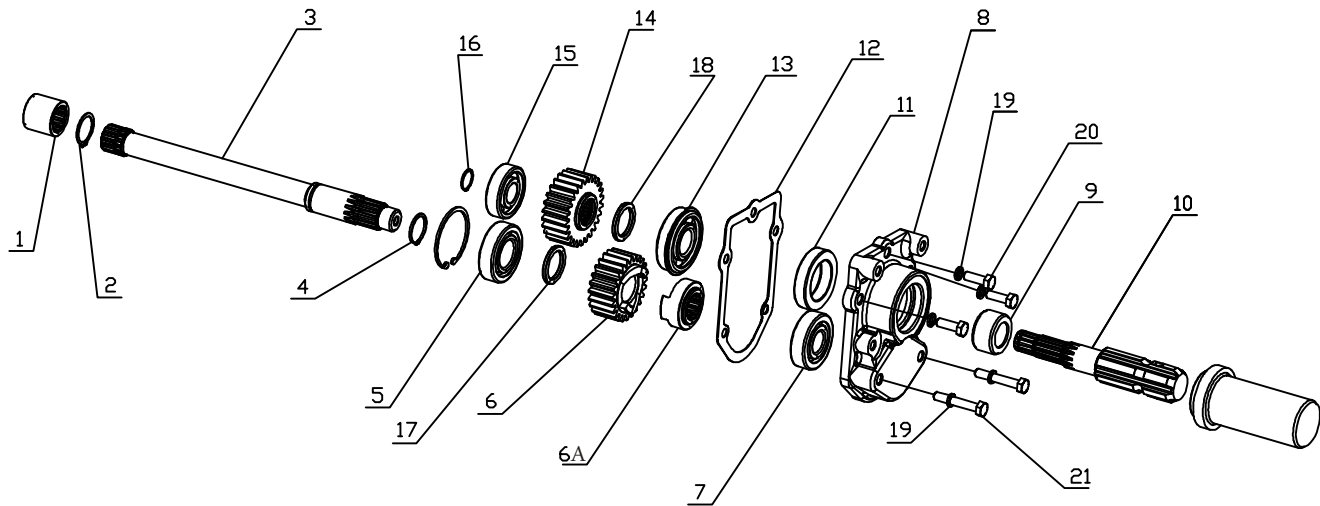
Step 5: Re-Assy of Differential Cage and Crown wheel Assy



- Assemble the Diff. side gear liner/ washer (2) on both inner sides of cage & place both gears diff side (3).
- Now, place the spherical thrust washer (4) on both sides cavities into the cage with the help of grease for sticking them with the wall.
- Place the two Gear diff pinion (5), one on top & other on bottom of assy and rotate the entire gears assy by locking them (by holding together) till they take the seating upon the spherical washers (4). **Note:** Lub. Oil to be used during assy of bevel-gears.
- Pass the pinion shaft (6) & lock it with the spring cotter (16). *Tools used:* Special tool & soft hammer
- Assemble crown wheel (8) with the above cage-assy (1) using locking washers (7) & screws (9). Tightening Torque: 21~23 Nm with application of Loctite 243.
- Fit Bearings (11) & (13) onto the Diff Cage assy (1) as shown on its both sides with the help of special tool. Initial shim Value=0.85/side 0.15X3=0.450.2X2=0.40
- Keep the above assembled Cage assy into the Transmission housing & Fit LH cage carrier (10) to the Transmission housing using shims (14.1). Tighten the screws (15) to proper torque by using locking washer (17). Tightening Torque: 21~23 Nm with application of Loctite 243.
- Similarly, Fit the RH cage carrier (12) to the Transmission housing side using shims (14.2). Tighten the screws (15) to proper torque by using locking washer (17). *Tools used:* Special tool & torque wrench. Tightening Torque: 21~23 Nm with application of Loctite 243.
- Check the back-lash with mating Tail-pinion with the help of Dial indicator. Adjust the shims (14), if needed to achieve the optimum values of it. **Backlash: 0.13~0.18mm.**
- Check the Contact-pattern & adjust the no. of shims to get the desired pattern with the help of yellow paste. **Note:** Values A, B, C, & D to be controlled as per layout given above.

TRANSMISSION

Step 6: Re-Assy of PTO Intermediate Shaft, Gears & End Cover Assy



Fit the external circlip (4) & Bearing (5) on the PTO intermediate shaft (3). Also put the external circlip (2) at the other end splines of the same shaft. *Tools used: Nose Plier*

Now, assemble the spacer (17) on the above shaft assy. Drop/ put the PTO gear (6) & Locking Hub (6A) into the housing & pass the already assembled PTO intermediate shaft (3) thru the gear & Hub from front side of hsg. Fit the bearing (7) on the free end of shaft (3) from back-side. *Tools used: Soft hammer, Claws of PTO gear (6) & Locking Hub (6A) should face each other.*

Heat-up the sleeve-PTO (9) to specified temp & fit the same alongwith bearing (13) & spacer (18) to the PTO shaft (10), while keeping snap ring of bearing towards sleeve-PTO(9). *Tools used: Special Tool, Temp.: @ 70°C, Time: for 2 minutes*

Drop/ put gear (14) inside the hsg & pass the above PTO shaft assy (10) thru it from back side of hsg & press it properly. *Raised Boss of PTO gear (14) should be towards front side of Hsg*

Fit the oil seal (11) into the PTO end cover (8) & Assemble the end cover (8) to the main hsg with the help of gasket (12) with Anabond, spring washer (19) & screws (20) and (21) as per shown locations. with Loctite 542. *Tools used: Special Tool & Torque Wrench, Torque: 21~23 Nm, Loctite: 542 (for screws), Anabond: 666 (for gasket)*

Fit the bearing (15) on the opposite end of the PTO shaft (10) & lock it with ext circlip (16). *Tools used: Special Mandrel*

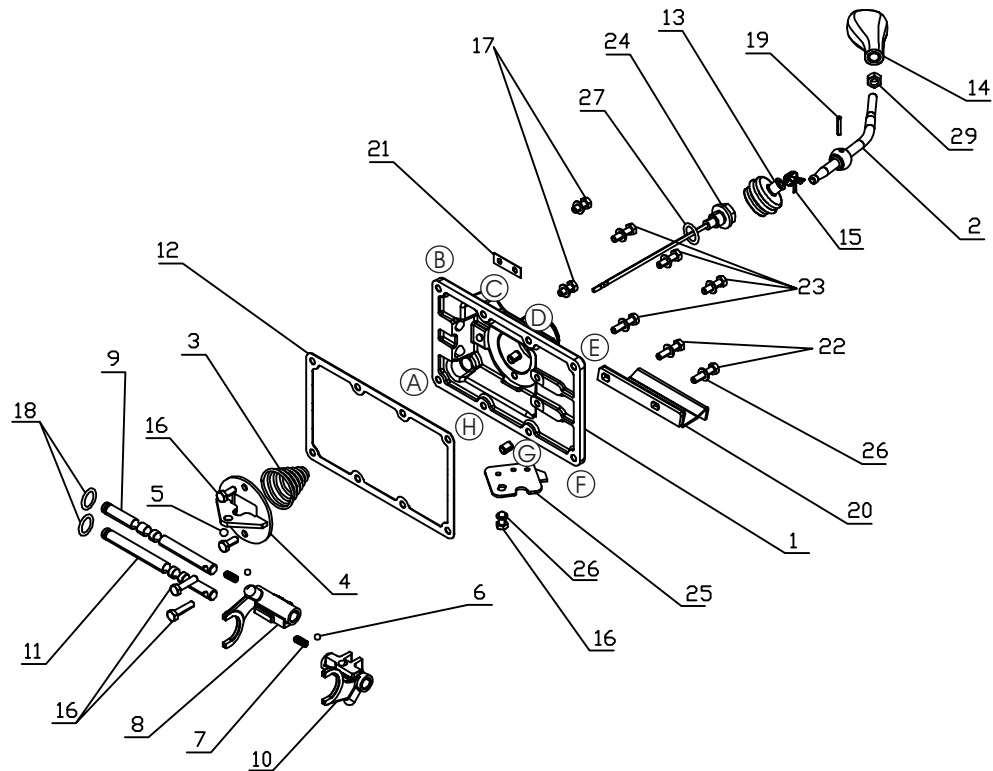
Check the back-lash value between PTO gears Z-23 (6) and Z-27 (14). *Tools used: Dial Indicator, Backlash: 0.08~0.27mm*

Assemble the sleeve (1) onto the end of PTO intermediate shaft (3).

Apply the Anti-Rust Oil onto the PTO shaft (10).

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Step 7: Re-assembly of Shifter Housing Assy.



Assemble the Shifter lever (2) thru the hole of shifter housing from lower side - after fitting the Spring cotter sleeve (19). Place the Conical Spring (3) & Fit the locking plate (4) with the help of hex screws M8x16 (16) - 2 nos with torque of 21~23 Nm. *Tools used: Torque Wrench, Apply Loctite: 243 Grade*

Put the Spring (7) & the ball (6) with dia 8, into the hole in shifter fork (8).

Fit the O-ring (18) to the shifter rod 2nd/3rd (9) & pass it thru housing (thru the hole opposite to the mark 2nd/3rd) & at the same time thru the Shifter fork with ball-spring assembled above.

Place the ball (5) with dia 10 carefully in between the hole provided in locking plate (4).

Similarly make the assembly of Shifter fork & rod for 1st/ 2nd (11). & pass thru shifter housing carefully keeping the ball (5) in locking plate.

Lock the Shifter rods both with hex screws M8x16 (17) - 2 nos with shifter housing with help of locking washer (21). *Tools used: Torque Wrench, Torque: 21~23 Nm, Loctite: 243*

Assemble the gasket (12) upon the transmission housing with the help of Anabond.

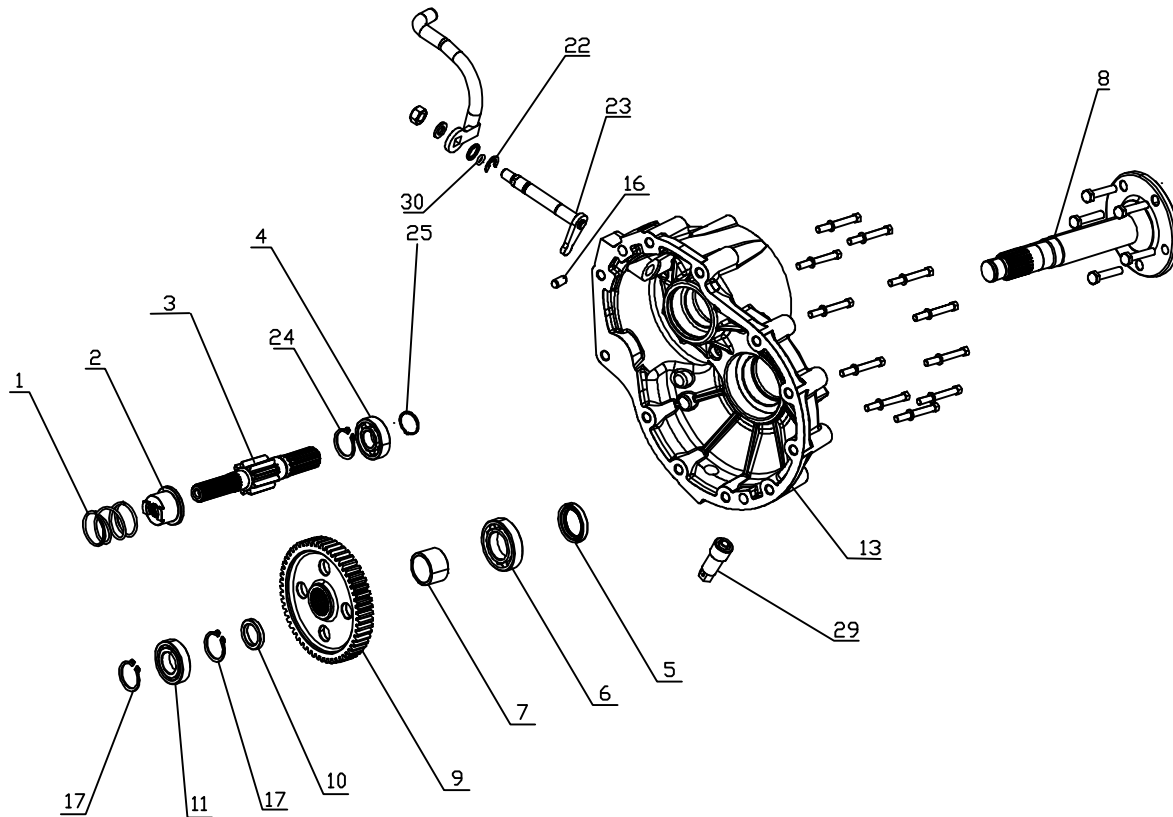
Assemble the Shifter housing with the transmission housing with spring washer B8 & Hex screws M8 with torque of 21~23 Nm and apply loctite 243 grade, along with Guide Plate (20) on the side holes as shown in sketch. Note that screw (22) length is diff for each location, as shown. Use screws with L=20 at location A & B, use screw with L=35 at G&H, & use screw with L=30 at remaining locations as per part codes given in tabular form above. *Tools used: Torque Wrench*

Assemble the rubber boot (13) & the knob (14) to the shifter lever.

Fit the Dipstick (24) using a copper sealing washer (27) into the open hole provided at the top of Shifter housing, as shown. *Tools used: Torque Wrench, Torque: 21~23 Nm*

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Step 8: Re-Assy of BP Shaft and Brake Cover Sub Assembly



Pick rear axle (8) already assembled with wheel bolts and place it on working table.

Pick brake housing (13) and place it on fixture such that rear axle (8) should come out through bore of brake housing (13).

Pick oil seal (F4D 48x65x10) (5) and assemble it into brake housing (13) as shown in figure. *Tools used: Mandrel, Hammer*

Pick ball bearing 6209 (6) and assemble it on rear axle (8) from inside brake housing (13). *Tools used: Mandrel, Hammer*

Pick spacer big (rear axle) (7) and assemble it on rear axle (8) from inside brake housing (13). *Induction heat 70 degree celsius for 2 minutes. Tools used: Induction Heater, Mandrel, Hammer*

Pick bull gear (9) and place it in brake housing over rear axle (8) as shown in figure.

Pick spacer small (rear axle) (10) and assemble it over rear axle (8) over bull gear (9) as shown in figure. *Induction heat 70 degree celsius for 2 minutes. Tools used: Induction Heater, Mandrel, Hammer*

Pick external circlip A-35 (17) - 1 nos. and assemble it to rear axle (8) from brake housing (13) as shown in figure. *Tools used: Circlip Plier*

Pick ball bearing 6207 (11) and assemble it to rear axle (8) after assembling external circlip A-35 (17) - 1 nos. to rear axle (8). *Tools used: Mandrel*

Pick external circlip A-35 (17) - 1 nos. and assemble it to rear axle (8) to lock the assembly. *Tools used: Circlip Plier*

Assemble drain plug assy (29) to brake housing. *Tools used: Spanner : 19 mm, Apply 574 Grade Loctite.*

Pick BP Shaft (3) and place it in fixture or vice.

Pick ball bearing 63/28 (4) and assemble it over BP Shaft.

Pick sub-assembled BP shaft (3) and place it in Brake housing (13).

Pick sleeve diff lock (2) and assemble it over BP shaft (3). Pick spring diff lock (1) and assemble it over BP sleeve diff lock (2) (in case of brake housing right only).

Assemble rubber boot - 1 nos. to Brake housing (13).

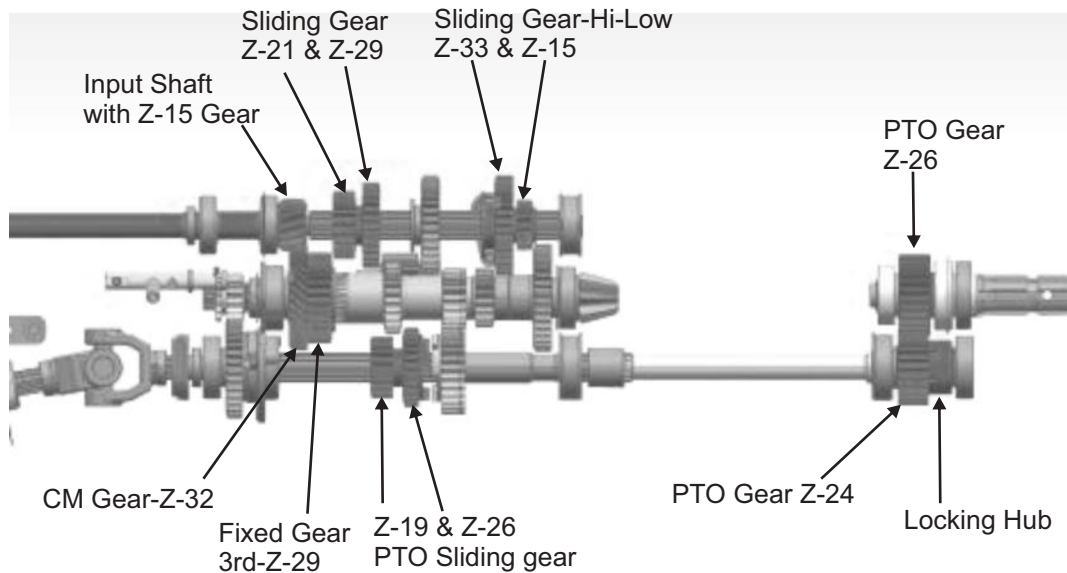
Assemble external Circlip A-28 (25) into brake housing (13) from outer side of brake housing (13).

Assemble O-ring (30) on lug diff lock assy (23). Pick Circlip C-12 and loosely pass it on lug diff lock assy (23). Assemble lug diff lock assy (23) in brake housing (13) from inner side and tighten the Circlip C-12.

TRANSMISSION

F. 5.0 CONVERSION OF 3 SPEED PTO TO 2 SPEED PTO (Solis/Sonalika-26)

Step 1: Components to be removed from 3 Speed PTO transmission

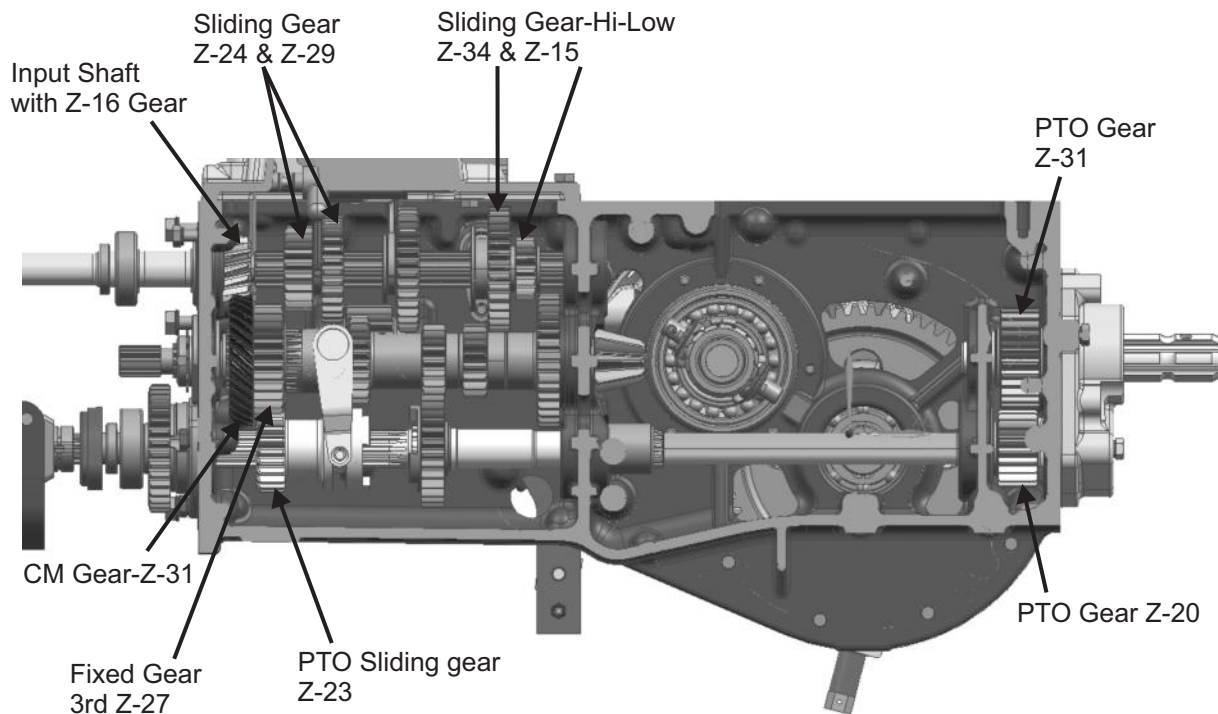


Sr No.	Description	Part No.	Qty/Tractor
1	Sliding Gear 2nd/3rd, Z-29/Z-21	10053229AB	1
2	Sliding Gear High Low Z-33 & Z-15	10050698AC	1
3	Fixed Gear Z-29 (3rd)	10050726AE	1
4	PTO sliding gear Z-19 & 26	10050727BD	1
5	INPUT SHAFT Z-15	10052911BB	1
6	C.M. GEAR Z-32	10053233BA	1
7	Transmission Housing	10053365AC	1
8	Locking Plate (for 3 Speed)	10056160AC	1
9	PIN ASSY. PTO	10050741AG	1
10	Sticker For PTO	10053670AB	1
11	PTO Gear Z-24	10050737CA	1
12	PTO GEAR Z-26	10050739EB	1
13	Locking Hub	10050738AC	1

TRANSMISSION

F. 5.0 CONVERSION OF 3 SPEED PTO TO 2 SPEED PTO (Solis/Sonalika-26)

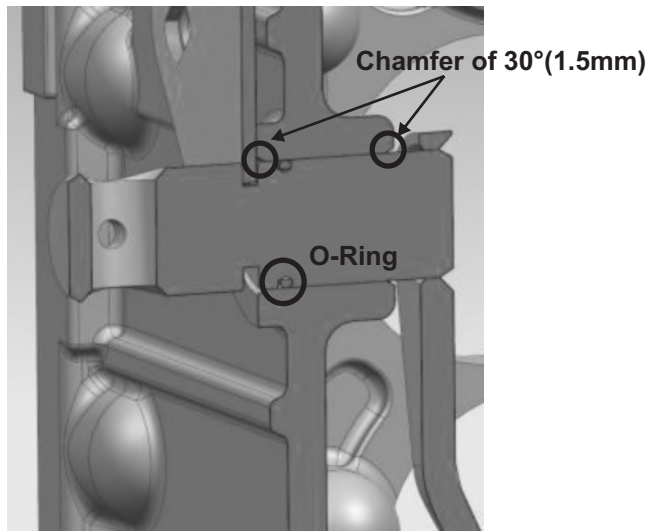
Step 2: Components to be added in 2 Speed PTO transmission



Sr No.	Description	Part No.	Qty/Tractor
1	Sliding Gear 2nd & 3rd (Z-29/Z-24)	10057078AA	1
2	Sliding Gear Hi-Low (Z-15/Z-34)	10056735AA	1
3	Fixed Gear Z-27 (3rd)	10057089AA	1
4	PTO Sliding Gear (Z-23)	10057196AA	1
5	Input Shaft (Z-16, L-504)	10056631AA	1
6	CM Gear (Z-31)	10056640AA	1
7	Transmission housing	10053365AE	1
8	Locking Plate (For 2 Speed)	10056755AB	1
9	Pin Assy. PTO	10056682AB	1
10	Sticker PTO	10046068AA	1
11	PTO Gear (Z-20)	10056740AB	1
12	PTO Gear (Z-31)	10056745AA	1
13	Locking Hub	10050738AD	1

F. 5.0 CONVERSION OF 3 SPEED PTO TO 2 SPEED PTO (Solis/Sonalika-26)

Step 3: Minor rework required in Transmission Housing for PTO Pin Assy Fitment



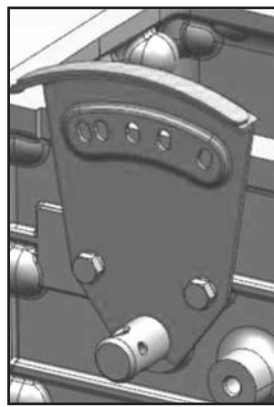
A chamfer of 30° (1.5 mm) is required (as shown in figure) inside the housing hole so that the O-ring gets a relief and goes inside (along with pin assy) the housing without getting damaged.

Step 4: PTO Locking plate & Sticker to be replaced

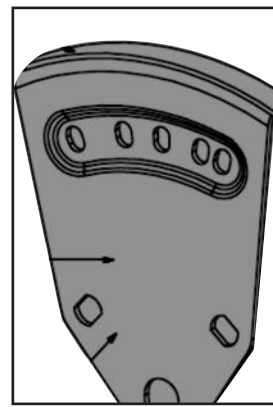
- 3 Speed PTO Locking plate & Sticker to be removed.
- 2 Speed PTO Locking plate & Sticker to be added.
- Hole position in locking plate shifted w.r.t. PTO Lever pin adjustment.



Sticker
3 Speed PTO



PTO Locking Plate
3 Speed PTO



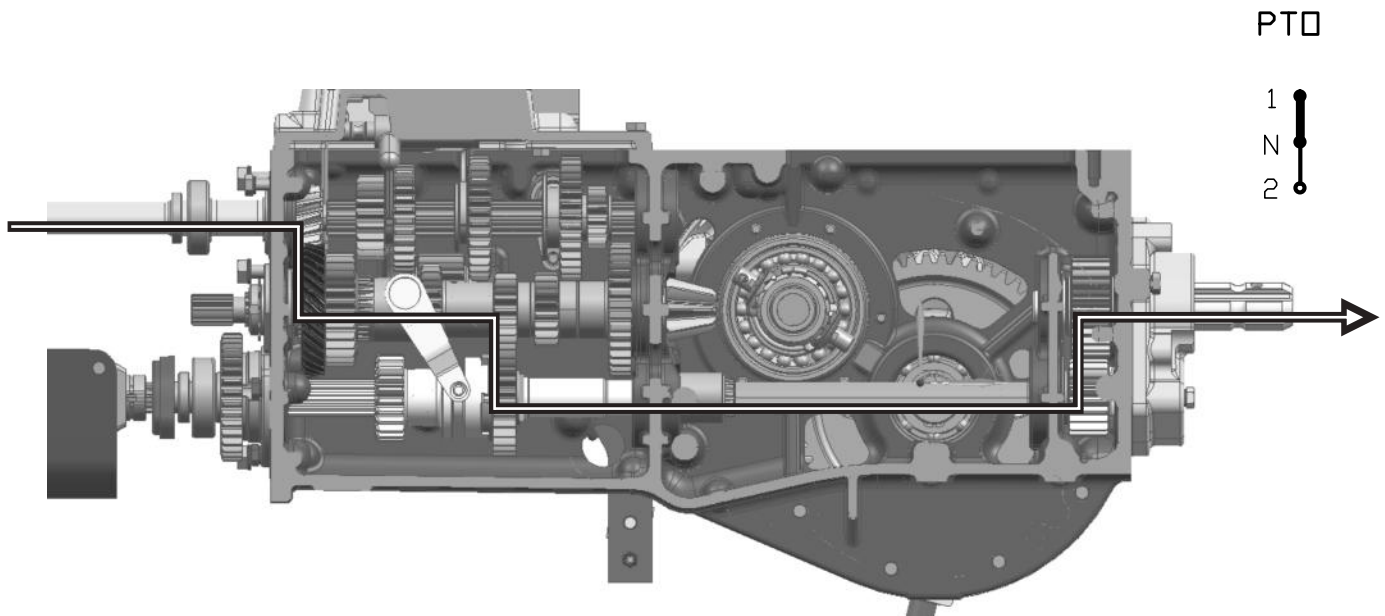
PTO Locking Plate
2 Speed PTO



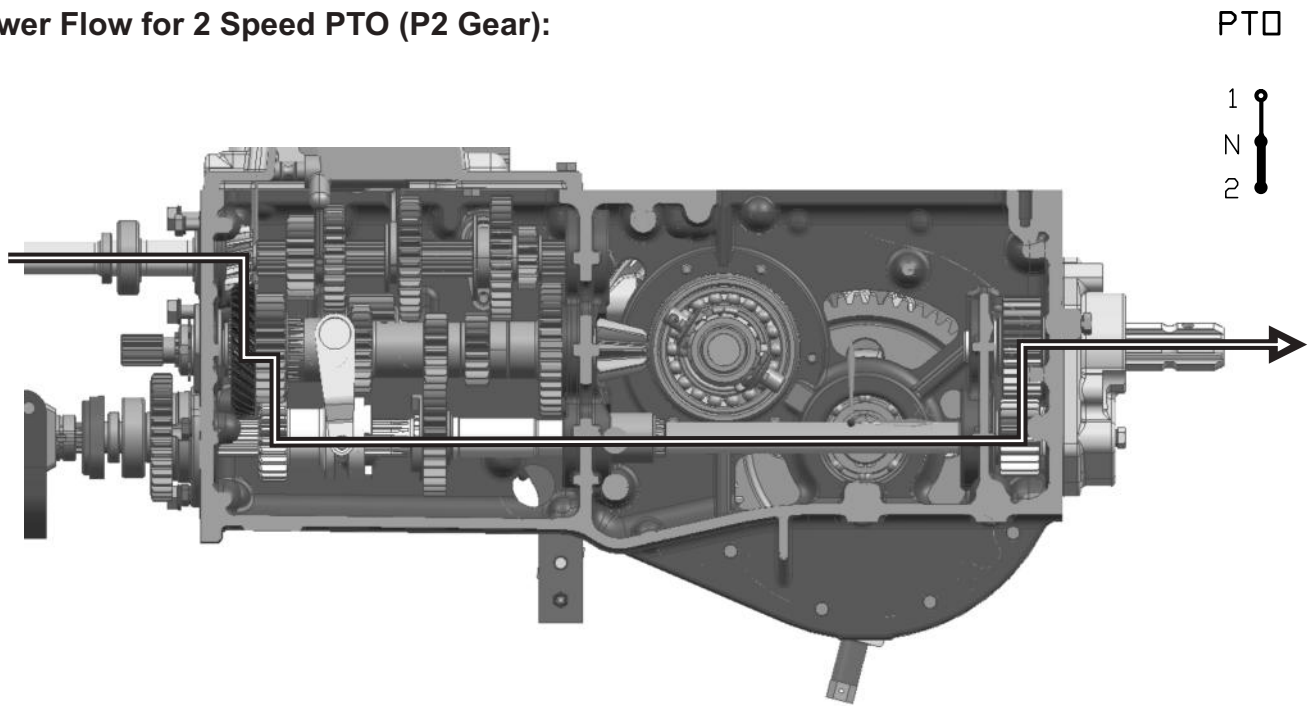
Sticker
2 Speed PTO

F. 5.0 CONVERSION OF 3 SPEED PTO TO 2 SPEED PTO (Solis/Sonalika-26)

Power Flow for 2 Speed PTO (P1 Gear):



Power Flow for 2 Speed PTO (P2 Gear):



TRANSMISSION

F. 5.0 CONVERSION OF 3 SPEED PTO TO 2 SPEED PTO (Solis/Sonalika-26)

Speed Chart for 3 Speed PTO:

(Option-1)

Gear	6-12, 8.3-20 BKT tyre Tr171
L1	1.51
L2	2.2
L3	3.83
H1	6.66
H2	9.68
H3	16.86
LR	1.93
HR	8.51
PTO1	540 @ 2080 ERPM
PTO2	540E @ 1411 ERPM
PTO3	1000 @ 1514 ERPM

Speed Chart for 2 Speed PTO:

Gear	6-12, 8.3-20 BKT Tyre Tr171
L1	1.67
L2	2.42
L3	3.44
H1	7.55
H2	10.98
H3	15.58
LR	2.13
HR	9.65
PTO1	540 @ 2703 ERPM
PTO2	1000 @2558 ERPM

F 6.0 INSPECTION PROCEDURE

PROCEDURE FOR MEASURING PRE-LOADING OF CROWN WHEEL & TAIL PINION

Pre-loading of Tail Pinion Shaft is 3-4 Kgf. Pre-loading can be increased by reducing number of shims and decreased by increasing number of shims.

To measure the pre-loading wrap one end of the string around differential cage housing with the help of bolt and other end with the help of spring balance.

Pull the spring balance and note down the reading. This reading gives the force in kilogram required to rotate the cage with equal speeds. This value should be between 3-4 Kg.

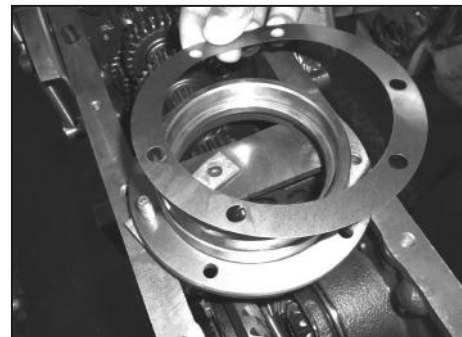
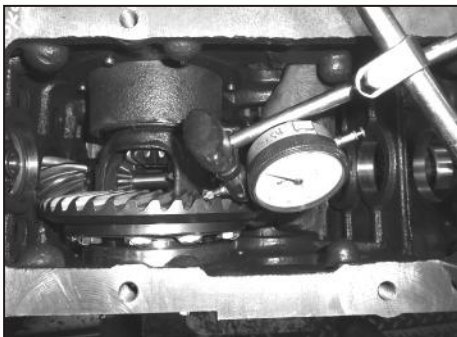
CAUTION: Once pre-loading is adjusted there should never be addition or subtraction of shims. While adjusting backlash and contact pattern, if necessary shims can be transferred from left to right or vice versa.

BACKLASH

Backlash can be generally defined as the play between a mating pair of gear teeth in assembled condition. The value of backlash are given with reference to the pitch circles. Proper amount of backlash ensure smooth running of gear ste. To little backlash may lead to overloading, overheating, jamming & ultimately & eventual failure of the system. Moreover, a tight mesh, may result in objectionable noise during running. Backless between the teeth of tail pinion and teeth of crown wheel are adjusted after setting. Preloading or crown wheel and tai pinion. It should be 0.13-0.18 mm.

PROCEDURE FOR CHECKING BACKLASH

Hold the dial indicator perpendicular to the tooth of the crown wheel, hold the tail pinion tightly to restrict the movement. Note down the deflection of dial indicator needle. Turn the crown wheel and take 3-4 reading at interval of 90 degree. Reading on the dial indicator should be 0.131~0.18mm.



ADJUSTMENT OF BACKLASH








Backlash is increased by adding shims to tail pinion or transferring shims left side to right of seal carrier. Backlash is decreased by removing shims to tail pinion or transferring shims right side of seal carrier to left side.

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CONTACT PATTERN OF TAIL PINION IN MESH WITH CROWN WHEEL

Crown wheel and tail pinion are painted with the help of paint & brush as shown in fig. for checking the contact pattern.



CASE	TOOTH CONTACT PATTERN	INTERPRETATION & ADJUSTMENT	CONTACT
1.	70% tooth contact in center	Tooth contact is correct check backlash for proper value.	
2.	Tooth contact at the root.	Move the tail pinion away from crown wheel out of mesh by adding shim tail pinion carrier bring the crown wheel closer to tail pinion by transferring right side shim seal carrier to left side.	
3.	Tooth contact at the tip.	Move the tail pinion closer to crown wheel axis by removing shim tail pinion carrier by crown wheel away from pinion by transferring left side shim seal carrier to right side.	
4.	Tooth contact at the thicker end.	Excessive backlash, bring the crown wheel near to tail pinion by transferring shim seal carrier from right side to left side this may necessitate changing tail pinion position.	
5.	Tooth contact at thinner end.	Insufficient backlash. Move the crown wheel away from tail pinion by transferring shim seal carrier side and this necessitate changing of tail pinion position.	
6.	Tooth contact at the thinner end while riding forward and at the thicker end while reversing.	Poor teeth machining, or faulty arrangement of holes in the housing. Do not interfere it cover 60% of tool length.	
7.	Tooth contact at the thicker end while riding forward, and at the thinner tooth end while reversing	Do not assemble.	

TRANSMISSION

F 7.0 TROUBLESHOOTING - GEARBOX

S.NO.	PROBLEM	PROBABLE CAUSES	REMEDIES
1	NOISE		
	Humming (a peccutior noise)	Wear on gear teeth flank	Replace the gear.
		Damage on gear teeth flank	Replace the gear.
	Metallic grinding	oil level low.	Top up oil level.
	Whine (Bullet passing sound)	Backlash less	Correct the back lash either by replacing gear on housing.
		Gear machining improper	Replace the gear.
	Hissing (Leaking noise tent-tire to air lack)	worn out bearing	Replace the bearing.
		Bearing ball/race pitted	Replace the bearing.
	Ratting (Ruppict series of short loud noise)	Backlash more	Correct the back lash either by replacing gears or housing.
		Bearing seat loosen	Replace the gearing or replace the housing.
		Bearing play more	Replace the gearing.
		Excessive end play	Correct the end play by tightening the hex retaining nut or replacing spacers/gears.
	Knocking (Noise of sharp blue)	Dent on the gear tooth	Remove the dent by polishing.
Gear tooth damage		Replace the gear.	
Foreign matter present		Clean the gear train and strain the oil.	
2	HARD SHIFTING	Insufficient oil.	Top up the oil.
		Detent lock assy. Tight	Replace detent-retaining spring.
		Bent in shifter rod	Replace the shifter rod.
		Gear tooth battered	Replace the gear.
		Sliding Gears tight on shaft	Free the gear shaft by polishing or by replacing gear/shaft.
		Pilot bearing jam	Replacing the bearing
		Excessive clutch free paly	Adjust & correct free play.
		Inter-lock pin tight	Loosen the pin by polishing.
		Clutch is not disengaging.	Adjust & correct
3	GEAR SLIPPING OUT	Incomplete gear engaqing	Engage gear fully.
		weak detent retaining spring	Replace the spring.
		Shifter rod retaining groove worn out	Replace the spring rod.
		Gear teeth rounded off	Replace the gear.
		Worn out / bent shifter fork	Replace the shifter fork.
4	GEAR STICKING	Detent balls/spring stuck	Free & lubrication.
		Scoring on fork.	Replace fork.
		Clutch not disengaging.	Adjust & correct.

TRANSMISSION

TROUBLESHOOTING - DIFFERENTIAL

S.NO.	TROUBLE	PROBABLE CAUSE	REMEDIES
1	Humming	1.Incorrect adjustment of crown wheel & Tail pinion. 2.Tooth contact pattern not correct.	1.Re-adjust as per procedure. 2.Correct the tooth contact pattern by doing the adjustment as per the procedure.
2	Noise while Accelerating	Tooth contact shifted toward thick end.	Adjust tooth contact pattern as per the procedure.
3	Noise while De-accelerating	Tooth contact shifted toward thick end.	Adjust tooth contact pattern as per the procedure
4	Noise while Turning	1.Bevel pinion tight on bevel gear.	1.Correct the gap.
		2.Damaged teeth of bevel	2.Replace the damaged gear.
		3.Excessive backlash between bevel pinion and bevel gear	3.Correct the backlash.
		4.Defective axle bearing	4.Replace the bearing.

TRANSMISSION

A.8.0 INTRODUCTION (BRAKES)

The brake are one of the most important control component of the tractor. They are required to stop it smallest possible distance and this is done by converting kinetic energy of the wheels into heat energy, which is dissipated into the atmosphere.

The brakes must be strong enough to stop the tractor with a minimum distance in a emergency. But it should be also be consistent with the safety. The driver must have proper control over the tractor during the emergency brake. The brake must have anti-fade characteristic i.e. their effectiveness should not decrease with constant prolong application e.g. while descending hills. This requirement demands that the cooling of the brake should be very efficient.

In actual practice, 100% brake efficiency is rarely used by ordinary tractor due to safety reason. The brake efficiency in general varies from 52% to 80%, which enables the tractor to stop within reasonable distance. With prolonged application of brakes, their effectiveness decreases. This is called fading of brakes. This happens on account of reversible changes in the friction properties of the brake lining on account of high temperatures produced due to prolonged application.

A 9.0 TECHNICAL SPECIFICATIONS OF BRAKES

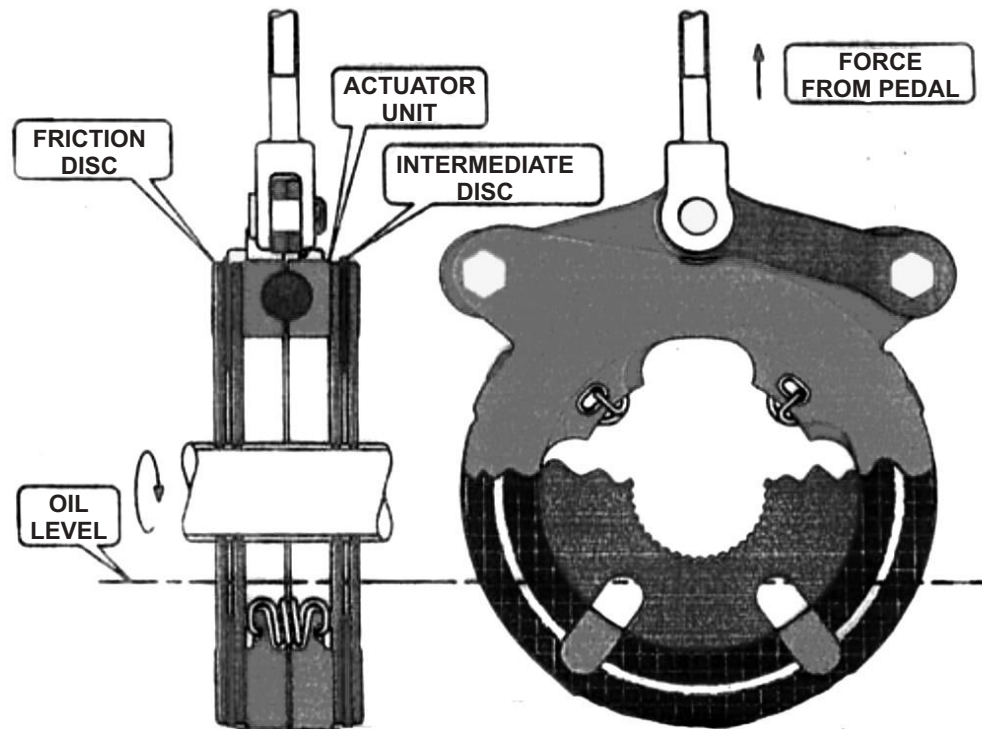
Description	Specification
Type	Oil Immersed Brake
No. of friction discs per wheel	2
Service Brake Control	Mechanically Operated
Hand Brake Control	Mechanically Operated
Parking Brake	Yes

TRANSMISSION

G.3.0 OIL IMMERSED BRAKES

These brakes are equally effective in both forward and reverse direction and its servo action reduce pedal effort. It employs two or more rotating friction discs and has large lining area for a comparatively small and light brake weight.

TYPICAL ILLUSTRATION :



OIL IMMERSED BALL-ON-RAMP BARKE

FEATURES OF OIL IMMERSED BRAKES :

- 1) Totally enclosed/sealed from their working environment prevents degradation from environment contamination.
- 2) Reliable & stable even at higher duty level.
- 3) Progressive pedal feel.
- 4) Smooth & consistent brake performance/operation.
- 5) Enhanced lining life.
- 6) Eliminates frequent brake adjustments.
- 7) Low operation cost (Maintenance free).
- 8) Very low fade characteristics.
- 9) Very smooth engagement characteristics.
- 10) Better cooling characteristics
- 11) Higher thermal capacity.

TRANSMISSION

OIL IMMERSED BRAKES WORKING PRINCIPLE :

The brake consists of a housing (G) bolted to the vehicle frame containing four discs (F) with an actuating assembly between the two discs. The discs have lining material on each face and they are driven by a splined shaft running through the housing.

The actuating assembly is composed of two plates (D) separated by hardened steel ball located in recess in the plate, and the assembly is held together by short springs.

The lugs on the actuating plates are connected to the yoke or jaw end (B) on the pull rod (A) by two links (C). When the brake pedal is pressed, the pull rod and links draw the lugs on the actuating plates towards each other refer fig.1. This contra-rotation of the actuator plates causes the steel ball separating the plates to roll up the inclined seat refer fig.2, thus forcing the actuating plates apart refer fig.5 and pressing them against the rotating lined discs. These in turn are forced against a face of the brake housing on one side, a face on the tractor transmission housing on the other side refer fig.5. When the actuating plates contact the rotating lined disc, the operating assembly is moved around until the torque reaction lug of one plate contacts the stop, refer fig.3 in the housing. The other actuating plate tends to rotate further, increasing the angular displacement between the pair, and assisting the braking action, refer fig.4&5. This action is same for both forward and reverse directions. When the brake pedal is released, spring retract the actuating plates to the original position releasing the lined surface of all pressures. The heat generated by braking is conducted away through the oil in the system.

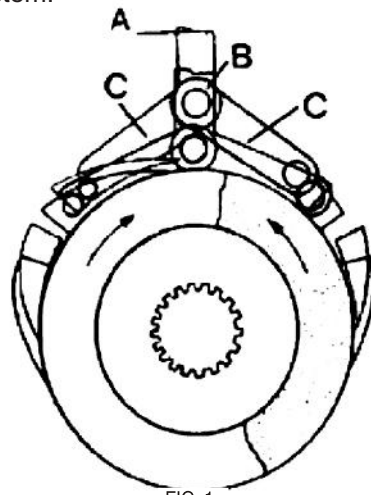


FIG. 1



FIG. 2

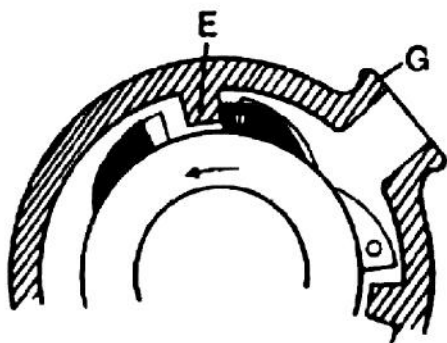


FIG. 3

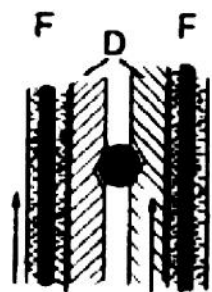


FIG. 4

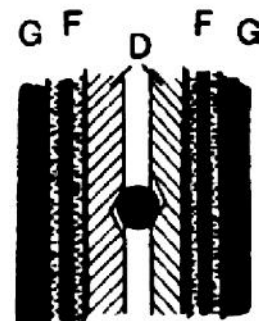
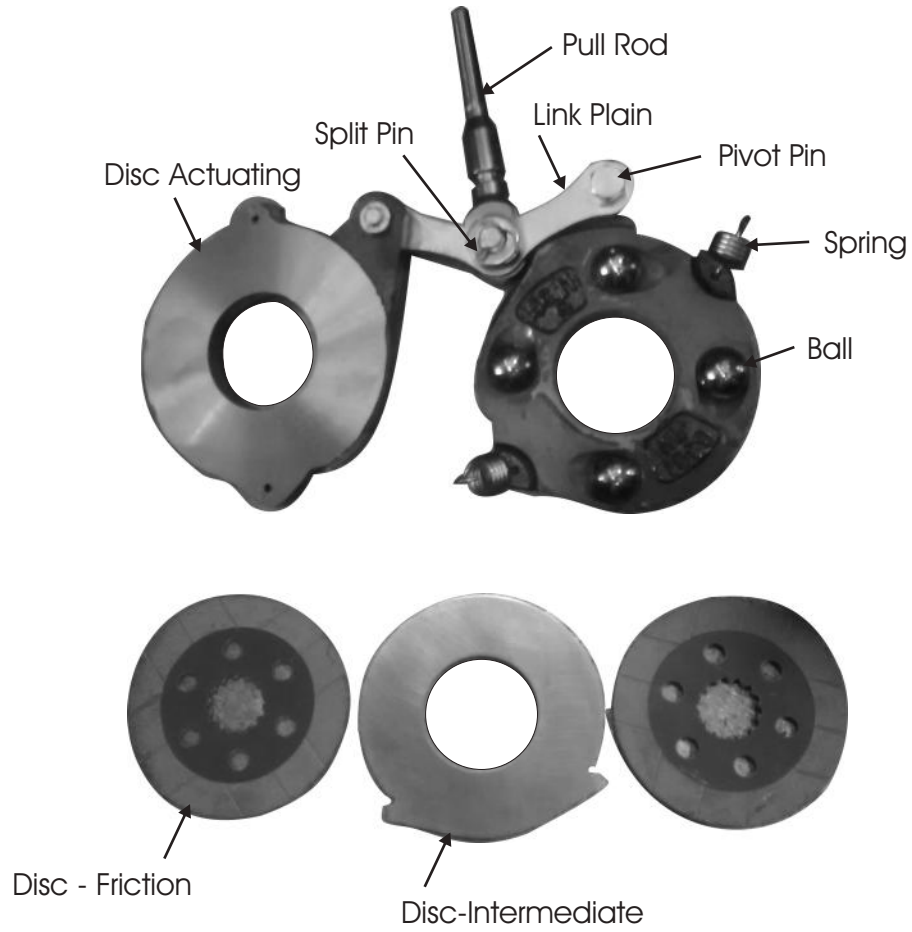


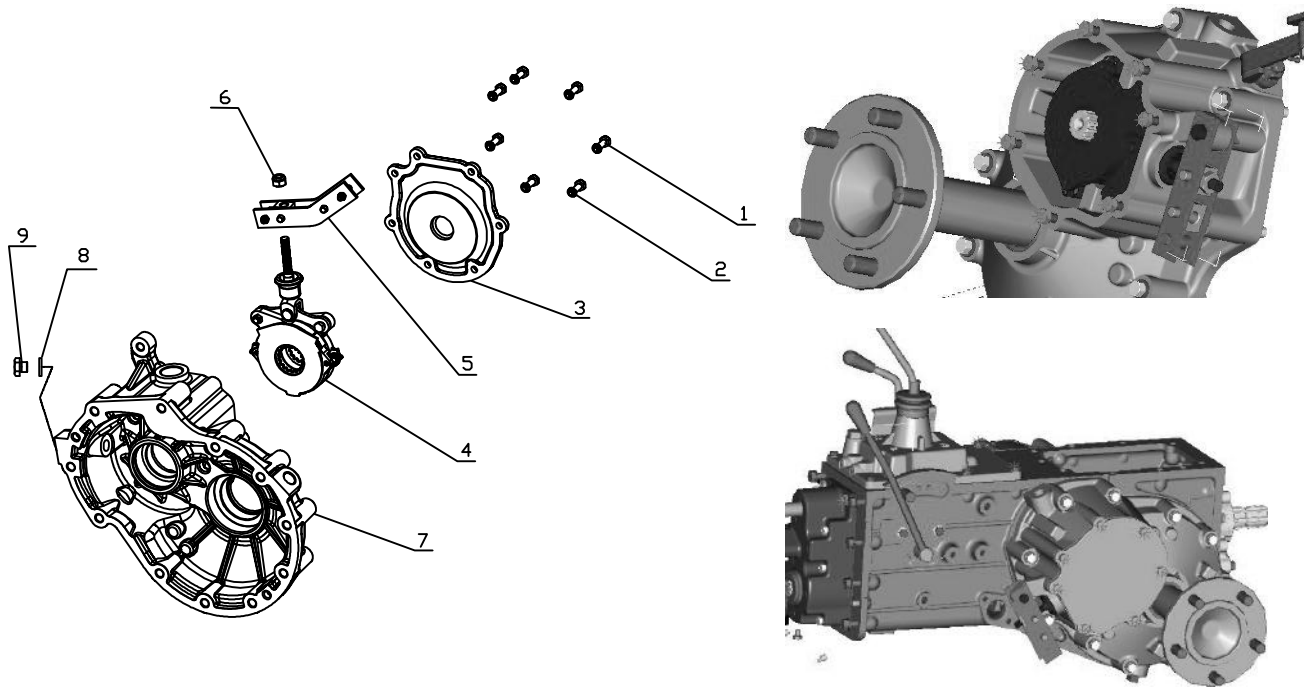
FIG. 5

TRANSMISSION

A 11.0 DETAIL VIEW OF OIL IMMERSED BRAKES



A 12.0 DISMANTLING BRAKE HOUSING FROM TRANSMISSION HOUSING



Dismantle bracket for OIB brake (5) from rod coming out of actuating disk of OIB brake assy (4) by unscrewing hex nylock nut M10 (6) as shown in figure.

Remove respective Brake cover (3) from respective Brake housing (7) by unscrewing Hex. head screw M8 x1.25-25 (1) - 7 nos. as shown in the figure.

Remove Leathers - 02 nos, actuating disk - 01 no, steel plate - 01 no from inside of brake housing (7) for repair, replacement or inspection purposes.

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Housing : It does not require any overhauling, if any damage noticed at the brake path, replace with new one.

Lined Friction Disc : When disc thickness less than 2.65-2.75 mm, friction disc has to be replaced with new one.

Intermediate Plates : If found damaged or rusted replace with new one.

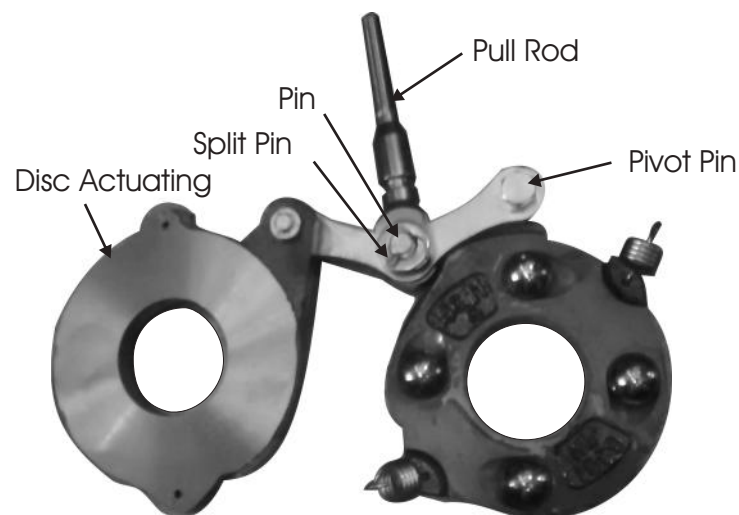
Actuator Unit Assembly :

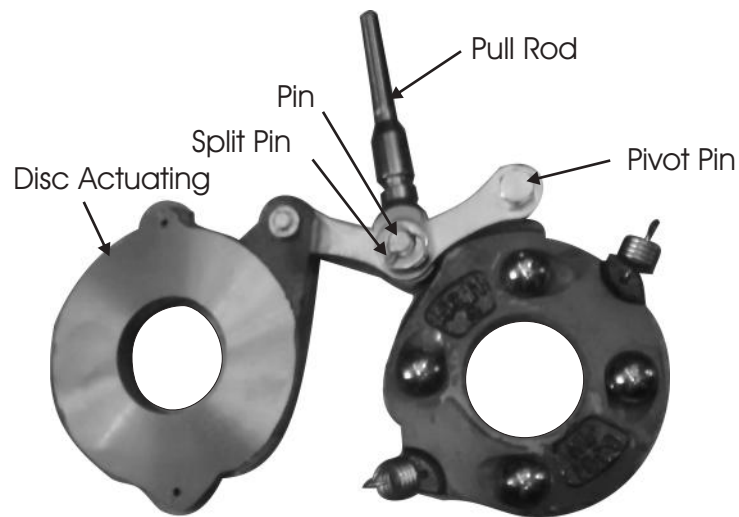
Follow the procedure as illustrated below :

- a) Disconnect the battery wires.
- b) Park the vehicle in a plain surface and choke the wheels.
- c) Disconnect the brake pedal from the pull rod.
- d) Ease the boot from pull rod.
- e) Drain the oil through drain hole in the container.
- f) Remove the cover.
- g) Take out the lined friction discs and intermediate plates.
- h) Take out the actuator unit from the housing.
- i) Dismantle the unit as given below and over haul the unit.

A 13.0 ACTUATING ASSEMBLY OVERHAULING PROCEDURE

1. Remove the split pin.
2. Remove the pin and disconnect the pull rod from the lever.
3. Holding the disc actuating and remove the the spring from the help of long screw driver.
4. Now disc actuating is dismantled and balls are in ramp.

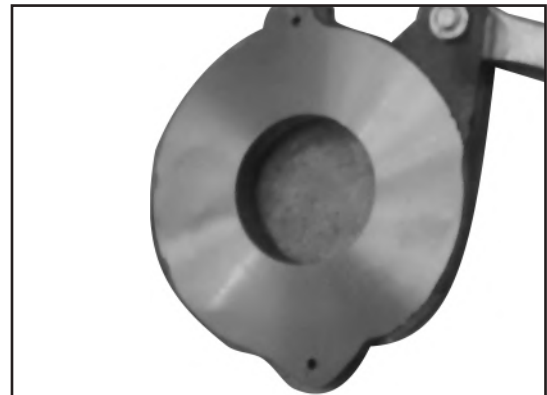




5. Remove the balls from the ramp and clean the disc actuating and balls. Inspect all components, if in doubt replace the disc actuating and balls. Discard the removed springs.

A 14.0 ACTUATING UNIT RE-ASSEMBLY PROCEDURE

1. Clean and examine the disc actuating for any defects or damages. Replace with new one, if in doubt.



2. Take one disc actuating and 4 balls into the ramp as shown and place top disc actuating over the balls.

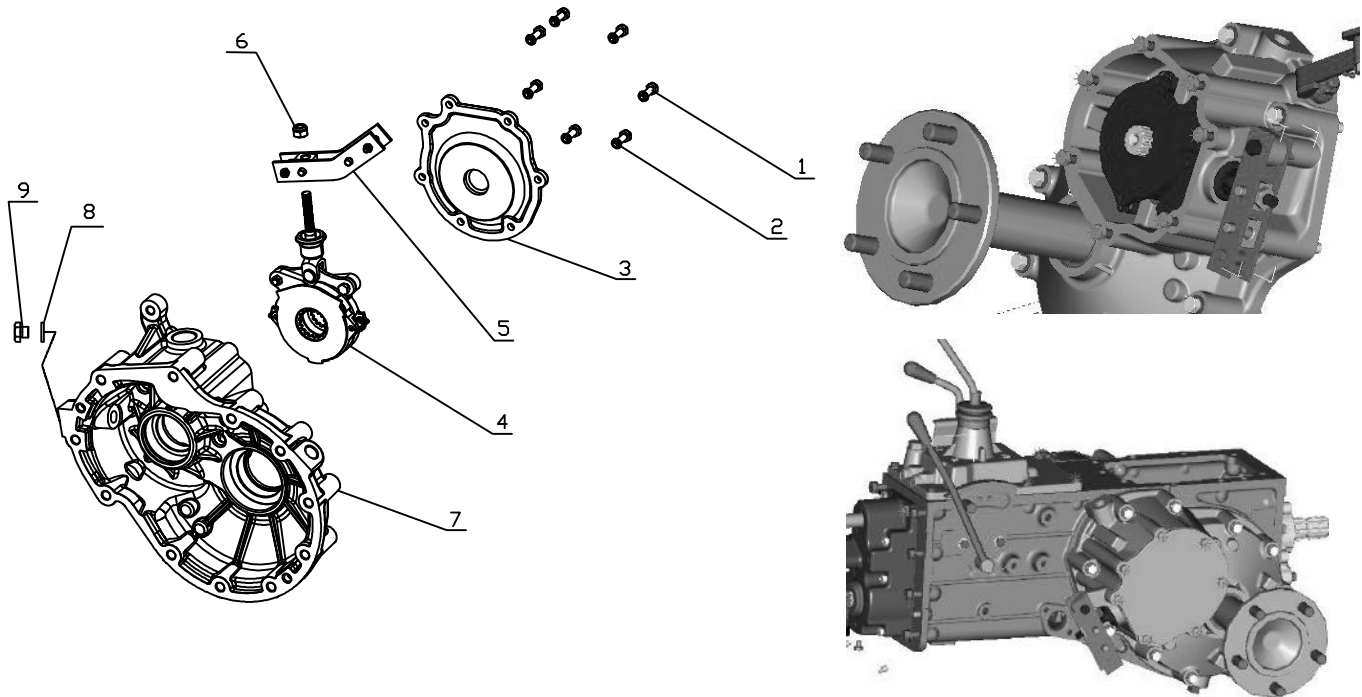


3. Fit the springs suitable hooking. Always use new springs whenever lined friction discs are replaced.

4. Fit the pull rod lever with the help of pin and then fit the circlip pin. Follow the reverse order of removal.

5. Now the disc actuating assembly is ready for the fitment.

A 15.0: ASSEMBLY OF BRAKE HOUSING WITH TRANSMISSION HOUSING



Apply loctite grade 518 properly on transmission housing where brake housing is to be assembled.

Assemble respective sub assembled brake housing (7) to the respective side of transmission housing by using spring washer B-10 - 7 nos. and hex head bolts M10x1.5x75 - 7 nos. at the specified location. *Torque : 30.40 Nm, Loctite : 243 Grade, Tools used: Socket - 17 MM, Torque Wrench*

Assemble sealing plug M16*1.5 (9) to brake housing (7) already assembled with transmission housing by using sealing plug M16*1.5 (9).

Place OIB brake assy (4) - 1 nos. inside brake housing (7) already assembled with transmission housing in proper sequence.

Place disc intermediate (steel plate) - 1 nos. inside brake housing (7).

Place friction disc - 1 nos. inside brake housing (7).

Place Actuating disc - 1 nos. inside brake housing.

Place friction disc - 1 nos. inside brake housing (7).

Pick respective brake cover (3) and apply Loctite on respective brake cover (3).

Pick spring washer B-8 (2) - 7 nos. And hex. Head screw M8 x 1.25-25 (1) - 7 nos.

Assemble respective brake cover (3) to respective brake housing (7) by using spring washer B-8 (2) - 7 nos. and Hex. Head screw M8 x1.25-25 (1) - 7 nos. as shown in figure.

Pick bracket for OIB brake (5) and Hex nylock nut M10 (1).

Assemble bracket for OIB brake (5) to rod coming out of actuating disk of OIB brake assy (4) by using Hex nylock nut M10 (1) at the specified location as shown in figures.

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A 16.0 INSPECTION PROCEDURE

Dos :

- 1) Use only genuine grade of lined friction disc from the INTERNATIONAL TRACTOR LIMITED.
- 2) Use only recommended oil.
- 3) Replace spring whenever lined friction disc is replaced.
- 4) Do adjust brakes regularly.

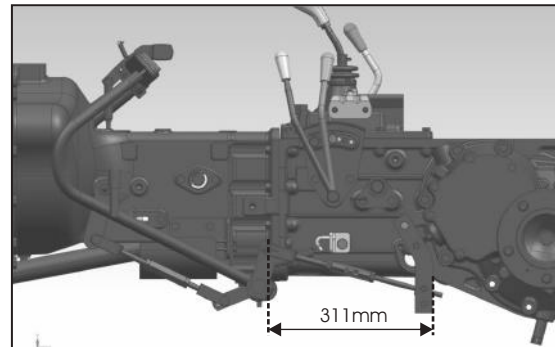
Don'ts :

- 1) Do not use non-recommended linings
- 2) Do not use non-recommended oil.
- 3) Do not use the same springs when friction disc is replaced.

SERVICE LIMIT	
Recommended Maximum wear Is per face of lining	0.25 mm per face
Lined friction disc discard	When Disc thickness becomes less then 2.65-2.75mm
Gasket	Replace whenever brake is overhauled.

A 17.0 SETTINGS OF BRAKE PEDAL AND LINKAGES

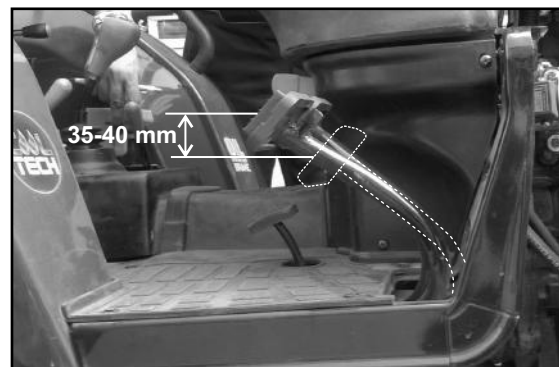
After assembling actuator rod linkage for brake pedal adjust the specified length **311 mm** by using gauge.



Method To Check Brakes Pedal Free Play

Release the hand brake. Uncouple the two pedals. Press down the right hand pedal and measure the free play of pedal as shown in the figure. The distance should be between **35-40 mm**.

If the free play is less than 35 mm or higher than 40 mm then adjust the both hex nut on actuator tie rod until free play comes to 35 to 40 mm. Now, press down the left hand pedal. If the values are not equal with the right hand pedal then repeat the same procedure until values come equal.



TRANSMISSION

A 18.0 TROUBLE SHOOTING

S. No.	PROBLEM	PROBABLE CAUSES	REMEDIES
1.	NO BRAKING ACTION	Pedal linkage broken or disconnected	Replace or repair
2.	POOR BRAKING ACTION	Brake setting improper	Adjust & correct
		Glazed brake liners	Replace
		Glazed brake disc	Correct by machining or replace
3.	BRAKE STUCKING	Linkage retracting spring loose	Replace springs
		Brake disc plate spring tension less	Replace springs
		Binding in linkage	Lubricant & free
4.	NOISE WHILE BRAKING	Loose rivets of brake lining	Correct or replace
		Worn out brake lining	Replace
		Rough or worn out brake disc plate	Correct by machining or replace
		Foreign matter imbedded in lining	Clean the liners
		Loose part in the system.	Tighten the loose part