TRACTORS

2810/T290/T300/T330

SERVICE MANUAL

TRACTOR RUNAWAY

1. The tractor can start even if the transmission is engaged position causing Tractor to runaway and serious injury to the people standing nearby the tractor.

For additional safety keep the pull to stop knob (fuel shut off control) in fully pulled out position. Transmission in neutral position, Foot brake engaged and PTO lever in disengaged position while attending to Safety Starter Switch or any other work on Tractor.

SAFETY STARTER SWITCH

1. Clutch operated safety switch is provided on all Tractors which allow the starting system to become operational only when the Clutch pedal is fully pressed.

2. Do not By-pass this safety starter switch or work on it. Only Authorized Dealers are recommended to work on safety starter switch.

3. On some models Safety Starter switch is provided on transmission High-low shifter lever and in PTO shifter lever.The tractor can be started only if High-low shifter lever is in neutral position.

Safety Starter Switch is to be replaced after every 2000 hours/4 years, whichever is earlier

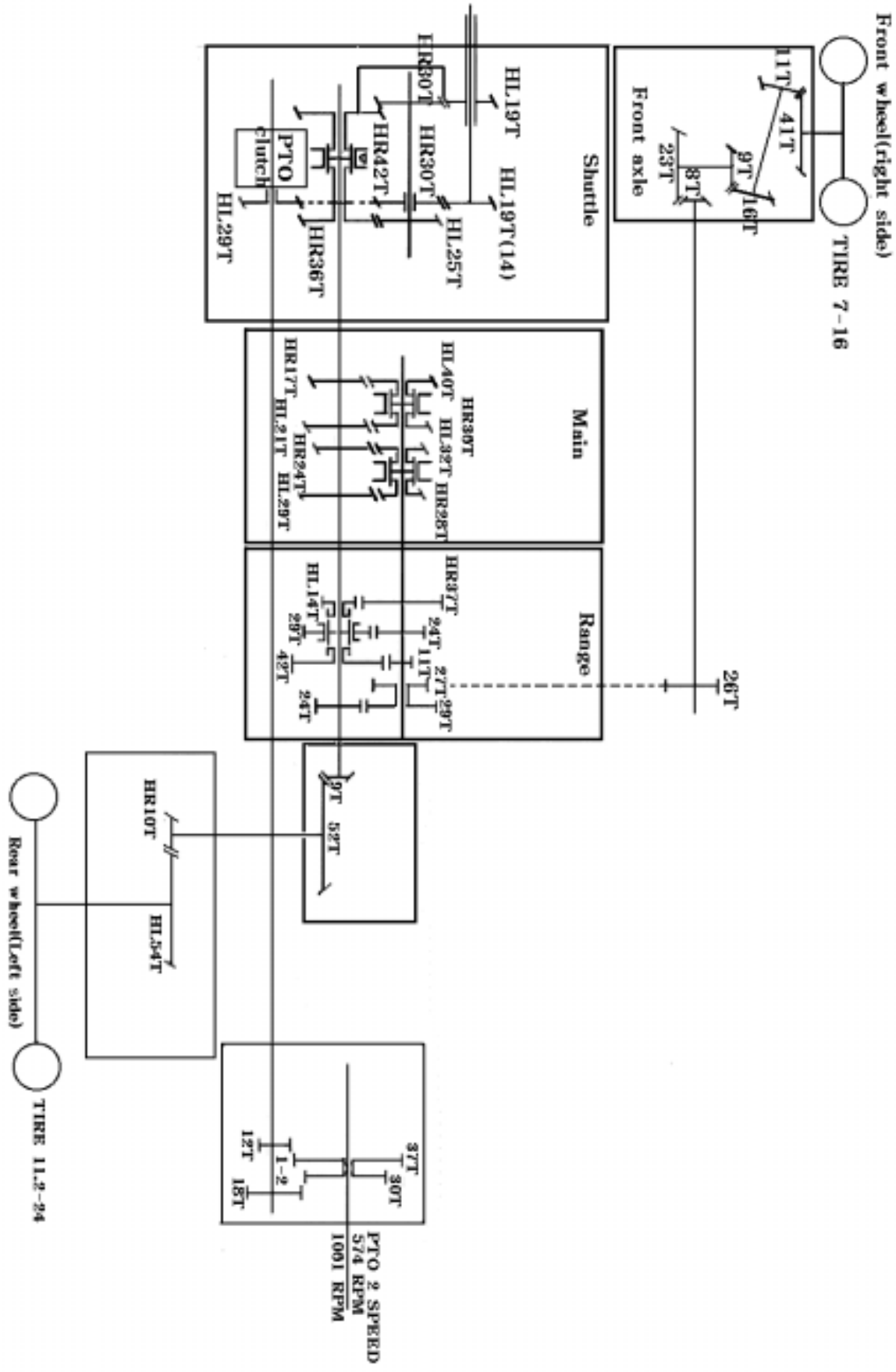


FIG.1-3 GEAR TRAIN DIAGRAM

2) During installation,be careful not to damage the lips,and assure that it is pushed in parallel to the shaft or hole.

3) When oil seals are installed,there should be no turnover of the lips nor dislocation of the springs.
4) When a multi-lip seal is installed, the grooves between lips should be filed with grease, not adhesive.

(3) O-rings

1) O-rings should be coated with grease before installing.
2) Installed O-rings should have no slack or twist.
3) Installed O-rings should maintain proper air tightness.

(4) Snap rings
1) Snap ring installers should be designed so as not to permanently deform the snap rings.
2) Installed snap rings should be seated securely in the groove.
3) Be careful not to overload the snap ring to the extent that it is permanently deformed.
4) How to install the snap ring:
When installing a snap ring,install it as shown in the figure with its round edge side turned toward the part to be retained.This round edge is formed when the snap ring is pressed out.

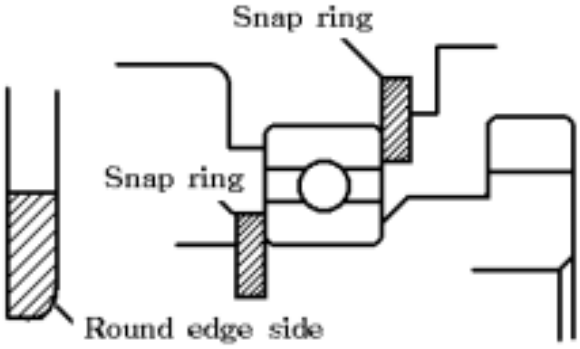


Fig.2-1

(5) Spring(roll) pins

1) Spring pins should be driven in properly as tightly.
2) Spring pins should be installed so that their seams should face the direction from which the load is applied.

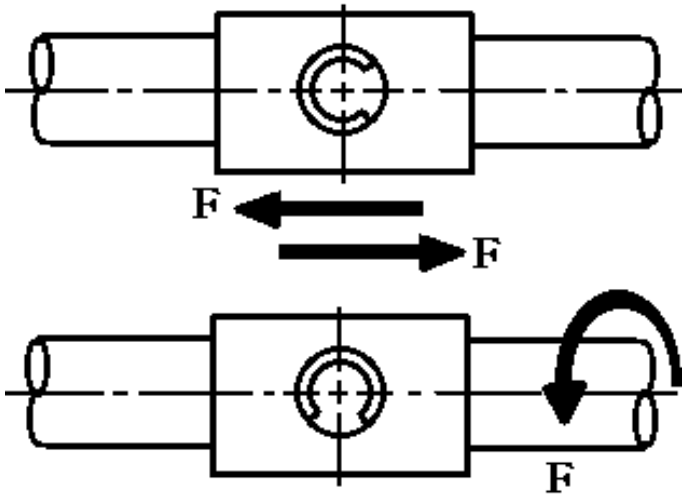


Fig.2-2

3) The roll pins installed in the transmission or other parts where much force is applied should be retained with the wire.

(6) Cotter pins
When installed, cotter pins should be bent securely at the ends as shown in the figure

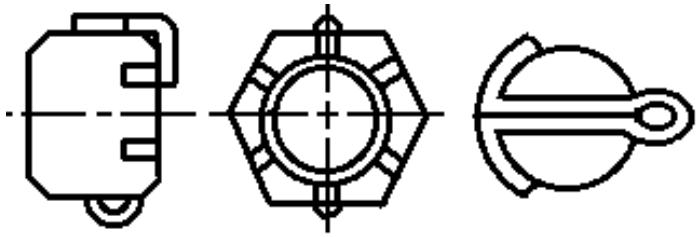


Fig.2-3

(7) Bolts and nuts

1) Special bolts are installed at several locations,so be sure not to interchange them other bolts.
2) Bolts and nuts should be tightened to their specified torque wrench.
3) When locking the bolts or nuts with wire or a lock washer,

18) Lift the floor gradually taking care not to allow the shaft of the slow return check valve and its hole in the floor to interfere with each other.

FIG.2-31 Slow return check valve

Note:
Lift up the floor gradually making sure that all relevant wiring. Piping, and links are disconnected.

FIG.2-32 Floor

B: Division of the chassis.
1) Drain the transmission of oil
2) Remove the front wheel drive shaft

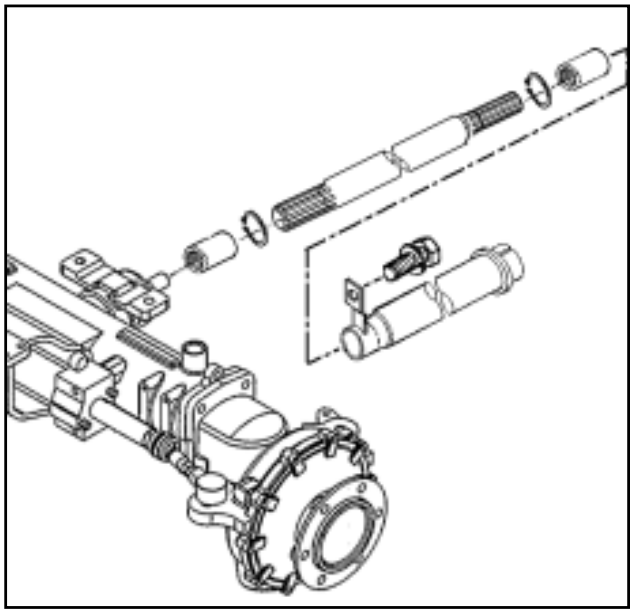


FIG.2-33 Front wheel drive

3) Disconnect the brake rods.

FIG.2-34 Brake rod.

4) When the tractor is equipped with an optional remote control valve ,remove the remote control piping.

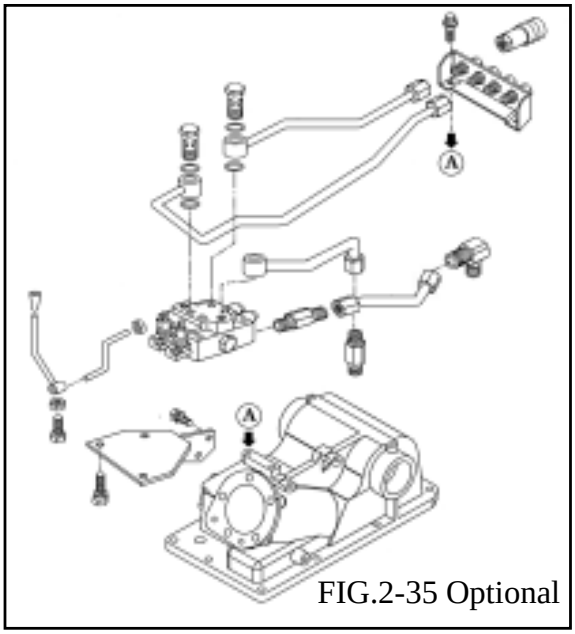


FIG.2-35 Optional

3. SPECIFICATIONS

Description	T290/T300/T330/2810NEW
Radiator core type	Flat water tube with corrugate fins
Core train number	4 trains
Radiator fin pitch	4.2 mm
Thermal radiator area	8.185㎡
Pressure valve opening pressure	0.9±0.15Kgf/ ㎠
Coolant capacity	7 ℓ(contains in cylinder block)
Test pressure	1.8 Kgf/㎠

4. REMOVAL OF THE RADIATOR

1) Release the clamp and remove the upper hose.

2) Release the clamp and remove the lower hose.

3) Release the hose clamp and remove the water drain hose.

Note:

- Refer to the paragraph"SEPARATION OF THE ENGINE AND THE FRONT AXLE BRACKET in chapter 2 for operation up to this step.

-When removing the radiator,take care not to damage the radiator cores and oil cooler.

5. INSPECTION OF EACH PART

(1) Inspection for radiator water leaks.

Water leaks are liable to occur at the fitting portion between the upper tank and the core section or between the lower tank and the core section.

If any water leak should occur there,repair the leak by soldering.Besides making a visual check,a more complete inspection should be accomplished as follows:

a. Leak test with compressed air.

Place the radiator as shown in the figure. Close the openings for water inlet and with something like a rubber plug and apply compressed air (1㎏f/㎠ or 14.2psi) through the drain pipe into the radiator.

Excessively compressed air may damage the cores, so perform the air delivery carefully,watching the pressure gauge. Water leaks are inspected by watching for rising air bubbles.

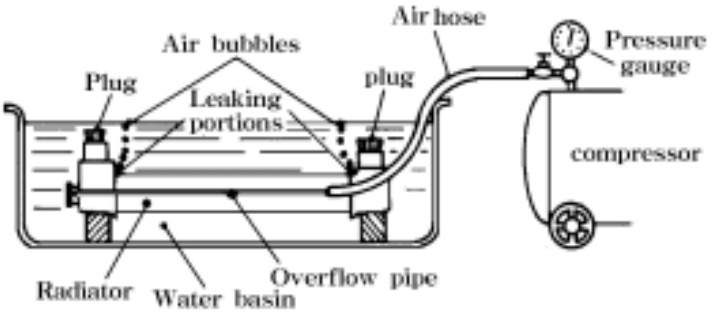


FIG.3-4

b.Leak test with a radiator cap tester

With the inlet and outlet pipes plugged up and the radiator filled with water,replace radiator cap with a radiator cap tester as shown in the figure.
Pump up the pressure in the radiator to the specified value and check to see if there are any leaks in the radiator.
When the radiator is water-tight,the pressure indicated on the pressure gauge does not increase,but if there are leaks,the pressure decreases.This tester is also applicable for leak tests for the whole cooling system,not only for the radiator.The test method is the same as mentioned above.

Table 4-1

Parts	Items		Description and assembly standard values
Clutch disc.	Type		Dry single
	Facing material		Y-02, Y-07
	Outer dia. ×inner dia. (㎜)		Ø225±1.0×Ø150±0.8
	spline hub	Large dia. (㎜) (in)	Ø25.0 (0.984)
		Small dia. (㎜) (in)	Ø21.7 (0.854)
		No.of splines	13
	Disc thickness (free) ㎜ (in)		8.4 ±0.3 (0.331)
	Surface deviation (㎜) (in)		0.4 MAX (0.016)
	Lateral deviation (㎜) (in)		0.7 MAX (0.028)
	Vertical deviation (㎜) (in)		1.0 MAX (0.039)
Clutch pedal	Clearance between lever plate and release bearing (㎜) (in)		2.0 (0.079)
	Clutch pedal free play(㎜) (in)		20 30 (0.79 1.18)

1st stage:

When force(F) is applied to shifter(1) through the gear shift lever,hub(2) is pushed in the direction of the arrow.Following movement of the hub,other parts such as block pin(3), synchro-ring(4),and thrust piece(6) also move in the same direction by means of spring(7), without allowing the hub to clear the groove in thrust piece(6) until such time as the friction surface of synchro-ring (4)comes into contact with the friction surface of synchro-cup (5).

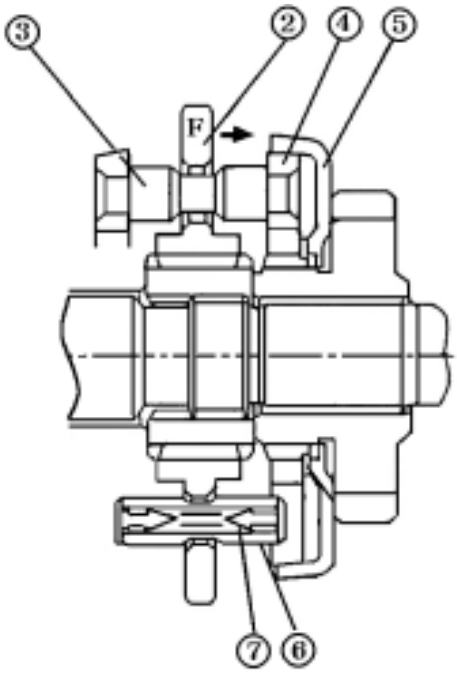


Fig. 5-4 1st stage

2nd stage:

At the moment when both the friction surfaces come into contact,the ring turns by as much as the surplus space in hub(2) for block pin(3)as shown in Fig.5-5

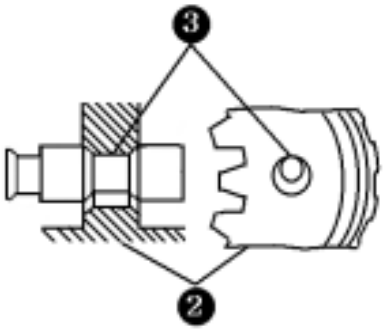
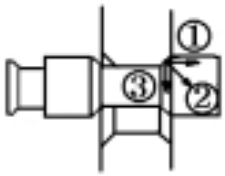


Fig.5-5 Block-pin

3rd stage:

When hub(2)is pushed further,the tapered surface in the hole of the hub and the tapered surface on the block pin are pressed tightly against each other,this pushes synchro-ring(4) against synchro-cup(5).Consequently,as shown fig.5-6,the synchro-ring and the synchro-cup are pressed more tightly against each other by the resultant turning force of the rear wheel and the thrust of the shifter.Ultimately,the revolving speeds of the synchro-ring and the synchro-cup become the same.



(1)Thrust
(2)Resultant force
(3)Turning force

Fig. 5-6 Synchro-ring and cup

4th stage :

When synchro-ring(4) and synchro-cup(5) reach the same speed,the friction force disappears.Then the resistance between hub(2)and block pin(3) also disappears to allow the hub to clear the groove on the block pin and to sit on the large diameter area of the pin. At the same time,thrust piece(6) which has a tapered shape and hub(2) advance smoothly on the pin to complete the meshing between spline(8) of the hub and spline(13) of the gear.

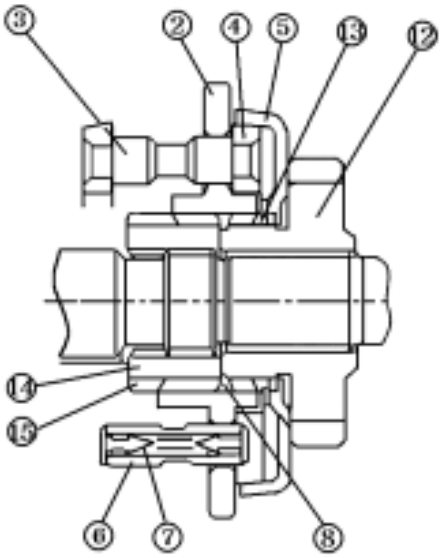


Fig. 5-7 Complete Synchro-ring and cup

-Inspection for disc thickness and serration wear.

Inspection Items	Specified values	Usable limit
Disc thickness	2.2±0.1mm (0.087 in)	1.9mm (0.075 in)
Surface flatness	-	0.2mm (0.008 in)

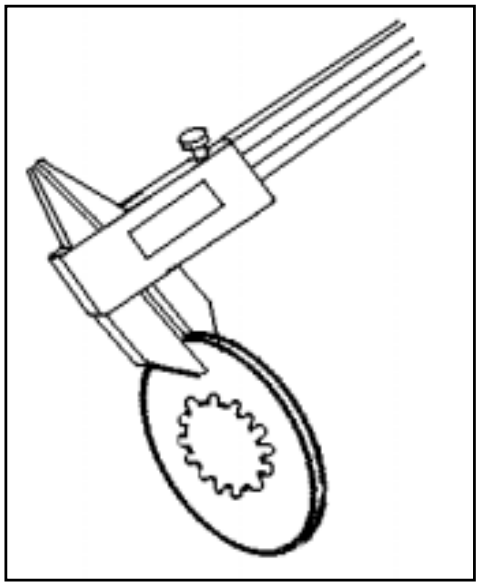


Fig.5-18

c. Driven plate
-Inspection for deformation and burning.
-A seriously damaged or worn disc should be replaced.

Inspection Items	Specified values	Usable limit
Surface flatness	-	0.2mm (0.008 in)

d. Brake disc
-Inspection for deformation and burning.
-A seriously damaged or worn disc should be replaced.

Inspection Items	Specified values	Usable limit
Disc thickness	3±0.1mm (0.118 in)	2.5 mm (0.098 in)
Surface flatness	-	0.2mm (0.008 in)

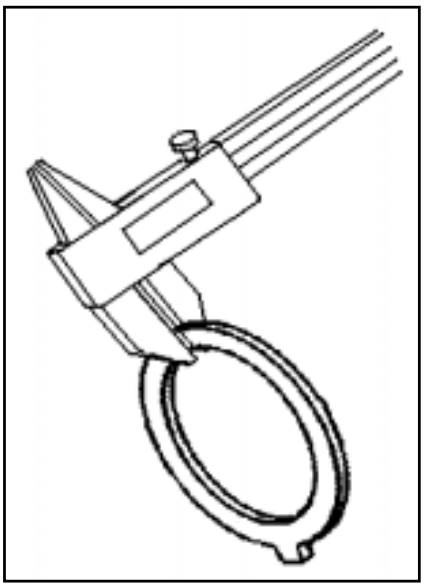


Fig.5-19

e. If the combined thickness of the return plate and brake disc deviates from the specified value, replace both parts.

Inspection Items	Specified values	Usable limit
Combined thickness of return plate and brake disc	5.5 ±0.18 (0.217 in)	5mm (0.2 in)

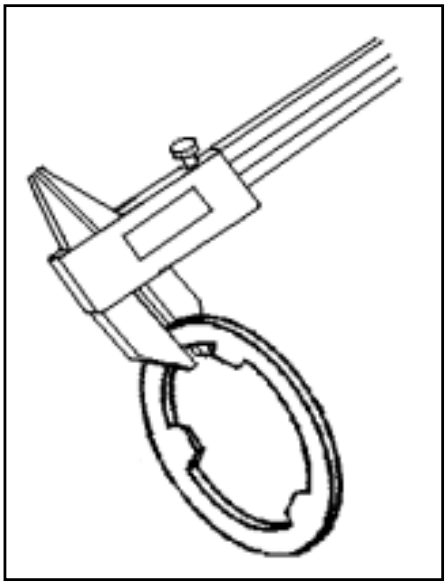


Fig.5-20

f. Also inspect other parts for wear and deformation and replace them if necessary

Note:
Seal ring and the two seal rings should be replaced as a pair

b. Pay attention to the installed direction of gear

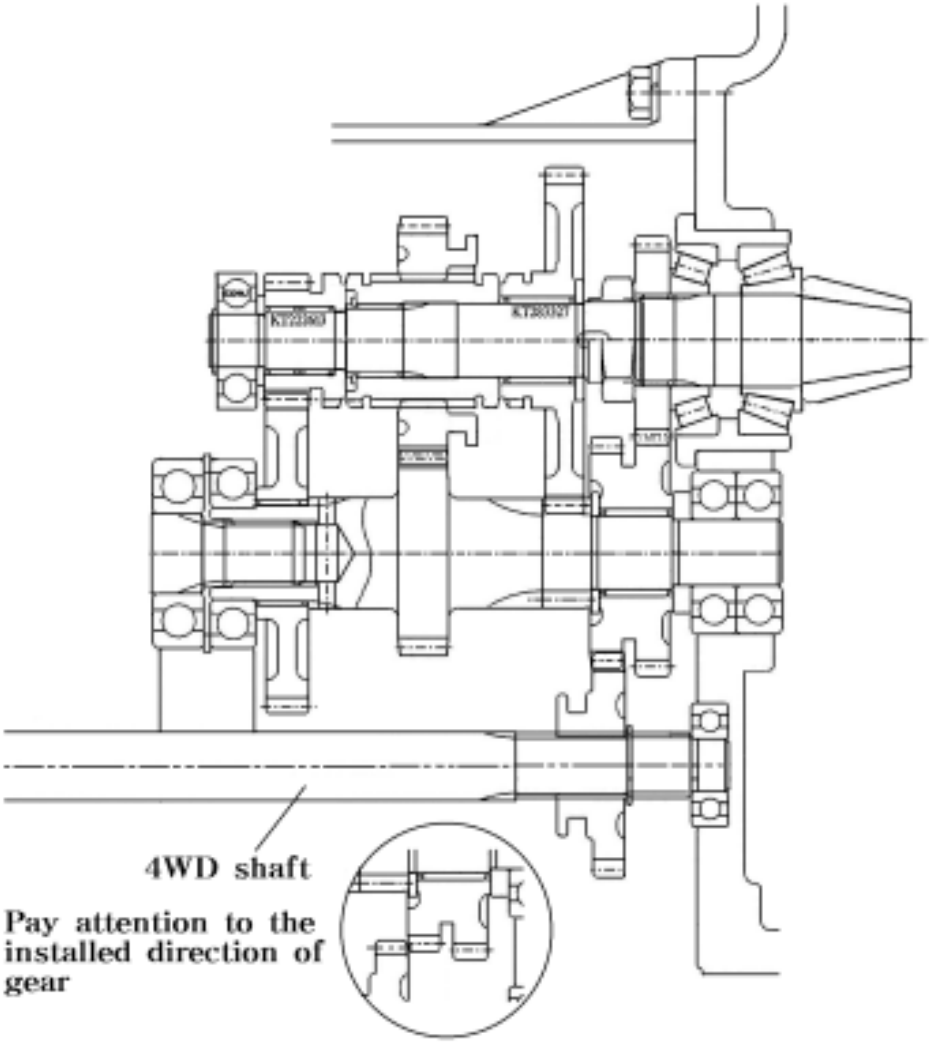


Fig.5-36

5. SHIFTERS AND RELATED PARTS.

5.1. CONSTRUCTION

(1)Forward and reverse control linkage mechanism(Linear speed shifter)
(synchromesh transmission version)

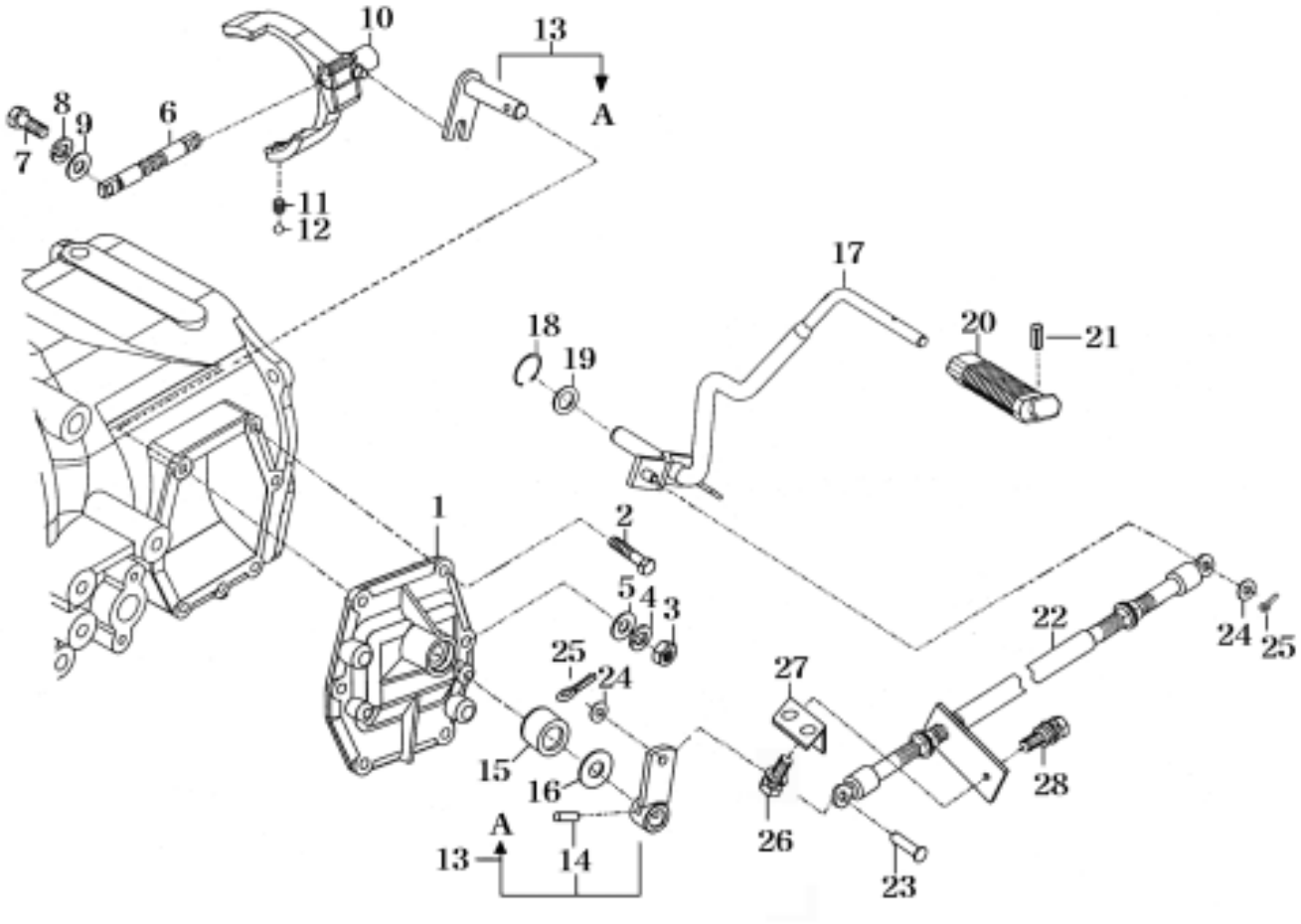


Fig.5-39

1.Metal(shifter,reverse) 2.Bolt(S) 3.Nut 4.Washer spring 5.Washer plain 6. Stay shifter reverse
7.Reamer bolt 8.Washer spring 9.Washer plain 10. Fork(shift/shuttle) 11. Shifter spring
12.Steel ball 13.Arm(reverse) 14. Split pin 15. Oil seal 16.Washer 17.Lever(Bar/14) 18.Snap ring
19.Washer(15X24X2) 20. Grip 21.Pin spring 22.Cable 23.Pin 24.Washer plain 25.pin split
26.Bolt(S) 27. Plate 28.Bolt(SP)

2. PTO DRIVE SYSTEM

problem	Causes	Counter measures
PTO does not spin with PTO shifted to ON	PTO shift lever is in neutral	Shift lever positively to ON
	Defective PTO switch	replace
	Clogged PTO valve	Wash clean
	Poor Pump	Replace
	Defective solenoid valve	Replace
PTO spins but does not produce sufficient torque.	Worn clutch disc	Replace
	Broken or fatigues seal ring at clutch sleeve	Replace
	Loose joint or broken O-ring of delivery valve	Retighten or replace
	Poor pump	Replace
	Clogged PTO valve	Wash clean
PTO does not stop when PTO switch is shifted to OFF	Defective PTO valve solenoid	Replace
	Poor PTO valve (contamination)	Wash clean
	Broken clutch piston return spring	Replace
	Poor switch	Replace
PTO follows too much when PTO switch is shifted to OFF	Improper oil	Replace
	Insufficient warming up	Let tractor warm up sufficiently
	Poor PTO clutch brake	Replace
	Weak or broken piston return spring	Replace
	Poor PTO valve(contamination)	Wash clean
	Deflected clutch plate	Replace

2-3.REASSEMBLY

Reassembly the parts in reverse order of disassembly,following these instructions.

1)Each friction surface should be coated with grease in advance.
2)The bevel pinion and the ring gear make a distinct pair after a mesh adjustment performed at the factory. Consequently, when reassembling the pair,be sure to pair parts with a same reference number.

-Tighten the lock nut to the specified starting torque of the single unit of the bevel pinion.

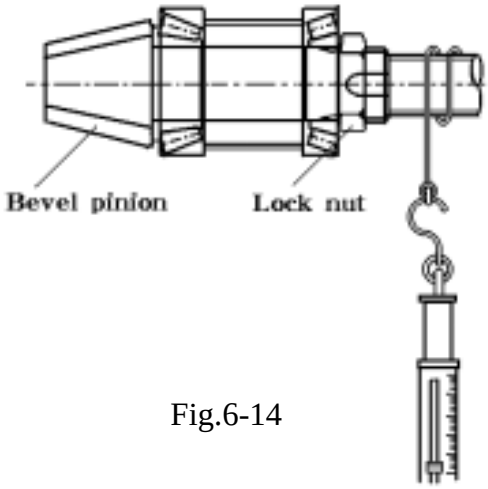


Fig.6-14

Note:
As a general rule,a disassembled lock nut should be replaced and a new one should be installed.However,when there is no alternative but to reuse the disassembled lock nut assure that it can lock securely.

Note:
Measure the starting torque a manner as shown in the figure 6-14.

Specified starting torque	6 -7 Kgf-cm (0.43-0.51 ft.lbs)

-When any of the bevel pinion,ring gear,TRB, collar,etc.has been replaced, inspect the bevel pinion assembly for thrust play in the front axle housing.

Specified thrust play mm(in)	0.1-0.3 (0.004-0.011 in)

Note:

TRB and collar should be replaced as a pair.

(1) Bevel pinion (8)

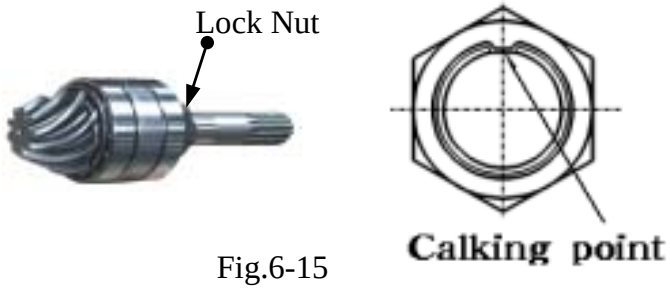


Fig.6-15

(2) FRONT DIFF CASE

a.When installing washer and thrust washer,apply fresh Molibdenium grease ahead of time.
b.Apply fresh Molibdenium grease to teeth of diff-pinion and dif-side gear.
c.Each parts should be washed clean,and There should be no sharp edge to the surface of thrust washer.
d.When assemble the spring pin,Be sure the spring pin should be different direction (Ø5 and Ø3)
e. When any of the bevel pinion,ring gear,TRB, collar,etc.has been replaced,inspect the bevel pinion assembly for thrust play in the front axle housing.

Specified thrust play mm(in)	0.1-0.3 (0.004-0.011 in)

SECTION 2. SPECIFICATIONS

MODEL			2810NEW/T290/T300/T330
Final reduction gears		Type	Helical gears
		Reduction ratio	5.5
Brake system	Friction Plate	Type	Wet,multi-disc,Mechanically operated
		Outer diameter	Φ184mm(Φ7.24 in)
		Thickness	3.4±0.1 mm(0.134 in)
		Lining material	Paper base
		Number of plates	4 on each side
	Separator Plate	Outer diameter	Φ188mm(Φ7.4 in)
		Thickness	2.5±0.09 mm(0.098 in)
		Number of plates	2 on each side
		Metal brake assembly Installed thickness	36 ±0.1 mm(1.417 in)
		Total brake thickness	60.5 mm(2.382 in)

2)Right Turn

When the steering control valve shaft is rotated to the right,the control valve moves off center.This connects the inlet port (P) to one port of each metering pump section and also connects the other port of each metering pump section to the cylinder.The amount that the spool moves off center depends on how fast the steering wheel is rotated and also how much effort is required to turn the wheel.

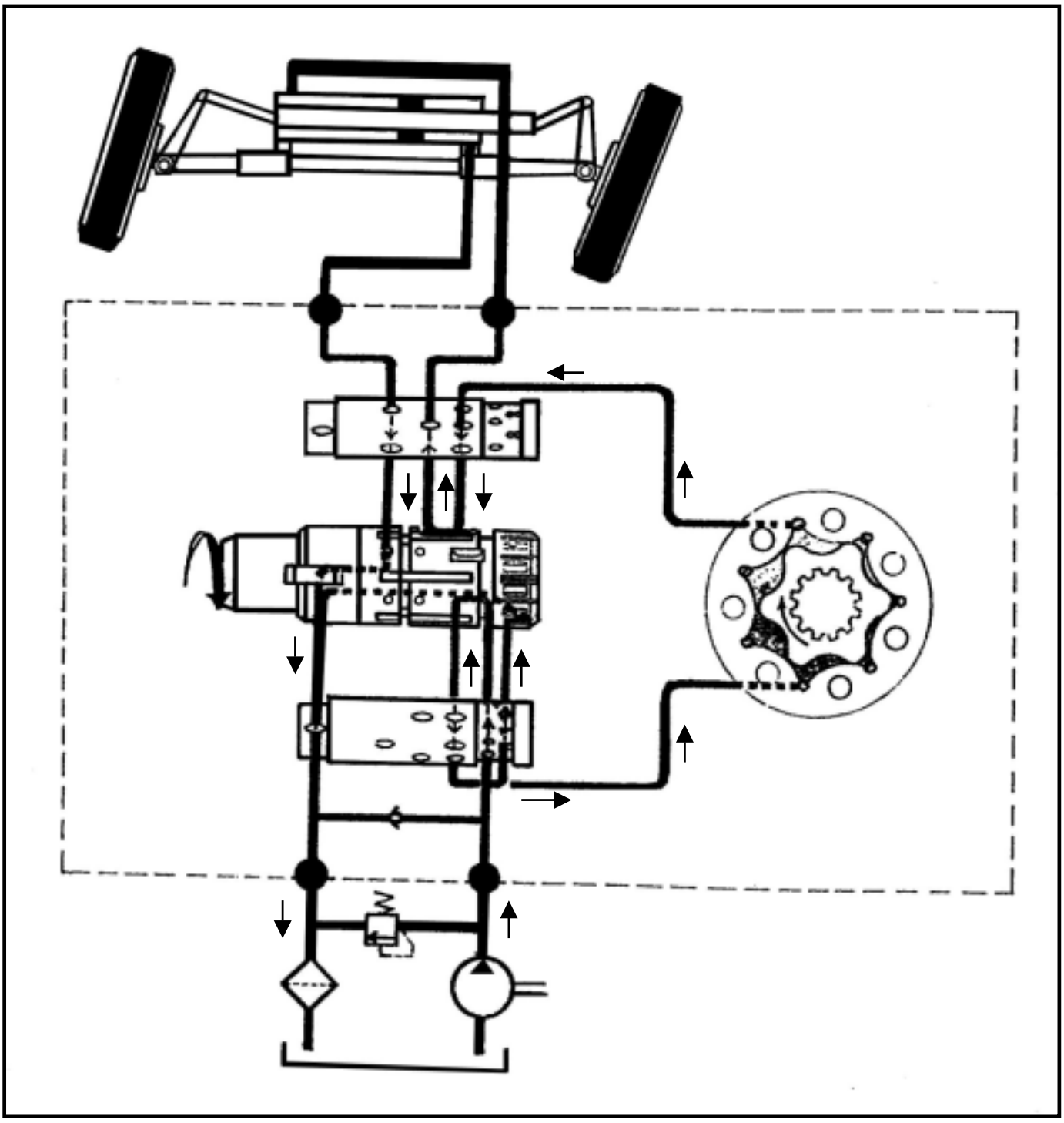


Fig.8-3 Right turn position

Problems and probable causes	Counter measures

3. Free play of steering wheel

1)Too low elastic of centering spring (Remove P port pipe line and check left and right turning) (1)Damaged spring or poor elastic	-Replace spring
2) Depressed control set (1) Excessive fluid and pressure (2) Depressed by foreign material (3) Depressed from external when assemble with column	 -Adjust fluid level and pressure properly -Wash -Check column and adjust

4. Steering wheel resistance with turning

(1)Worn of spline gear column	-Replace column
(2)Depressed control set	-Wash,and Adjust fluid level and pressure properly
(3)Air trapped in cylinder and pipe line	-Deflate the air
(4)Excessive backlash column	-Adjust column
(5)Poor turning of column,or wear of bearing .	-Replace column and replenish oil

5.Too much free play of steering wheel(Rough touching on tire causes vibration)

(1)Air trapped in steering cylinder and pipe line.	-Deflate the air
(2)Worn ball bearing	-Replace

6.Free play steering wheel

(1)Insufficient oil in the tank	-Replenish oil
(2)Worn,damage steering cylinder	-Replace oil seal and cylinder
(3)Loose spacer in unit	-assemble spacer parts.

7.Kick-back of steering wheel

(1)Loose check valve in "P" port or don't operate	-Adjust check valve
(2) Trouble in system	-consult workshop

3.2 OPERATIONS

1) DOWN position

The fluid from port B pushes up stop ring (9) of poppet(10) until the ring comes into contact with adjust screw(6),as it reaches chamber(R). Consequently,the extent choke (C) is opened is determined by the positioning of adjust screw (6):that is,when adjust screw(6) is screwed in clockwise,the opening of chock(C) decreases and the lowering speed of the lift arm slows down;whereas the opening of choke(C) increases and the lowering speed of the lift is accelerated when the adjust screw is unscrewed counterclockwise.When the adjust screw screwed in completely,the poppet comes into contact with body seat(S) and the choke is closed completely,so the lift arm stops.

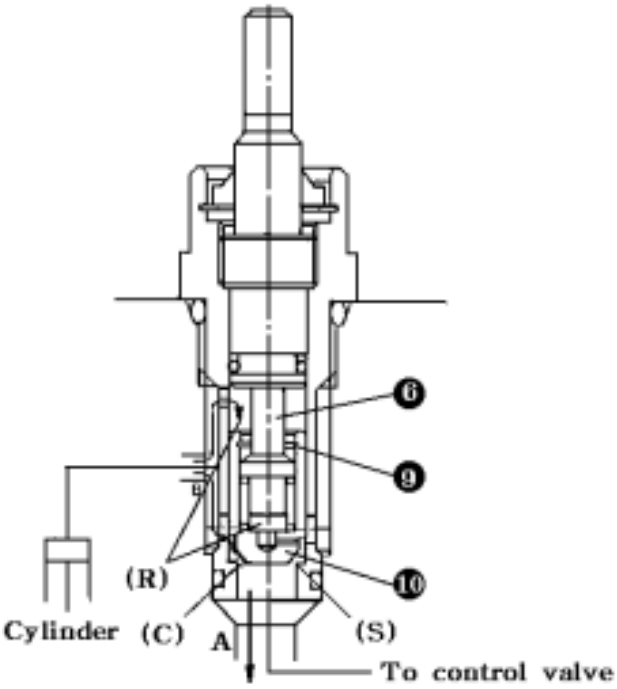


Fig. 9-7 Down position

2) Up position

The flow port A,overcoming the force of spring(11),pushes up poppet (10) and choke(C)is fully opened regardless of the position of adjust screw(6).Thus the fluid flows to port B and the cylinder,which results in raising the lift arm.

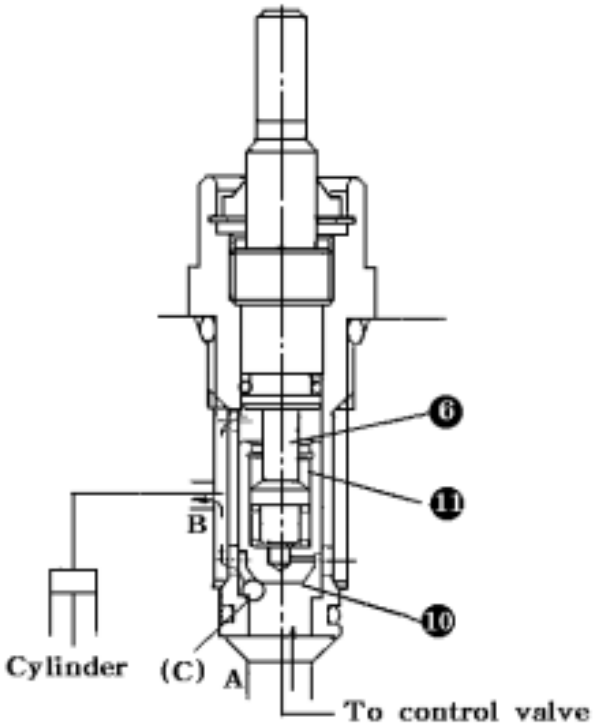


Fig. 9-8 Up position

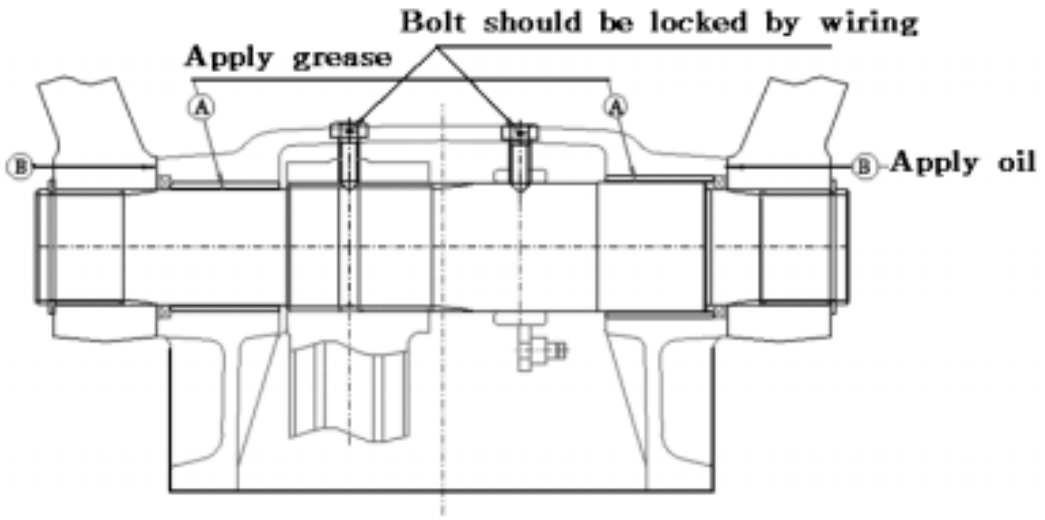


Fig.9-34.Lift arm

9)Adjust the angle of the roll bush from horizontal is 30°
10)Apply grease to the roll bush.
11)Apply grease to the cylinder case and lift arm face Which touched with each other.
12) When assemble the lift crank on the lift shaft, mesh their splines using the alignment marks which were put there before disassembly.
13)Hex bolt (M8×20) should be locked by wiring after installation .
14)Be sure the lift shaft should be moved smoothly after installation.
15)The clearance of lift arm should be less than 3 mm

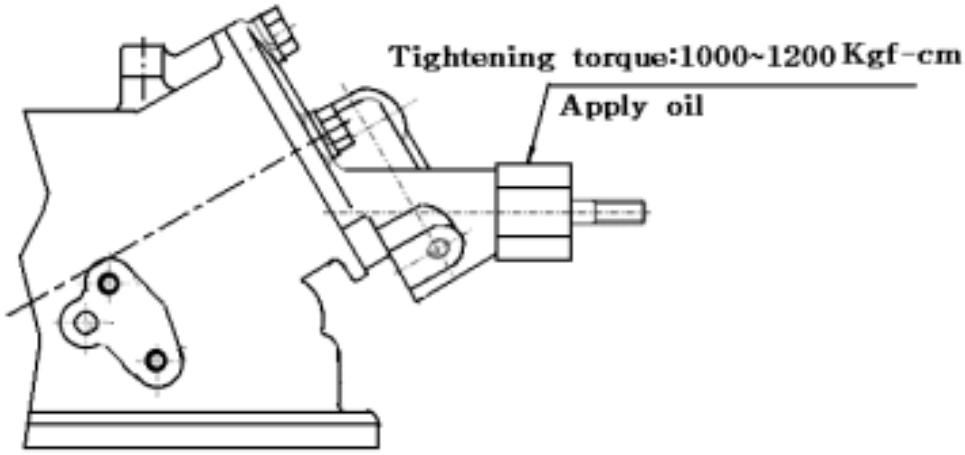


Fig. 9-35 Slow return check valve.

16)Rap the plug with sealing tape.
17)Tighten the slow return valve to the specified torque 1000 1200 kgf-cm and be sure not to damage the O-ring.

Problems	Causes	Countermeasures
2.Too low rising speed of lift	1)Above causes can also be possible	Repair according to above instructions.
	2) Too small a spool stroke in control valve	Inspect,readjust,or replace link mechanism if necessary.
	3)Broken compensator spring (unloading valve 1) in control valve	Replace spring.
	4)Stuck poppet (unloading valve 2)	Correct minor flaws with an oil stone
3.Lift lowers even when adjust knob is closed fully with adjust Handle (While engine is stopped)	1)Stuck poppet	Lap after disassembling,cleaning,repairing flaws with oil stone
	2)Poor valve seat	Replace valve
	3)Poor 0-ring	Replace
4.Lift does not lower	1)Slow-return-check valve knob is turned to the lock position	Turn knob to fast position
	2)Stuck poppet of slow-Return-check valve	Lap after disassembling, cleaning,repairing flaws with oil stone
	3)Seized lift shaft	Apply grease and repair or replace bushings or shaft if necessary.
	4)Stuck main spool	Lap lightly after disassembling, cleaning, and repairing flaws with oil stone or replace as an assembly.
5.Too slow lift lowering speed	1)Above mentioned causes can also be possible.	Repair or adjust according to instructions mentioned above.
	2)Insufficiently lowered control lever	Lower lever sufficiently
	3)Excessively closed slow-return check valve	Open valve sufficiently
6.When hydraulic control lever is raised,relief,valve beeps.	1) Maladjusted lever stopper check valve	Readjust lever stopper guide position
	2) Poor link mechanism	Inspect,readjust,repair,or replace link mechanism if necessary.
7.Fluid overheating	1)Excessively high working pressure	Inspect and adjust
	2)Too high or low viscosity of working fluid.	Replace with fluid of adequate viscosity.
	3)Insufficient fluid	Maintain specified level by replenishing

(2) Inspection

a.The main switch circuit,switching positions, and terminals are as shown in the figures. Check the continuity across respective terminals referring to the switch circuit diagram. Replace a defective switch as an assembly

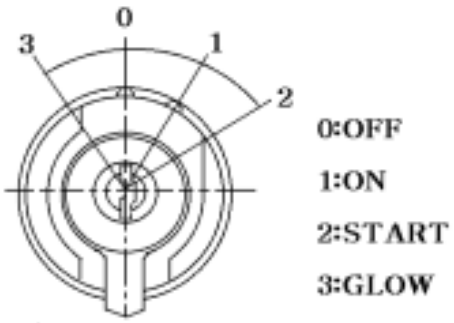


Fig.10-9

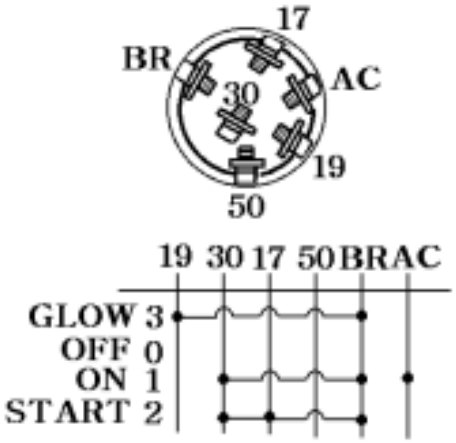


Fig.10-10

3. COMBINATION SWITCH

1) Removal

(1) Remove the meter panel
(2) Remove the light switch knob and turn signal switch lever.

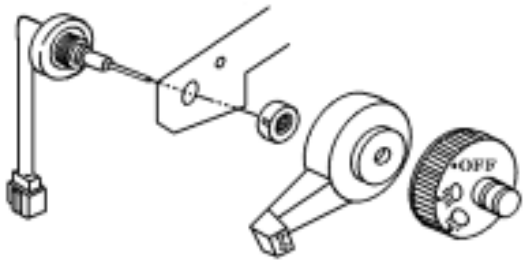


Fig.10-12

(3) Release the ring nut with a conventional screw drive(-) and remove the combination switch.

2) Inspection
Each switch circuit is as shown,so check each switch for a continuity across respective terminals with a tester.Replace a defective switch as an assembly.

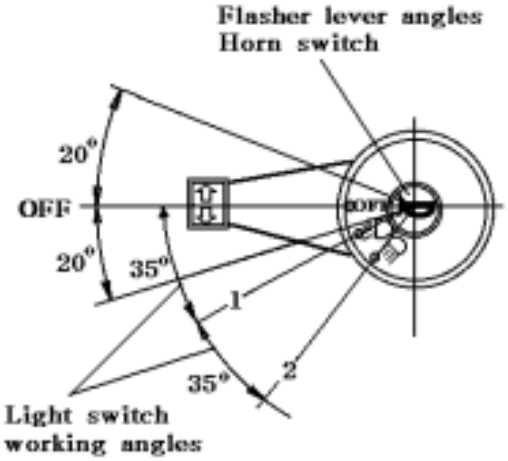


Fig.10-13 combination switch

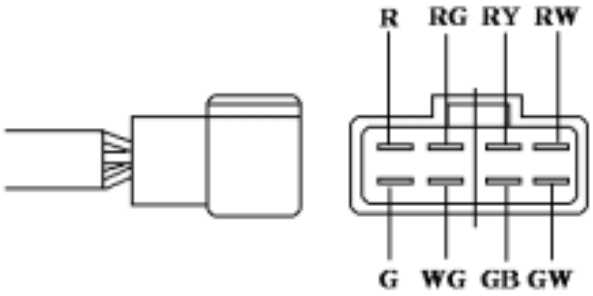


Fig.10-14 Harness socket

4. STARTING SYSTEM

Problems	Causes	Countermeasures
Starter motor does not spin	Discharged battery	Check battery and charge or renew
	Defective stop light switch	Check and renew
	Defective key switch	Check and renew
	Defective starter motor connections or loose battery connections	Check,clean and tighten connections
	Faulty starter motor	Inspect,repair,or renew
	Defective master brake pedal	Inspect and try to push brake pedal
	Faulty reverse or forward pedal	Inspect ,adjust neutral
	Defective push switch	Check and renew
	Defective controller	Check and renew
Engine cranks slowly	Discharged battery	Check battery and charge or renew
	Excessive resistance in starter circuit	Check circuit connections and repair or renew faulty wiring
	Defective starter motor	Refer to the engine manual
	Tight engine	Refer to the engine manual

5. CHARGING SYSTEM

Problems	Causes	Countermeasures
Battery is low in charge or discharge	Loose or worn alternator drive belt	Check and adjust belt tension or renew
	Defective battery:It will not accept or hold charge.Electrolyte level is low	Check condition of battery and renew
	Excessive resistance due to loose charging system connections	Check,clean,and tighten circuit connections
	Defective alternator	Check and repair or renew
Alternator is charging at high rate (Battery is overheating)	Defective battery	Check condition of battery and renew
	Defective Alternator	Check and repair or renew
No output from alternator	Alternator drive belt is broken	Renew and tension correctly
	Loose connection or broken cable in charge system	Inspect system,tighten connections and repair or renew faulty wiring
	Defective voltage regulator	Check and renew
	Defective alternator	Check and repair or renew

Part names and inspection items	Nominal dimensions	Standard value for reassembly	Usable limits	Service instructions and remarks

6) SLOW RETURN CHECK VALVE(Flow control valve)

Maximum pressure	280 kgf/㎠	Gear oil SAE #80 #90 at a temperature of 50 ± 5℃
Cylinder port leaks	1 cc/min.at a pressure of 90 kgf/㎠	

7) MAIN CONTROL VALVE

Cylinder port leaks	5 cc/min or less under a pressure of 100 kgf/㎠			Gear oil SAE #80 #90 at a temperature of 50 ± 5℃
Clearance between main spool and casing			0.01 ㎜	

8) MAIN RELIEF VALVE

T290/T300/T330/ 2810NEW		145 ±5 kgf/㎠		

9) MAIN GEAR PUMP

T290/T300/T330/ 2810NEW		21.5 ℓ/min		Efficiency of 92 % at 2600 rpm

10) SUCTION FILTER

Rated flow		45 ℓ/min		
Filtration density		150 mesh		
Filtration area		790㎠		

11) LINE FILTER

Rated flow		32 ℓ/min		
Filtration density		80 mesh		
Filtration Area		31 ㎠		