

Foreword

We are pleased to present the Service Manual for the “YUVRAJ 215” Tractor.

This Service Manual contains repair and maintenance information on Engine, Transmission, Hydraulics and Other Aggregate of Tractor.

We hope this Service Manual will serve useful to you. For any further help or query contact at the below mentioned address.

**Product Support
Customer Care Department
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Index

Description	Page No
General Specifications	05
Engine	07
Transmission	29
Hydraulics	45
Front Axle & Steering	71

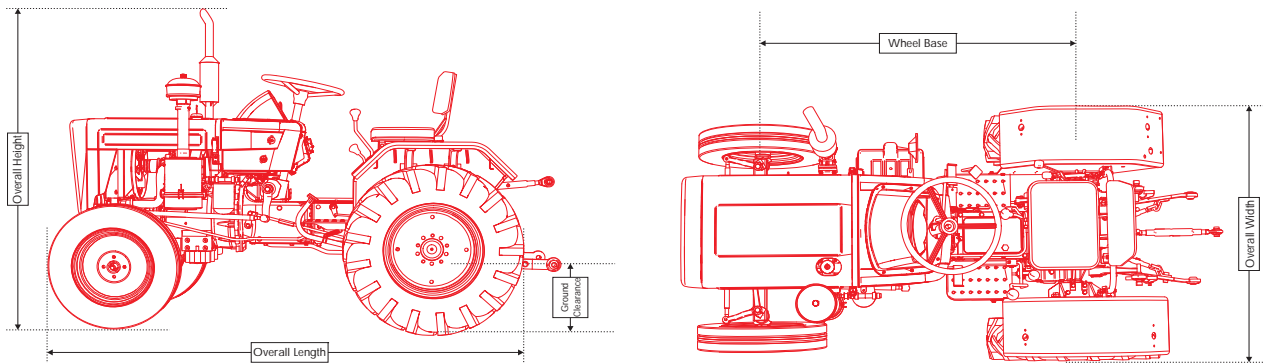


General Specifications

Engine	
Type	FMW100 Water Cooled Direct Injection NA type Engine
No. of Cylinders	1
Bore / Stroke mm	100 / 110
Displacement cc	863.5
Rated Governed Speed	2300 ± 50
Low Idle R.P.M.	1050 ± 100
High Idle R.P.M.	2550 ± 50
Valve Clearance	Cold - Inlet - 0.1, Exhaust- 0.1, Hot - Inlet - 0.1, Exhaust - 0.1
Air Cleaner	Wire Mesh & Foam type Oil Bath
Nozzle Opening Pressure	247 to 261 kg/sqcm (250 + 8 bar)
Cooling System	Water cooled pressurised, Cap Operating Pressure 0.9 kg/sqcm, without thermostat
Clutch	
Clutch Type	200 mm dry Single plate Cerametalic type
Transmission	
Type	Sliding Mesh
No of Gears	6 Forward & 3 Reverse with Hi-low-Reverse Selector Lever
Power Take Off	Rear mounted six splines, constant running - 450 R.P.M
Standard PTO rpm at rated engine speed	605
Brakes	Totally enclosed self energising dry disc with heavy duty friction linings
Hydraulic	
Type	Hytech Hydraulics. Fully live Hydraulic with Position & Draft Controls
Lifting Capacity (Kgs)	450
Tractor	
Steering Type	Worm & Roller
Tyre Size Front	5.2 x 14 - 8pr

General Specifications

Tyre Size Rear	8 x 18 - 4pr
<i>Operating Weight & Distribution (Kgs)</i>	
Front	340
Rear	510
Total	850
<i>Capacities (liters)</i>	
Engine (including filter)	2.5 (1.5 ltr in Oil Pan & 1ltr in Crank Case)
Cooling System (Approx)	3.8
Steering Gear Box	0.33
Fuel Tank	25
Transmission & Hydraulic System	15
Air Cleaner	0.5
<i>Dimensions (In mm)</i>	
Overall Height (mm)	1690
Overall Length (mm)	2440
Ground Clearance (mm)	260
Overall Width (mm)	1175
Wheel Base (mm)	1480



***Complying to Bharat (Term) Stage III Emission norms

(All dimensions and specifications for guidance only & are subject to change without prior notice)

ENGINE
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MANIFOLD, CYLINDER HEAD & VALVES	
Inlet Valve	
No of Inlet Valve	1
Stem Diameter (mm)	8.93 / 8.95
Port diameter (mm)	40 x 47
Clearance in guide,mm	0.05 to 0.08mm
Exhaust Valve	
No of Exhaust Valve	1
Stem Diameter (mm)	8.93 / 8.95
Port diameter (mm)	32 x 38
Clearance in guide,mm	0.05 to 0.08mm
Tappet clearance Hot (mm)	0.1
Tappet clearance Cold (mm)	0.1
Valve Guides	
No of Guides	2
Length Inlet & Exhaust (mm)	56
Inside diameter (mm)	9
Set Height of guide measured from cylinder head Topdeck	42 \pm 0.1
Height Inlet & Exhaust (mm)	56

Engine Specifications

Valve Spring	
Free length (mm)	49.5 +/-0.5
Spring rate@30-70%of finest Load (N/mm)	23.88
Valve Tappets (Cam Follower)	
Diameter (mm)	12
Running Clearance (mm)	0.016 to 0.045
Valve Push Rods	
No of Push Rods	2
Diameter (mm)	10
Length (mm)	289.5 +/-0.50
Valve Timing	
Inlet opens (deg. BTDC)	9 ± 3
Inlet closes (deg. ABDC)	48 ± 3
Exhaust opens (deg. BBDC)	52 ± 3
Exhaust closes (deg. ATDC)	25 ± 3
CONNECTING RODS, PISTONS AND CYLINDER SLEEVES	
Connecting Rod	
Material	EN18 D
Connecting Rod Big End Bearing	
Material	Steel back,'p' copper lead.
Connecting Rod Small End Bearing	
Type	Bush
Material	Steel back, 'Y' copper lead.
Small end bush diameter (mm)	30 +0.02/+0.033
Piston Rings	
Number of Rings per Piston	3
Top Ring Material	Half Key stone, crome plated
Middle Ring Material	Bevelled
Bottom Ring Material (Oil Ring)	Chromepelated conformable Oil ring.
Ring Width (Axial)	
Top (mm)	2.563
Middle (mm)	2
Bottom (mm)	3

Engine Specifications

Ring Gap	
Top (mm)	0.25 to 0.45
Middle (mm)	0.60 to 0.85
Bottom (mm)	0.35 to 0.55
Piston	
Type	Re-entrant
Material	Aluminium
Dia at crown	99.35 +/-0.015
Dia at skirt	99.88
Bumping Clearance	1.12 to 1.2
Number of Ring Groove (No.)	3
Ring Groove Width (mm)	
Top Groove (mm)	2.7
Middle Groove (mm)	2
Bottom Groove (mm)	3
Ring Groove Clearance	
Top groove (mm)	0.137
Middle groove (mm)	0.08/0.04
Bottom groove (mm)	0.09/0.07
Piston Pin	
Inner Diameter (mm)	16
Outer Diameter (mm)	30
Clearance in piston (mm)	0.016/0.004
Clearance in con rod (mm)	0.434/0.268
Length (mm)	78
Cylinder Sleeve	
Type	Non Replaceable wet liner
Material	Synthetic Low alloy gray cast iron
Wall thickness (mm)	8.5
Sleeve I.D. (mm)	100
Max. taper (mm)	0.015
Max. ovality (mm)	0.01
Sleeve I.D. Discard limit (mm)	100.030 + 0.150

Engine Specifications

LUBRICATION SYSTEM	
Pressure Regulating Valve	Between the oil pump and oil filter
Location Oil pump body	In front lower side of crankcase
Spring free length (mm)	15
Opening pressure (kg/cm ²)	3
By-Pass Valve	
Location Filter Head when viewed from Front of Engine"	"Extreme left on the Outer wall" of crank case
Opening pressure (kg/cm ²)	0.8 to 1 bar
OIL PUMP INTERNAL ROTOR CAMSHAFT DRIVERS	
Backlash (mm)	0.05 to 0.08
Drive pinion to camshaft (mm)	0.08
Clearances	
Gears to housing (mm)	0.075 - 0.153
Drive shaft to body (mm)	0.037 to 0.074
Drive pinion to body (end float) (mm)	0.075 to 0.123
COOLING SYSTEM	
Type	Water cool, force feed
Water Pump Type	Centrifugal
TIMING GEAR TRAIN, FRONT COVER AND CAMSHAFT	
Camshaft	
Material	EN -8
Number of bearings (No.)	2
Bearing Diameter Front (mm)	35
Bearing Diameter Rear (mm)	25
Running clearance (mm)	0.39 / 0.93
Exhaust cam lift (mm)	9
Inlet cam lift (mm)	8.9
Max cam shaft lobe	30
Timing Gears	
Number of teeth	40
Crankshaft gear (No.)	1
Camshaft gear (No.)	1
Backlash between any pair of gear (mm)	0.08

Engine Specifications

CRANKSHAFT	
Material Alloy steel	EN 19 C
Main journal diameter (mm)	66
Running clearance main journal (mm)	0.028 / 0.153
Crank-pin diameter (mm)	53
End clearance (float) (mm)	0.2 to 0.5
Running clearance crank pin (mm)	0.052- 0.098
Rear end oil seal dia. (mm)	64
Main Bearings	
Type	Replaceable, shell
Material Steel backed babbitt	Bi- Metal
WEAR LIMITS	
Cylinder sleeves	
Bore diameter (mm)	100.030 + 0.150
Ovality (mm)	0.06
Taper (mm)	0.06
Piston Rings	
Ring gap	
First ring (mm)	1
Second ring (mm)	2
Third ring (mm)	2
Valve train	
Valve guide clearance (mm)	0.05
Tappet valve clearance (mm)	0.3
Spring rate N/mm (Kg/mm)	16 (1.63)
Crankshaft	
Main bearing clearance (mm)	0.18
End play (mm)	0.8
Connecting rod	
Big end bearing clearance (mm)	0.15
End play (mm)	0.8

Engine Torque Values

TORQUE CHART FOR YUVRAJ 215 - FMW100 ENGINE		
SR. NO.	DESCRIPTION & BOLT/NUT/STUD USED	TORQUE-Nm
	CRANKCASE SUB-ASSEMBLY	
1	Fip.Mtg Stud to crank case(M8 x 22)	15 to 20 Nm
2	Main brg housing mtg stud to crank case- (M10 x 20)	25 to 30 Nm
3	Camfollower bkt Allen bolt (M10 x 48.5 - 12.9)	55 to 60Nm
4	Stud for Cyhead at rocker side	45 to 50 Nm
5	Stud for Cyhead at injector side	46 to 50 Nm
6	Engine flange mtg bolt (M 12 x 30)	65 to 70 Nm
7	Oil sump mtg bolt (M8 x16 - 8.8)	20 to 25 Nm
8	Counter Unbalance shaft	40 to 50 Nm
9	Oil pump mtg bolt (Hex bolt - M8 x 35 – 8.8)	25 to 30Nm
10	Hex Bolt M8 X 20 For oil pump gear and water pump rear mounting bolts	20 to 25Nm
11	Oil Pump spacer Nylock nut	25 to 30Nm
12	Allen screw for Oil filter mtg bkt (M8 x 30 - 10.9)	25 to 30Nm
13	Hex bolt for low idle setting (M6 x 55 x 55 - 8.8)	10 to 12Nm
13	Hex bolt for Pull to stop lever bkt (M6 x 12-8.8)	10 to 12 Nm
14	Hex Socket Pipe Plug (M10X1)	15 to 18 Nm
15	Relief Valve Assembly	25 to 30 Nm
	CRANKSHAFT, FLYWHEEL SUB-ASSEMBLY	
16	Main brg housing Hex Nut (M10 - 8)	45 to 55 Nm
17	Allen screw for flywheel (M12 x 75 - 12.9)	100 to 120 Nm
18	Allen screw for Balance weight (M10 x 50-10.9)	65 to 70 Nm

TORQUE CHART FOR YUVRAJ 215 - FMW100 ENGINE

SR. NO.	DESCRIPTION & BOLT/NUT/STUD USED	TORQUE-Nm
	CAM SHAFT,PUSH ROD,TIMING COVER SUB-ASSEMBLY	
19	High Idle setting Hex Nut (M8 - 8)	18 to 22 Nm
20	Hex bolt for Timing cover (M 8 x 30 - 8.8)	25 to 30Nm
21	Hex bolt for P.T.O. shaft (M 10 x 45 - 8.8)	48 to 52 Nm
	PISTON,CON. ROD SUB -ASSEMBLY	
22	Con Rod bolt (M10 x 48 - 12.9)	60 TO 65 Nm
23	Stud for water inlet flange (M8 x 22)	12 to 15 Nm.
24	Hex bolt for closed flang of water inlet (M8 x 12-8.8)	20 to 25 Nm
	CYLINDER HEAD SUB-ASSEMBLY	
25	Injector flange stud (M 8 x 40 - 5.6)	10 to 12 Nm
26	Exh. And Air Intake manifold mtg. stud (M10X42X1.5)	45 to 50 Nm
27	Exh.manifold mtg bolt (M 8 x 25)	20 to 25 Nm
28	Breather pipe mtg stud (M 6 x 30 - 5.8)	10 to 12 Nm
29	Hex nut for Adjustment screw of rocker (M8)	18 to 22Nm
30	Hex bolt for Rocker shaft locking (M6 x 16-8.80)	10 to 12 Nm
31	Hex Nut for cy.head (M12)	127 to 147 Nm
32	Rocker cover hex bolt (M8 x 50-8.8)	25 to 30 Nm
33	Rocker cover hex bolt (M8 x 75-8.8)	25 to 30 Nm
34	Hex nut for breather pipe (M 6 – 8.8)	10 to 12 Nm
35	Water Temperature Sensor	25 to30 Nm
36	Oil Pressure Switch	15 to 20 Nm

TORQUE CHART FOR YUVRAJ 215 - FMW100 ENGINE

SR. NO.	DESCRIPTION & BOLT/NUT/STUD USED	TORQUE-Nm
INJECTION EQUIPMENT SUB- ASSEMBLY		
37	Hex Nut for FIP (M8 - 8)	18 to 22 Nm
38	Hex bolt for H.P.pipe clamp mtg (M8x16-8.8)	25 to 30 Nm
39	Injector flange Hex Nut (M8 - 8)	25 to 30 Nm
40	Fuel filter bkt Mrg bolt (M10 x 30 - 8.8)	45 to 50Nm
41	Hex Nut for fuel filter mtg bolt (M10 - 8)	45 to 50 Nm
42	Fuel filter mtg bolt (M10 x 30 - 8.8)	45 to 50 Nm
43	Banjo Bolt M14 for fuel filter	20 to 25 Nm
44	M6 Banjo bolt for injector overflow pipe	5 to 7 Nm
AIR FILTER, EXHAUST SILENCER SUB-ASSEMBLY		
45	Exh. Manifold manifold hex nut (M10)	45 to 50 Nm
46	Hex bolt for stub pipe mtg (M8 x 30-8.8)	25 to 30 Nm
47	Hex nut for stub mtg bolt (M8 – 8.8)	25 to 30 Nm
48	Hex nut for silencer clamp (M8 – 8.8)	25 to 30 Nm
49	Air cleaner manifold hex nut (M10 – 8.8)	45 to 50 Nm
STARTER MOTOR, ALTERNATOR SUB-ASSEMBLY		
50	Hex bolt for starter mtg (M10 x 30 - 8.8)	45 to 50 Nm
51	Hex bolt for Alternator mtg bkt (M8 x 20 - 8.8)	25 to 30 Nm
52	Hex bolt for Alternator mtg (M8 x 110 - 8.8)	25 to 30 Nm
53	Hex bolt for Radial bkt (M 8 x 25 - 8.8)	25 to 30 Nm
54	Nut for Alternator Adj bolt (M8)	25 to 30 Nm

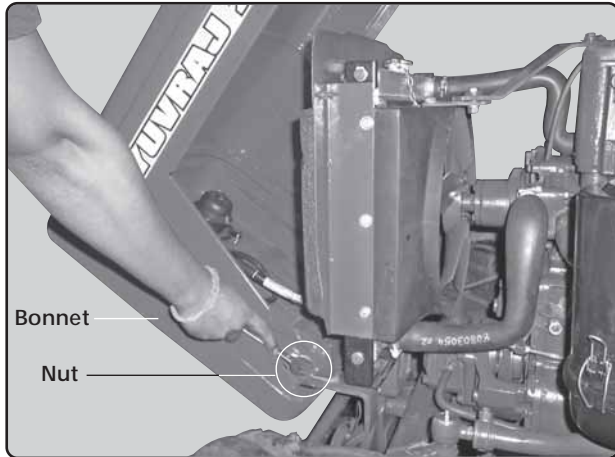
TORQUE CHART FOR YUVRAJ 215 - FMW100 ENGINE

SR. NO.	DESCRIPTION & BOLT/NUT/STUD USED	TORQUE-Nm
COOLING SYSTEM SUB-ASSEMBLY		
55	Hex bolt for water pumpmtg. Bkt.(Rear) (M8X20X8.8)	25 to 30 Nm
56	Hex bolt for water pulley and spacer (IM6X35X-8.8)	10 to 12 Nm
57	Hex bolt for Cooling fan and Spacer (M8 x 20-8.8)	25 to 30 Nm
58	Hex nut for Flange for Inlet Hose (M8 - 8)	12 to 15 Nm.
59	Hex bolt for Fan spacer (M6X30)	10 to 12 Nm
60	Hex bolt for Flange for Outlet Hose (M8 x 20-8.8)	12 to 15 Nm.
ACCESSORIES SUB-ASSEMBLY		
62	Hyd pump mtg bkt Flange Headed Bolt(M12 x 75 - 12.9)	45 to 50 Nm
63	Hex bolt for hour meter adapter (M6X16X8.8)	10 to 12 Nm
64	Hex bolt for hour meter (M8 x 16 - 8.8)	25 to 30 Nm
65	Plug Magnetic Drain (Oil Pan Drain Plug)	40 to 50 Nm
66	Oil Filter	15 to 20 Nm
67	Fuel Injection Pump M12 Banjo bolt	20 to 25 N.m
68	Fuel Injection Pump M8 banjo bolt and fuel return line M8 banjo bolt	6 to 10 N.m
69	Tappet Bolt for Crankshaft Pulley	45 to 50 Nm
70	HPP Nut M12 at FIP and M14 at Injector End	20 to 25 N.m

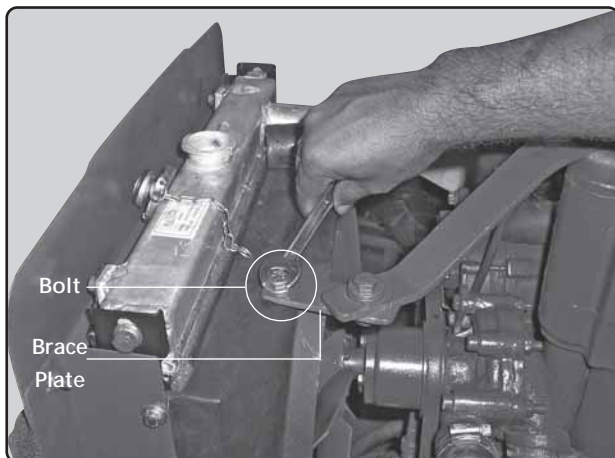
Removal of Engine :

Dismantling of Bonnet & Radiator -

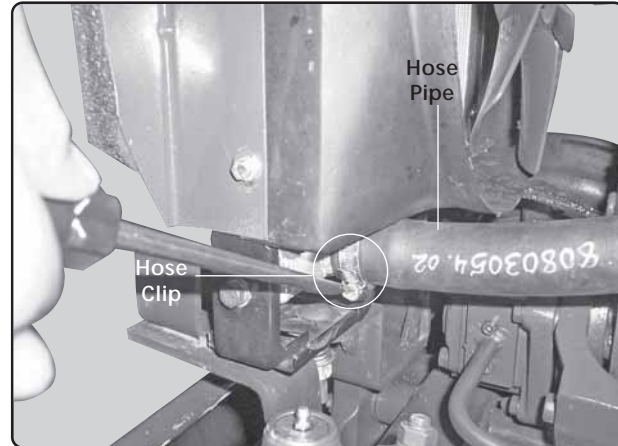
- 1 Remove the two nos. nuts of bonnet of LH & RH side.



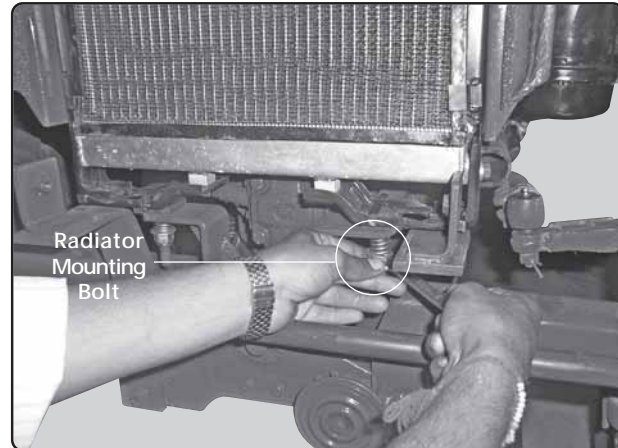
- 2 Remove the two nos bolts of bonnet. & remove the Bonnet.
- 3 Drain the coolant in the radiator by removing the radiator drain plug.
- 4 Remove the brace plate of radiator



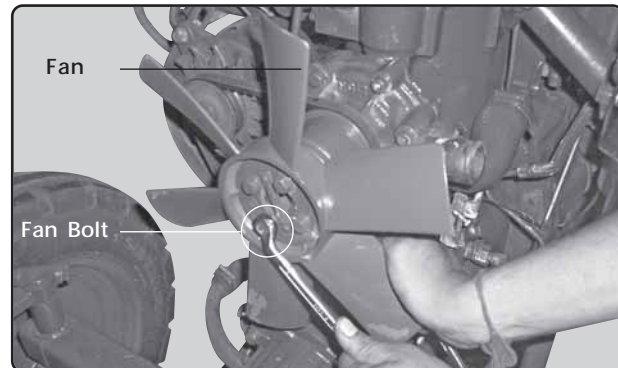
- 5 Remove the clip of radiator each inlet & outlet hose.



- 6 Remove the two nos. radiator mounting spring loaded bolts & plain washer and remove the radiator.

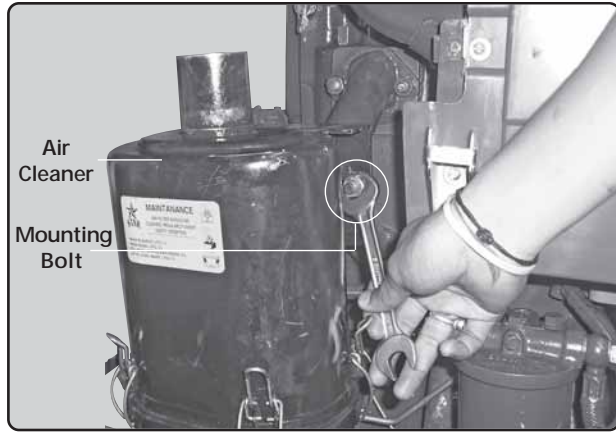


- 7 Remove the four nos bolts (spanner size 12 mm) of fan blade & remove the fan blade.

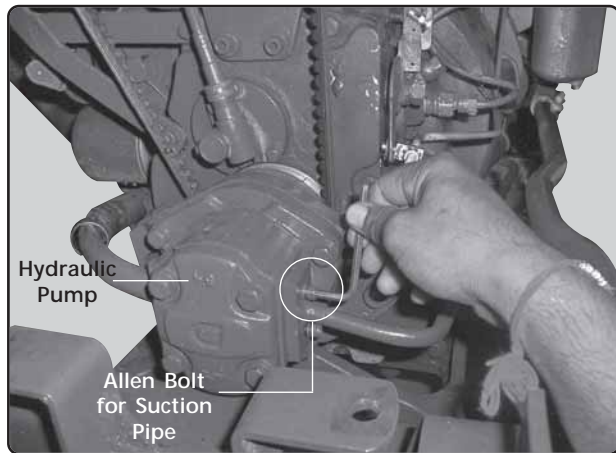


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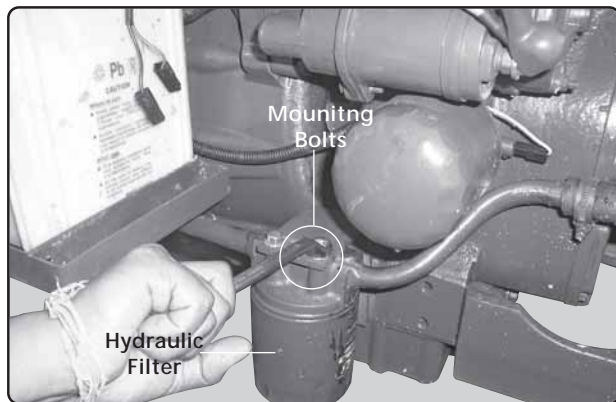
- 8 Remove the air cleaner by removing the two nos bolts of air cleaner assembly.



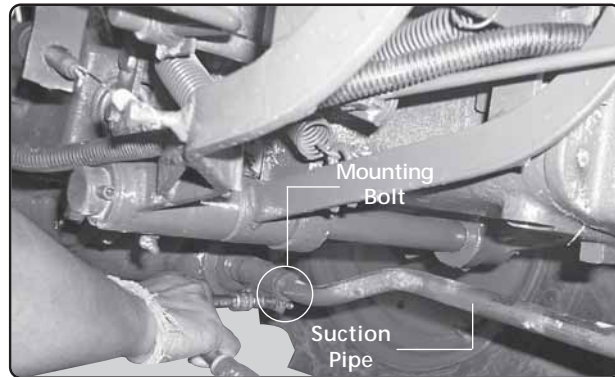
- 9 Remove the two Allen bolts each of suction pipe & pressure pipe. (3/16 size bolt of Pressure pipe & 7/32 of suction pipe).



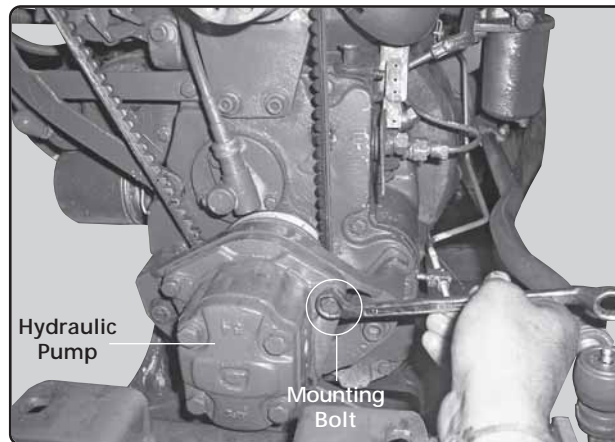
- 10 Remove the hydraulic filter in suction line by removing two bolts of it.



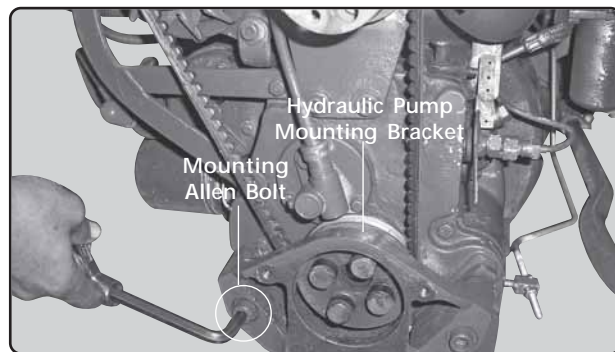
- 11 Remove the suction pipe. (Suction pipe below the transmission housing has to be removed by removing two bolts with the help of 7mm ratchet.)



- 12 Remove the four nos of hydraulic pump mtg. bolts (spanner size- 12/13) & remove the hydraulic pump.

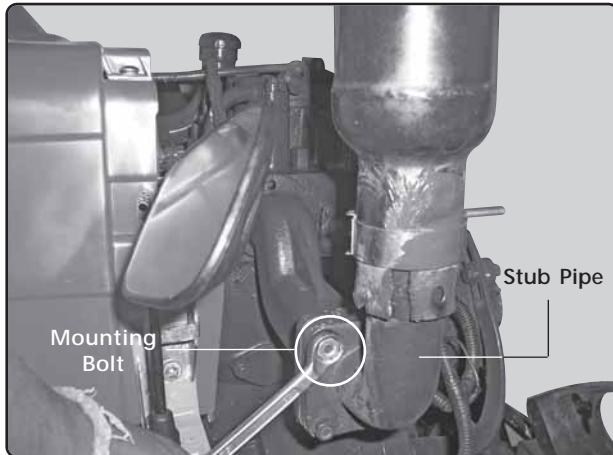


- 13) Remove the two Allen bolts of hyd. Pump bracket(10mm) and remove the hydraulic bracket.



Engine

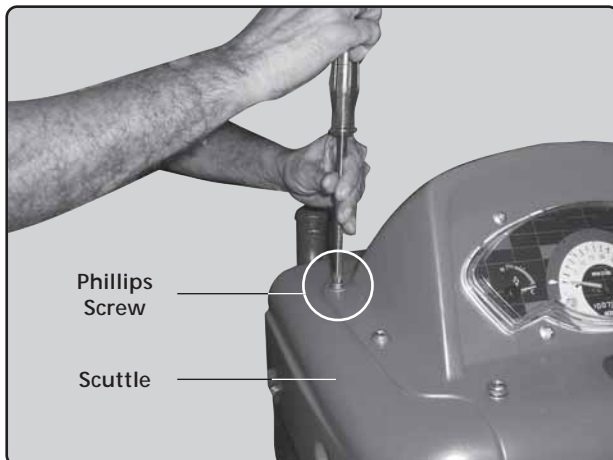
14 Remove the four nos bolts (13mm size) stub pipe on exhaust manifold & remove the stub pipe with silencer assembly.



15 Remove the steering wheel with the help of steering puller



16 Remove the eight nos of Phillips screws of scuttle top panel by the screwdriver & remove it.



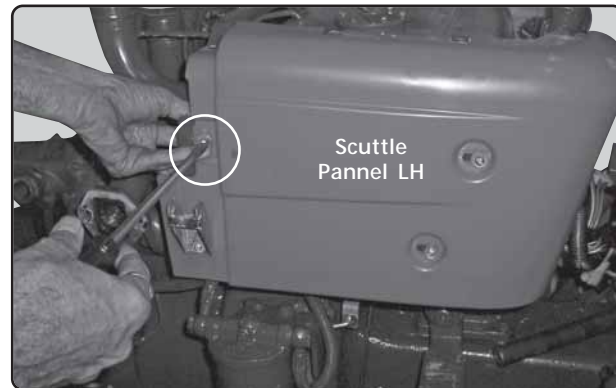
17 Remove the four nos of Phillips screws of scuttle front panel by the screwdriver & remove it.



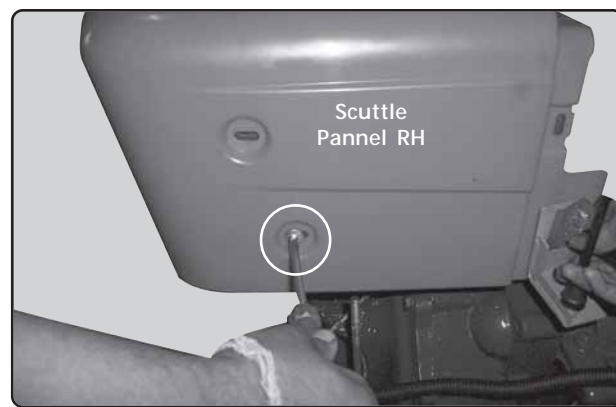
18 Disconnect all wiring harness couplers connected to the scuttle.

19 Remove the pull to stop knob.

20 Remove the three screws of scuttle LH side panel & remove the bonnet mtg. bracket.



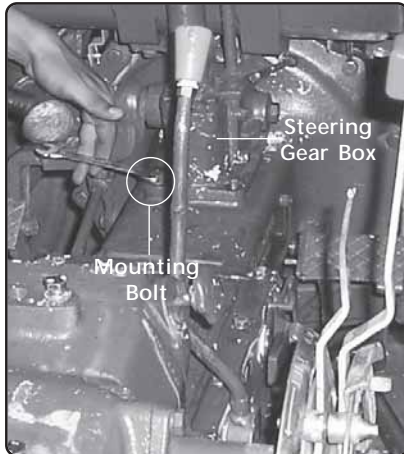
21 Remove the three screws of scuttle RH side panel.



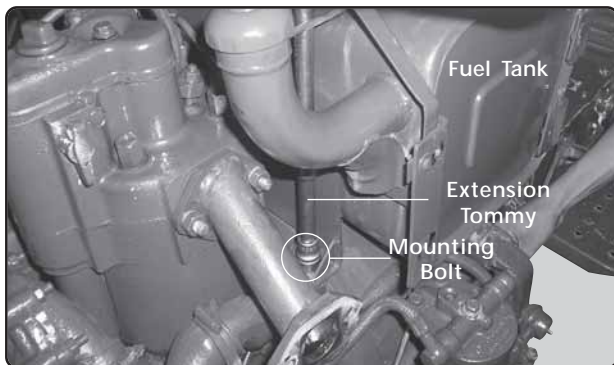
Engine

22 Remove the accelerator linkage.

23 Remove the three nos of bolts of steering mounting bracket (14mm- size) & remove the bracket.

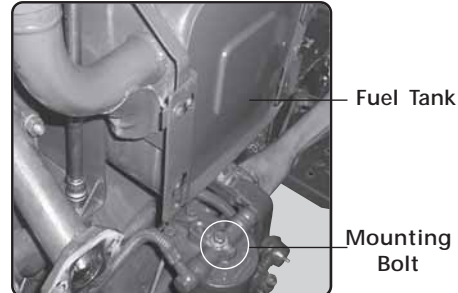


24 Remove the two bolts of fuel tank mounting bracket. (19mm Size)& remove the bracket.



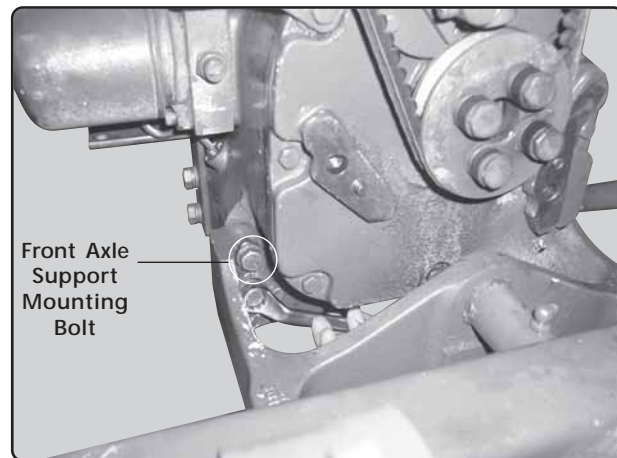
25 Remove the nut connecting the drop arm to drag Link.

26 Remove the two bolts of fuel filter & remove the fuel filter to pump pipe. Remove the filter.



27 Remove the radiator mounting bracket by removing the two nos bolts. (16mm).

28 Remove the four bolts (M12) of front axle support. & remove the support.

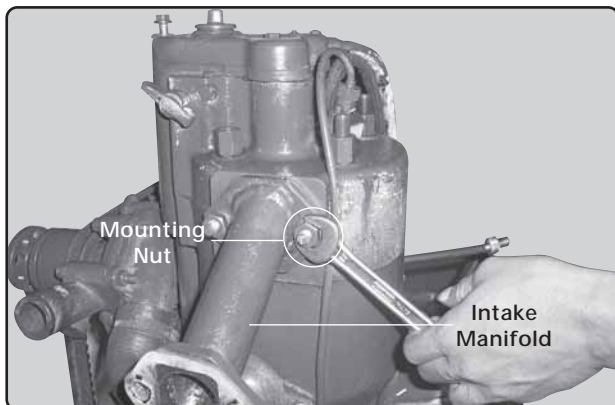


29 FAS will come along with the Front Axle.

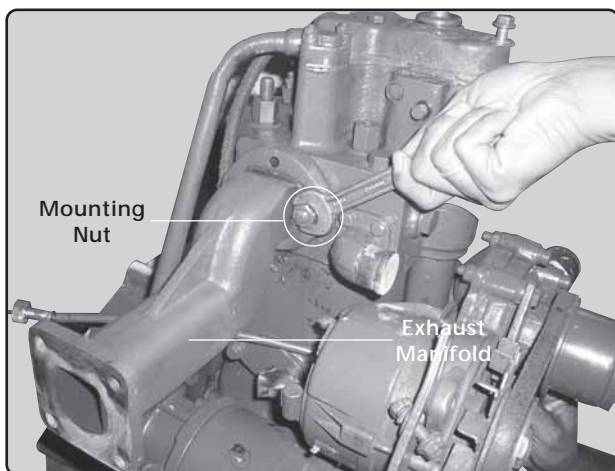
30 Remove the two bolts of fuel filter bracket & remove the bracket.

Engine

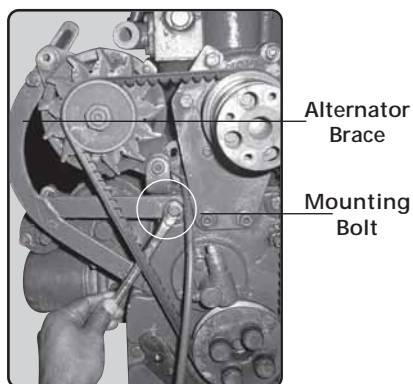
31 Remove the two nut of inlet manifold (Spanner size :17mm) & remove the manifold & gasket.



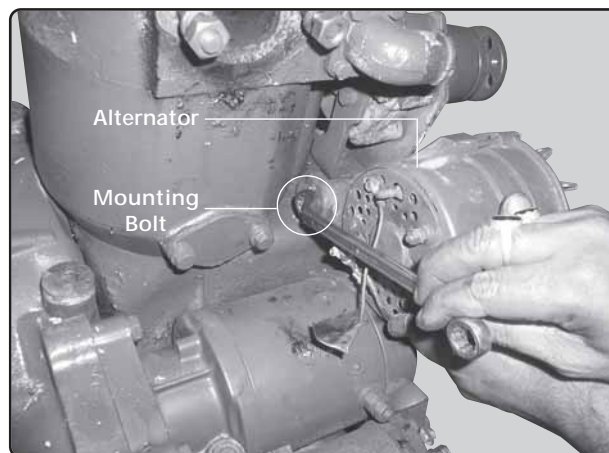
32 Remove the two Nut of exhaust manifold (Spanner size 17mm) & remove the exhaust manifold.



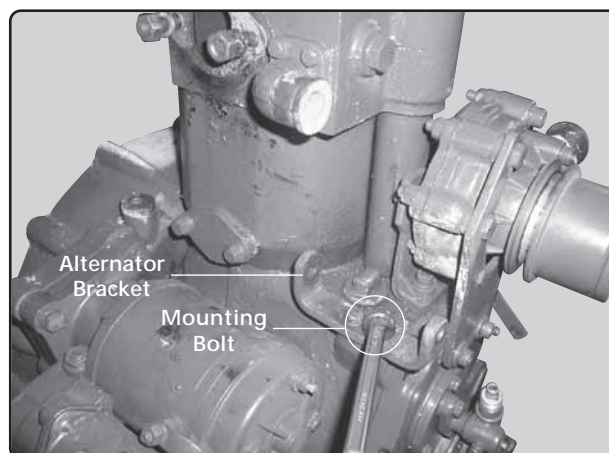
33 Remove the three bolts of (Spanner size 12mm) alternator brace & remove the brace.



34 Remove the alternator by removing the bolt.



35 Remove the two bolts of alternator bracket & remove the bracket.(Spanner size 8mm)

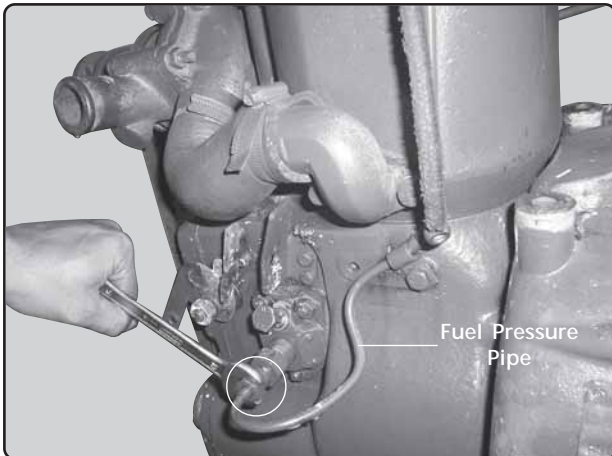
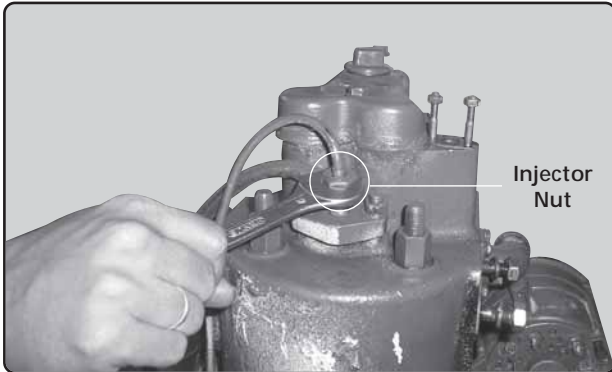


36 Remove the two bolts of breather assembly (Spanner size 10mm) and separate it.

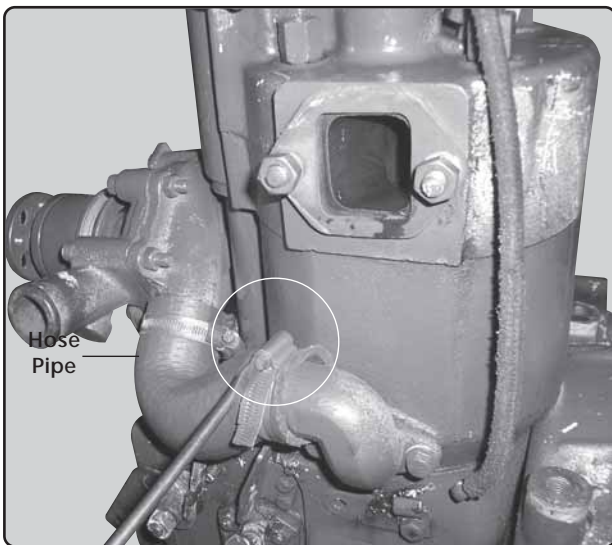


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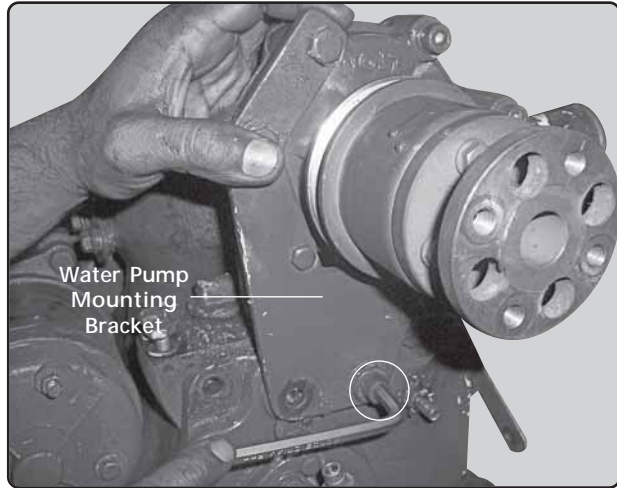
37 Remove the nut connected to the injector & other nut on the crankcase (17mm), to remove the Fuel Pressure pipe loosen the clamp bolt.



38 Remove the two clips of the hose between the water pump and crankcase block.



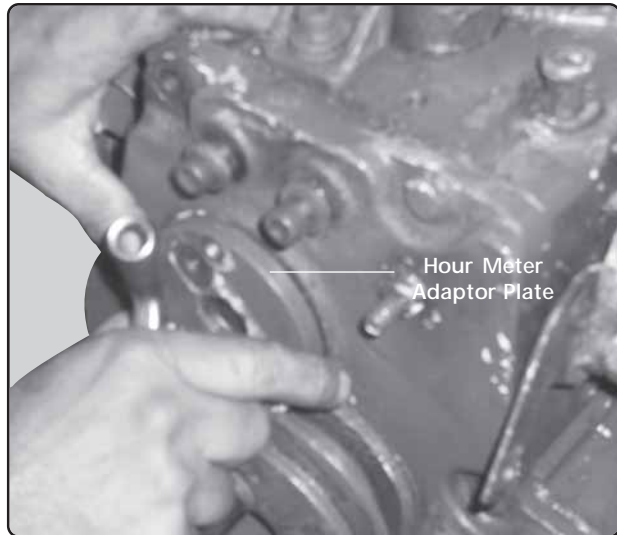
39 Remove the two bolts of water pump & remove it. (Spanner size 13mm)



40 Remove the hour meter adaptor by removing two bolts.



41 Remove the three bolts of hour meter adaptor plate.

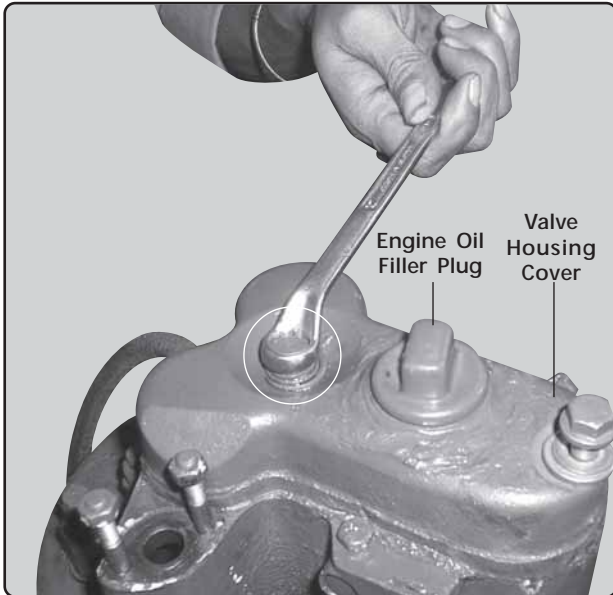


42 Remove the crankshaft pulley by removing one bolt.(16mm).

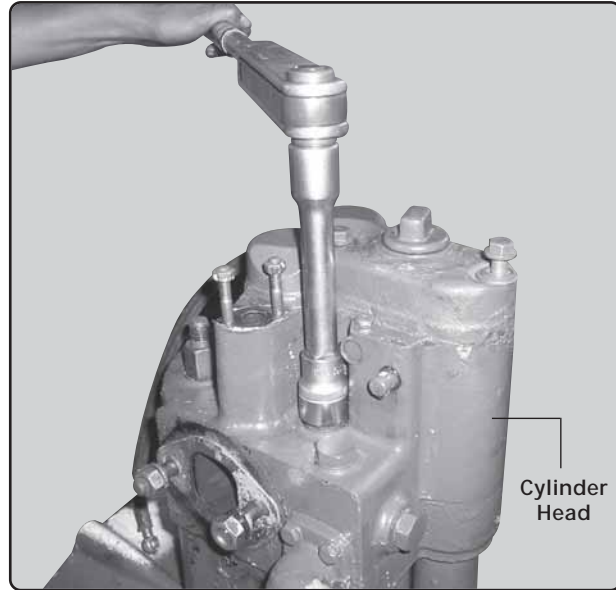


Dismantling procedure of the valve housing cover & cylinder head

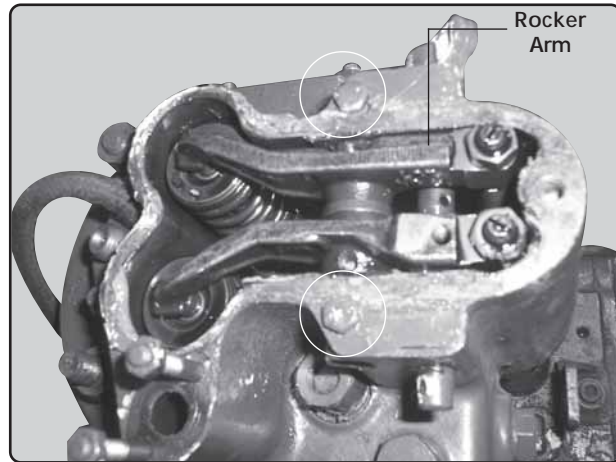
43 Remove the two bolts of the valve housing cover & remove it.



44 Remove the four bolts of the cylinder head. (Spanner Size 3/4).



45 Remove the two nos bolts of rocker arm & remove the rocker arm shaft. (Rail of rocker arm).



46 Remove the rocker arm & Push rods..

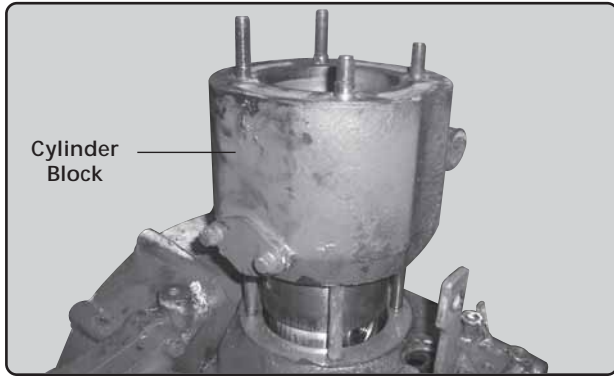
47 Remove the cylinder head from the crankcase block.



Engine

48 Valve Springs can be removed from the Cylinder head by removing the lock. Remove the top retainer, Spring, Bottom retainer and thrust washer.

49 Remove the cylinder head block by removing the dowel by pulling it.

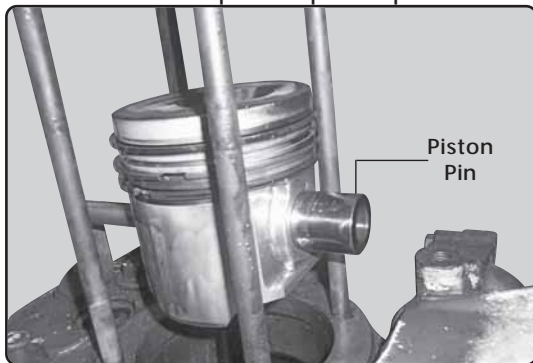


Dismantling procedure of the Piston assembly.

50 Remove the circlip of piston pin.

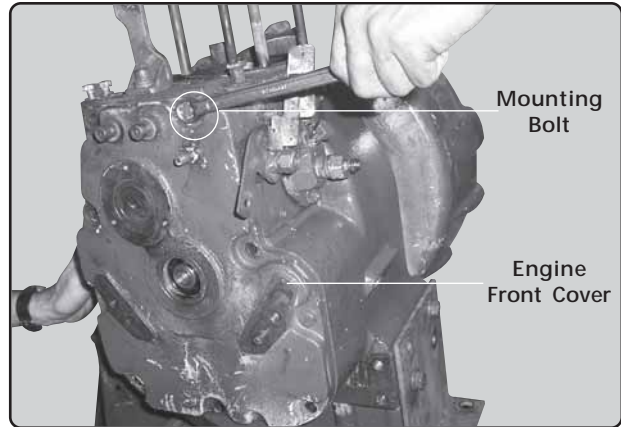


51 Hammer the piston pin with a mallet and remove the piston pin & piston.

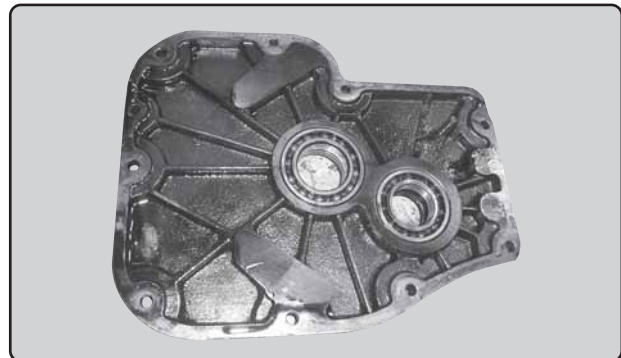


Dismantling procedure of crankcase front cover-

52 Remove the nine bolts of the front engine cover.



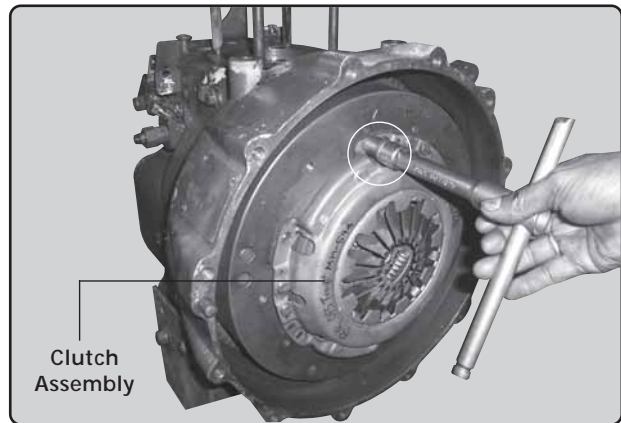
53 Remove the engine front cover



54 Remove the gasket front cover.

55 Remove the spin on oil filter.

56 Remove the six bolts of the clutch cover assembly (13mm).



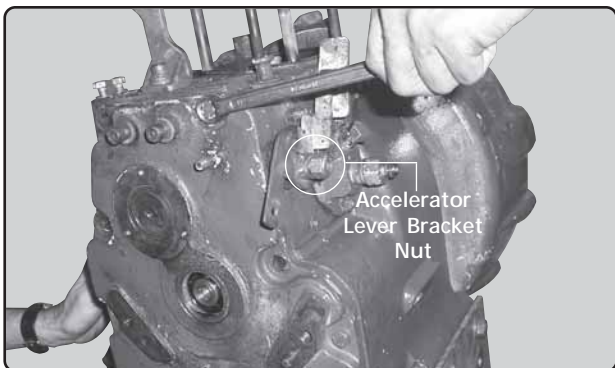
Engine

57 Remove the clutch.



58 Drain the oil from the oil pan.

59 Remove the nuts of the accelerator lever bracket.



60 Remove the Accelerator lever bracket.



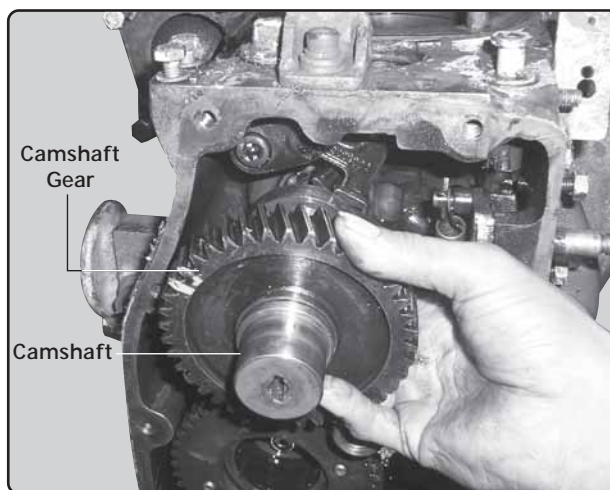
61 Remove the three bolts to remove the fuel injection pump (13mm).



62 Remove the fuel injection pump & its gasket.

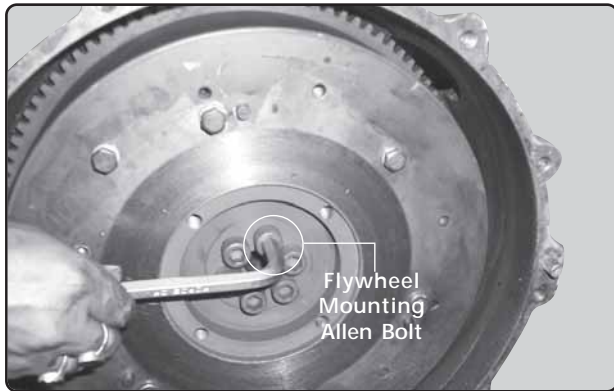


63 Remove the camshaft.

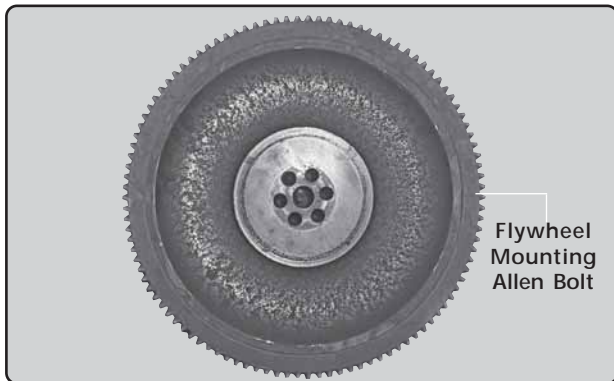


Engine

64 Remove the six nos Allen bolts (10mm) of the flywheel assembly.



64 Remove the flywheel.



65 Remove the pressure distribution plate.

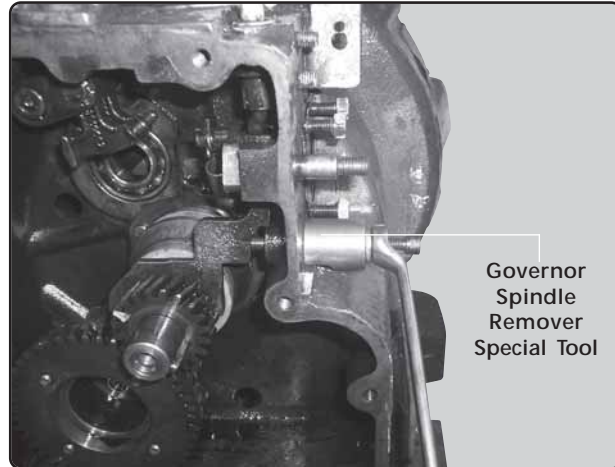


Dismantling procedure of the governor control shaft

66 Remove the inside circlip of the governor control shaft with the help of the circlip plier.

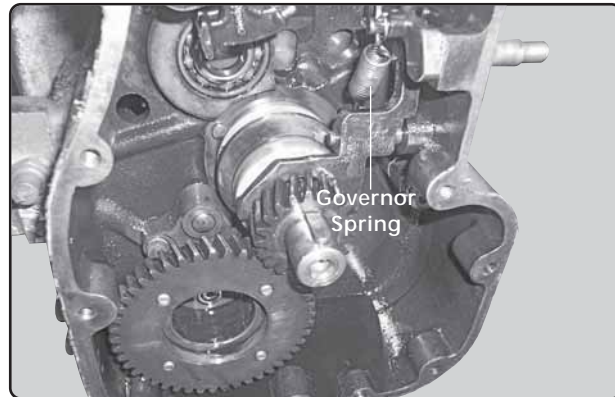
67 Remove the governor control spindle by placing the puller (MST-H1-EN-) on the Crankcase. Screw the bolt such that the

threaded portion fits into the spindle. Tighten the lock nut such that the spindle is pulled out along with the bolt.



68 Remove the pin of the hand accelerator lever.

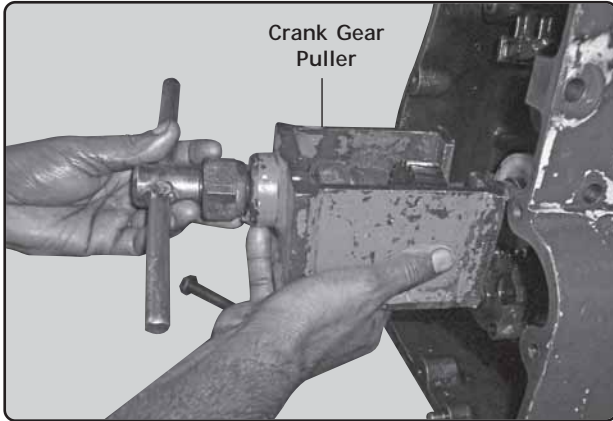
69 Remove the spring connecting the governor control lever with hand accelerator lever.



70 Remove the oil pump gear by tapping it with the mallet.

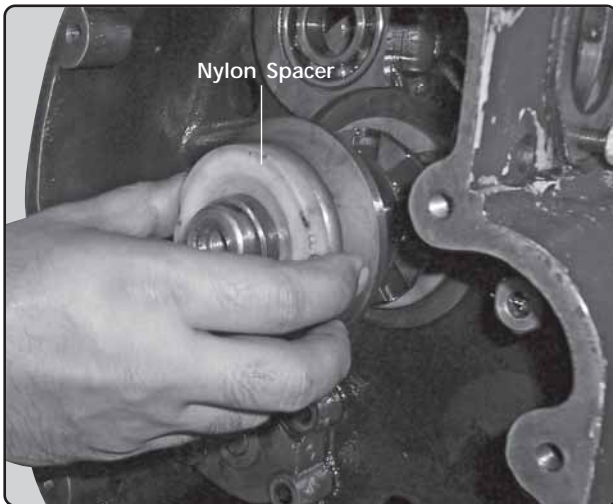


71 Remove the crank gear with the help of puller (SST MST-H1-EN-).

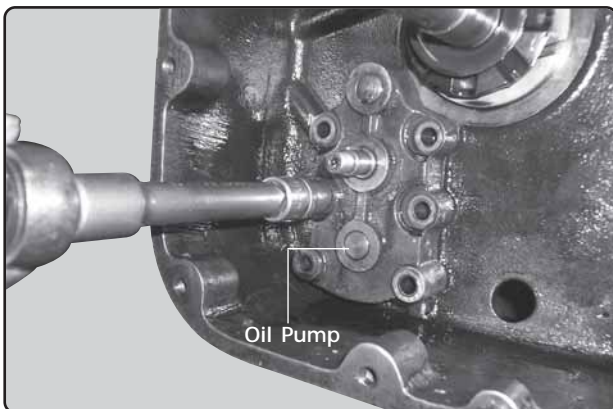


72 Remove the ball hub & disc of the ball hub with the help of the puller.

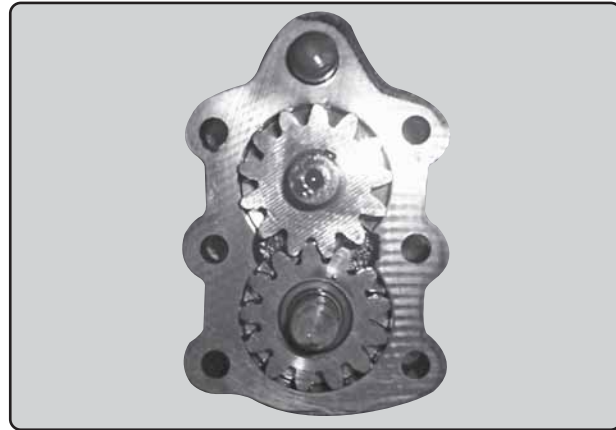
73 Remove the nylon spacer.



74 Remove the 6 nos bolts of the oil pump.



75 Remove the oil pump.

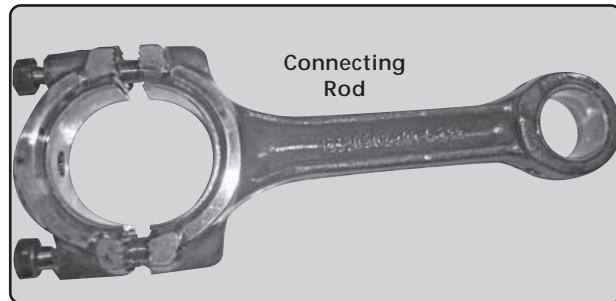


- The Oil Pump gears are non-serviceable.
- Oil Pump has to be replaced in case of replacement required for gears

76 Remove the 12 nos bolts of the oil pan

77 Remove the oil pan.

78 Remove the two bolts of the connecting rod cap & remove the connecting rod cap.



79 Remove the two allen bolts of crank balance weight.

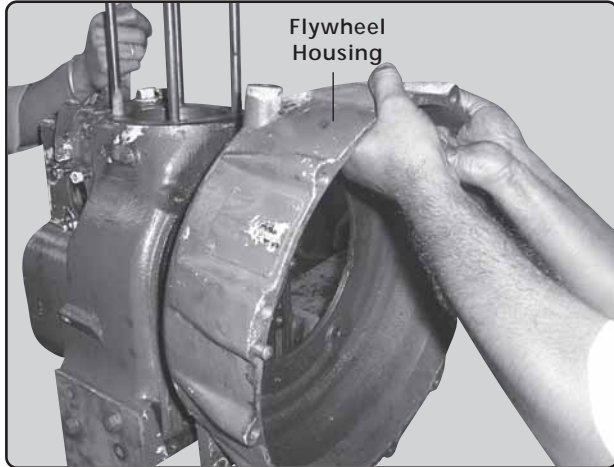
80 Remove the crank balance weight.(2 nos)

81 Remove the cam follower bracket & cam follower by removing Allen bolts. (8mm)

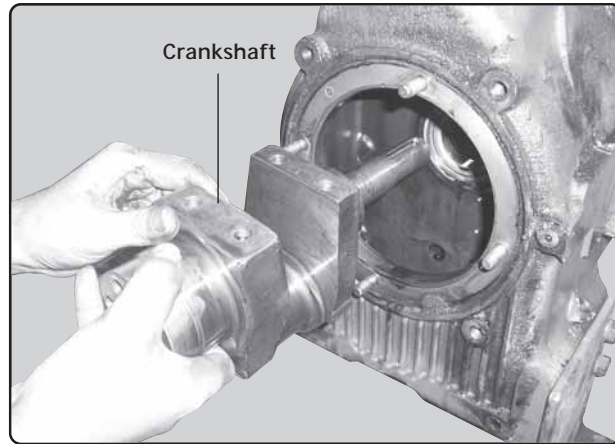
82 Remove the relief valve assembly by loosening the nuts.

Engine

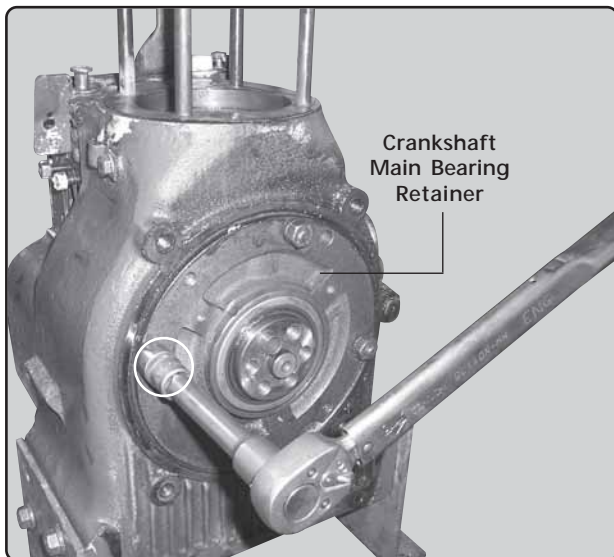
83 Remove the 6 nos bolts of the flywheel housing & remove the flywheel housing.



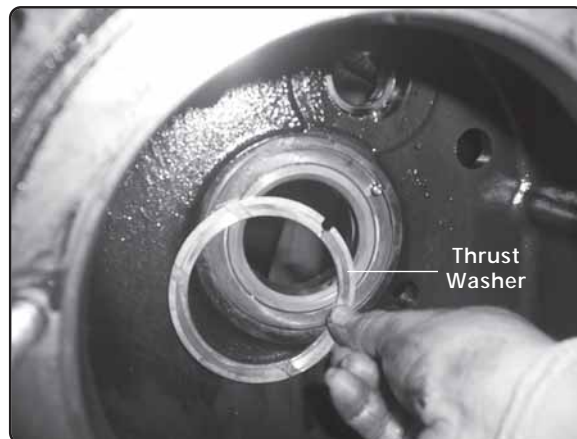
86 Remove the crankshaft



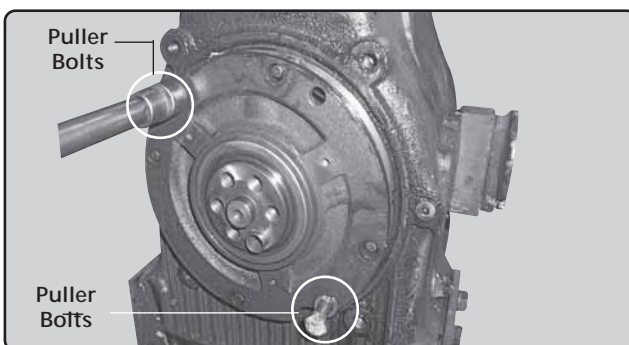
84 Remove the 4 nos bolts of the rear retainer (17mm).



87 Remove the thrust washer.



85 Use the two bolts as a puller & remove the retainer.



Before Assembly ensure that

- 1 Use new gaskets, 'o' rings, Oil Seals and fasteners.
- 2 All bearings must be cleaned & lubricated.
- 3 All moving parts must be smeared with lubricants.
- 4 Smear oil on oil seal lip before fitment.
- 5 Use recommended Special Service tools.

Assembly :

Assembly is reverse of dismantling sequence. Some of the important adjustments that needs to be done are as follows :

The Crankshaft –gear has one dot on it which should be matched with matching marks (two dots) on the camshaft gear.

On the Crankshaft front end another gear is mounted with the help of key way . This gear is called as PTO gear which is having one dot. This has to be matched with the two dots on the balancing gear. This Gear pair is provided to reduce engine vibrations.

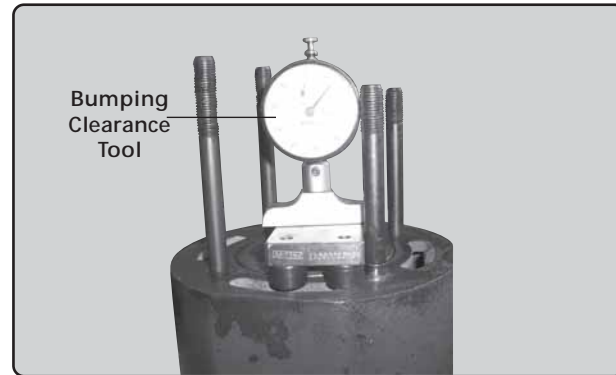
Bumping Clearance Setting (Selection of Shims below the Cylinder block):

- 1 Mount the Cylinder block on the crankcase without shims.
- 2 Rotate the Crankpulley and get the piston in T.D.C position.
- 3 Place the bumping clearance tool (MST-H1-EN-) on the liner top face without cylinder head gasket. The tool can be placed on any of the two cylinder head studs and with the help of given spacers tighten the tool. Torquen the nuts to 40 Nm. This will ensure that the tapered portion of the Cylinder blocks sits properly in the crankcase.
- 4 Rotate Crankpulley in clockwise/ anticlockwise and note the maximum dial reading at TDC. This is to ensure that piston is at the top dead centre position. If the reading is 'X' mm then the shims required will be " (X - 0.2 or 0.30) mm".

The shims are available in '3' different sizes : 0.4 mm, 0.3 mm and 0.2mm. The



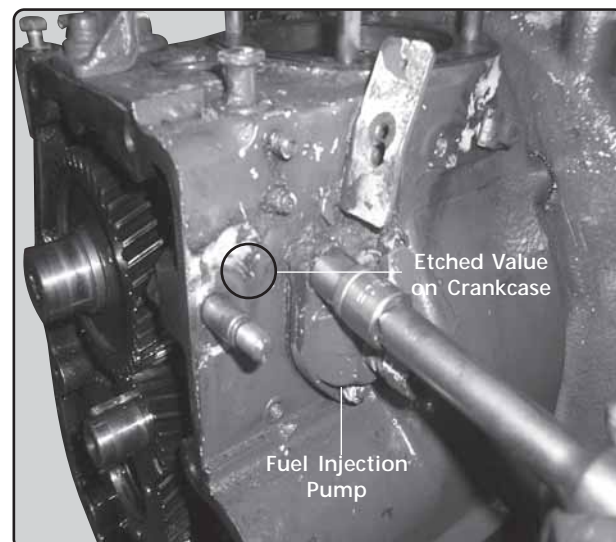
Value of X will always be greater then 0.30mm.



FIP Mounting Setting : There is a value in mm which is punched on the crankcase next to the FIP.

- 1 Whenever the FIP is removed the no of shims to be replaced should be equal to the value on the Crankcase.
- 2 If FIP is to be replaced, then value on the old FIP Should be noted.
- 3 Value provided on new FIP to be noted.

Now the revised number of shims = Value on Crankcase - Value on old FIP x 0.1 + Value on New FIP x 0.1



Engine

Service Instruction for Air Cleaner Service

1. Remove oil bowl of air cleaner and drain entire oil.
2. Remove primary & secondary wiremesh element & clean them with diesel.
3. Remove foam element clean it in diesel and squeeze it to remove dirt.
4. Apply 6 to 8 gms of oil uniformly on the surface of foam.
5. Clean housing from inside and place foam inside.
6. Completely clean top and bottom filter element, dry them with compressed air and put in to filter.
7. Fill the oil bowl up to oil filling mark and assemble it in to main body.
8. Check for perfect assembly.
9. Check the seal for perfect sealing condition and replace it if necessary.

Care Required While Assembling Crank Shaft



Loctite 5060 needs to be applied on the face of the Gear for Counter weight at Crankshaft - 006009900B1, as highlighted in the images.

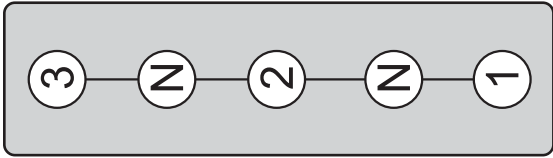
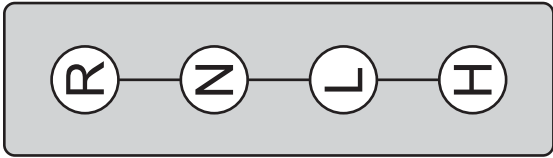
MAINTENANCE CHART FOR ENGINE

Job	Activity	To be done by Customer		To be done by Dealer		
		10 Hrs / Daily	Every 50 Hrs	Every 250 Hrs	Ev-ery 500 Hrs.	Every 1000 Hrs.
Engine						
Oil Level	Check	✓	✓	✓	✓	✓
Oil	Change			✓	✓	✓
Oil Filter	Change			✓	✓	✓
Valve Clearance	Check			✓	✓	✓
Low-Hi Idle Engine R.P.M.	Check			✓	✓	✓
Power, Response & Exhaust Smoke	Check			✓	✓	✓
Air Cleaner (Oil Bath Type)						
Pre-cleaner-®	Clean	✓	✓	✓	✓	✓
Wire Mesh / Bowl-®	Clean / Replace Oil		✓	✓	✓	✓
Air Cleaner Connections	Check		✓	✓	✓	✓
Fuel System						
Fuel Filter (First at 500 hrs & then every alternate service)	Change				✓	✓
Injector	Check					✓
Cooling System						
Radiator Fins	Clean	✓	✓	✓	✓	✓
Coolant - Water	Check & water Top Up	✓	✓	✓	✓	✓
Radiator Cap	Check			✓	✓	✓
Fan Belt & Fan Belt Tension	Check		✓	✓	✓	✓

TRANSMISSION



Transmission Specification

CLUTCH		
Make	M & M	
Type	Dry Organic Facing type	
No of Plate	Single Plate	
Outer Diameter (mm)	200	
Thickness of Clutch plate (mm)	7.2	
Operating Method	Pedal Operated	
GEAR BOX		
Make	M & M	
Type	Sliding Mesh	
Number of Gears	6 Forward & 3 Reverse	
Gear Shift Pattern		
Gear Shift Lever		
Front		Rear
Hi low Reverse Shift Lever		
Front		Rear
Transmission Oil (Including Hydraulic)	EP90	
Capacity	16	
Oil Change Period	Every 1000 Hrs	
Crown Wheel & bevel pinion ratio	4.77:1	
Final Drive gear ration (Bull gear ratio)	2.933:1	
BRAKE		
Type	Mechanical dry type	

Transmission Torque Charts

Sr No	Description	Torque (Nm)
1	Transcase Cover to Transcase	21 - 25
2	Retainer Layshaft to Transcase	21 - 25
3	Retainer Splineshaft to Transcase	21 - 25
4	Retainer Rear Axle to RAC	21 - 25
5	PTO Housing to Transcase	21 - 25
6	Bull Cageto Transcase	41 - 50
7	RAC to Transcase	41 - 50
8	Clutch Hsg to Transcase	41 - 50
9	Cross Shaft to Ring Gear	41 - 50
10	Brake Hsg. To Bull Cage	41-50
11	Clamping Plate to Transcase	21 - 25
12	Clutch ReleaseFork to Clutch Shaft	21 - 25
13	Washer Angular Contact Brg to Transcase	21 - 25
14	Nut For Bracket Spring Holding	21 - 25
15	Nut For Differential Stud	75 - 87
16	Bolt for Rail	41 - 50
17	Bolt for Reverse Idler Shaft	41 - 50
18	Lock Nut Bull Gear	110 - 120
19	Plug Magnetic Drain	68 - 75
20	Dipstick	47 - 54
21	Grease Nipple Clutch Release Sleeve	21 - 25
22	Grease Nipple Clutch Release Shaft	21 - 25
23	VTU to Transcase	64 - 75
24	VTU to Transcase	65 - 75
25	VTU to Transcase	41 - 50
26	VTU to Transcase	65 - 75

Transmission

General :

To work or dismantle the transmission form engine, first remove the bellow aggregate or assemblies.

1. Fender assembly
2. Hydraulic assembly
3. Electrical system.
4. Linkage, pipes & fittings
5. Three point Linkages
6. Seat assembly
7. Scuttle assembly
8. Steering assembly

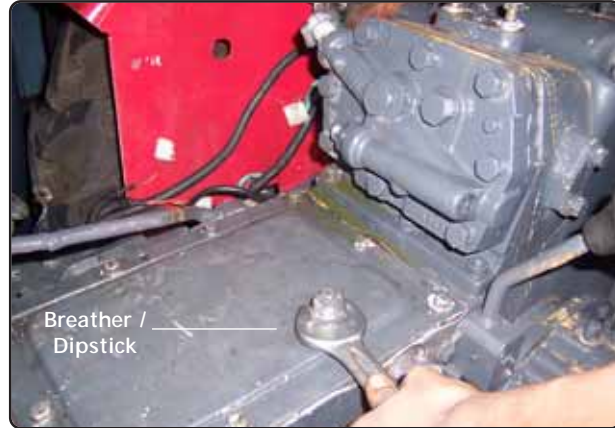
Jack the tractor with proper jack or hoist



Loosen the bolts of the tyre & remove both the tyres.

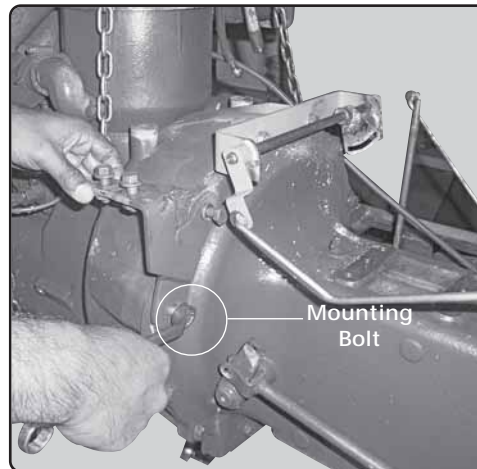
Loosen the drain the plug of the transmission & drain the transmission oil.

Remove the transmission breather / dipstick for free flow of transmission oil.

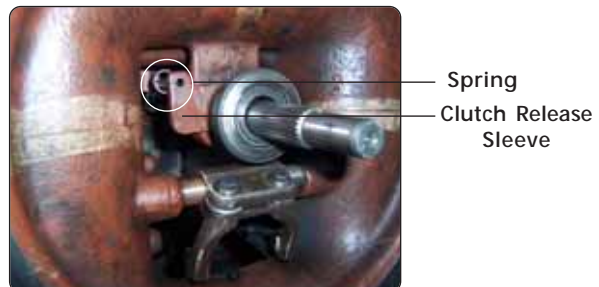


Removal of Clutch Housing & Connection

1. Remove the bolts mounting the clutch housing to engine.



2. Separate the engine form the clutch housing.
3. Remove the spring of clutch release sleeve & remove the clutch release sleeve with bearing.



Transmission

4. Remove the Clutch housing hand hole cover by removing 6 nos of bolts mounting it on the clutch housing.
5. Remove the clutch release bearing shaft & fork as follows

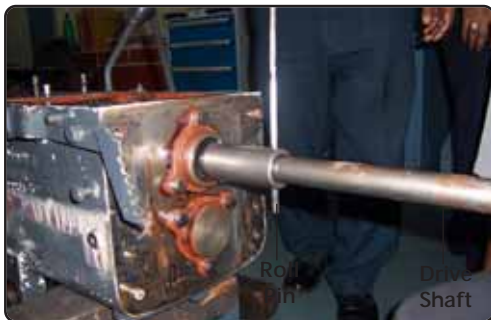


Release Fork

- a. Remove 2 nos of bolt & spring washer of clutch release with the help of spanner.
- b. Remove the RH circlip of clutch release shaft
- c. Tap the clutch release shaft from the RH side with the help of mallet.
- d. Hold the fork with one hand & pull out the clutch release shaft by other hand.

Note:- The clutch release shaft has a circlip on the LH also which acts as retainer & avoids fouling of actuating portion of the shaft with the housing.

6. Remove the 8 nos of bolts mounting the clutch housing to the transmission case.
7. Remove the clutch housing in straight direction, if not the drive shaft may get bend.
8. Remove the roll pins of transmission drive shaft with the help of roll pin punch & remove the drive shaft.



Roll Pin Drive Shaft

9. Remove the coupling by removing the roll pins with the help of roll pin punch.



10. Clean all the parts with the help of cleaning fluid & inspect of wear & damage if found beyond permissible replace the same with new one.

Note: Always use new gaskets & roll pins at the time of assembly.

Dismantling of Rail Assembly



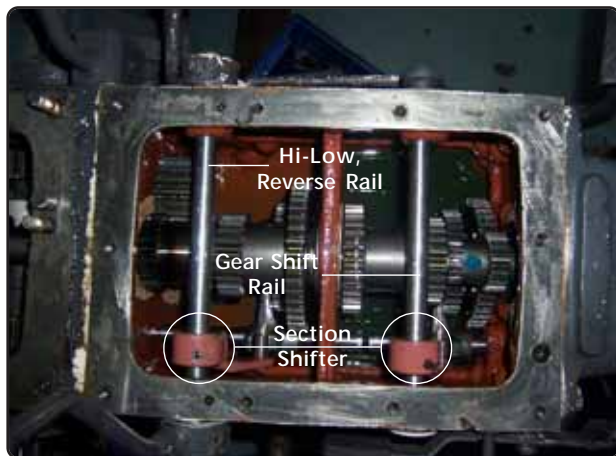
1. Remove the Hi Low Reverse shift lever by removing the double roll pin with help of roll pin punch & hammer.
2. Remove the cotter pin & plain washer of the link actuating the gear shift rail.
3. Remove the external circlip of gear shift lever with the help of circlip plier .
4. Remove the washer retaining the gear shift lever.
5. Then remove the gear shift lever with actuating link.

Transmission

- Remove the Top cover of transmission case by removing 10 nos of bolts with the help of spanner.

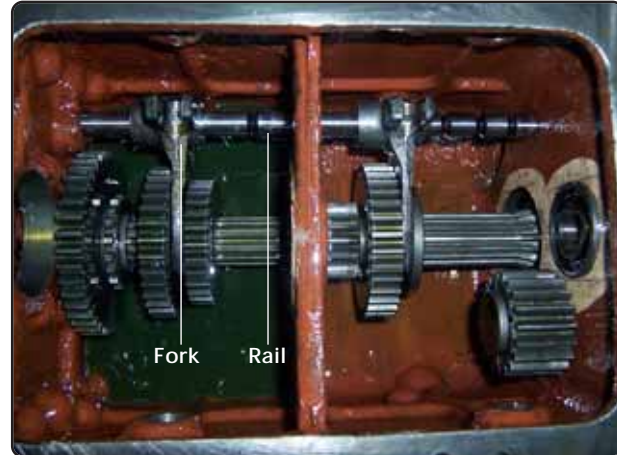


- Remove the roll pin of section shifter with help of roll pin punch & make the section shifter free on it individual rail.



- Hold the Hi low reverse section shifter with one hand & with other tap & remove the Hi Low Reverse rail from the transmission.
- Remove the Hi Low Reverse section shifter & oil seal of it.
- Remove the RH external circlip & washer of gear shift rail with the help of plier.
- Hold the gear shift section shifter with one hand & with other tap & remove the gear shift rail from the transmission.
- Remove the gear shift section shifter.

- Remove the rail holding the shifting forks by tapping it for the rear end (Differential side).



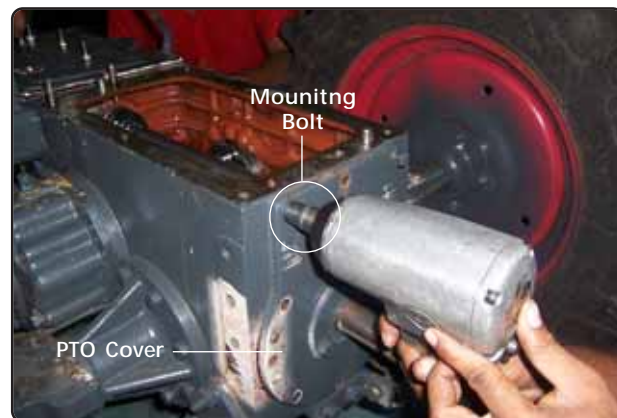
Note:- The rail has spring & ball on it at the forks.

- Remove the forks form the transmission.
- Clean all the parts with the help of cleaning fluid & inspect all the parts for wear & damage, replace if necessary.

Note: Use new seals, roll pins, cotter pins & gaskets at the time of assembly.

Dismantling of PTO Assembly

- Remove 10 nos of bolts & spring lock washer of rear PTO cover with the help of a 8 mm spanner.



- Slightly tap on the PTO cover on the edge with the help of mallet

Transmission

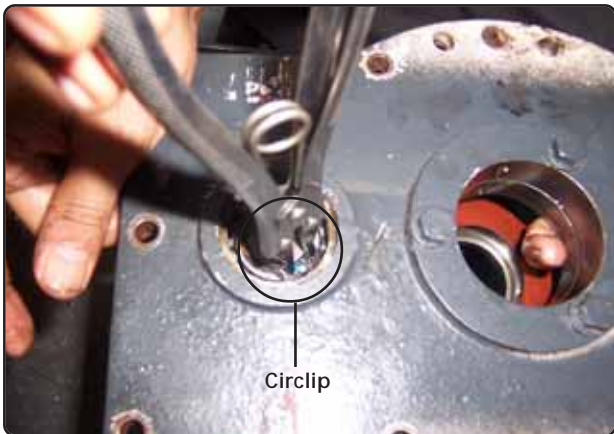
3. Pull out the PTO shaft subassembly by holding the main PTO shaft.



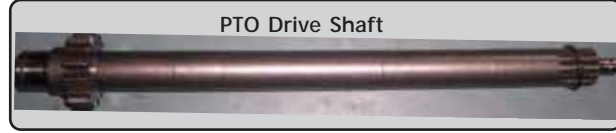
4. Damage & remove the welch plug mounted on the rear cover.



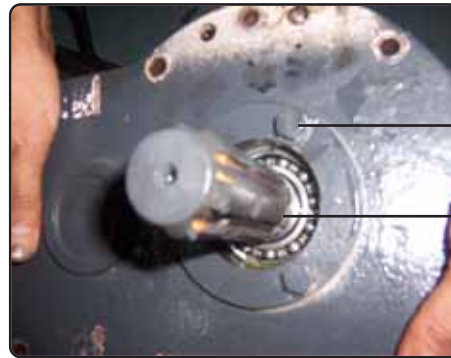
5. Remove the rear circlip of the PTO drive shaft with the help of external circlip plier.



6. Remove the PTO drive shaft by tapping it from the rear with the help of a mallet.



7. With the help of circlip piler remove the circlip of PTO drive shaft bearing.
8. Tap & remove the bearing of PTO shaft drive shaft.
9. Remove 3 nos of bolt & spring lock washer of PTO oil seal retainer with the help of 8 mm spanner.



10. Pull & remove the PTO oil seal retainer.
11. Remove the PTO oil seal.
12. Remove the front & rear circlip of main PTO shaft.



Transmission

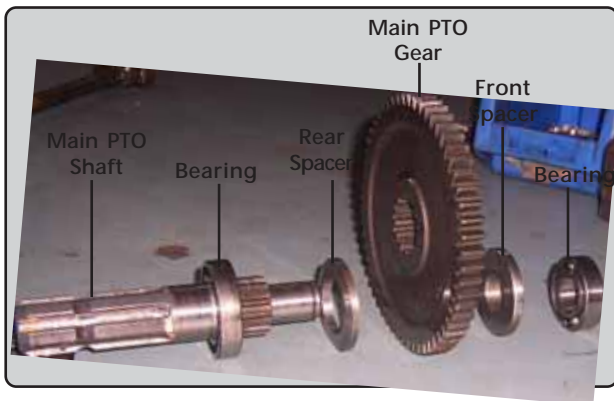
13. Remove the shims of PTO shaft.
14. Tap the main PTO shaft with the help of mallet from the front side & draw the main PTO shaft from the rear.



Mallet

Main PTO Gear

15. After removing the main PTO shaft, draw out the PTO gear with front & rear PTO shaft spacer.



16. Remove the remaining bearings.
17. Remove the PTO coupling.



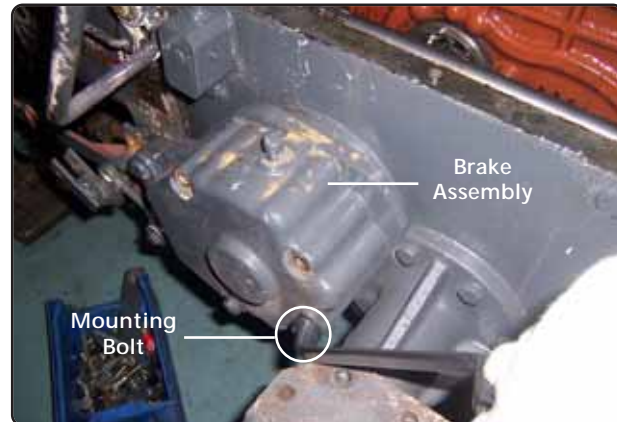
PTO Coupling

18. Remove the roll pin of PTO shift lever with the help of roll pin punch & draw out the PTO shift lever with ball & spring.
19. Remove the bolt & spring lock washer of PTO shifter shaft retaining plate with the help of 8 mm spanner & remove the PTO shifter retaining shaft.
20. Rotate & remove the PTO shifter by tapping with the mallet from the outside.
21. Remove the PTO shifter oil seal.
22. Clean all the parts with the help of cleaning fluid & inspect all the parts for wear & damage, replace if necessary.

Note: Always Use new seals & circlips at the time of assembly.

Dismantling of Brae Assembly

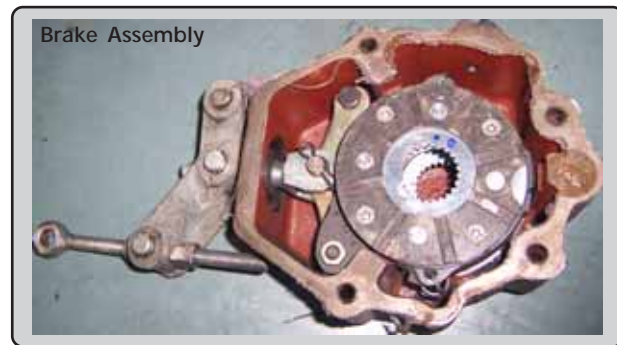
1. Remove 4 nos of hexagonal headed bolts & washer, mounting the brake assembly to the transmission with the 10 mm spanner.



Brake Assembly

Mounting Bolt

2. Remove the Brake assembly with friction disc & actuating disc assembly.



Brake Assembly

Transmission

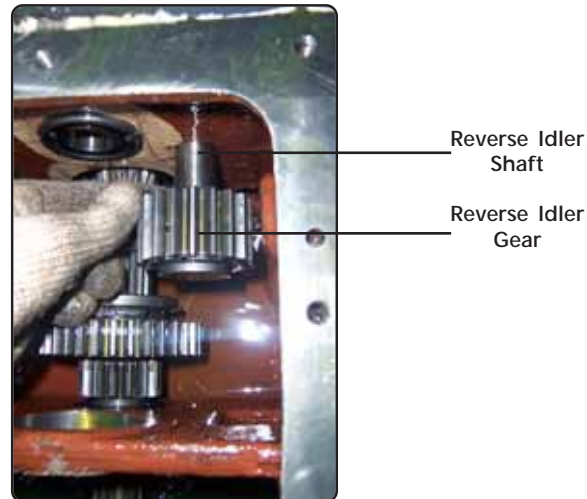
3. Remove the breather.
4. Remove the cotter pin of the actuating disc pull rod & remove the bolt of the pull rod.
5. Remove the pin of the tension link by removing the cotter pin & washer with pin mounting the tension link on the brake housing.
6. Pull out the actuating assembly.
7. Remove the rubber boot mounting on the brake housing.
8. Remove the friction disc.
9. Dismantling of actuating disc assembly.
 - a. To remove the actuating disc assembly from the brake assembly remove the pin connecting the pull rod & crank link by removing the 'R' pin.
 - b. Remove the pull rod & actuating unit assembly from the housing.
 - c. To separate the two actuating disc, remove the 2 nos of springs holding the disc together with the help of screw driver or plier.
 - d. Remove the two discs & take out the 4 nos of Steel balls.
 - e. Remove the crank link of each actuating disc by removing the nut & bolt.
10. Remove the inner friction disc.
11. Clean all the part with the help of cleaning fluid except the friction disc & inspect all for wear & damages. If found beyond limit replace the same with new one.

Dismantling of Reverse Idler Assembly

1. Remove the grub screw retaining the reverse idler assembly on the transmission case with the help of 10 mm spanner.



2. Tap & remove the reverse idler assembly with the help of mallet from the rear side of the transmission.



3. Remove the external circlip retaining the reverse idler gear in the reverse idler shaft with the help of external circlip plier.
4. Remove the thrust washer.
5. Remove the reverse idler gear from the shaft.
6. Remove the snap ring from the reverse idler gear & remove the 2 nos of needle roller bearing from it.

Transmission

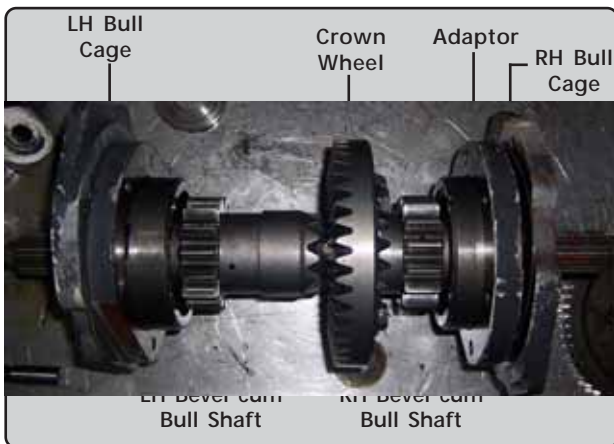
7. Clean all the part with the help of cleaning fluid & inspect them for wear & damage, replace if found worn & damage.

Note: While assembly ensure that the reverse idler shaft half cut portion is on the top side & match the hole of the reverse idler shaft with the help of a round rod. (The half cut on the reverse idler shaft is provided for lubrication of the reverse idler assembly.)



Half Cut Portion

Dismantling of Differential Assembly



1. Loosen & remove 6 nos each bull cage mounting bolt form bull cage RH & LH with the help of 10 mm spanner.



Mounting Bolt

2. Tap & remove the bull cage LH & RH with the help of mallet. Hold the differential cage assembly while removing the bull cage assembly LH & RH.
3. Remove the adaptor of bull cage LH & RH with the help of screw driver.



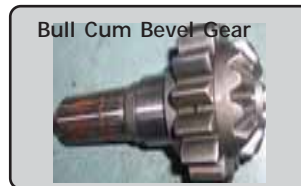
Adaptor

4. Remove the shims mounted on the bull cage.



Shims

5. Remove the Bull cum Bevel gear shaft from the cage with the help of mallet from both LH & RH.



Bull Cum Bevel Gear

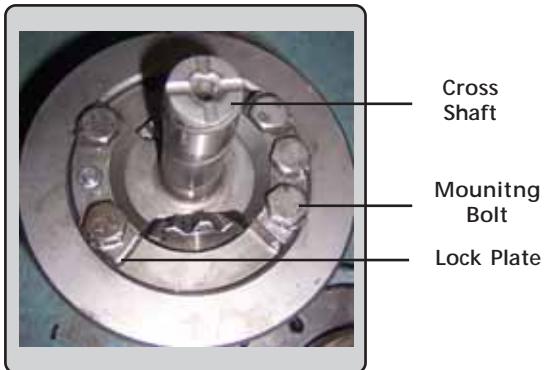
6. Remove the circlip of bull cage bearing & remove the bearing.
7. Unlock the lock plate of the bull shaft & remove the nut with lock plate form the bull shaft.

Transmission

8. Remove the integral stud, inserted in the bull shaft.



9. Dismantling of differential cage assembly.
 - a. Unlock the lock plate of bull cage cross shaft & remove the 5 nos of bolts mounting the cross shaft to the crown wheel. The cross shaft will come out with the bevel pinion gear.



- b. Remove the bevel pinion gear & bevel pinion shaft

10. Clean all the part with the help of cleaning fluid & inspect all the parts for wear & damage. Replace if found, with new one.

Note: Always use new seals & circlips at the time of assembly.

Dismantling of Rear Axle Assembly

1. Jack the rear axle assembly with the help of hydraulic hoist & chain.

2. Unlock the lock plate of bull gear locking nut & remove the lock nut with the spanner.

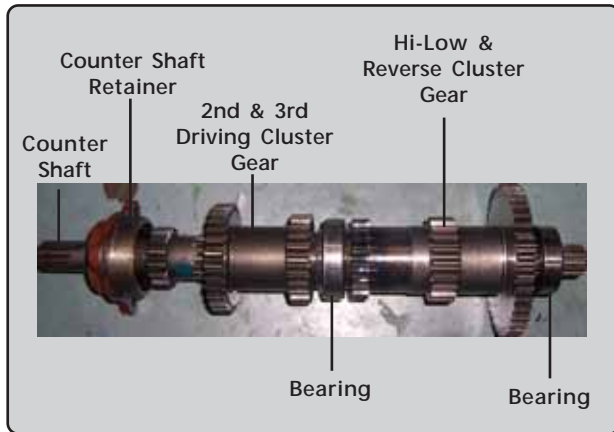


3. Remove the bull gear & conical spacer from the transmission.
4. Remove the 7 nos of bolts & spring washer mounting the rear axle assembly to the transmission with the help of 10 mm spanner. Place the assembly in a clean place.
5. Tap the rear axle inner end with the help of mallet till it comes out from the inner bearing of the rear axle carrier.
6. Further tap on the rear axle wheel mounting area in diagonal sequence with the help of mallet till the rear axle comes out.
7. Remove 4 nos of bolts & washer of rear axle retainer with the help of 8 mm spanner & remove the rear axle retainer.
8. Remove the oil seal form the retainer.
9. Remove the inner bearing by remove the retaining circlip with help of circlip plier, also remove the outer bearing.
10. Clean all the parts with the help of cleaning fluid & inspect all the parts for wear & damage, replace defective & worn out parts with new ones.

Note: Use new seals, lock nuts & circlips at the time of assembly.

Transmission

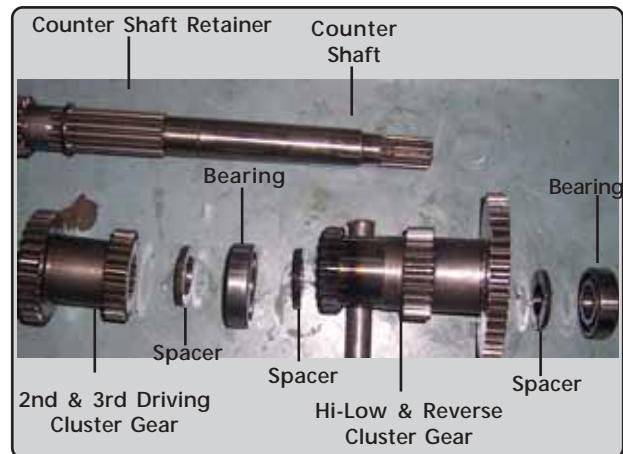
Dismantling of Counter Shaft Assembly (Driving Shaft Assembly)



1. Remove the 3 nos of bolts & washer of Counter shaft retainer with the help of 8 no. spanner.



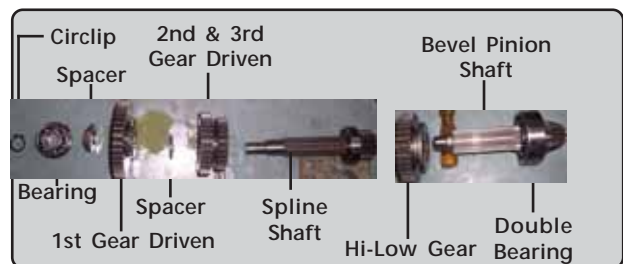
2. Remove the retainer with oil seal by tapping the retainer with mallet.
3. Remove the rear circlip on the counter shaft with the help of circlip plier.
4. Slightly tap the counter shaft from the rear end with the help of mallet.
5. Hold the Hi low Reverse cluster gear with one hand & with other pull out the counter shaft from front side till the Hi low reverse cluster gear is free to come out from the transmission case. Also, remove the spacer which is at the front & rear end of the cluster gear. The cluster gear has 3 nos of needle roller bearing & 2 nos of plastic bush inside it.



6. Hold the 1st & 2nd driving gear with one hand & with other hand pull out the counter shaft out of the transmission case. Remove the 1st & 2nd driving cluster gear with shims & rear spacer from the transmission.
7. Remove the bearings from retainer, mid wall of transmission & rear wall of the transmission. To remove the retainer bearing & rear transmission bearing first remove the circlip from the transmission.
8. Clean all the part with the help of cleaning fluid & inspect all the part for wear & damage, replace with new one if found.

Note: Always use new Oil seals & circlips at the time of assembly

Dismantling of Spline Shaft Assembly (Driven Shaft Assembly)



Transmission

1. Remove the 3 nos bolts & spring lock washer with the help of 8 no. spanner.



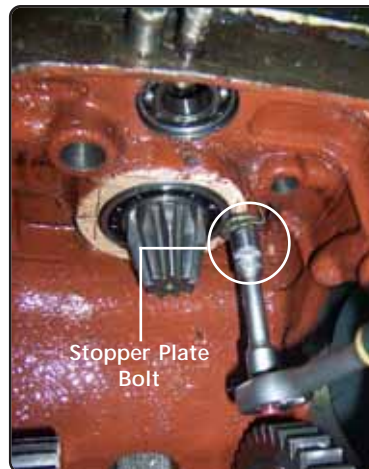
2. Remove the spline shaft retainer with the help of mallet.



3. Remove the circlip of the spline shaft front end.



4. Unlock the lock plate of the Pinion shaft & remove the bolt with lock plate & stopper plate of Pinion shaft.



5. Tap the spline shaft slightly with the help of mallet.
6. Hold the Hi low driven gear with one hand & with other pull out the pinion shaft which has double ball bearing, spacer & circlip. Also remove the Hi low driven gear & shims from the housing.
7. Hold the constant mesh gear with one hand & with other pull the spline shaft till the constant mesh gear is free to come out of the transmission case, remove the constant mesh gear with stepped spacer.
8. Remove the spacer mounted on the spline shaft & remove the 2nd & 3rd driven cluster gear.
9. Remove the spline shaft with mid bearing & circlip from transmission case.
10. Remove the circlip & remove the bearing of the spline shaft.
11. Remove the front bearing, oil seal from the retainer & double bearing from the spline shaft.
12. Clean all the part with the help of cleaning fluid & inspect all the part wear & damage replace with new one if found.

Note: Always use new oil seals & circlips at the time of assembly.

Transmission

For all above assemblies the assembly will be done in the reverse way of dismantling, although below important adjustment are to be carried out at the time of assembly step by step.



HYDRAULICS

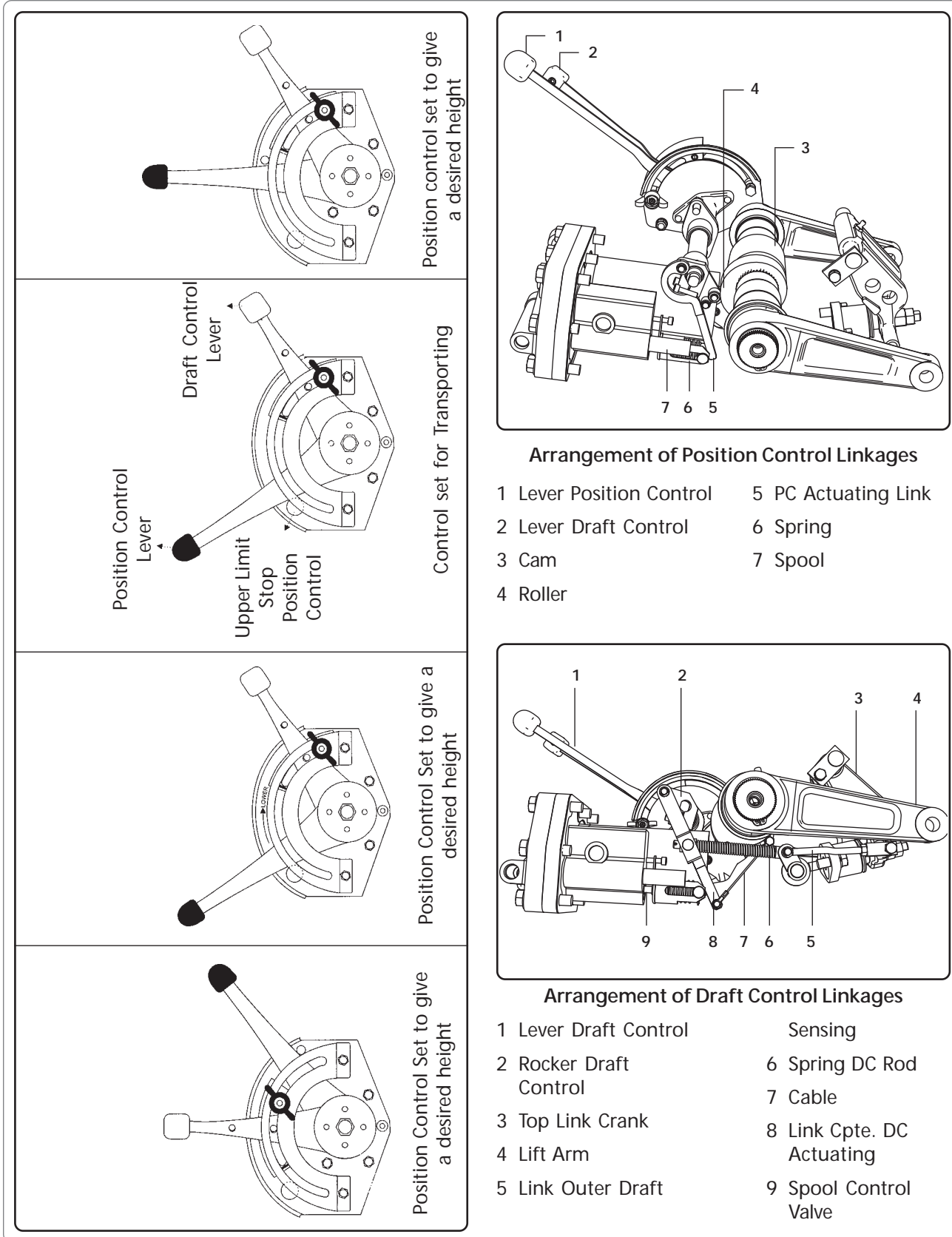
HYDRAULICS



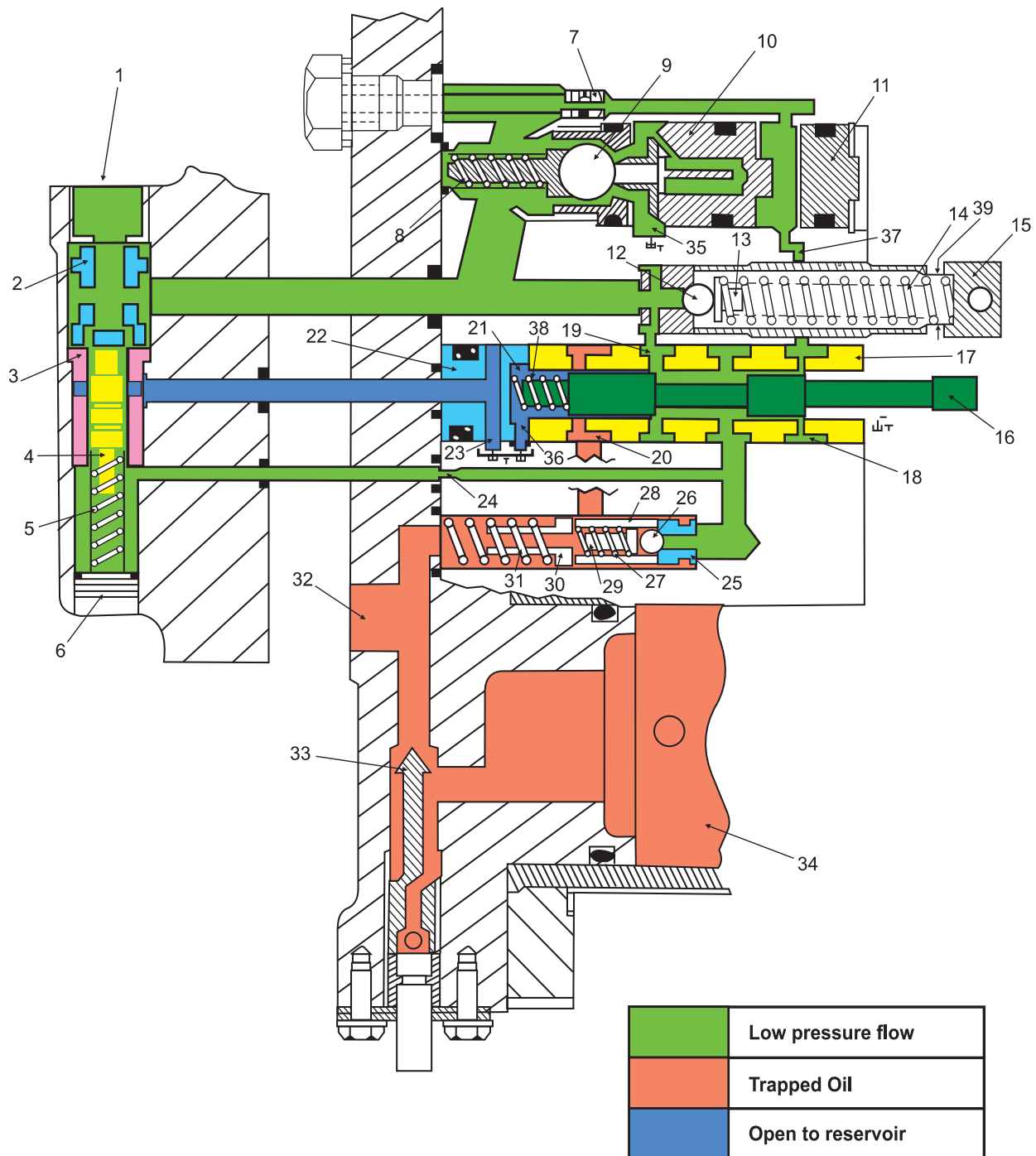
Hydraulic Specification & Torque Values

Hydraulic Specifications		
The Pump		
Make	Dowty	
Type	Gear	
Capacity (cc/rev)	7.03	
Output @ 2300 Engine RPM (lpm)	16	
Control Valve		
Make	M & M	
Relief Valve Pressure (kg/sqcm)	123 - 157	
Lift Cylinder (mm)	76.2	
Rock Shaft		
Rockshaft OD (mm)	46.95 - 46.91	
Bush ID (mm)	47.03 - 46.98	
Bell Crank		
Bell Crank Pin (mm)	20.00 - 19.9	
Torque Values		
Sr No	Description	Torque (Nm)
1	Closure Plate to VTU Bolt	45 to 50
2	Mounting Bolts	18 to-20
3	Bell crank to DC Outer Rod Bolt	18 to 20
4	Quadrant Tightening Bolt	20 to 25
5	Quadrant Mounting Bolts	35 to 40
6	Control Valve Mounting Bolts	95 to 101
7	Draft Sensing Bolts	96 to 102
8	Hydraulic Mounting Bolts	41 to 45
9	Hydraulic Mounting Studs	55 to 60
10	Hydraulic Mounting Nut	41 to 45
11	DC Sensing Nut	15
12	DC Sensing Lock Nut	25

Hydraulic Torque Values



Schematic Layout Showing Details of Control Valve Components in Neutral Position

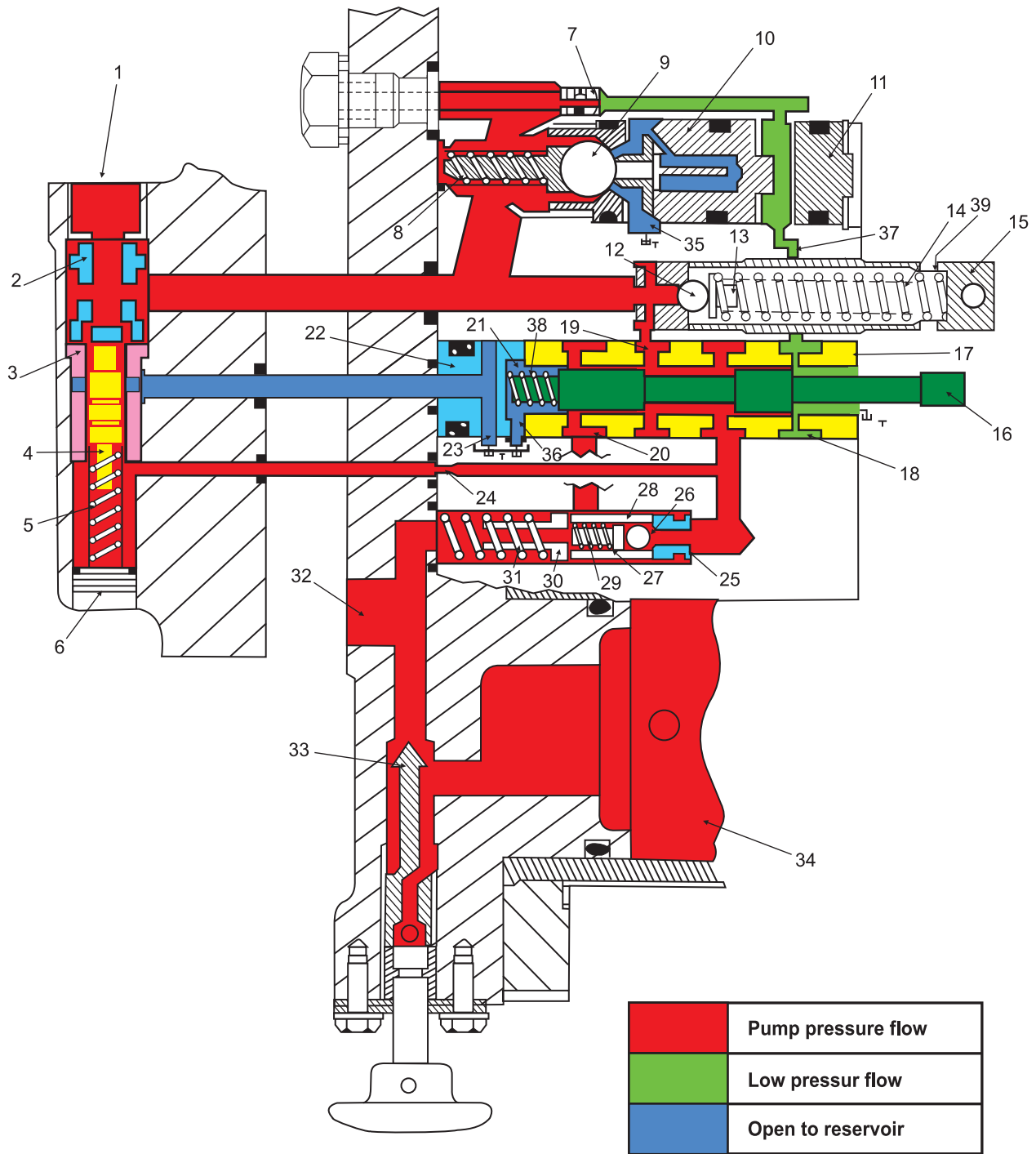


Hy-tec Hydraulics

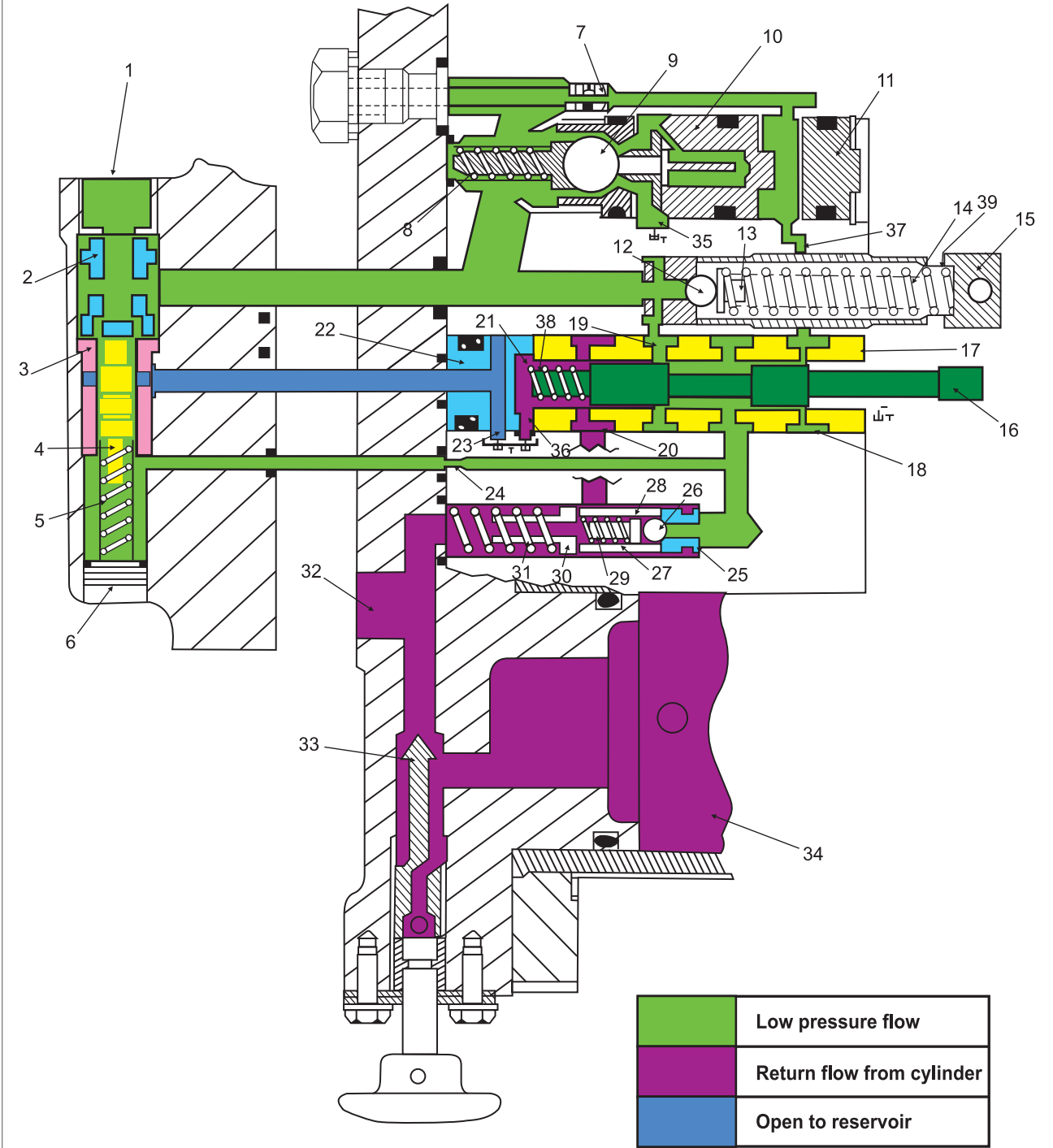
Sr. No	Description
1.	Pump Inlet
2.	Spacer Compensator
3.	Sleeve Compensator
4.	Spool Compensator
5.	Spring Compensator
6.	Retainer Plug
7.	Orifice
8.	Spring Regulator Valve
9.	Ball Regulator Valve
10.	Regulator Piston
11.	Valve Plug
12.	Relief Valve
13.	Ball Rider Relief Valve
14.	Spring Relief Valve
15.	Housing Relief Valve
16.	Spool Control Valve
17.	Sleeve Control Valve
18.	Pilot Port Sleeve CV
19.	Lifting Port Sleeve CV
20.	Lowering Port Sleeve CV

Sr. No	Description
21.	Tank Port
22.	Main Plug
23.	Tank Port Bypass
24.	Orifice (0.8 mm dia)
25.	Seat Check Valve
26.	.Ball Check Valve
27.	Spring Check Valve
28.	Sleeve Check Valve II. Valve Plug
29.	Rider Check Valve
30.	Retainer Check Valve
31.	Spring Check Valve Retainer
32.	Auxiliary Port
33.	Isolator Valve
34.	Lift Cylinder
35.	Tank Port Regulator Valve
36.	Tank Port Lowering
37.	Piolet Line
38.	Spring Main Valve
39.	Relief Valve Reservoir Port

Lifting Position



Lowering Position



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General

1. Description

These tractors are equipped with 'Vary Touch' hydraulic system consist of an engine driven gear type pump, lift housing connecting pipes and filter.

The reservoir is transmission housing. The oil is common for a transmission and hydraulics. The strainer is fitted on transmission, addition paper filter in incorporated on suction line, with as ensured 100% filtration, Lift cylinder, control valves, control valve linkage and rock shaft, carries the lift arm for the three point linkages. The control valves provided a jack tapping to accommodate a self sealing coupling which provides hydraulic power to any equipment fitted with single acting hydraulic cylinder. A bell crank lever housed in the rear frame carries a top link which act as a sensing arm with control valve linkage.

2. Principle of Operation.

The direction of flow is from the pump through the reponse compenseter valve, spool control valve to cylinder and non return valve / checke valve is the regulator and the restricting orifice which also connect to the sleeve control valve assembly. The draft and lowering the system is prodedcted by a relief valve between the pump and response control (compensator) valve.

The control valve is operated by two levers. The inner lever control the implement position and outer lever controls Implement draft. When one of the levers is in use, the other lever **MUST** be in the fully forward position to close the lift port and open the lowering port of the circuit. Thus the only flow delived to the cylinder is that controlled by the lever in use.

When the spool in use is in neutral or hold

position there will be no return to reservoir from the spool and the pressure either side of the restricting orifice will equalise. As the two sides of the regulator piston (11) have different areas this pressure will have more effect on the greater face thus moving the piston to hold the regulator ball (9) off its seat allowing pressure oil to pass the ball and return the reservoir through the regulator port (35).

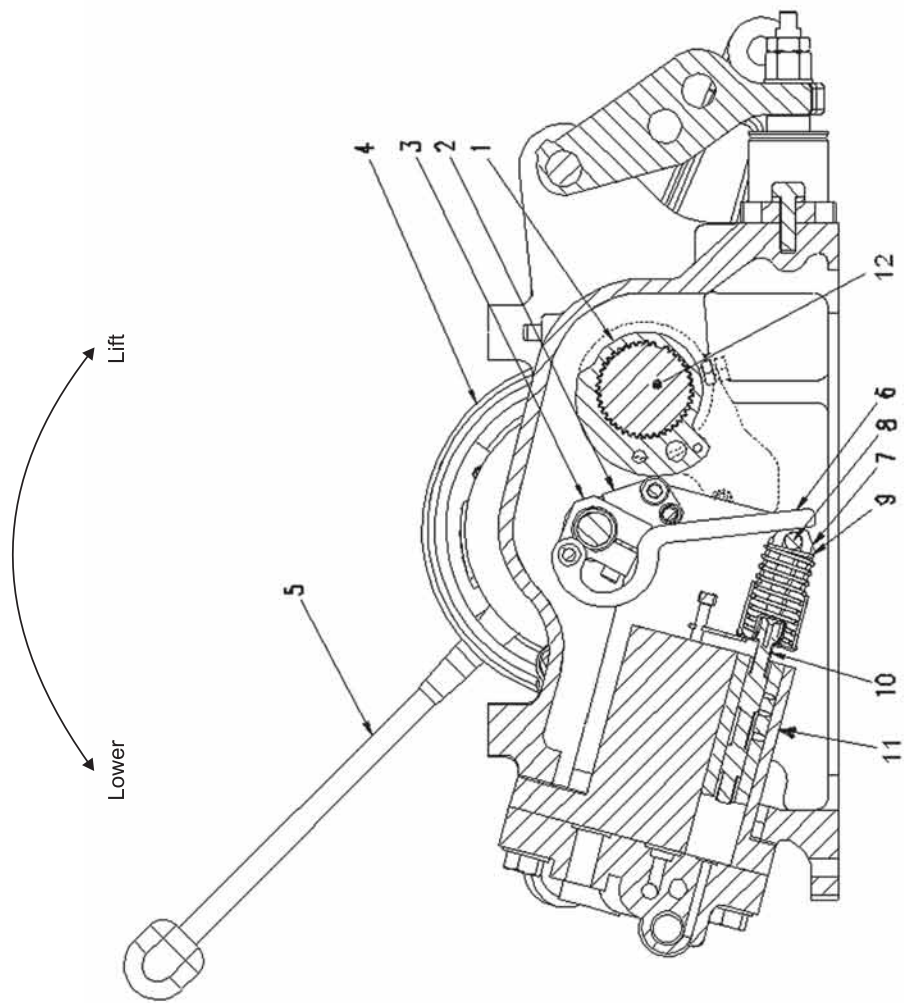
When the spool is moved to open the lift port (18) to reservoir, the resulting flow through restricting orific will cause the pressure drop at the regulator allowing the regulator ball to seat. The pressure will then open the non return valve/check valve against its spring and allow pressure to reach the flift cylinder.

When the spool is moved to lower, the flow through the restrictor port / pilot port (18) is stoped to un seat the regulator ball and allow pressure from the cylinder discharge through the lowering port (36). The non return valve / check valve. Closes due to its spring to prevent return oil entering the pressure line.

a. Position Control (Dia. Pg No.57)

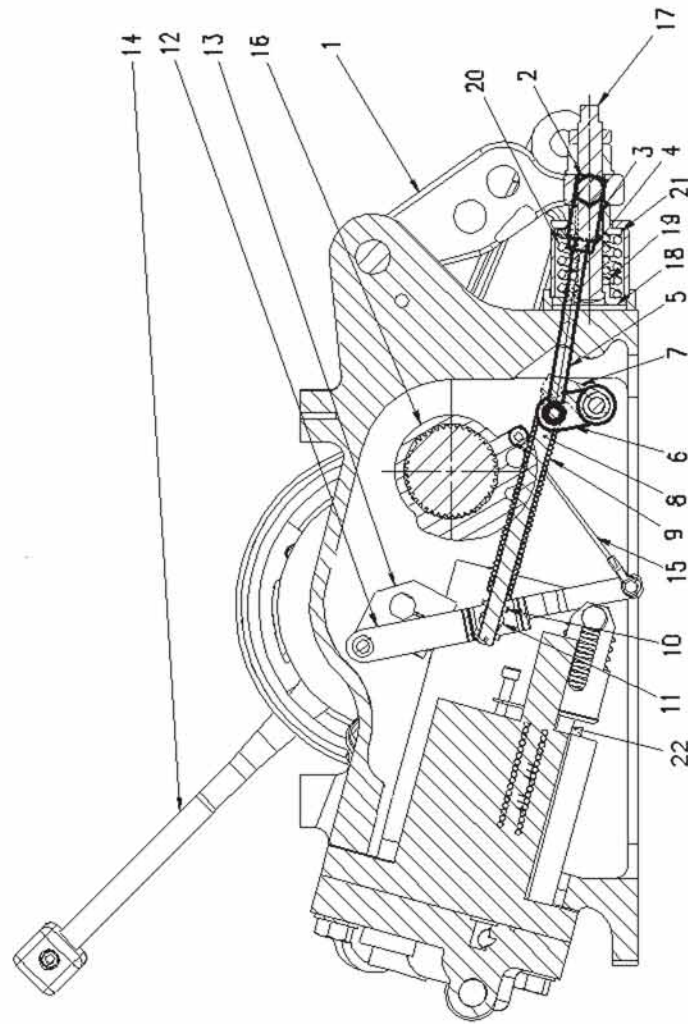
When the positon control lever (5) is moved to LIFT, the PC actuating link (6) pushes the spool (10) in control valve (11) under the action of return spring opening the pilot port (18). The resulting pressure drop allows the regulator ball to seat and pressure is directed to the cylinder.

As the rocks shaft rotate and the lift arms and implement lift, the PC cam contacts the PC roller assy to move the PC linkage (6) and plunger to closed the pilot port. The regulating pressure built up, moves the regulator piston to unseat the regulator ball allow pump pressure to discharge to reservoir through the regulator port (35). The lift arms and implement are then held by the oil locked in the cylinder (34). When PC lever (5) moved to lower the PC



1. Cam Position Control
2. Position Control Roller Assembly
3. Rocker Position Control Cpte.
4. Quadrant
5. Position Control Lever
6. Position Control Actuating Link.
7. Spool Extension Assembly
8. Feedback Pin
9. Feedback Washer
10. Spool Control Valve
11. Control Valve Assembly.
12. Rock Shaft.

INTERNAL LINKAGES LAYOUT – POSITION CONTROL



1. Crank Top Link
2. Step Bolt DC Outer Block
3. DC Outer Block
4. Lock Nut M8
5. DC Feedback Link Outer Assembly
6. DC Feedback Outer Rocker Cpte.
7. DC Feedback Inner Rocker Cpte.
8. DC Feedback Rod Cpte.
9. Spring DC Rod.
10. Spacer DC Spring.
11. Block DC Link
12. DC Actuating Link Cpte.
13. Rocker Draft Control Cpte.
14. Lever Draft Control Cpte.
15. Cable DC Feedback.
16. Cam Position Control.
17. Spindie Draft Sensing.
18. Sleeve Bottom Sensing.
19. Spring Inner DC Sensing.
20. Spring Outer DC Sensing.
21. Sleeve Draft Sensing.
22. Spool Control Valve

INTERNAL LINKAGES LAYOUT - DRAFT CONTROL

actuating link pivots about PC roller assy (2) and moves back towards rockshaft. This allows spool (10) to come out under the action of spring main valve (38). This allow the oil to return from lift cylinder and discharge to the reservoir causing the lift arms and implement to lower under their own weight.

As the rocker shaft (12) rotates, the rock shaft cam tends to move away from the roller (2) and, in following the cam profile the roller and linkage allow the plunger to move out until the spool control cover the sleeve port (20) then the lift arms and implement are again held by the oil locked in the lift cylinder (34).

As the pump pressure is unchanged the regulator ball will be held off its seat and pressure oil discharges to reservoir.



NOTE : The distance raised depends on the movement of the position control lever in quadrant.

b. Draft Control (Dia. Pg 58)

The draft control system operate on the principle of draft loads i.e. resistance acting on the implement while it is being pulled through the ground. Load, actuates the DC feedback link outer assy (5) which is linked to the draft control spool of the valve.

The position of the draft control lever (14) corresponds with a definite resistance of the implement being pulled through the ground.

The implement penetrates into the ground until the pre selected operating resistance is reached. At this point the draft control linkage top link, bell crank / top link crank (1) (sensing element) acts on DC feedback link outer assy (5) which in turn transfer motion to DC feedback rod (8) which is connecting to DC actuating link (12) which actuates spool control lever (22).

An increase in implement draft moves the link outer draft sensing (5) against the

spring thus move the spool control valve plunger.

As the spool plunger moves inward. The pilot port sleeve is uncovered, the consequent pressure drop allow the regulator ball to seat and pressure is directed to the cylinder to raise the lift arms and implement. As the implement is raised, the compression load on the top link is reduced and by the top link crank (1) will go back and allow the spool control valve (22) to move out by action of feedback spring. The spool cuts off the pilot port and resulting pressure rise unseats the regulator ball to allow pump pressure to return to reservoir. A decrease in implement draft allow the Link outer draft sensing to move back taking the spool control valve with it. This uncover the lowering port, allowing the lift arms and implement to fall until the increase in implement draft moves the control spool through the linkages to close the lowering port.

The draft control lever (14), by moving the rocker draft control (13) of the operating link / link cpte DC actuating move the draft link relative to the DC feedback link outer assy this movement is transmitted to the control spool and oil flows in the appropriate direction until the resulting movement of the lift arms brings the implement draft to the desired setting. The spool then returns to the neutral position to cut off the oil flow.

c. Draft control / sensing element.

1. The Tension or pressure forces acting on the Top link sensing element are converted into control signal i.e.

These signal are taken up by the Top link crank (1) and transmitted to the spool control valve (22) for lifting or lowering action.

2. Operation

In draft control mode, the lever (14) is set at particular position on the quadrant, top link attached to top link crank (1), under

Hy-tec Hydraulics

the top link force the top link spring (19) (20) will deflect. This displacement is passed to link outer draft sensing (5). The movement of link outer draft sensing is transferred to spool control valve (22) with certain amplification through DC feedback rod (8) and link DC actuating (12). This results in lifting of implement in operation till the set force is reached. If the implement is lifted more then required which will reduce the top link crank back ward will lower the hitch till the set draft is achieved.

d. Check Valve

The ball is kept on its seat by the spring until pressure in the pump line is approximately 75 PSI. This ensure that in the drop position the lift arm fall will not be allowed by low pressure oil, which is circulated by the pump to the reservoir through the regulator port the check valve also locks the oil in the cylinder when controls are in the natural (or hold) position.

e. The Relief Valve

The relief valve ball become unseated allowing the high pressure oil to drain to the reservoir through port when the pressure in the system exceeds the specified figure and overcomes the spring. The relief valve is not adjustable.

f. Cylinder cushion valve

This valve is fitted on the cylinder piston. The purpose of the cylinder cushion valve is to protect the system against shock loads when driving over a bumpy road with a bouncing implement. In this pressure way due to shock loads or many thousand and p.s.i. may result. As soon as these shocks exceed specified limits the cylinder cushion valve will become unseated, relieving pressure in the power cylinder.

⚠ CAUTION: Never drive with the position control lever against the upper limit stop

g. Remote Cylinder

To operate, single-acting cylinders, the adjustable stop is moved to contact the upper limit stop, the position lever is then used to raise the lift arms full. Close the isolating valve. With the position lever against the adjustable stop, the remote cylinder is in the neutral or hold position. To operate the remote cylinder the lever is spring over the adjustable stop until it is in contact with the limit stop. The valve operation for remote cylinder LIFT and as soon as, cylinders are extnded, return the position lever to the hold position. To allow the cylinder to retract, move the lever forward from the hold position

4. TEST PROCEDURE

a. General

Before Investigation any service problem the following basic points should be checked Hydraulic system that has failed step by step.

- Fluid level
- Age condition, and type of fluid
- External leakage
- Air in the system
- Operating temperature of 50°-20°C.

The Test procedure covers the following tests.

1. Hydraulic pump capacity
 2. Plain relief valve setting
 3. Cylinder cushion valve setting
- b. Hydraulic pump capacity may be measured when pump is installed, or on a test bench.**

Test valves see specification.

Pump is designed for 16 Lts.

Maximum permissible operation speed 2500 rpm.

Hy-tec Hydraulics

Maximum permissible pressure (Hydraulic lift element) 207 bar.

Repair or replace the pump if capacity is less than 75% of normal value.

c. Relief valve pressure

Install a pressure gauge (-0-210 kg/cm²) 140 bar in the external jack tapping. (auxiliary port) with the draft control lever in the top most position and the engine at full throttle the pressure should be as per specification.

⚠ WARNING:

1. To avoid over heating of the system the pressure test should not be maintained for more than 30 seconds.
2. After completion of the test the draft control lever must be return to the deepest position other wise serious damage to the hydraulic system may result. If the recorded pressure is not as per the specification while the relief valve is operating, the relief valve spring must be checked.

If the relief valve is OK and not getting specified pressure, either the compensator spool has stuck in the fully opened position or the pump efficiency is low.

d. Back Pressure

With the draft control lever in the deepest position and the position control lever in the full lower position, the gauge should read zero.

e. Speed of Lift and Lower

Move the position control to lift. Full lift should be completed in not more than three seconds.

Move the lever to lower and check that it is possible to control the drop so that at least two seconds are taken for a full drop.

f. Isolating Valve Leakage

Raise the weights fully then close the isolating valve.

With the control lever in "Lower" there should be no more than 0.127mm drop of the lower link ends in 30 seconds.

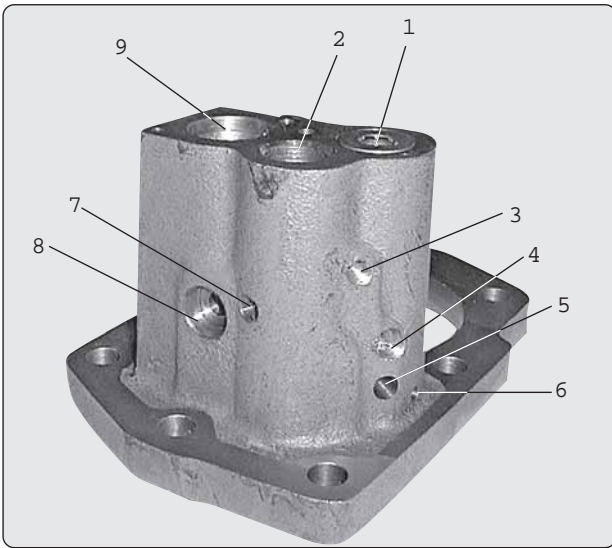
⚠ WARNING: Open the isolating valve fully after the above test.

g. Position Control Valve Leakage Test

Fully lift the weights (600kg) then return the position control lever to a mid position. There must be no more than 0.3mm drop of the link ends in 30 seconds.

With the lever in the lowest position the link ends must be not more than 127mm from the ground.

Hy-tec Hydraulics



1. Main Spool Valve Bore
2. Relief Valve Bore
3. Plug Connecting Check Valve to Control Valve
4. Plug Connecting Cylinder to Control Valve
5. Lowering Port Connecting Control Valve Spring chamber to Tank
6. Bypass Tank Port
7. Plug Connecting Pump, Relief Valve & Control Valve
8. Port Connecting Regulator Bore to reservoir
9. Regulator Valve Bore

h. Position Control Valve Lift — Lower Test

Locate the position control stop at about mid range.

Fully raise the lift arms then lower until the control lever is against the stop.

Measure the height from the centre line of the lower link ball ends to the ground.

Fully lower the lift arms then raise until the control lever is against the stop and on the same side of the stop as in the first test.

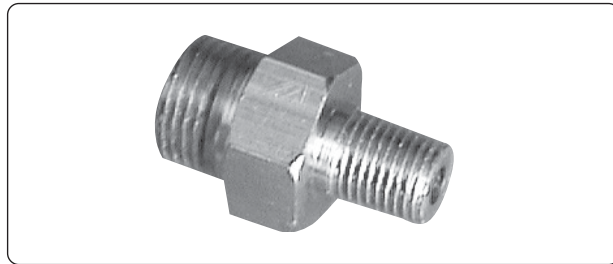
Measure the height of the ball ends from the ground. If these two measurements differ by more than 25.4mm. The control valve spool may sticky.

i. Noise

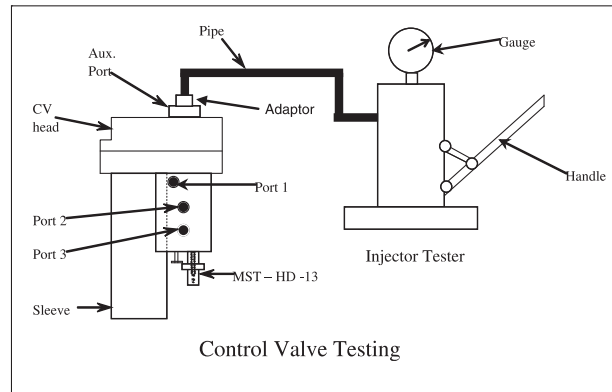
There should be no noise from any part of the hydraulic system apart from a slight hiss caused by oil flow.

j. Pressure Testing the Valve Unit Before Assembling to the Housing

- a. Clean the control valve with help of air & make it dry.
- b. Remove external jack tapping plug. Fit special tool MST-H1/2-HD-12 & MST-H1/2-HD-11



- c. Connect the hand pump (injector tester) to the external jack tapping.



- d. Screw in the isolator valve.
- e. Hold the spool at the full lift position (inside).

Hy-tec Hydraulics

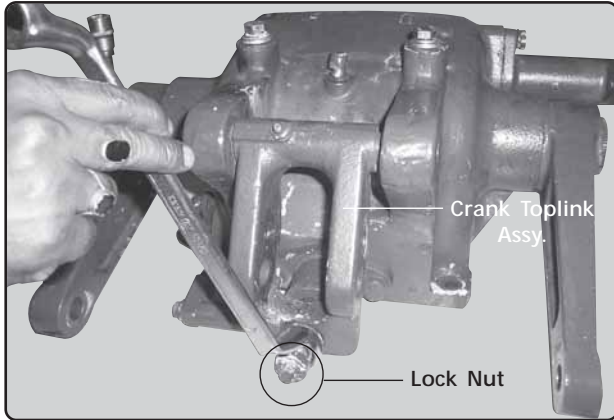
- f. Raise the pressure to 125-140 kg/cm². Do not raise the pressure sufficiently to blow the relief valve. Wait for 2-3 minutes and observe plugs and ports for leakage. If any of these plugs are leaky tighten it or replace if required.
- g. IF oil is coming out from coupling pressure pipe, or port (9-3) 'check valve' is leaky, remove check valve and observe seat for any damage, observe 'O' ring for any cut and deformation etc. Before reassembling, change 'O' ring on seat.
- h. After reassembling, observe the pressure guage, if the pressure is coming down, and if oil is leaking from clearance between main spool and sleeve is more than (0.010-0.012) mm. Replace the spool with the spool of bigger diameter and do necessary lapping.

Hy-tec Hydraulics

Dismantling procedure of the hydraulics.-

A) Dismantling procedure of the bell crank Assembly-

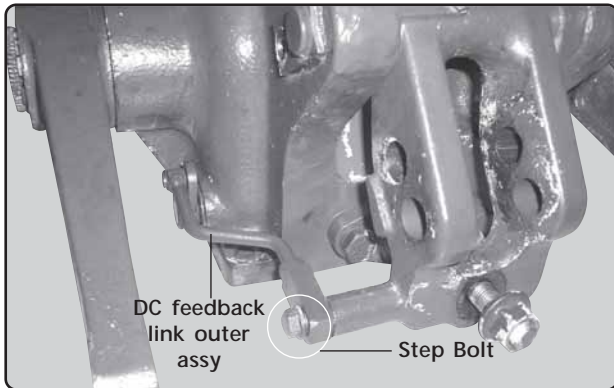
1 Remove the M14 lock nut of the crank toplink assembly.



2 Remove M14 Flange nut on the crank toplink.

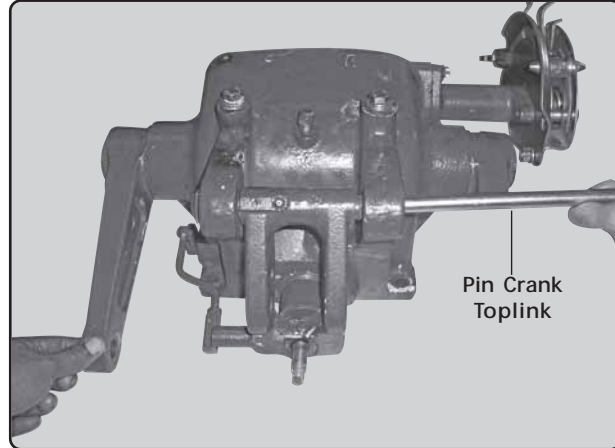


3 Remove the step bolt DC outer block of DC Connecting link.



4 Remove the M8 bolt of pin crank top link.

5 Remove the pin crank top link.

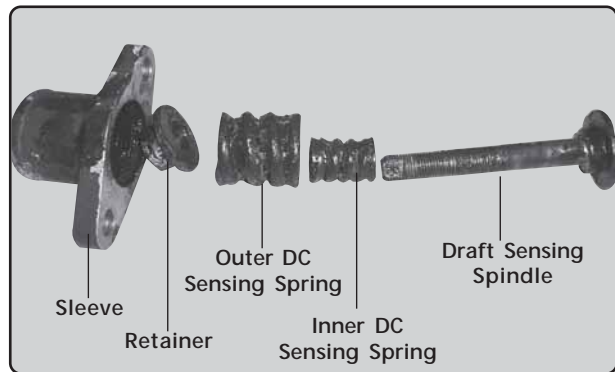


6 Remove crank top link.

7 Remove '2' bolts (M12 x 1.75) of draft sensing mounting assembly.

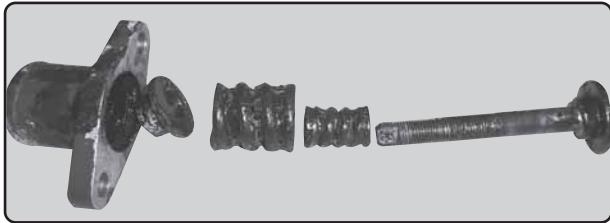


8 Remove sleeve draft sensing

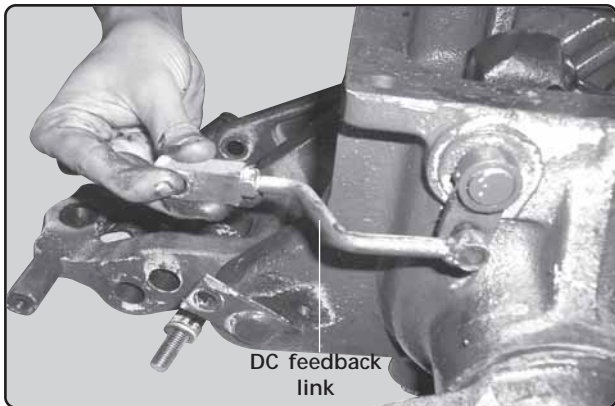


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- 9 Remove outer DC sensing spring.
- 10 Remove inner DC sensing spring.
- 11 Remove Spindle Draft Sensing..



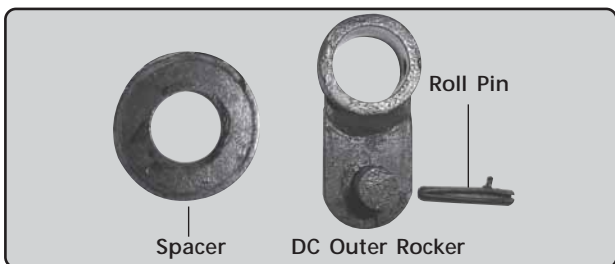
- 12 Remove sensing bottom sleeve.
- 13 Remove external circlip of the DC feedback link & remove draft sensing link.



- 14 Remove the roll pin of DC outer rocker.

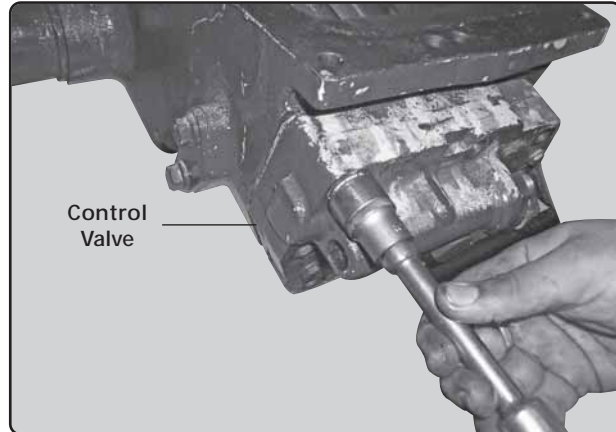


- 8 Remove the spacer of DC Outer rocker.

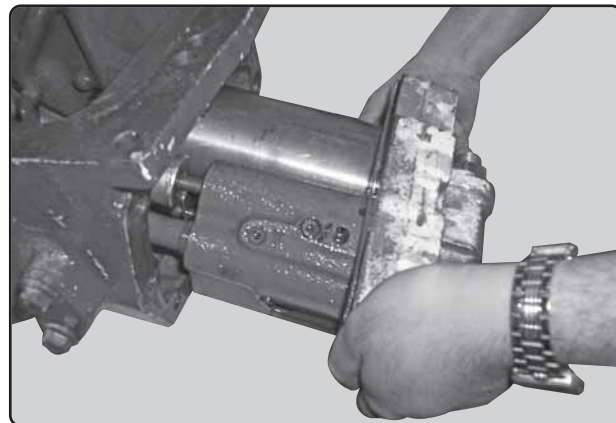


B) Removal of Control Valve assembly.

- 1 Remove the 8 bolts (1/2" UNC) of the CV Assembly with spring washer.

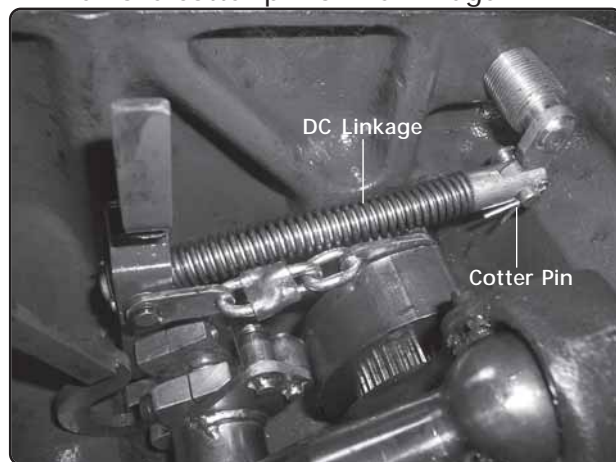


- 2 Remove the control valve. Remove two small attaching cap screw and draw of the cylinder head realising spring.



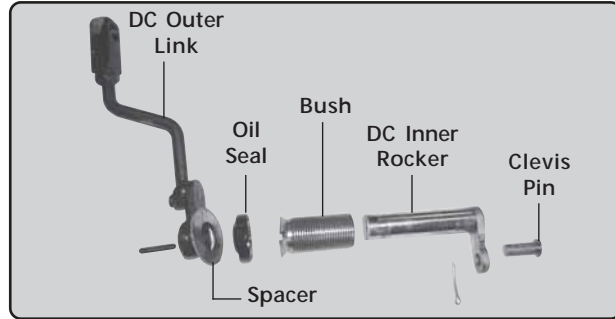
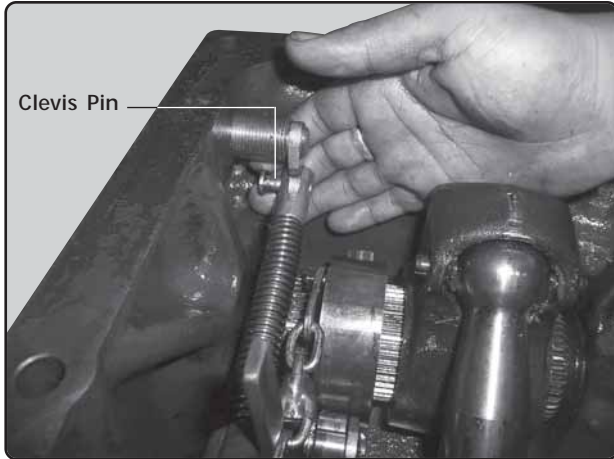
C Removal of Linkages -

- 1 Remove cotter pin of DC linkage.

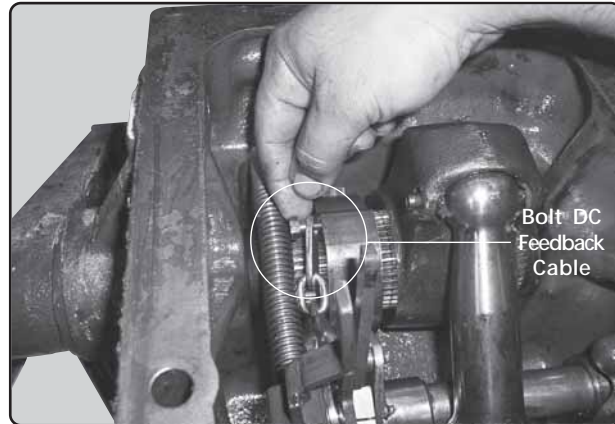


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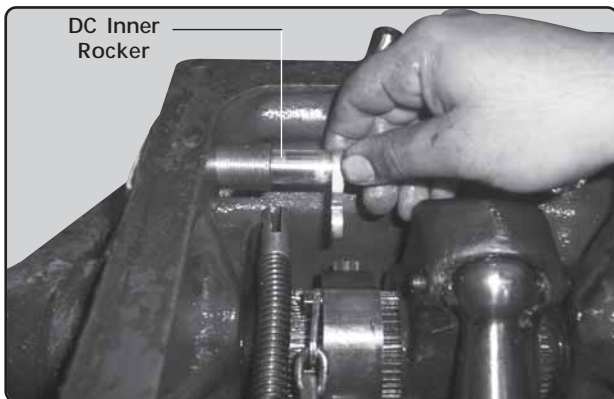
2 Remove the clevis pin.



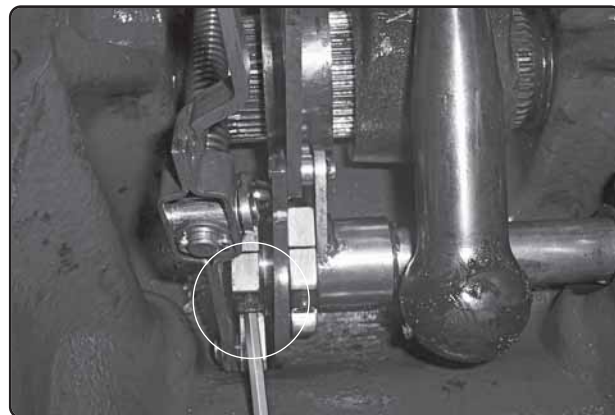
5 Remove bolt from cam of cable DC feedback.



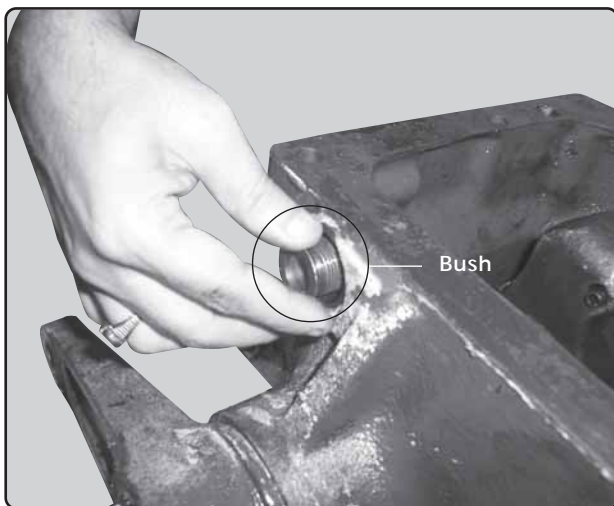
3 Remove the DC inner rocker assembly.



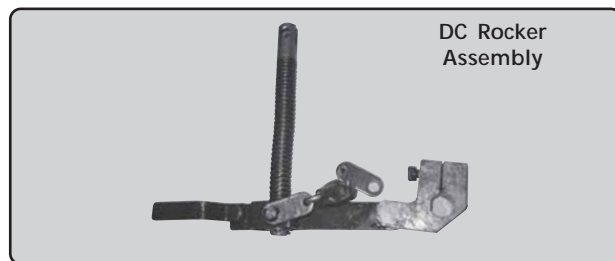
6 Remove DC rocker Allen Screw.



4 Remove Bush DC Feedback shaft.

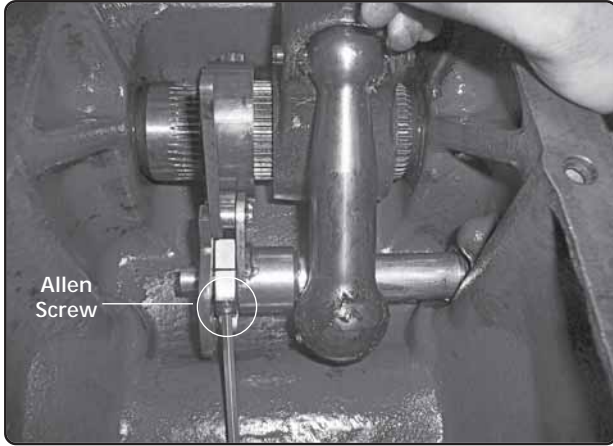


7 Remove DC rocker assembly.

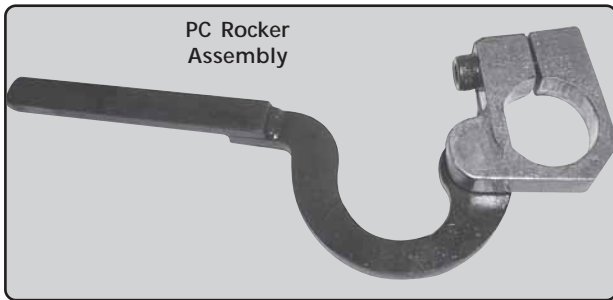


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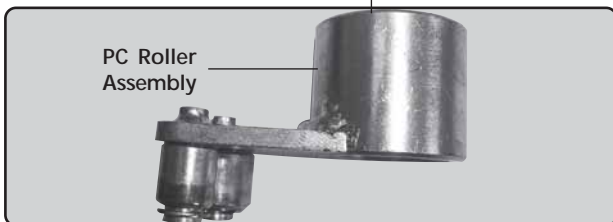
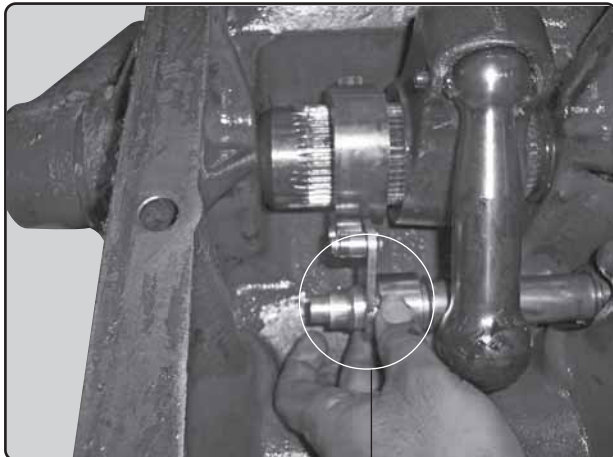
8 Remove Allen Screw of PC rocker.



9 Remove the PC link assembly.

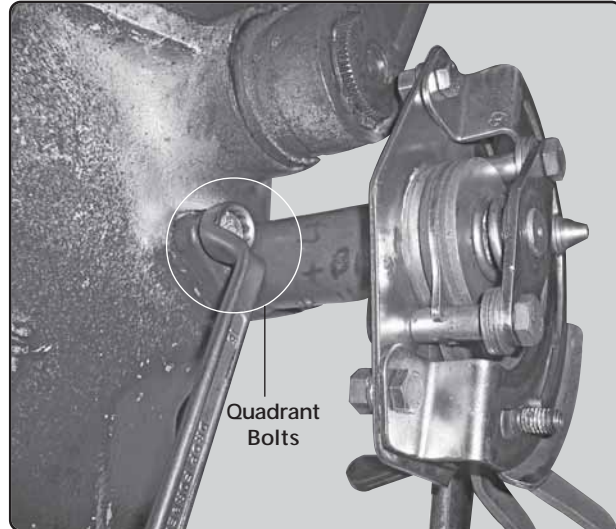


10 Remove the PC roller assembly.

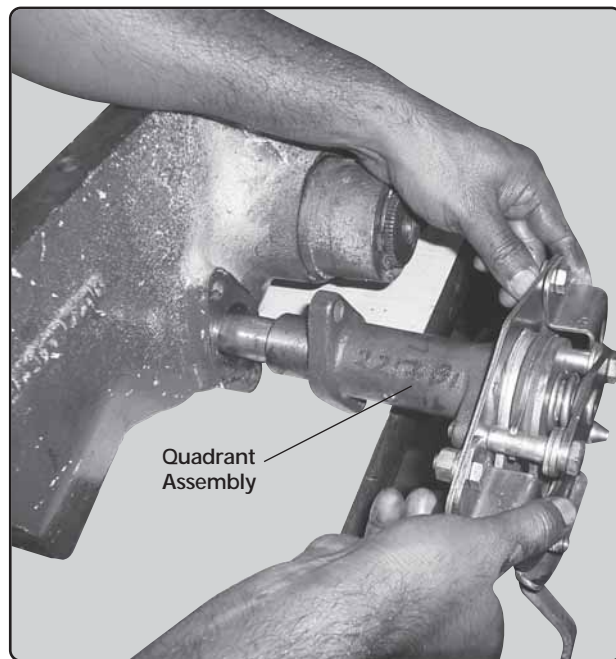


D Removal of Quadrant assembly.

1 Remove two bolts of quadrant assembly (Bolt Size M10 x 1.5)

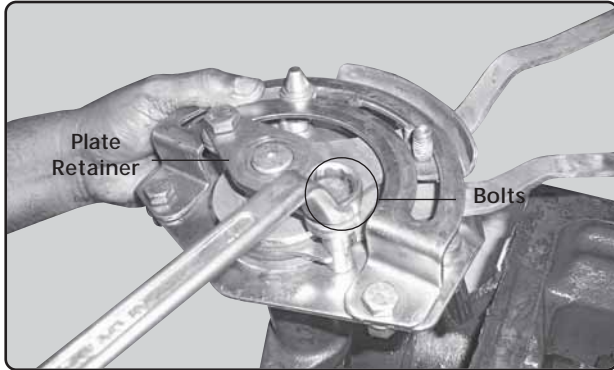


2 Remove quadrant assembly.

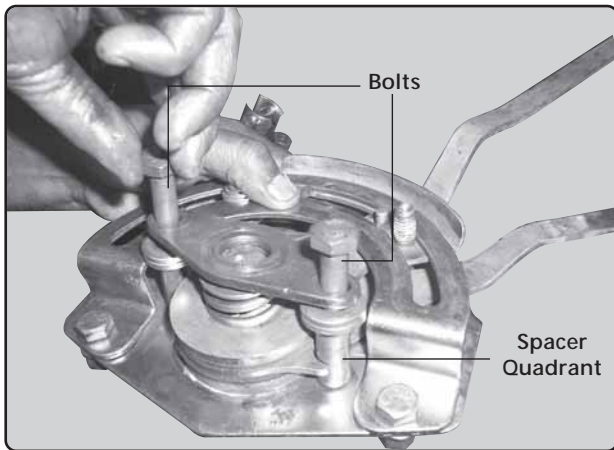


Hy-tec Hydraulics

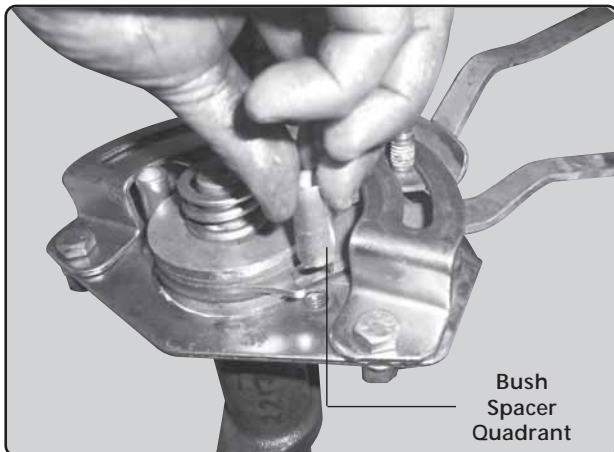
3 Remove the two bolts (M10 x 60) of plate spring retainer.



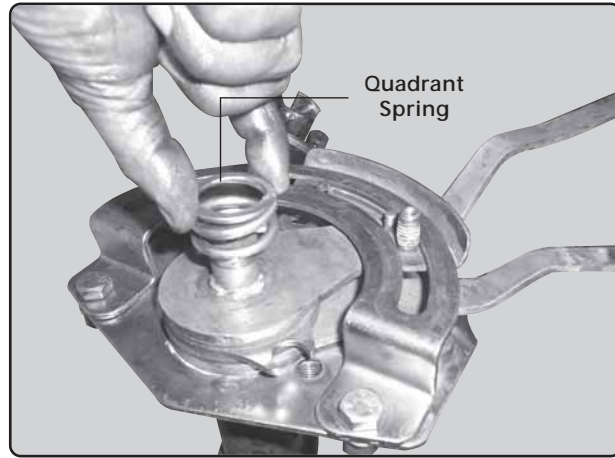
4 Remove plate spring retainer.



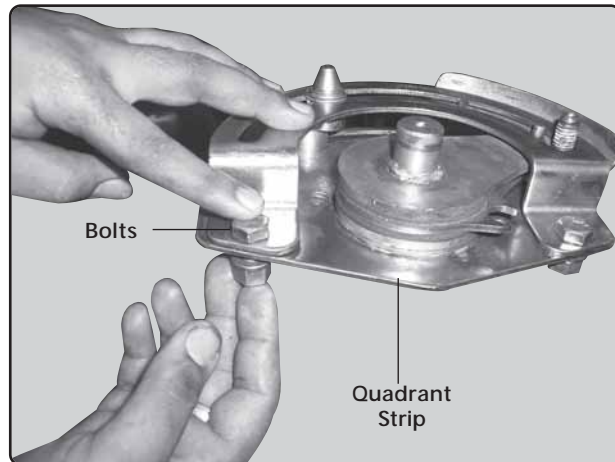
5 Remove spacer quadrant draft control.



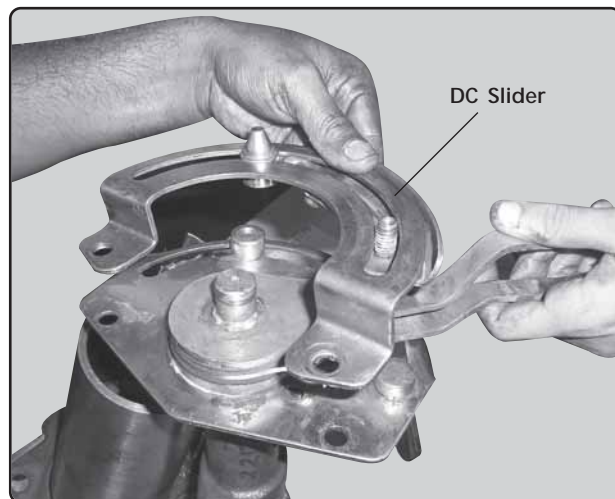
6 Remove the Quadrant spring.



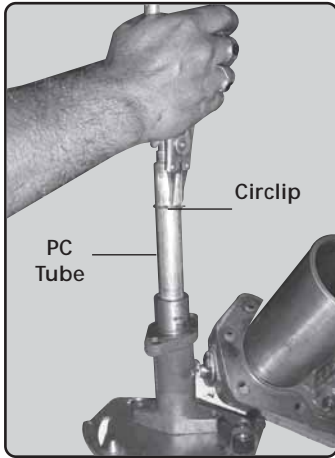
7 Remove the two bolts of quadrant strip. (Spanner Size 15mm)



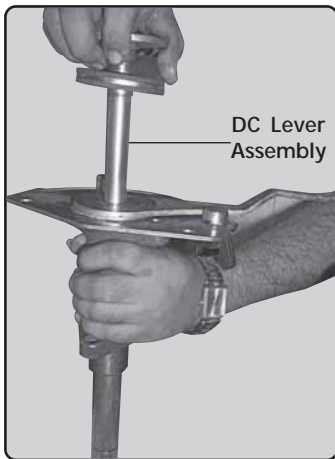
8 Remove the quadrant strip & DC slider.



8 Remove the circlip from PC tube.

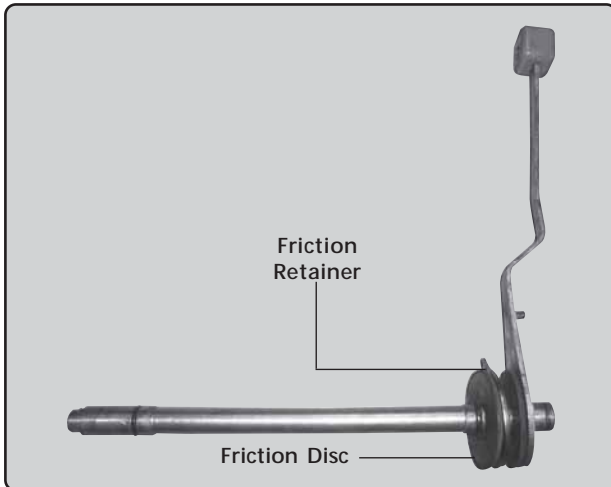


9 Remove DC lever Assembly.



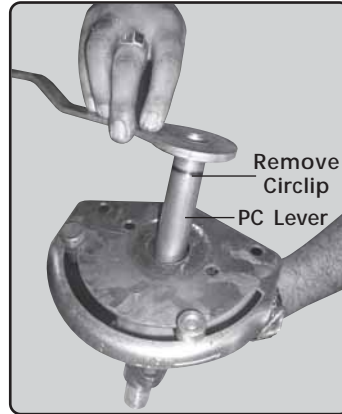
10 Remove friction disc.

11 Remove plate friction retainer.



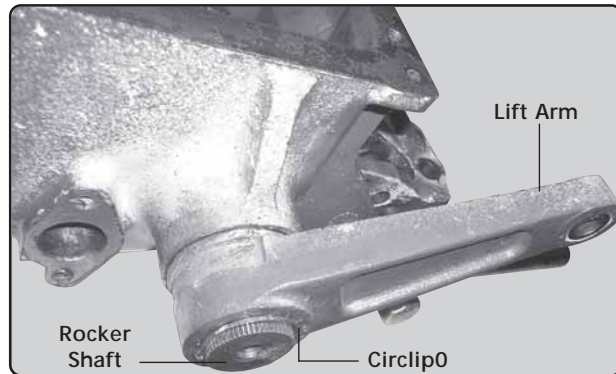
12 Remove friction disc.

13 Remove PC lever assembly.

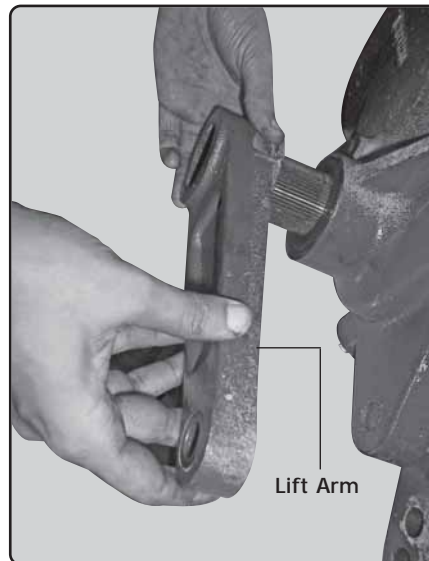


5 Removal procedure of power train

1 Remove circlip of rockshaft (RH)

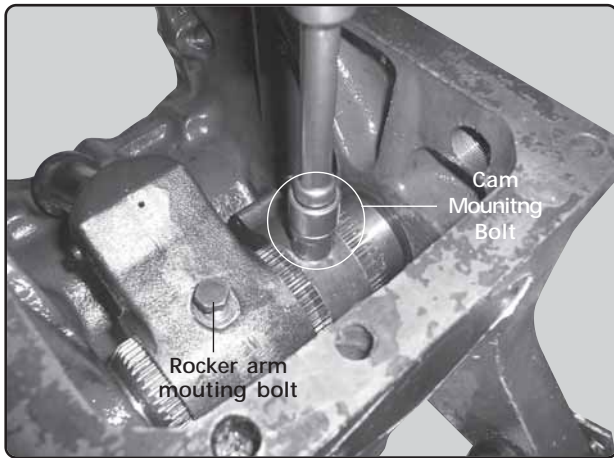


2 Remove lift arm (RH)



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- 3 Remove LH side circlip of rockshaft
- 4 Remove locking bolt of cam rocker arm. (13mm)



- 5 Remove LH lift arm.
- 6 Remove both side oil seal.
- 7 Remove the both side washer oil seal.
- 8 Loosen & Remove the Cam and rocker arm mounting bolt.
- 9 Remove rockshaft from LH side only.
- 10 Remove two bushes (Only if Worn out) from LH & RH.
- 11 Remove rocker arm with connecting rod.
 - a) Remove spring (rollpin) of connecting rod.
 - b) Remove connecting rod.
 - c) Remove rocker arm.

ADJUSTMENTS

a. Adjusting the Position Control

Connect the lower links to a dead weight of 450kg.

Open the isolating valve and set the draft lever to the deepest position. Lift the weight by operating position control lever slowly until the distance from the center line of the top hitch pin to the center line of the lift arm pin is 620mm lock the position control lever stop firmly behind the lever in touching position.

NOTE : Check that this is correctly set by lowering and lifting to the top again with the position control lever. It should now be possible to lift the links a further 12.5mm approximately by moving the draft control lever to the top most position.

- b. Checking the relief valve pressure. Fit pressure gauge (0-214 kg/cm²) in the external jack tapping. Close isolating valve. Put engine to full throttle and lift the draft control lever in the top most position the pressure reading should be as per specification (123-157 kg/cm²)

WARNING To avoid overheating the system the pressure test should not be maintained for more than 30 seconds.

After completion of the test the draft control lever must be returned to the deepest position otherwise serious damage to the hydraulic system may result. If the recorded pressure is not 154-168 kg/cm². It can be increased or decreased by adding or removing shims in the relief valve spring housing. Addition of one 0.076 mm will increase by 3.5 Kg/cm² and removal of one shim will decrease the pressure by 3.5 Kg/cm².

SERVICE INSTRUCTIONS

a. Adding Oil

After every 250 hrs of operation, check the level of oil in the transmission reservoir.

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Clean the area around the filler/level plug before removing the plug. Add oil of specified grade up to the slotted mark given on dipstick whenever required.

b. Replacement of suction filter

Replace the suction filter after every 250 hrs. as per procedure mentioned below.

- 1) Put a clean tray below suction line filter.
- 2) Unscrew the filter cartridge and collect the oil in the tray.
- 3) Apply oil on 'O' ring of the new filter.
- 4) Assembled it with hand as per give instruction on the filter.
- 5) Add oil if necessary.
- 6) Remove air as per instruction given below.

c. Changing the oil

After every 1000 hrs. of operation system should be drained, strainer cleaned, oil refilled as follows.

- 1) Clean the area around the filter plug, suction strainer & orific filter.
- 2) Remove drain plug then allow the oil to drain in to a suitable container, remove the orifice filter, clean or change.
- 3) Grip the suction strainer stub pipe near the base & pull it out.
- 4) Clean the strainer in clean diesel fuel, using a soft brush, then blow dry with compressed air and replace with new if necessary.
- 5) Install the drain plug on transmission housing then fill the reservoir upto the slotted mark of dipstick.
- 6) Run the engine for approximately for one min. this will expel the air from the system & allow the reservoir to be filled to capacity.
- 7) If additional cylinders are used then add extra oil with respected to cylinder capacity.
- 8) Install the fill plug cum dipstick.

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TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Hitch lifts slowly (Not lifting with full speed)	● Oil level in reservoir is low	Fill to correct level
	● Fall in pump efficiency	Replace or repair the Pump
	● Suction strainer! Suction line filter clogged	Clean strainer! replace filter
	● System overloaded	Reduce load
	● Spring relief valve has taken permanent set	Replace the spring
	● Spring compensator damaged	Replace the spring
	● Spring regulator valve damaged	Replace the spring
	● Regulator piston 'O' ring damaged or not fitted properly	Replace 'O' ring
	● Compensator spool stuck in fully open position.	Clean or replace if required
	● Thermal relief valve is leaky.	Replace
	● In draft control draft control feedback link adjustment disturbed.	Adjust the draft control feedback link, adjusting link length
Implement does not reach maximum height	● Load movements restricted	Remove restriction
	● Hydraulic rock shaft, cam, lift arms, improperly assembled	Check & assemble properly
	● Improperly set three point Linkages	Adjust
Lift coming down when engine is stopped jerking when engine is running	(A) ● Piston oil seal or piston relief valve leaking ● Valve or cylinder head 'O' ring leaking ● Isolator valve leaky ● Spigot 'O' ring leaky	Fit new seals or relief valve Fit new 'O' ring. Change 'O' ring Replace
	(B) ● Valve parts leaking due to wear a) Main control valve – damaged or worn surface b) Check valve – damaged ball surface, damaged ball sleeve, damaged valve seat "O" ring	Check spool fit, replace components if required. Check ball surface, ball seat, damaged valve seat "O" ring & replace if required.

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TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Noisy System	● Low oil level	Fill to correct level
	● Clogged suction strainer	Remove and clean
	● Air in the system	Check oil level and suction line joints
	● Load movement restricted	Check for free movement of the links and that load is not fouling tractor
	● Restriction in high pressure line	Remove and clean
	● Pipes vibrating	Check the unions and tighten.
	● Faulty pump	Repair or replace
Regulator valve not opening (oil flows through relief valve when lift arms are fully raised)	● Position of position control stop lever not correct	Adjust
	● Orifice filter choked	Clean
	● Regulator piston stuck in closed position	Remove and correct
Links creep up when working with external cylinder	● Isolator valve not fully closed	Close
	● Isolator valve is leaking	Rectify / replace

FRONT AXLE &
FRONT AXLE & STEERING
STEERING



Front Axle & Support

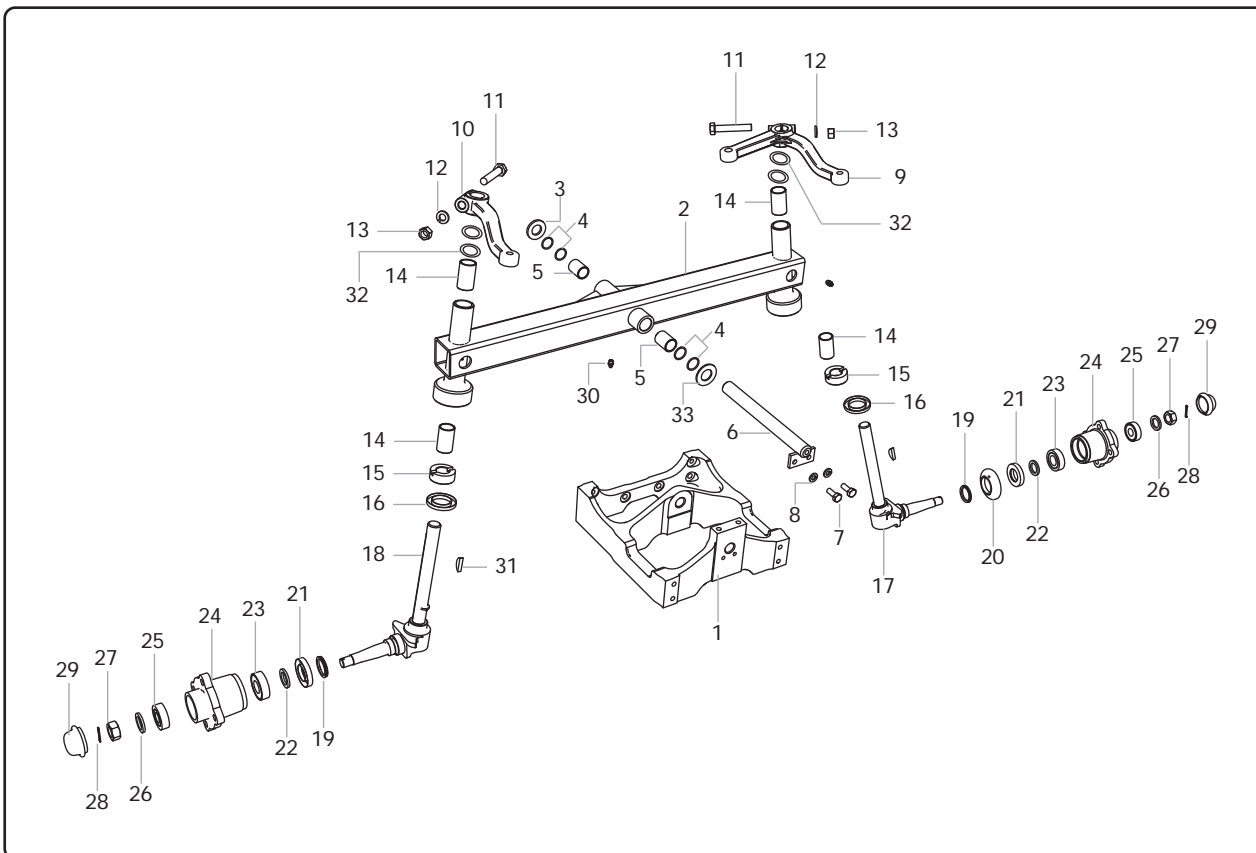
Torque Values

Sr No	Description	Torque (Nm)
1	Front Wheel Nut	65 to 75
2	Rear Wheel Nut	180 to 200
3	Drag link & Tie Rod Nut	35 to 40
4	Steering Arm Nut	110 to 120
5	Front Axle Support Mounting Bolts	110
6	Pivot Pin Mounting Bolt	21
7	Enine Mounting Bolts to Clutch Housing (Shorter Length)	45
8	Enine Mounting Bolts to Clutch Housing (Longer Length)	60
9	Rear Wheel Mounting Bolts	250
10	Front Wheel Mounting Bolts	110
11	Hood Bracket Mounting Bolts	60
12	PTO Cap Mounting Bolts	21
13	Hand Brake Mounting Bolts	21
14	Radiator Mounting Bolts	21
15	Hydraulic Filter Mounting Bolts	60
16	Seat Mounting Bolts	60
17	Steering Gear Box Mounting Bolt	60
18	Check Chain Mounting Bolts	105

Wear Limits

Sr No	Description	Initial Value (mm)	Discard Value (mm)
1	Front Axle Pivot Pin Bush I.D.	22.06	22.01
2	Pivot Pin To Bush Clearance	0.11	0.01
3	Front Axle Pivot Pin OD	22	21.95
4	Steering Knuckle Pivot shaft OD	25	24.95
5	Steering Knuckle Bush ID	25.06	25.01
6	Steering Knuckle To bush Clearance	0.11	0.01

Front Axle & Support



Sr. No.	Description
1	Support Front Axle
2	Axle Front Complete
3	washer Thrust Front Axle Support 4.5
4	'O' Ring Pivot Pin Sleeve
5	Bush Pivot Pin Sleeve
6	Pin Pivot Cpte
7	Bolt Pivot Pin
8	Washer Spring Lock
9	Arm Knuckle LH
10	Arm Knuckle RH
11	Bolt M12
12	Wahser Spring Lock
13	Nut M12
14	Bush King Pin Sleeve
15	Washer Cast Iron
16	Seal Oil King Pin Sleeve
17	Knuckle Steering Cpte LH

Sr. No.	Description
18	Knuckle Steering Cpte RH
19	V Seal Front Wheel Hub
20	Dust Shield
21	Seal Oil Front Wheel Hub
22	Spacer Inner Bearing
23	Bearing Inner Front Wheel Hub
24	Hub Front Wheel
25	Bearing Outer Front Wheel Hub
26	Washer Outer Bearing Retainer
27	Nut Slotted
28	Pin Split
29	Cap Front Wheel Hub
30	Nipple Grease
30	Nipple Grease
31	Key Wood Ruff
32	'O' Ring King Pin Sleeve
33	Washer Thrust Front Axle Support 2.5

Front Axle & Support

General

The Single Piece Front Axle are of box section steel construction. The axle Pivots on a Pin which passes through the Front Axle Support and is retained in position by Lock Plate secured by lock washer and nut in slot which is provided on pin. The Pivot Pin Sleeves are replaceable bushings pressed into the axle.

Removal of Front Axle :

- 1) Support the Engine by Jacks.
- 2) Remove the 4 Bolts mounting the Front Axle Support to the engine and separate the Front Axle Support along with the Front Axle.
- 3) Remove the '2' nos of Locking Bolts on the Locking Plate holding the Front Axle with Front Axle Support.
- 4) Remove the locking Plate and remove the Front Axle Pivot Pin.
- 5) Separate the Front Axle from the Front Axle Support.

Dismantling of the Front Wheel hub :

- 1) Remove the Front wheel by removing the '4' Wheel nuts.
- 2) Remove the Front Wheel Cap which is press fitted.
- 3) Remove the Split pin on the Castle nut and remove the Castle nut.
- 4) Remove the washer
- 5) Remove the Front tapered roller bearing.
- 6) Remove the hub.
- 7) From the rear end of the hub, remove the Inner tapered roller bearing.
- 8) Remove the Spacer inner bearing.
- 9) Remove the Oil Seal.
- 10) Remove dust shield from the Steering knuckle
- 11) Remove the V Seal from the Steering Knuckle.

Removal of Steering Arm & Steering Knuckle :

- 1) Remove the locking bolt of the Knuckle arm, holding the Knuckle arm with the Steering knuckle.
- 2) Remove the Knuckle arm over the Key way.
- 3) Remove the Key and separate the Complete Steering Knuckle.

Installation :

- 1) Clean all the parts thoroughly and observe the parts for any cracks, damages etc.
- 2) Oil Seals should be replaced with new ones during assembly.
- 3) Assembly is the reverse of dismantling procedure.

Front Axle & Support

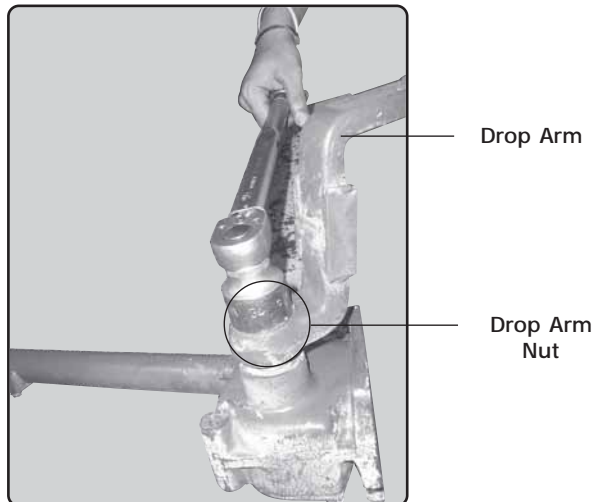
TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
(1) Tractor will not steer.	<ul style="list-style-type: none"> (a) Work or damaged steering linkage, (b) Faulty steering gear assembly. 	<ul style="list-style-type: none"> (a) Check drag link, steering knuckle arms and drop arm for wear or damage.
(2) Tractor is hard to steer.	<ul style="list-style-type: none"> (a) Low tyre pressure. (b) Steering knuckles binding, (c) Work or damaged steering linkage, (d) Incorrect toe-in. 	<ul style="list-style-type: none"> (a) Inflate to specified pressure. (b) Check steering knuckle shafts and bushings for seizure or lack of lubrication. (c) Check drag link, drop arm, steering knuckle arms for wear or damage. (d) Check and adjust toe-in.
(3) Shimmy	<ul style="list-style-type: none"> (a) Excessive play in front axle and/or steering gear assembly, (b) Incorrect toe-in. 	<ul style="list-style-type: none"> (a) Check for wear or play in rocker shaft, drop arm, drag link, steering knuckles and pivot pin sleeve. (b) Check and adjust toe-in.

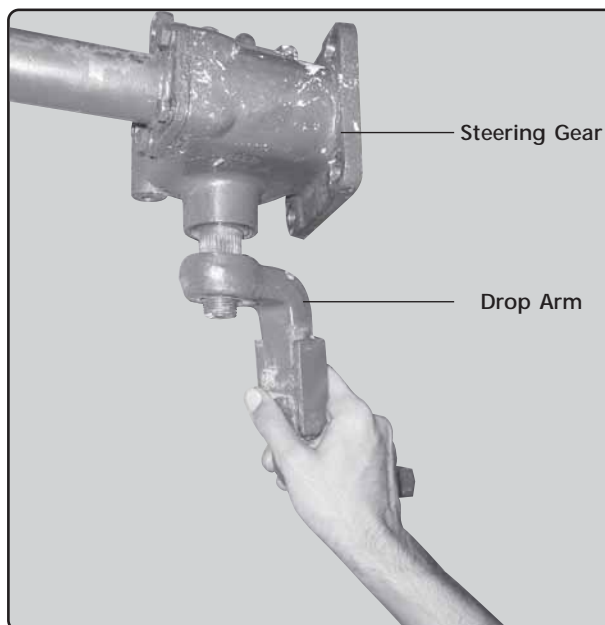
Steering Assembly

Dismantling procedure of steering gear box

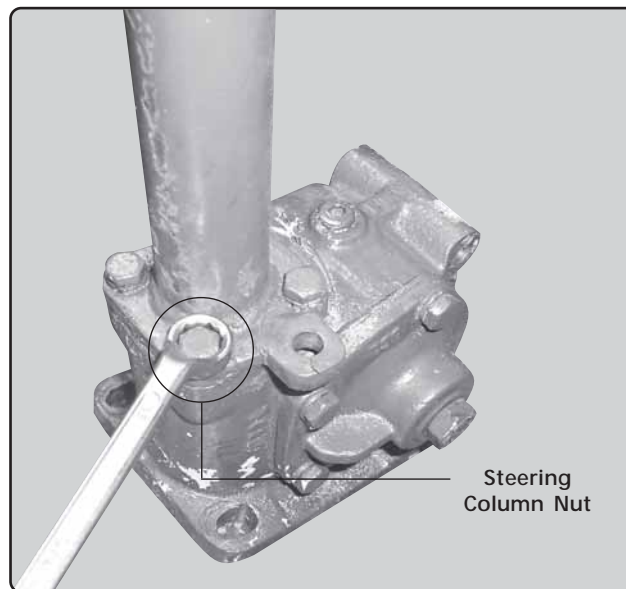
- 1 Remove the nut of the drop arm. (Spanner Size 34)



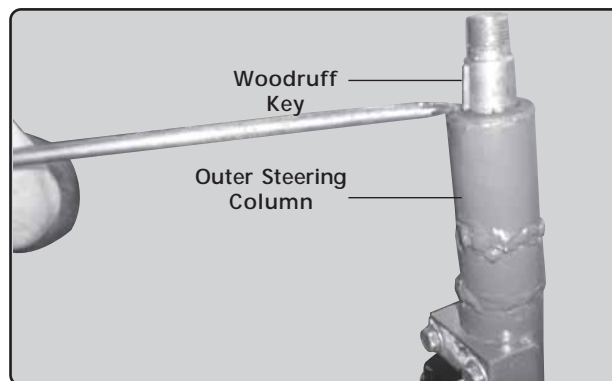
- 2 Remove the drop arm by using the puller.



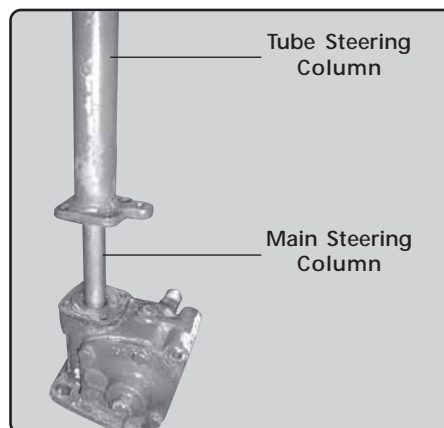
- 3 Remove the four bolts of the steering column.



- 4 Remove the woodruff key on which the steering wheel is mounted.

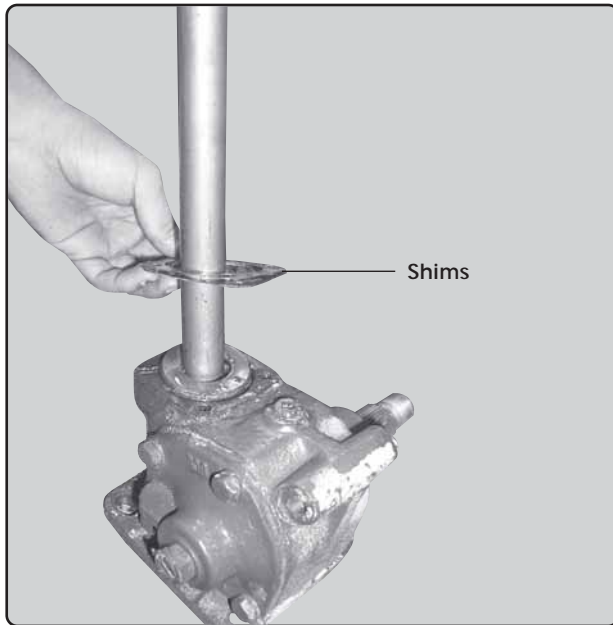


- 5 Remove the steering column tube.

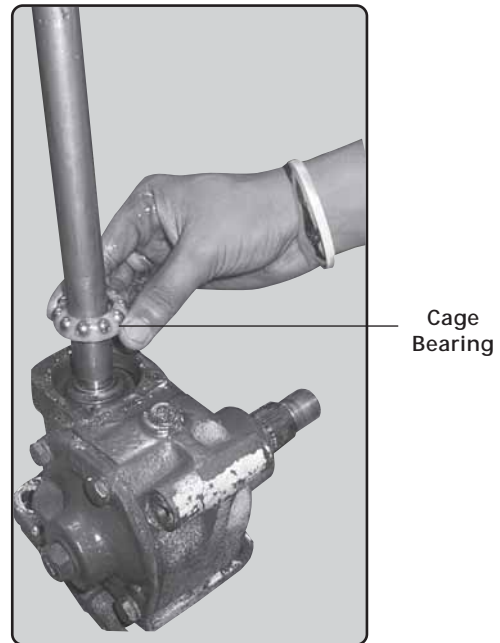


Steering Assembly

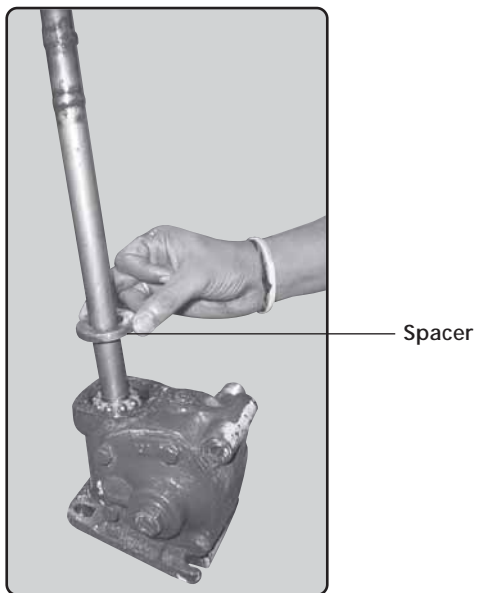
6 Remove the shims.



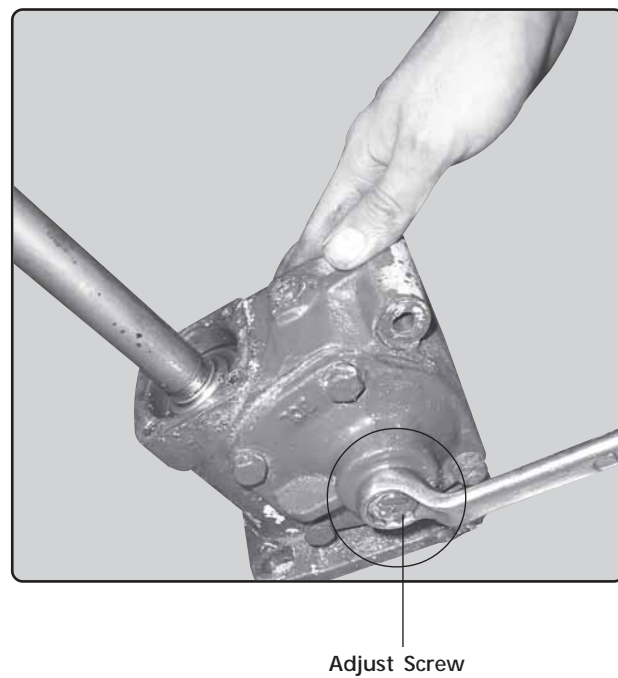
8 Remove the bearing cage.



7 Remove the spacer.

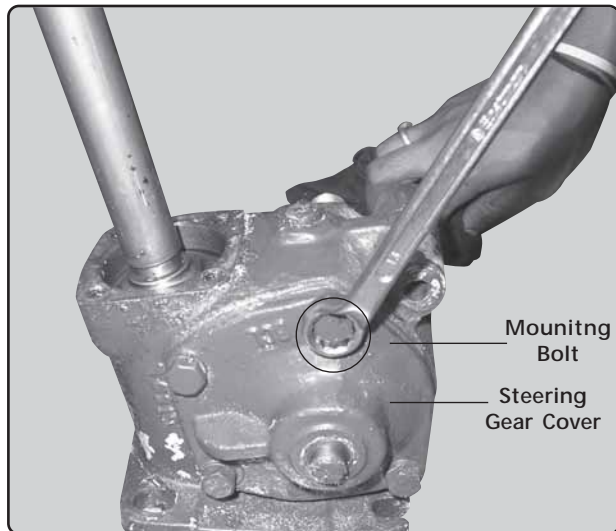


9 Remove the nut over the adjusting screw.

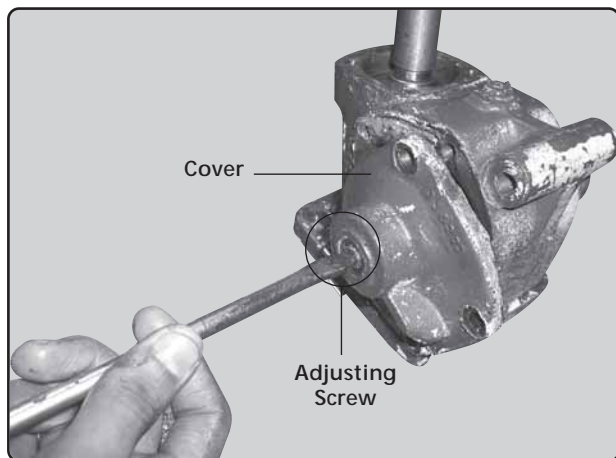


Steering Assembly

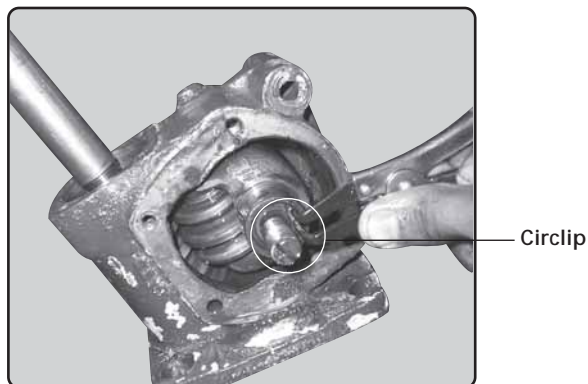
10 Remove the four bolts on the end cover & remove the end cover. (Adjusting screw need to rotate to take cover off.)



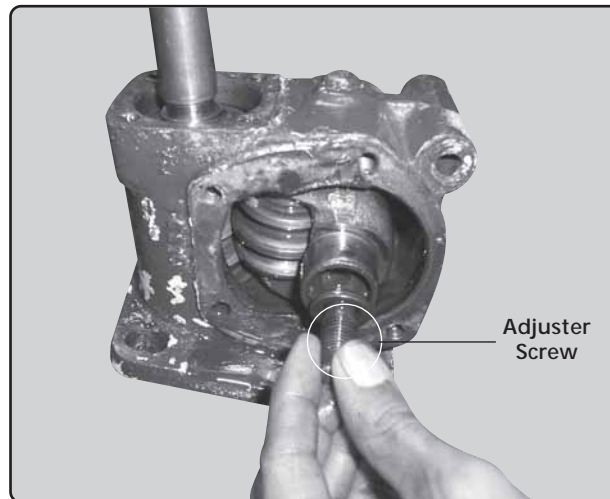
11 Adjusting screw need to rotate to take cover off.



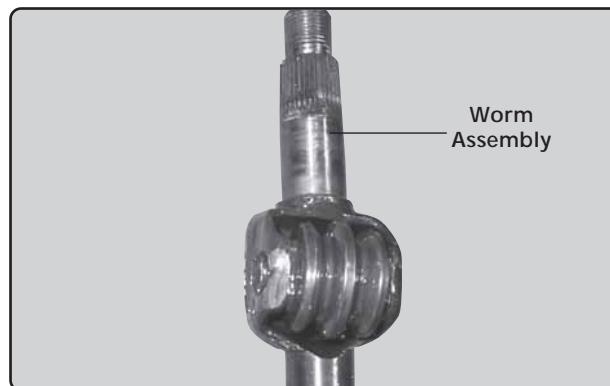
12 Remove the circlip.



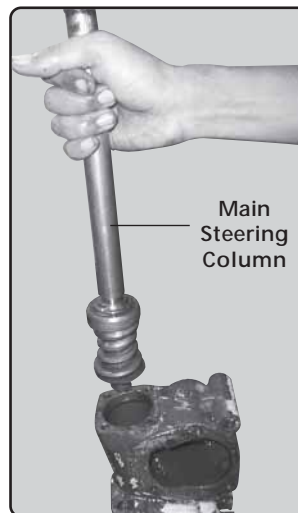
13 Remove the adjuster screw with plain washer.



14 Remove the worm assembly.

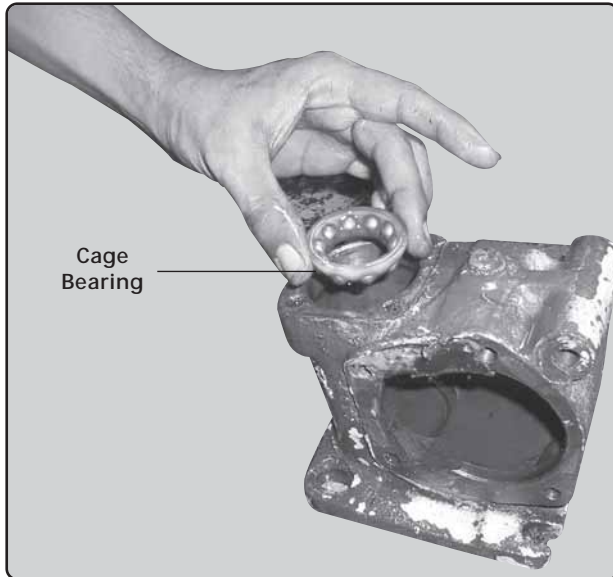


15 Remove the main steering column



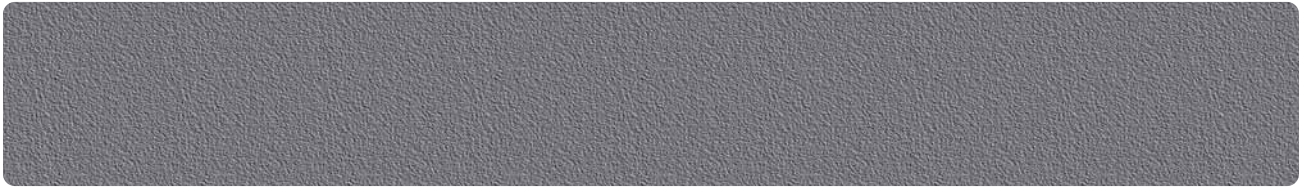
Steering Assembly

16 Remove the bottom bearing.



17 Clean all the parts with cleaning and inspect all the parts for wear & damage. Replace defective and worn out parts with new ones.

Note: Assembly of all parts will be in the reverse part of dismantling.



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