TS90, TS100, TS110 REPAIR MANUAL CONTENTS

SECTION 1
GENERAL INFORMATION
CONTENTS

ENGINE SPECIFICATIONS

Model		**TS80**	**TS90**	**TS90**	**TS100**	**TSS110**
(T=Turbocharged)		N/A	N/A	N/A	TURBO	TURBO
Emissionised		NO	NO	YES	YES	YES
No of Cylinders		4 (450 NF)	4 (450 NA)	4 (450 NE)	4 (450 T/PF)	4 (450 T/PD)
Bore	mm	111.8	111.8	111.8	111.8	111.8
	ins	4.4	4.4	4.4	4.4	4.4
Stroke	mm	127.0	127.0	127.0	127.0	127.0
	ins	5.0	5.0	5.0	5.0	5.0
Displacement	cu cm	4987	4987	4987	4987	4987
	cu in	304	304	304	304	304
Compression Ratio		17:5–1	17:5–1	17:5–1	17:5–1	17:5–1
Cylinder Bore Compression at cranking speed of 200 R.P.M	bar	25.5	25.5	25.5	25.5	25.5
	lbs in^2	375	375	375	375	375
Firing Order		1342	1342	1342	1342	1342
Idle Speed Revs/min ± 50		750	750	750	750	750
Maximum no Load Speed Revs/min		2320	2320	2320	2320	2320
Rated Engine Speed		2170	2170	2170	2170	2070

CYLINDER BLOCK

Taper of Cylinder Bore	0.025mm (0.001 in) Repair Limit 0.127mm (0.005 in) Wear Limit
Cylinder Bore out of Round	0.03mm (0.0015 in) Repair Limit 0.127mm (0.005 in) Wear Limit
Cylinder Bore Diameters	111.778–111.841mm (4.4007–4.4032 in)
Rear Oil Seal Bore Diameter	140.77–140.87mm (5.542–5.546 in)
Block to Head Surface Flatness	0.08mm (0.003 in) in any 152mm (6 in) 0.03mm (0.001 in) in any 25.40mm (1 in)

CYLINDER HEAD

Valve Guide Bore Diameter	9.469–9.495mm (0.3728–0.3738 in)
Head to Block Surface Flatness	0.03mm (0.001 in) in any 25.4mm (1 in), or 0.127mm (0.005in) overall limit

EXHAUST VALVES

Face Angle	44°15'–44°30' Relative to the Head of Valve
Stem Diameter	Std :9.401–9.421mm (0.3701–0.3709 in) 0.076mm (0.003 in) Oversize :9.477–9.497mm (0.3731–0.3739 in) 0.38mm (0.015 in) Oversize :9.781–9.802mm (0.3851–0.3859 in) 0.030 in (0.76mm) Oversize :10.163–10.183mm (0.4001–0.4009 in)
Head Diameter	42.88–43.13mm (1.688–1.698 in)
Stem to Guide Clearance	0.048–0.094mm (0.0019–0.0037 in)
Lash Clearance (Cold)	0.43–0.53mm (0.017–0.021 in)

INTAKE VALVES

Face Angle	29°15'–29°30' Relative to Head of Valve
Stem Diameter	Std :9.426–9.446mm (0.3711–0.3719 in) 0.076mm (0.003 in) Oversize :9.502–9.522mm (0.3741–0.3749 in) 0.381mm (0.015 in) Oversize :9.807–9.827mm (0.3861–0.3869 in) 0.762mm (0.030 in) Oversize :10.188–10.208mm (0.4011–0.4019 in)
Head Diameter	47.37–47.63mm (1.865–1.875 in)
Stem to Guide Clearance	0.023–0.069mm (0.0009–0.0027 in)
Lash Clearance (Cold)	0.36–0.46mm (0.014–0.018 in)

VALVE SPRINGS

Number per Valve	1
Free Length Length, loaded at 27.7–31.3kg (61.69 lb) Length, loaded at 61–69kg (135–153 lb)	60.7mm (2.39 in) 48.26mm (1.900 in) 35.69mm (1.405 in)

VALVE TIMING

Intake Opening	12° Before Top Dead Centre
Intake Closing	38° After Bottom Dead Centre
Exhaust Opening	48° Before Bottom Dead Centre
Exhaust Closing	12° After Top Dead Centre

VALVE INSERTS

Insert Oversize	Exhaust Valve Insert Counter bore Diameter in Cylinder Head	Intake Valve Seat Insert Counter bore Diameter in Cylinder Head
0.254mm (0.010 in)	44.17–44.20mm (1.739–1.740 in)	50.01–50.04mm (1.969–1.970 in)
0.508mm (0.020 in)	44.42–44.45mm (1.749–1.750 in)	50.27–50.29mm (1.979–1.980 in)
0.762mm (0.030 in)	44.68–44.70mm (1.759–1.760 in)	50.52–50.55mm (1.989–1.990 in)

VALVE SEATS

Exhaust Valve Seat Angle	45°00’ – 45°30’
Intake Valve Seat Angle	30°00’ – 30°30’
Interference Valve Face Angle to Valve Seat Angle	0°30’ – 1°15’
Concentricity With Guide Diameter	0.051mm (0.002 in) Total Indicator Reading Max
Seat Width Exhaust Valve Intake Valve	1.8–2.3mm (0.072–0.092 in) 1.9–2.5mm (0.078–0.098 in)

CAMSHAFT IDLER GEAR

Number of teeth	47
End Play	0.076–0.35mm (0.003–0.014 in)
Bushing Inside Diameter	50.813–50.838mm (2.005–2.0015 in)
Adaptor Outside Diameter	50.762–50.775mm (1.9985–1.9990 in)
Backlash with Crankshaft Gear	0.15–0.46mm (0.006–0.018 in)
Backlash with Camshaft Gear	0.025–0.381mm (0.001–0. 015 in)
Backlash with Fuel Injection Pump	0.10–0.15mm (0.004–0.006 in)

CAMSHAFT GEAR

Number of Teeth	52
Timing Gear Backlash	0.025–0.38mm (0.001–0.015 in)

ROCKER ARM SHAFT	
Shaft Diameter	25.40–25.43mm (1.000–1.001 in)
Shaft Support Internal Diameter	25.45–25.20mm (1.002–1.004 in)
ROCKER ARM	
Inside Diameter	25.48–25.50mm (1.003–1.004 in)
TAPPETS	
Clearance to Bore	0.015–0.053mm (0.0006–0.0021 in)
Tappet Diameter	25.118–25.130mm (0.9889–0.9894 in)
Tappet Bore Diameter	25.15–25.17mm (0.9900–0.9910 in)
CAMSHAFT	
Bearing Journal Diameter	60.693–60.719mm (2.3895–2.3905 in)
Bearing Clearance	0.025–0.076mm (0.0010–0.0030 in)
End Play	0.051–0.18mm (0.0020–0.0070 in)
CONNECTING RODS	
Small End Bushing (Internal Diameter) Normally Aspirated Turbocharged	 38.113–38.120mm (1.5005–1.5008 in) 41.288–41.259mm (1.6255–1.6258 in)
Clearance Bushing to Piston Pin	0.013–0.025mm (0.0005–0.0010 in)
Side Float	0.13–0.33mm (0.0050–0.0130 in)
Maximum Twist	0.30mm (0.0120 in)
Maximum Bend	0.10mm (0.0040 in)
PISTON PIN	
Outside Diameter Normally Aspirated Engine Turbocharged Engine	 38.095–38.100mm (1.4998–1.5000 in) 41.270–41.275mm (1.6248–1.6250 in)
PISTONS	
Skirt to Cylinder Clearance Naturally Aspirated	 0.140–0.171mm (0.0055–0.0067 in) – *New, unrun engines* 0.140–0.28mm (0.0055–0.011 in) – *Run engines*
Skirt to Cylinder Clearance Turbocharged	 0.162–0.188mm (0.0064–0.0074 in) – *New, unrun engines* 0.162–0.28mm (0.0064–0.011 in) – *Run engines*
Taper (Out of Round)	0.063–0.127mm (0.0025–0.0050 in)
Grading Diameter (at Right Angles to Piston Pin)	111.64–111.74mm (4.3951–4.3991 in) 0.0127mm (in increments of 0.0005 in)
Piston Pin Clearance	0.0030–0.0140mm (0.00012–0.00055 in) at 21°C (70°F)
Piston Crown to Block Face, Naturally Aspirated Turbocharged	 0.28–0.58mm (0.011–0.023 in) 0.0–0.3mm (0.0–0.012 in)

PISTON RINGS

Compression rings, Number and Location	2 off -1st and 2nd from the top of the piston
Naturally Aspirated, Top Compression Ring 2nd Compression Ring	 Parallel Sides-Inner Chamfer or no Chamfer Straight Face-Inner Step
Turbocharged, Top Compression Ring 2nd Compression Ring	 Keystone Tapered With Internal Chamfer to Top Straight Face-Inner Step
Oil Control, Number and Location Type	 1 off,-Directly above the Piston Pin, Slotted With Expander
Side Face Clearance To Ring Groove, Top Compression Ring 2nd Compression Ring Oil Control Ring	 0.112-0.155mm (0.0044-0.0061 in) 0.099-0.142mm (0.0039-0.0056 in) 0.061-0.104mm (0.0024-0.0041 in)
Gap Width, Top Compression Ring 2nd Compression Ring Oil Control Ring	 0.38-0.84mm (0.015-0.033 in) 0.66-1.12mm (0.026-0.044 in) 0.38-0.84mm (0.015-0.033 in)

CRANKSHAFT

Main Journal Diameter-	85.631mm (3.3713 in) 85.656mm (3.3723 in)
Main Journal Length (except thrust, rear, or intermediate)	36.96-37.21mm (1.455-1.465 in)
Main Journal Wear Limits	0.127mm (0.005 in) Maximum
Main and Crankpin Fillet Radius	3.048-3.556mm (0.12-0.14 in)
Thrust Bearing Journal Length	37.06-37.11mm (1.459-1.461 in)
Intermediate Bearing Journal Length	36.96-37.21mm (1.455-1.465 in)
Rear Bearing Journal Length	37.97-38.48mm (1.495-1.515 in)
Crankpin Journal Length	42.62-42.72mm (1.678-1.682 in)
Crankpin Diameter	69.840-69.850mm (2.749-2.7500 in)
End Play	0.10-0.20mm (0.004-0.008 in)
Crankpin Out of Round	0.005mm (0.0002 in) Total Indicator Reading
Taper Surface Parallel to Centre Line of Main Journal	0.005mm (0.0002 in)
Crankshaft Rear Oil Seal Journal Diameter	122.12-122.28mm (4.808-4.814 in)
Crankshaft Pulley Journal Diameter	44.45-44.48mm (1.750-1.751 in)
Crankshaft Timing Gear Journal Diameter	46.23-46.25mm (1.820-1.821 in)
Crankshaft Flange Runout	0.038mm (0.0015 in) Maximum

CRANKSHAFT DRIVE GEAR

Number of teeth	26

MAIN BEARING

Liner length (except thrust liner)	27.94-28.19mm (1.10-1.11 in)
Liner Length (Thrust Liner)	39.91-39.96mm (1.453-1.455 in)
Vertical Assembled Bearing Clearance	0.055-0.117mm (0.0021-0.0046 in)

CRANKPIN BEARINGS

Liner Length	35.56-35.81mm (1.40-1.41 in)
Vertical Assembled Bearing Clearance	0.035-0.094mm (0.0014-0.0037 in)

CRANKSHAFT RE-GRINDING

When re-grinding a crankshaft the main and crankpin journal diameters should be reduced the same amount as the undersize bearings used, and the following dimensions apply. The rear end of the crankshaft should be located on the 60° Chamfer of the pilot bearing bore.

UNDERSIZE BEARING AVAILABLE	MAIN JOURNAL DIAMETERS
0.051mm (0.002 in)	85.580-85.593mm (3.3693-3.3698 in)
0.254mm (0.010 in)	85.390-85.402mm (3.3618-3.3623 in)
0.508mm (0.020 in)	85.136-85.148mm (3.3518-3.3523 in)
0.762mm (0.030 in)	84.882-84.894mm (3.3418-3.3423 in)
1.016mm (0.040 in)	84.628-84.640mm (3.3318-3.3323 in)
UNDERSIZE BEARING AVAILABLE	**CRANKPIN JOURNAL DIAMETERS**
0.051mm (0.002 in)	69.789-69.799mm (2.7476-2.7480 in)
0.254mm (0.010 in)	69.956-69.606mm (2.7400-2.7404 in)
0.508mm (0.020 in)	69.342-69.352mm (2.7300-2.7304 in)
0.762mm (0.030 in)	69.088-69.098mm (2.7200-2.7204 in)
1.016mm (0.040 in)	68.834-68.844mm (2.7100-2.7104 in)

BALANCER

Gear Backlash	0.05-0.25mm (0.002-0.010 in)
Shaft to bushing clearance	0.0127.0-0.038mm (0.0005-0.0015in)
Shaft Diameter	25.133-25.40mm (0.9895-1.000 in)
Backlash between balancer / crankshaft gear	0.05-0.20mm (0.002-0.008 in)
End float balancer gear to support	0.20-0.51mm (0.008-0.020 in)

FLYWHEEL

Ring Gear Runout	0.63mm (0.025 in)
Flywheel Runout	0.27mm (0.005 in)
Maximum depth to be skimmed from face	3 mm (0.118 in)

OIL PUMP

Rotor Clearance	0.025-0.15mm (0.001-0.006 in)
Rotor to Pump Housing Clearance	0.15-0.28mm (0.006-0.011 in)
Rotor End Play	0.025-0.089mm (0.001-0.0035 in)
Oil Pressure	1.24 bar (18 lbs in^2) minimum at idle speed, 2.76 bar (40 lbs in^2) minimum at rated speed
Pump Gear to Camshaft Gear Backlash	0.40-0.56mm (0.016-0.022 in)

OIL FILTER SUPPORT

Relief Valve, Operating Pressure	4.0 bar (59 lb in^2)
Flow Rate	68 litres/min (15 imp gals/min) 18 US gals/min
Relief Valve, Spring Free Length	52.8mm (2.08 in)

Temperature	Oil Viscosity and Type	API Classification	Engine Oil & Filter Change Period (hours)
-12°C (Below 10°F)	Low Ash , SAE 5W or Low Ash SAE 5W/20 or SAE 10W-30	SF/CD / CF-4	150 150 150
-12°C to 4°C (10°F to 40°F)	Low Ash , SAE 10W Series 3 or SAE 10W-30	SF/CD / CF-4	150 300
0°C to 32°C (32°F to 90°F)	Low Ash , SAE 30W Series 3 or SAE 10W-40	SF/CD / CF-4	300 300
Above 24°C (75°F)	Low Ash , SAE 30W Series 3 or SAE 15W-40	SF/CD / CF-4	300

NOTE: *When using diesel fuel with a sulphur content below 1.0%, Series 3 diesel engine oil with an A.P.I. classification of CD may be used instead of CF-4 oil , but the oil and filter interval must be reduced to 150 hours .*

When using diesel fuel with a sulphur content between 1% and 1.3% use only oils listed above but reduce the oil and filter change period to every 50 hours .

ENGINE OIL CAPACITIES (With Oil Filter)

Model	Litres	Imp Gals	U.S. Gals
4 CYL	11.4	2.5	3.0

THERMOSTAT

Opening Temperature	79-83°C (174-181°F)
Fully Open	93-96°C (199-205°F)

RADIATOR CAP

Opening Pressure	0.9 bar (13 lbs in^2)

WATER PUMP

Type	Centrifugal
Drive	Multi V Belt

COOLING SYSTEM CAPACITIES

Model	Litres	Imp gals	U.S. gals
4 CYL (with cab)	16	3.5	4.2
4 CYL (less cab)	14.5	3.2	3.8

COOLING FLUID
Content Mixture - Use Anti-freeze (50%) plus clean, soft water (50%)
Type Ambra Agriflu (NH 900 A)

MINIMUM HARDWARE TIGHTENING TORQUES

IN FOOT POUNDS (NEWTON-METERS) FOR NORMAL ASSEMBLY APPLICATIONS

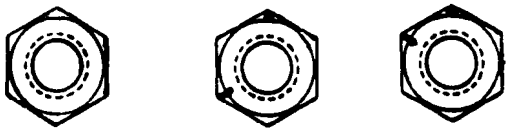
INCH HARDWARE AND LOCKNUTS

NOMINAL SIZE	SAE GRADE 2		SAE GRADE 5		SAE GRADE 8		LOCKNUTS		NOMINAL SIZE
	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	UNPLATED or PLATED SILVER	PLATED W/ZnCr GOLD	GR.B w/GR5 BOLT	GR.C w/GR8 BOLT	
1/4	55* (6.2)	72* (8.1)	86* (9.7)	112* (13)	121* (14)	157* (18)	61* (6.9)	86* (9.8)	1/4
5/16	115* (13)	149* (17)	178* (20)	229* (26)	250* (28)	324* (37)	125* (14)	176* (20)	5/16
3/8	17 (23)	22 (30)	26 (35)	34 (46)	37 (50)	48 (65)	19 (26)	26 (35)	3/8
7/16	27 (37)	35 (47)	42 (57)	54 (73)	59 (80)	77 (104)	30 (41)	42 (57)	7/16
1/2	42 (57)	54 (73)	64 (87)	83 (113)	91 (123)	117 (159)	45 (61)	64 (88)	1/2
9/16	60 (81)	77 (104)	92 (125)	120 (163)	130 (176)	169 (229)	65 (88)	92 (125)	9/16
5/8	83 (112)	107 (145)	128 (174)	165 (224)	180 (244)	233 (316)	90 (122)	127 (172)	5/8
3/4	146 (198)	189 (256)	226 (306)	293 (397)	319 (432)	413 (560)	160 (217)	226 (306)	3/4
7/8	142 (193)	183 (248)	365 (495)	473 (641)	515 (698)	667 (904)	258 (350)	364 (494)	7/8
1	213 (289)	275 (373)	547 (742)	708 (960)	773 (1048)	1000 (1356)	386 (523)	545 (739)	1

NOTE: Torque values shown with * are inch pounds.

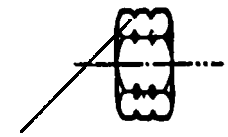
IDENTIFICATION
CAP SCREWS AND CARRIAGE BOLTS

SAE GRADE 2 SAE GRADE 5 SAE GRADE 8

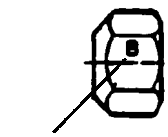


REGULAR NUTS SAE GRADE 5 HEX NUTS SAE GRADE 8 HEX NUTS

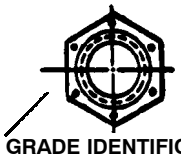
LOCKNUTS



GRADE IDENTIFICATION
GRADE A NO NOTCHES
GRADE B ONE CIRCUMFERENTIAL NOTCH
GRADE C TWO CIRCUMFERENTIAL NOTCHES



GRADE IDENTIFICATION
GRADE A NO MARKS
GRADE B LETTER B
GRADE C LETTER C



GRADE IDENTIFICATION
GRADE A NO MARKS
GRADE B THREE MARKS
GRADE C SIX MARKS
MARKS NEED NOT BE LOCATED AT CORNERS

TORQUE VALUES - VARIOUS	Nm	lbf ft	Kgf m
Main Bearing Bolts	197	145	20.0
Connecting Rod Bolts	149	110	15.2
Cylinder Head Bolts (with Engine Cold)	217	160	22.0
Intake Manifold-to-Cylinder Head	35	26	3.5
Exhaust Manifold-to-Cylinder Head	38	28	3.9
Exhaust Pipe-to-Flange	31	23	3.2
Flywheel-to-Crankshaft	197	145	20.0
Oil Pan Drain Plug	41	30	4.2
Valve Rocker Cover Bolts	24	18	2.4
Crankshaft Pulley-to-Crankshaft	224	210	23.0
Self-Locking Screw - Valve Rocker Arm	24	18	2.4
Injector Attachment Bolts	23	17	2.3
Cover Bolts	31	23	3.1
Oil Pump to Block	23	17	2.3
Water Pump-to-Cylinder Block	48	35	3.6
Water Pump Cover-to-Pump	27	20	2.8
Oil Pan-to-Cylinder Block (Cast)	38	28	3.9
Injector Line Nuts	24	18	2.4
Leak-off Tube Banjo Fitting Bolts	11	8	1.1
Injection Pump-to-Front Cover	24	18	2.4
Camshaft Idler Drive Gear-to-Block	237	175	24.0
Front Cover-to-Cylinder Block	24	18	2.4
Thermostat Housing Bolts	24	18	2.4
Camshaft Gear Bolt	69	51	7.0
Camshaft Rear Gear Plate Bolts	47	35	4.8
Oil Filter Adaptor Bolts	42	31	4.2
Oil Filter Mounting Bolt Insert	34	25	3.5
Starting Motor-to-Rear Adaptor Plate	31	23	3.2
Injection Pump-to-Gear Nut	79	58	8.0
Oil Pressure Switch Assembly	31	23	3.2
Turbocharger-to-Exhaust Manifold Nut	44	33	4.5
Fan Blade to Support Body	27	21	2.8
Crankshaft Rear Oil Seal Retainer -			
Initial Tightening	12	9	1.2
Final Tightening	23	17	2.3
Belt Tensioner Pulley Bolt	54	40	5.5
Temperature Senders	20	15	2.0
Tensioner to Water Pump Bolt	54	40	5.5
Idler Pulley Bolt	54	40	5.5
Pump Connector to Block	24	18	2.4

CYLINDER BLOCK PLUG TORQUES	Nm	lbf ft	Kgf m
1/4 in-27 NPT	11	8	1.1
1/4 in-18 NPT	29.8	22	3.0
3/4 in-18 NPT	38	28	3.8
3/4 in-14 NPT	27	20	2.7

COOLING

THERMOSTAT
Opening Temperature 79-83°C (174-181°F)
Fully Open 93-96°C (199-205°F)

RADIATOR CAP
Opening Pressure 0.9 bar (13 lbs in^2)

WATER PUMP
Type Centrifugal
Drive Multi 'V'

COOLING SYSTEM CAPACITIES

Model	Litres	Imp Gals	U.S. Gals
4 CYL with cab	16	3.5	4.2
4 CYL less cab	14.5	3.2	3.8

COOLING FLUID
Content Mixture - Water 50%, Antifreeze 50% . If the recommended antifreeze is not used, a heavy duty antifreeze must be used with a 5% solution of Inhibitor. This inhibitor must be added to the cooling system and is available from Dealers Part No FW 15.

TORQUES

TORQUE VALUES - VARIOUS	Nm	lbf ft	Kgf m
Water Pump-to-Cylinder Block	48	35	3.6
Water Pump Cover-to-Pump	27	20	2.8
Thermostat Housing Bolts	24	18	2.4
Fan Blade to Support Body	27	21	2.8
Temperature Senders	20	15	2.0

LUBRICATION

Oil Pump

Rotor Clearance	0.025-0.15mm (0.001-0.006 in)
Rotor to Pump Housing Clearance	0.15-0.28mm (0.006-0.011 in)
Rotor End Play	0.025-0.089mm (0.001-0.0035 in)
Oil Pressure	1.24 bar (18 lb/in^2) minimum at idle speed, 2.76 bar (40 lb/in^2) minimum at rated speed
Pump Gear to Camshaft Gear Backlash	0.40-0.56mm (0.016-0.022 in)

Oil Filter Support

Relief Valve, Operating Pressure	4.0 bar (59 lbs in^2)
Flow Rate	68 litres/min (15 imp gals/min) 18 US gals/min

Oil Type

Temperature	Oil Viscosity and Type	API Classification	Engine Oil & Filter Change Period (hours)
-12°C (Below 10°F)	Low Ash , SAE 5W or Low Ash SAE 5W/20 or SAE 10W-30	CF-4/SG	150 150 150
-12°C to 4°C (10°F to 40°F)	Low Ash , SAE 10W Series 3 or SAE 10W-30	CF-4/SG	150 300
0°C to 32°C (32°F to 90°F)	Low Ash , SAE 30W Series 3 or SAE 10W-40	CF-4/SG	300 300
Above 24°C (75°F)	Low Ash , SAE 30W Series 3 or SAE 15W-40	CF-4/SG	300

When using diesel fuel with a sulphur content between 1% and 1.3% use only oils listed above but reduce the oil and filter change period to every 50 hours .

ENGINE OIL CAPACITIES (With Oil Filter)

Model	Litres	Imp Gals	U.S Gals
4 CYL	11.4	2.5	4.8

TORQUE VALUES

TORQUE VALUES - VARIOUS	Nm	lbf ft	Kgf m
Oil Pan Drain Plug	41	30	4.2
Oil Pump to Block	23	17	2.3
Oil Filter Adaptor Bolts	42	31	4.2
Oil Filter Mounting Bolt Insert	34	25	3.5
Oil Pressure Switch Assembly	31	23	3.2
Idler Pulley Bolt	54	40	5.5
Pump Connector to Block	24	18	2.4

FUEL GENERAL

Turbocharger type: Garrett T250

LUCAS C.A.V. pump

Type DPS or DPS 200 Series, integral speed governor and advance device

Fuel System - General	**MODEL**				
	8×2	**16×4**	**12×12**	**24×24**	**16×16**
Fuel Tank Capacity	130 litres 28 imp. galls 34 U.S. galls		160 litres 35 imp. galls 42 U.S. galls		
Fuel Filter Type	Single Disposable Element and Separator				
Fuel Filter Change Interval	600 hours	600 hours	600 hours	600 hours	600 hours
Injector Nozzle Opening Pressure	DPS = 240–250 bar (3480–3590 lbs in^2)		DP200 = 290 – 300 bar (4230–4350 lbs in^2)		
Reset at	225 bar (3260 lbs in^2)		–275 bar (–3990 lbs in^2)		
Injection Pump Type	DPS Distributor	DPS Distributor	DP203 Distributor	DP203 Distributor	DP203 Distributor
Pump Rotation Firing Order	Clockwise 1342	Clockwise 1342	Clockwise 1342	Clockwise 1342	Clockwise 1342
Injector Change Interval	1200 hours	1200 hours	1200 hours	1200 hours	1200 hours
Maximum No-Load Speed	2320 (except TS110 Turbo = 2220)				
Idle Speed ± 50	750	750	750	750	750
Rated Speed	2170 (except TS110 Turbo = 2070)				

TORQUE VALUES

DESCRIPTION	**N·m**	**ft. lbs.**	**kgf/m**
Throttle Cable Locknuts	50	37	5.1
Throttle Lever Stop Bolt Locknut	10	7	1.0
Fuel Tank Strap Retaining Nut	2.5	1.8	0.25
Fuel Tank Strap Locknut	25	18	2.5
Fuel Tank Shutoff Valve	14	10	1.4
Fuel Tank Leak-Off Elbow	14	10	1.4
Leak-Off Pipe to Elbow	24	18	2.4
Thermostart Plug	37	27	3.8
Thermostart Pipe Union	10	7	1.0
Leak-Off Pipe to Injector Line	24	18	2.4
Fuel Tank Sender Retaining Screws	2.5	1.8	0.25
Fuel Filter Element Retaining Bolt	10	7	1.0
Fuel Filter Retaining Bolts	30	22	3.1
Exhaust Muffler Retaining Clamp	35	26	3.6
Air Cleaner Retaining Bolts	55	40	5.6
Air Cleaner Hose Clamps	2.5	1.8	0.25
Air Cleaner Restriction Indicator Switch	12	9	1.2

AIR CLEANERS

AIR CLEANER

Type	Dry, Dual Element
Change Interval	600 hours (or more frequently when operating in adverse conditions)
Type	Oil Bath
Service Interval	10 and 50 hours
Oil Type	API CF-4 15G

TORQUE VALUES

DESCRIPTION	ft. lbs.	N·m	kgf/m
Air Cleaner Retaining Bolts	40	55	5.6
Air Cleaner Hose Clamps	1.8	2.5	0.25
Air Cleaner Restriction Indicator Switch	9	12	1.2

ELECTRIC LIFT PUMP

Type	Filter head mounted 12 volt supply Electric Lift Pump
Pump operation	Mechanically Actuated
Output Pressure at 2000 revs/min	0.27-0.47 bar (3-6 lbs in^2)

INJECTORS

INJECTORS	LUCAS C.A.V.
Adjustment	Variable
Quantity, nozzle holes	5 Hole
Pressure Setting	240-250 bar (3480-3590 lbs in^2) (non emissionized). 290-300 bar (4230-4350 lbs in^2) (emissionized)
Injector change interval	1200 hours

TORQUE VALUES

Application	**Nm**	**ft. lbs.**	**kgf/m**
Injector Nozzle Retaining Nut	48	35	4.9
Injector Retaining Bolts	22	17	2.2
Injector Leak-Off Line Banjo Bolts	12	10	1.2
High Pressure Gland Nuts at Injector	32	23	3.3
High Pressure Gland Nuts at Fuel Pump	33	23	3.3

INJECTION PUMP

LUCAS C.A.V. pump

Type DPS/DP203	Series Distributor type, integral speed governor and advance device
Pump rotation	Clockwise
Firing order	1342

Model	TS80	TS90	TS90	TS100	TS110
Pump Type	DPS	DPS	DP203	DP203	DP203
Engine Timing BTDC Engine Position	-	-	28°	28°	28°
Pump Timing, Locking Bolt Position Overcheck	-	-	29°	29°	29°
Pump Scribe Mark to Engine Plate Timing Mark	0°	0°	-	-	-
Pump Internal Timing	262	263	-	-	-

TORQUE VALUES

DESCRIPTION		Nm	lbf.ft
Fuel Inlet Connection		59	43
Delivery Valve Holders		41	30
Fuel Injection Pump to Front Plate	– DPS	40	29
	– DP203	20–24	15–18
Front Plate Bolts Cover Bolts		22	16
Pump Locking Bolt DP203		13	10
Drive Gear		75–81	55–60

TURBOCHARGER

TURBOCHARGER

Compressor Shaft Axial End Play	0.025 mm - 0.10 mm (0.001in - 0.004in)
Bearing Radial Clearance	0.4 mm - 0.5 mm (0.016in - 0.021in)

TORQUE VALUES

GENERAL TORQUES	Nm	lbf ft	kgf m
Turbine Housing Bolts	20–25	15–18	2.0–2.5
Turbocharger to Manifold	41–47	30–35	4.1–4.7
Oil Feed Tube to Turbocharger (Banjo Bolt)	30–40	22–30	3.0–4.0
Oil Feed Tube to Filter Head Connector	18–20	13–15	1.8–2.0
Connector to Filter Head	54–81	40–60	5.4–8.1
Oil Return Tube bolts from Turbocharger	20–25	15–18	2.0–2.5
Oil Return Tube to Block Connector	60–70	45–50	6.0–7.0
Oil Return Connector to Block	27	20	2.7
Inlet Hose Clamps	1.7–2.3	(15–20 lbs in)	

MANIFOLDS

Inlet Manifold	Aluminium - with Plenum Chamber
Exhaust Manifold	Cast Iron

TORQUE VALUES

TORQUE VALUES - VARIOUS	Nm	lbf ft	Kgf m
Intake Manifold-to-Cylinder Head	35	26	3.5
Exhaust Manifold-to-Cylinder Head	38	28	3.9
Exhaust Pipe-to-Flange	31	23	3.2

ELECTRICAL SYSTEM SPECIFICATIONS

Alternator		12v. 100 amp – with cab 12v. 55 amp – less cab
Regulator		Integral with alternator
Battery		Minimum maintenance type – 12v. 800 cca Dual battery option – with cab
Starting motor		Positive engagement, solenoid operated
Cold starting aid		Thermostart (with electric timer) Block heater optional
Bulb rating and type:	Headlights	60/55W – H4
	Position lights	5W – R5W
	Work lights	55W – H3
	Turn signals	21W – P21W
	Stop/tail lights	21/5W – P21/5W
	Licence plate lights	10W – R19/10

STARTING SYSTEM

	Starter Type **Bosch 3.1 Kw**
Maximum No Load Current Draw at 12.0 volts and 8000 rev/min.	80 amps
Minimum Brush Length	7.00 mm (0.28 in)
Minimum Commutator Diameter	42.5 mm
Maximum Armature Shaft End Play	0.4 mm (0.015 in)

TORQUE SPECIFICATIONS

	lbf.ft	**Nm**
Starting motor to Engine Block Retaining Bolts	25	34
Solenoid Cable nuts	5	7
Starting Motor End Housing Nuts	7	10
Solenoid Retaining Bolts	4	5

CHARGING SYSTEM

	Alternator Type	
	A127-55	A127-1R
Polarity	Negative Ground	
Nominal Voltage	12.0 v	
Maximum Rev/Min.	15,000	18000
Maximum Output	55 Amps	100 Amps
Regulator Controlled Voltage	13.6 - 14.4 v	
Rotor Field Winding Resistance	2.9Ω	2.6 Ω
Stator Field Winding Resistance	0.2Ω	0.075 Ω
New Brush Length	20.0 mm	
Minimum Brush Length	5.0 mm	
Brush Spring Pressure	1.3-2.7 N (4.7-9.8 oz)	

TORQUE SPECIFICATIONS

	lbf.ft	Nm
Alternator Through Bolts	4.0	5.5
Pulley Retaining Nut	52.0	70
Rectifier Attaching Screws	3.0	4.0
Regulator and Brushbox Screws	2.0	2.7
Terminal Nuts	2.0	2.7

BATTERY

	Standard
Capacity (Ampere hour at 20 hour rate)	107
Cold Cranking Ampere Rating	800
Voltage	12
Cells	6
Ground Terminal	Negative

HYDRAULIC SYSTEM SPECIFICATIONS

HYDRAULIC PUMP ASSEMBLY WITH VARIABLE DISPLACEMENT CLOSED CENTRE LOAD SENSING (CCLS)

Variable Displacement Closed Centre Load Sensing Swash Plate Pump with Integral Charge and Steering Pumps

Charge Pump

Type	Gear Type Pump
Minimum Output @ 2100 eng rev/min (New Pump)	24 US Galls/min, (20 Imp Galls/min, 90 ltrs/min) @ 90 lbf/in^2 (6.2 bar)
Charge Pressure Filter Dump Valve	Crack open @ 100 lbf/in^2 (6.9 bar) Fully open @ 180 lbf/in^2 (12.4 bar)
Charge Pressure	Minimum 23 lbf/in^2 (1.6 bar) @ 2100 rev/min and variable displacement pump 'On' load Maximum 50 lbf/in^2 (3.4 bar) @ 2100 rev/min and variable displacement pump 'Off' load
Charge Pressure Switch	Close @ 8–12 lbf/in^2 (0.55–0.82 bar) Making charge pressure warning light flash

Variable Displacement Closed Centre Load Sensing Pump

Type	Variable Piston Pump (Swash Plate Controlled)
Minimum Output @ 2100 eng rev/min (New Pump)	20 US Galls/min, (16.6 Imp Galls/min, 76 Ltrs/min) @ 2550 lbf/in^2 (176 bar)
Standby Pressure (Low Pressure Standby)	310–350 lbf/in^2 (21–24 bar)
Maximum System Pressure (High Pressure Standby)	2700–2800 lbf/in^2 (186–193 bar)
Low Pressure Hydraulic Circuit Pressure Regulating Valve	250–280 lbf/in^2 (17–19 bar)
Low Pressure Circuit Safety Valve	Crack open @ 290 lbf/in^2 (20 bar) Fully open @ 415 lbf/in^2 (29 bar)
Low Transmission Oil Pressure Switch (Tractors with 16 x 16 transmission only)	Close @ 210–220 lbf/in^2 (14.5–15.2 bar) making low transmission oil pressure warning light come 'On' Open @ 240–250 lbf/in^2 (16.5–17.2 bar) Making low transmission oil pressure warning light go 'Off'
Low Transmission Oil Pressure Switch (Tractors with 12 x 12 transmission only)	Close @ 80 lbf/in^2 (5.5 bar) Making low transmission oil pressure warning light come 'On' Open @ 120 lbf/in^2 (8.3 bar) Making low transmission oil pressure warning light go 'Off'
High Oil Temperature Switch	Close @ 104–110°C (219–230°F)

Steering Pump

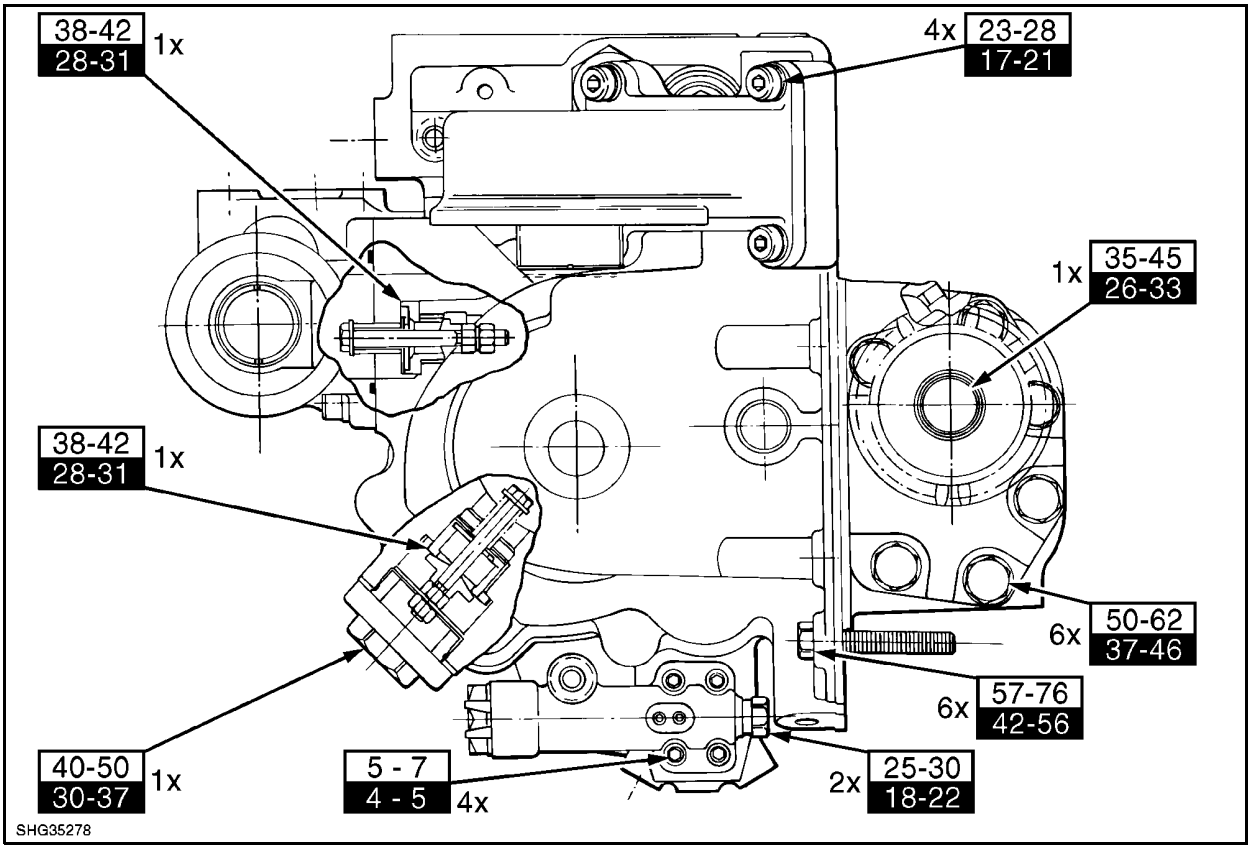
Type	Gear Type Pump
Minimum Output @ 2100 eng rev/min (New Pump)	9.2 US Galls/min (7.7 Imp Galls/min 34.8 Ltrs/min) @ 2600 lbf/in^2 (169 bar)
Maximum Operating Pressure	2600 lbf/in^2 (179 bar)
Blocked Steering Filter Vacuum Switch	Close @ 18 in Hg. making blocked steering filter warning light come 'On' providing oil temperature 42-48°C (107-118°F)
Low Steering Oil Temperature Switch	Close @ 42-48°C (107-118°F)

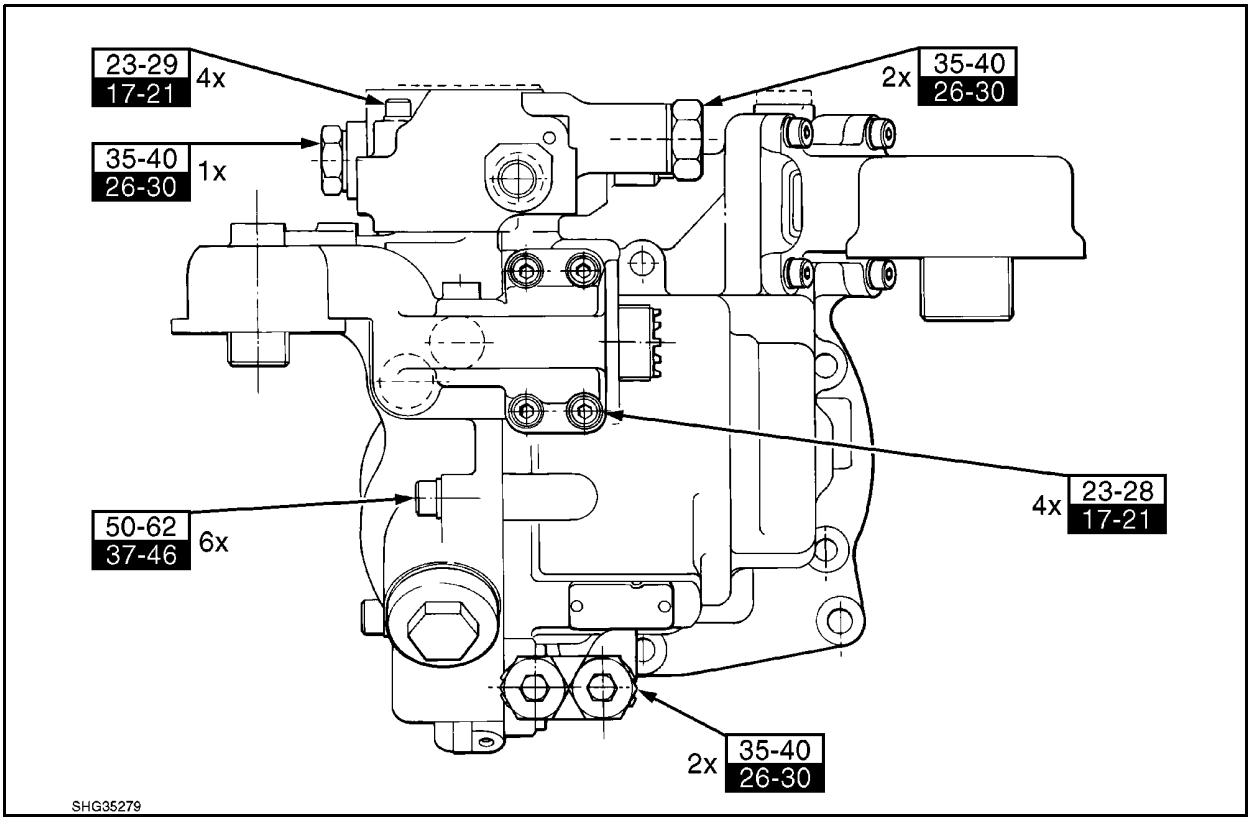
THREAD SEALANT

New Holland Thread Lock & Seal, Part Number 82995773
Applied to pump driveshaft gear retaining nut.

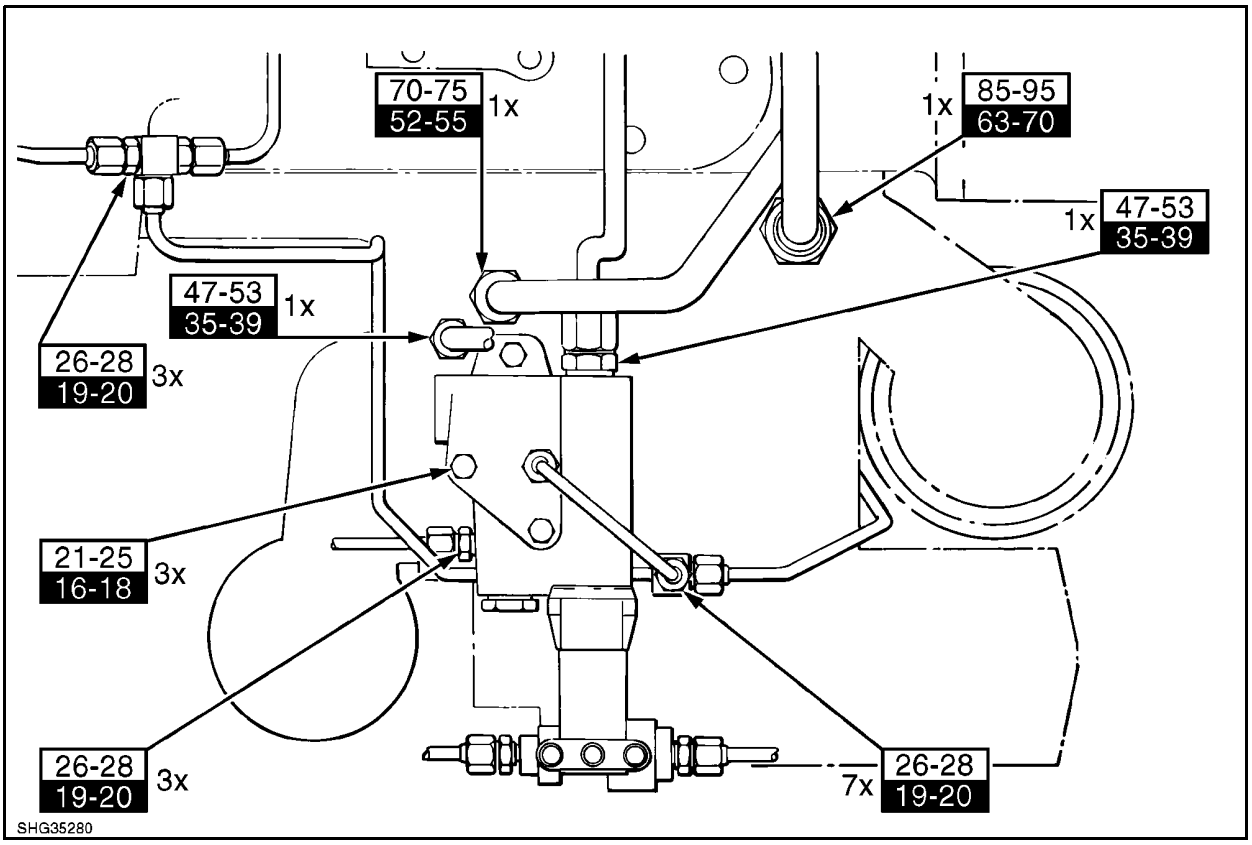
= Nm
= lbf ft

TORQUES





Hydraulic Connections



Plan View of Variable Displacement Hydraulic Pump Tube Connections

HYDRAULIC LIFT ASSEMBLY WITH ELECTROLINK™ FOR TRACTORS WITH VARIABLE DISPLACEMENT CLOSED CENTRE LOAD SENSING HYDRAULIC PUMP

MAXIMUM LIFT CAPACITY

New Holland test results to OECD criteria-links horizontal, maximum hydraulic pressure:

		TS90	TS100	TS110
Without Assist Rams				
at link ends	lb	6712	6712	n/a
	kg	3045	3045	n/a
24 in. to rear of link ends	lb	5190	5190	n/a
	kg	2354	2354	n/a
With One Assist Ram				
at link ends	lb	9904	9904	9904
	kg	4492	4492	4492
24 in. to rear of link ends	lb	7484	7484	7484
	kg	3395	3395	3395
With Two Assist Rams				
at link ends	lb	n/a	n/a	13001
	kg	n/a	n/a	5897
24 in. to rear of link ends	lb	n/a	n/a	9957
	kg	n/a	n/a	4516

VALVE SETTINGS

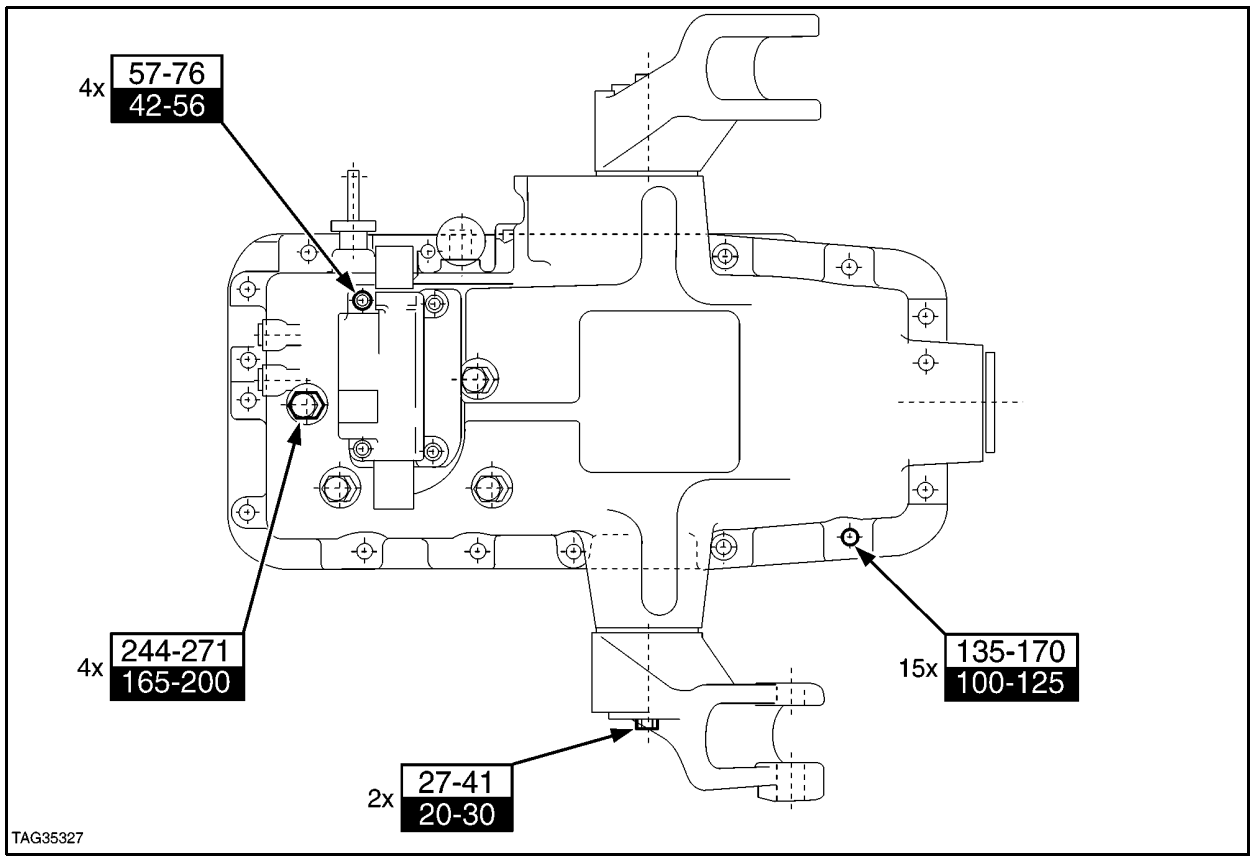
Lift Cylinder Relief Valve 2850-3050 lbf/in^2 (197-210 bar)

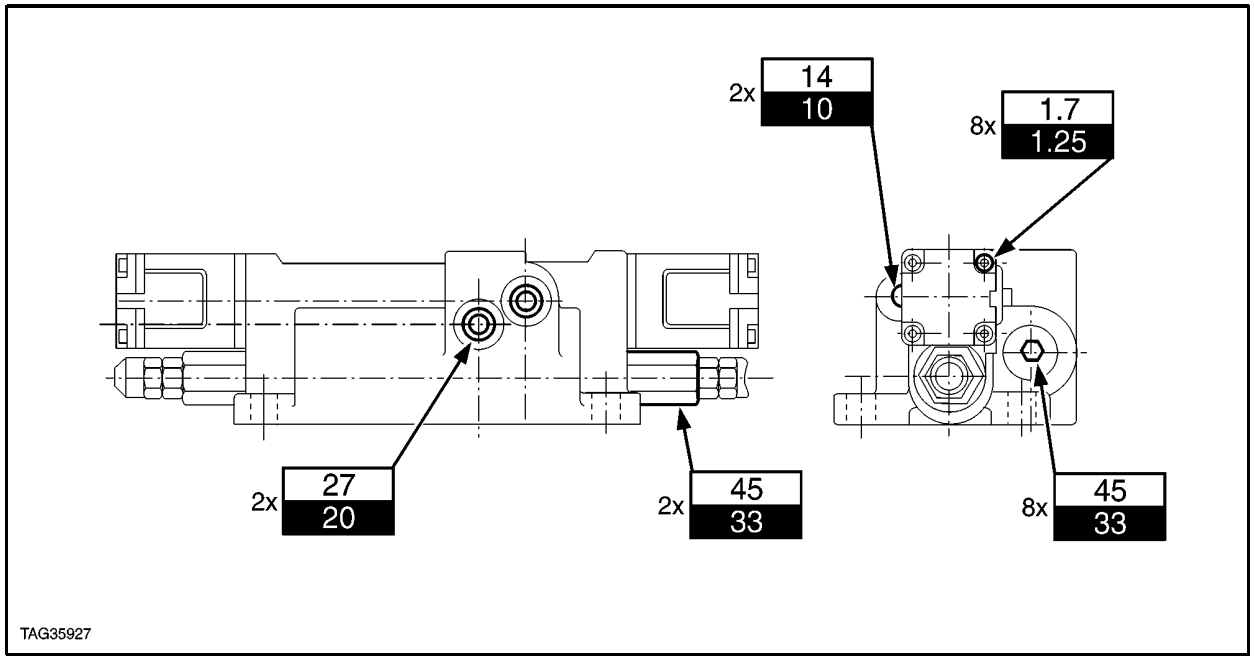
GASKET SEALER

New Holland Flexible Gasket Sealant, Part No. 82995770 (50 ml) 82995771 (300 ml)

TORQUES

= Nm
= lbf ft





Lift Cylinder Relief Valve Torque 75-90 lbf ft (102-122Nm)

HYDRAULIC LIFT ASSEMBLY WITH TOP LINK SENSING

MAXIMUM LIFT CAPACITY
THREE POINT LINKAGE

Maximum lift capacity – Manufacturers' figures to OECD criteria – links horizontal, maximum hydraulic pressure:

Models with 12 × 12 transmission – without assist rams

		TS90	TS100	TS110
at link ends	kg	2880	2880	n/a
	lb	6350	6350	n/a
24 in. to rear of link ends	kg	2227	2227	n/a
	lb	4910	4910	n/a

Models with 12 × 12 transmission – with one assist ram

at link ends	kg		4250	
	lb		9370	
24 in. to rear of link ends	kg		3211	
	lb		7080	

Models with 12 × 12 transmission – with two assist rams

at link ends	kg	n/a	n/a	5579
	lb	n/a	n/a	12300
24 in. to rear of link ends	kg	n/a	n/a	4273
	lb	n/a	n/a	9420

without assist rams

at link ends	kg	3045	3045	n/a
	lb	6713	6713	n/a
24 in. to rear of link ends	kg	2354	2354	n/a
	lb	5190	5190	n/a

Models with 16 × 16 transmission – with one assist ram

at link ends	kg		4492	
	lb		9904	
24 in. to rear of link ends	kg		3395	
	lb		7484	

Models with 16 × 16 transmission – with two assist rams

at link ends	kg	n/a	n/a	5897
	lb	n/a	n/a	13001
24 in. to rear of link ends	kg	n/a	n/a	4516
	lb	n/a	n/a	9957

ASC SELECTOR VALVE SIZES

Colour	Inches	mm
Green	0.6247–0.6244	15.8674–15.8598
Yellow	0.6244–0.6241	15.8598–15.8521
Blue	0.6241–0.6238	15.8521–15.8445
White	0.6238–0.6235	15.8445–15.8369
Blue/White	0.6235–0.6232	15.8369–15.8293

CONTROL VALVE SIZES

Colour	Inches	mm
Orange	0.5928–0.5927	15.057–15.055
Green	0.5926–0.5925	15.052–15.050
Yellow	0.5923–0.5921	15.044–15.039
Blue	0.5921–0.5919	15.039–15.034
White	0.5919–0.5917	15.034–15.029

CONTROL VALVE BUSHING SIZES

Colour	Inches	mm
Green/White	1.0014–1.0012	25.436–25.430
Orange	1.0012–1.0010	25.430–25.425
Green	1.0010–1.0008	25.425–25.420
Yellow	1.0008–1.0006	25.420–25.415
Blue	1.0006–1.0004	25.415–25.410
White	1.0004–1.0002	25.410–25.405
Blue\White	1.0002–1.0000	25.405–25.400

VALVE SETTINGS

Lift Cylinder Relief Valve	197–210 bar (2850–3050 lbf/in^2)

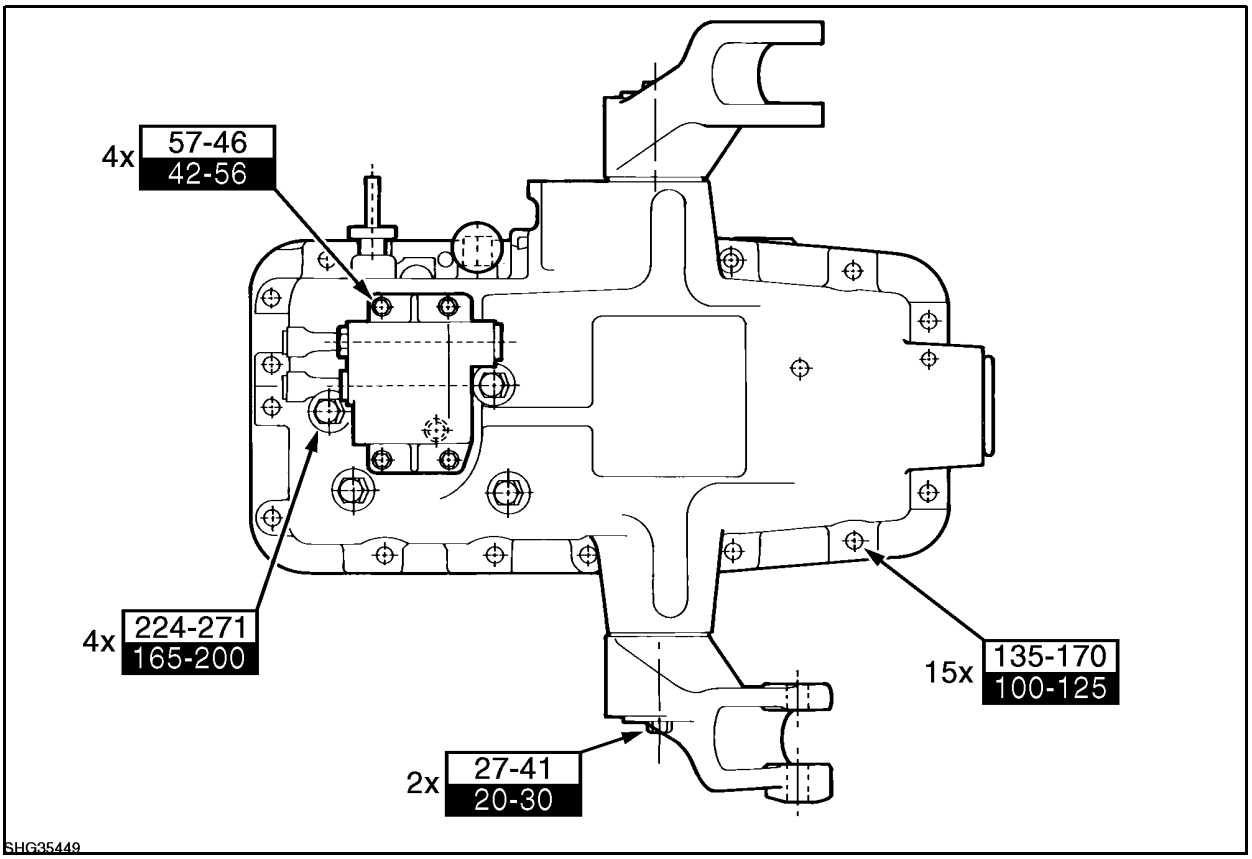
GASKET SEALER

Gasket Sealer 82995770

TORQUES

= **Nm**

= **lbf ft**



Components	Nm	lbf.ft
Lift Cylinder Relief Valve	102-122	75-90
Selector Support Bolts	57-76	42-56
Selector Body Turning Torque	9-14	7-10
Eccentric Shaft Locknut	20-27	15-20
Unload Valve Plug (CCLS Pump)	23-49	17-35
Yoke Retaining Nut Set Screw	27-34	20-25

FIXED DISPLACEMENT GEAR TYPE PUMPS

Fixed Displacement Gear Type Pump With Integral Steering Pump

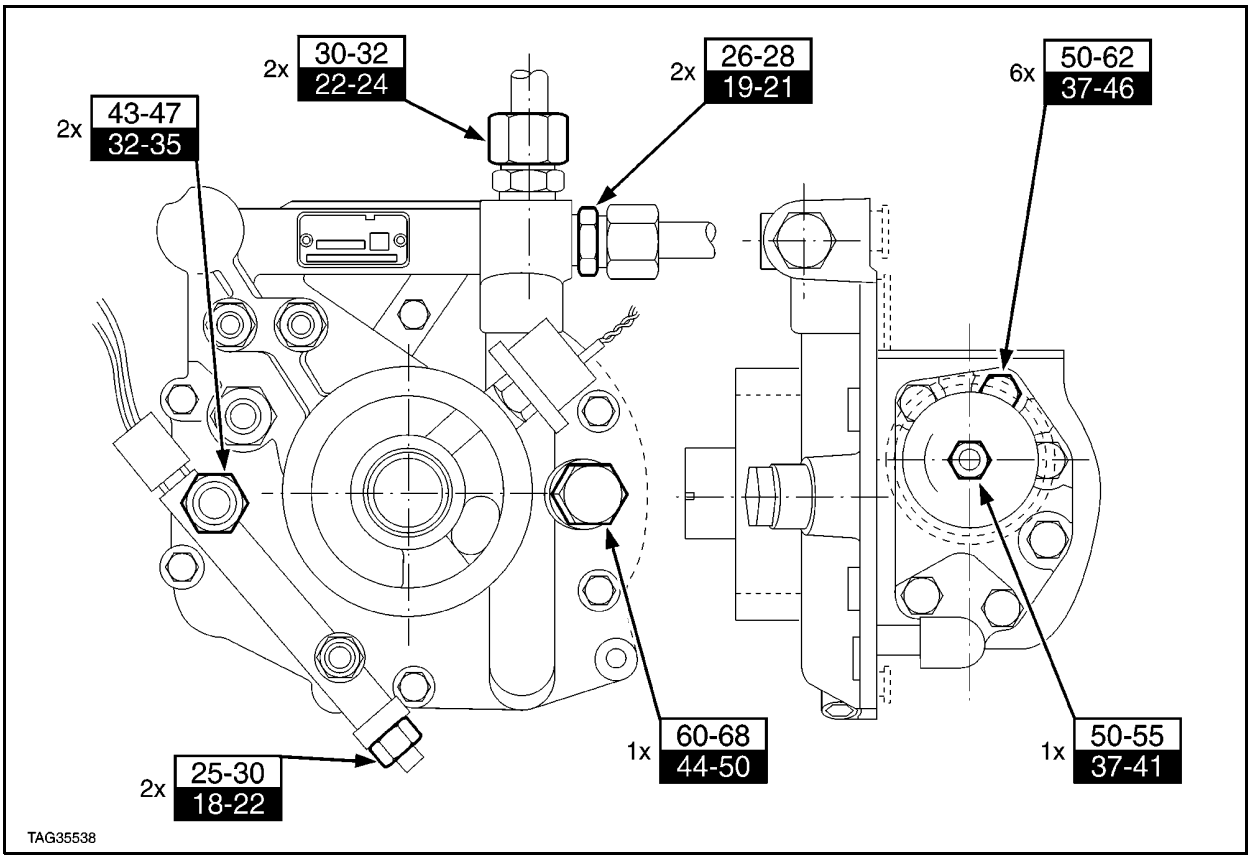
Main Hydraulic Lift Pump	
Type	Gear Type Pump
Minimum output @ 2100 engine rev/min @ 2000 lbf/in^2 (165 bar)	
New pump	35 Ltrs/min (7.7 Imp gals/min 9.3 U.S. Gals/min)
Used pump	32 Ltrs/min (7.0 Imp gals/min 8.4 U.S. Gals/min)
Pressure relief valve setting	176–183 bar (2550–2650 lbf/in^2)
Steering Pump	
Type	Gear Type Pump
Minimum output @ 2100 engine rev/min	
New pump	35 Ltrs/min (7.7 Imp gals/mim 9.2 U.S. Gals min)
Used pump	31 Ltrs/min (6.8 Imp gals/min 8.2 U.S. Gals/min)
Steering Motor Relief Valve Setting	
2WD Tractors	138–145 bar (2000–2100 lbf/in^2)
4WD Tractors	166–172 bar (2400–2500 lbf/in^2)

Auxiliary Engine Mounted Fixed Displacement Gear Type Pump

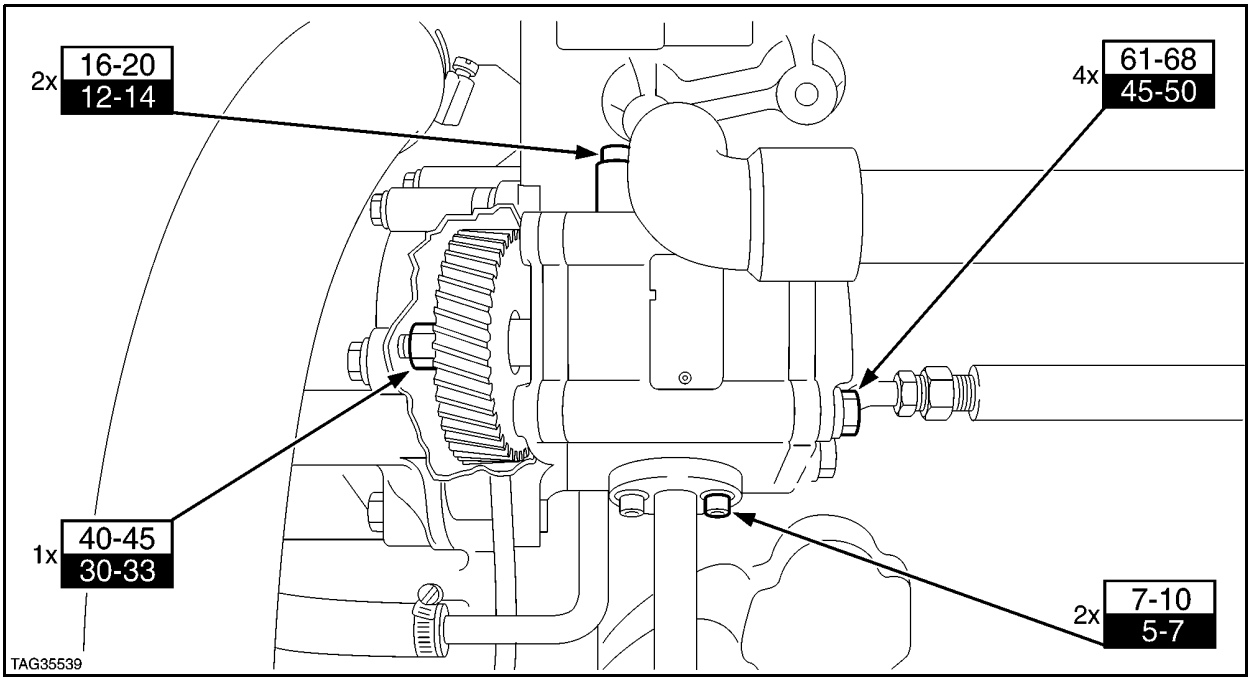
Type	Gear Type Pump
Minimum output @ 2100 engine rev/min @ 165 bar (2400 lbf/in^2)	
New pump	33 Ltrs/min (7.3 Imp gals/min 8 U.S. Gals/min)
Used pump	23 Ltrs/min (5 Imp gals/min 6 U.S. Gals/min)

TORQUES

= **Nm**
= **lbf ft**



Transmission Mounted Fixed Displacement Tandem Gear Type Pump



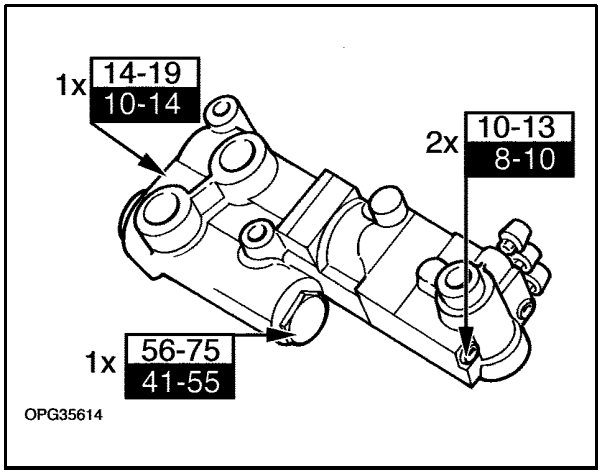
Engine Mounted Fixed Displacement Gear Type Pump

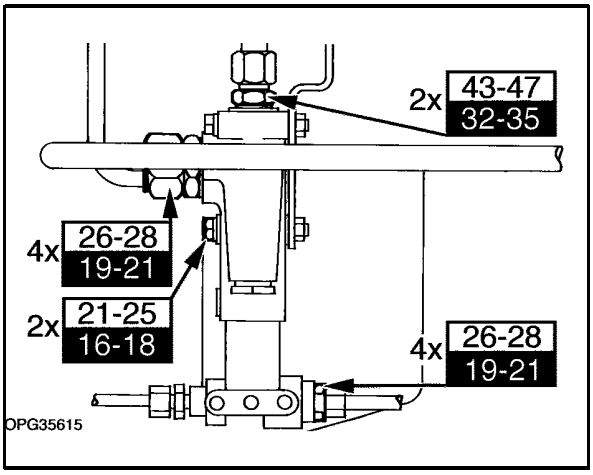
HYDRAULIC TRAILER BRAKES

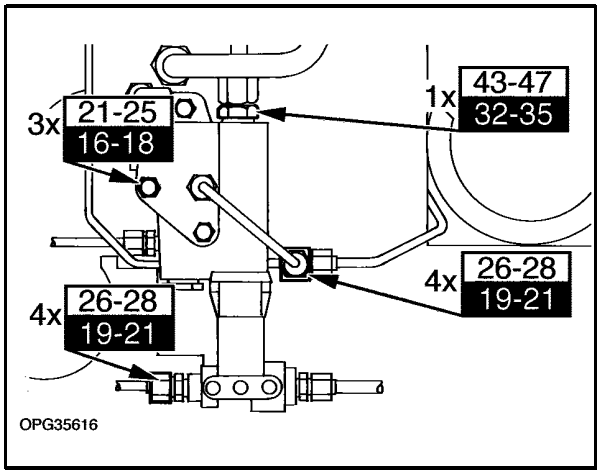
Maximum Trailer Brake Pressure	1740-2176 lbf/in^2 (120-150 bar)
Brake Reservoir Oil	New Holland Specification Mineral Oil

TORQUES

= Nm
= lbf ft







REMOTE CONTROL VALVES

Detent Regulating Valve Pressure 2150–2350 lbf/in^2 (148–162 bar)

TORQUES

Flow Control Valve Plug	20 lbf ft	27 Nm
Detent Shaft Pivot Coupling	5 lbf ft	7 Nm
Detent Housing Retaining Screws	5 lbf ft	7 Nm
Priority Check Valve	5 lbf ft	7 Nm
Valve to Coupler Housing Bolts	11–15 lbf ft	15–20 Nm
Valve to Mounting Bracket Bolts	20–26 lbf ft	27–35 Nm
Remote Valve Coupler to Housing	60 lbf ft	82 Nm

THREAD SEALANT

New Holland Thread Lock and Seal, Part Number 82995773

ASSIST RAMS

MAXIMUM LIFT CAPACITY

Tractors with Fixed Displacement Gear Type Hydraulic Pump @ 2650 lbf/in^2 (183 bar)

Test results to OECD criteria–links horizontal

		TS80, TS85, TS90, TS95, TS100	TS110
Without Assist Rams			
at link ends	lb	6350	n/a
	kg	2880	n/a
24 in. to rear of link ends	lb	4910	n/a
	kg	2227	n/a
With One Assist Ram			
at link ends	lb	9370	9370
	kg	4250	4250
24 in. to rear of link ends	lb	7080	7080
	kg	3211	3211
With Two Assist Rams			
at link ends	lb	n/a	12300
	kg	n/a	5579
24 in. to rear of link ends	lb	n/a	9420
	kg	n/a	4273

Tractors with Fixed Displacement Gear Type Hydraulic Pump @ 2385 lbf/in^2 (164 bar)

Test results to SAE criteria–links horizontal

		TS80, TS85, TS90, TS95, TS100	TS110
Without Assist Rams			
24 in. to rear of link ends	lb	4200	n/a
	kg	1905	n/a
With One Assist Ram			
24 in. to rear of link ends	lb	6210	6210
	kg	2817	2817
With Two Assist Rams			
24 in. to rear of link ends	lb	n/a	8240
	kg	n/a	3728

MAXIMUM LIFT CAPACITY

Tractors with Variable Displacement Closed Centre Load Sensing (CCLS) Hydraulic Pump @ 2800 lbf/in^2 (193 bar)

Test results to OECD criteria–links horizontal

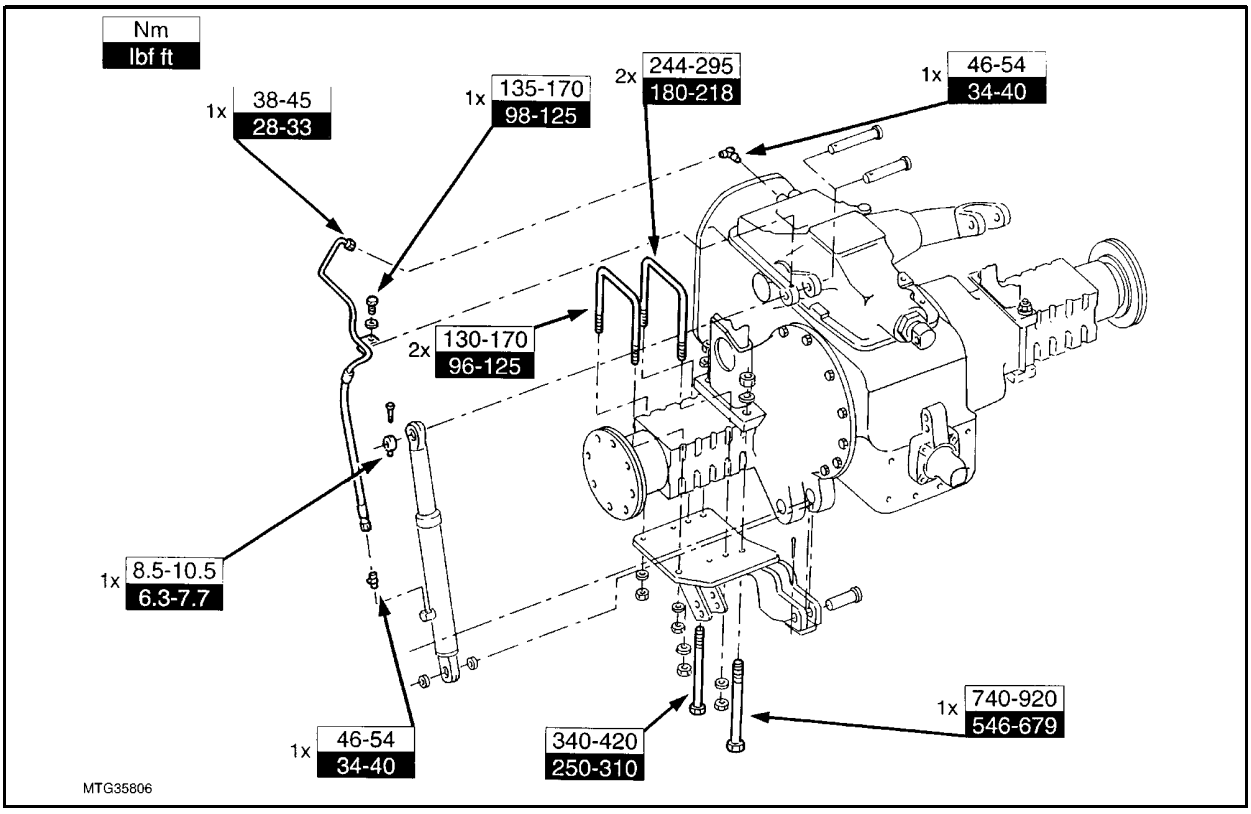
		TS90	TS100	TS110
Without Assist Rams				
at link ends	lb	6712	6712	n/a
	kg	3045	3045	n/a
24 in. to rear of link ends	lb	5190	5190	n/a
	kg	2354	2354	n/a
With One Assist Ram				
at link ends	lb	9904	9904	9904
	kg	4492	4492	4492
24 in. to rear of link ends	lb	7484	7484	7484
	kg	3395	3395	3395
With Two Assist Rams				
at link ends	lb	n/a	n/a	13001
	kg	n/a	n/a	5897
24 in. to rear of link ends	lb	n/a	n/a	9957
	kg	n/a	n/a	4516

Tractors with Variable Displacement Closed Centre Load Sensing (CCLS) Hydraulic Pump @ 2800 lbf/in^2 (193 bar)

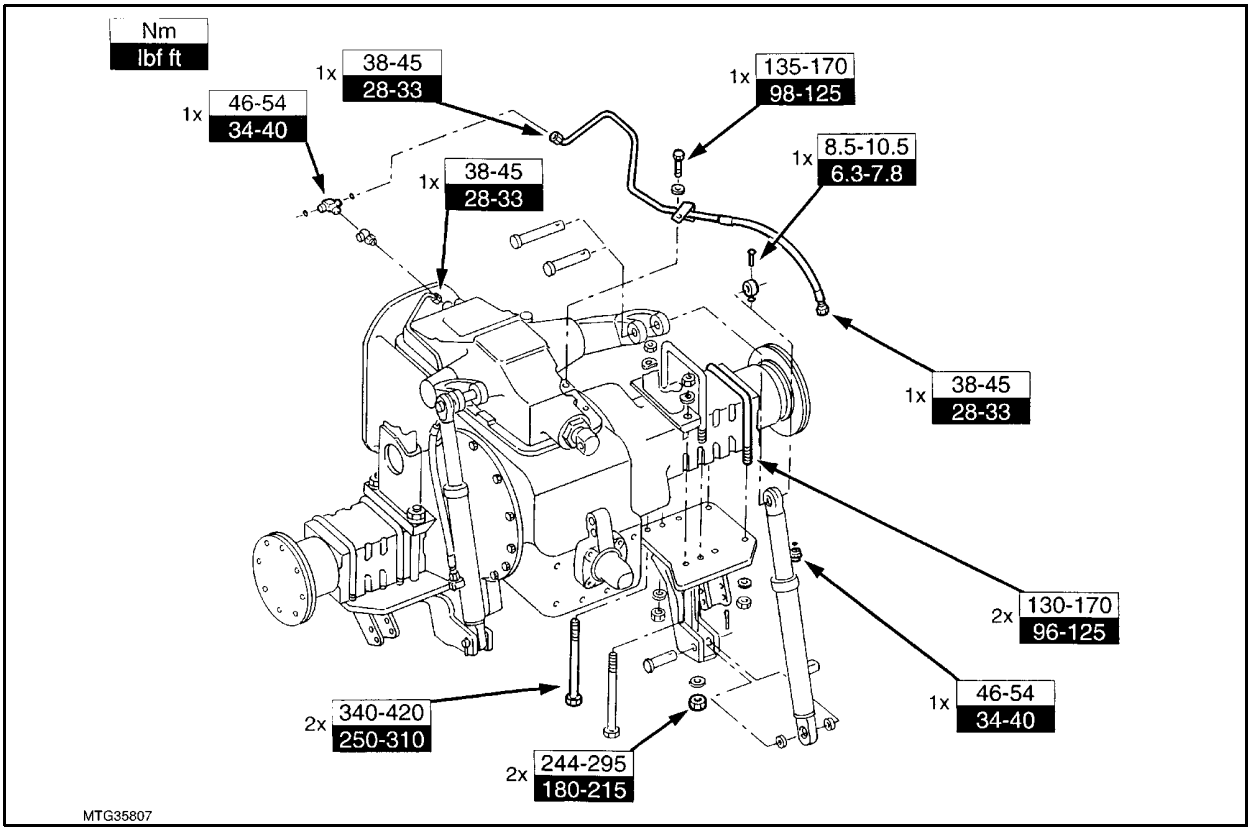
Test results to SAE criteria-links horizontal

Without Assist Rams		TS90	TS100	TS110
24 in. to rear of link ends	lb	4439	4439	n/a
	kg	2014	2014	n/a
With One Assist Ram				
24 in. to rear of link ends	lb	6564	6564	n/a
	kg	2978	2978	n/a
With Two Assist Rams				
24 in. to rear of link ends	lb	n/a	n/a	8710
	kg	n/a	n/a	3950

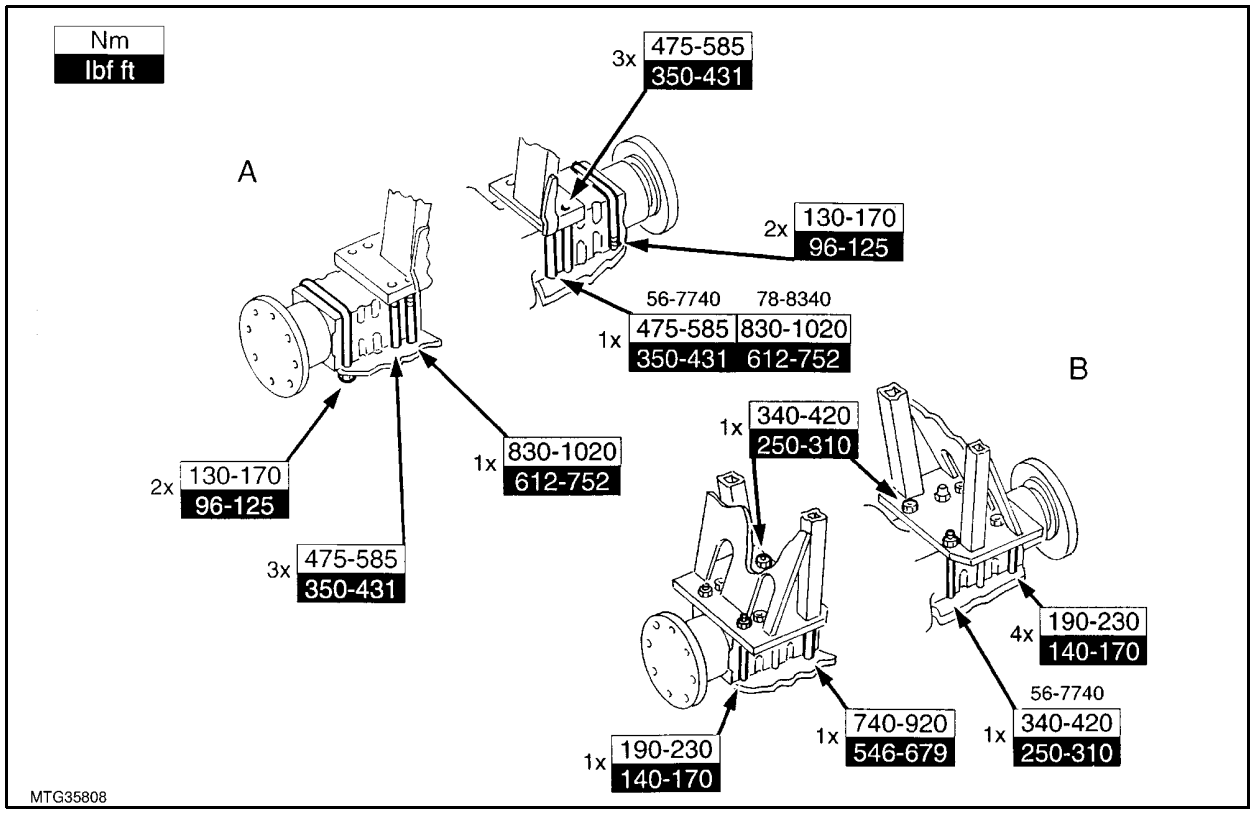
TORQUES



Single Hydraulic Assist Ram and Bracket Installation (With and Less Cab)



Double Hydraulic Assist Ram and Bracket Installation (With and Less Cab)



Assist Ram Mounting Bracket
(Two and Four Post Roll Over Protection Frame)

A. Two Post Roll Over Protection Frame

B. Four Post Roll Over Protection Frame

HYDRAULIC LIFT ASSEMBLY WITH ELECTRONIC DRAFT CONTROL FOR TRACTORS WITH FIXED DISPLACEMENT HYDRAULIC PUMP

VALVE SETTINGS

Lift Cylinder Relief Valve	2850–3050 lbf/in^2 (197–210 bar)

GASKET SEALER

New Holland Gasket Sealant Part No.	82995770 (50 ml) 82995771 (300 ml)

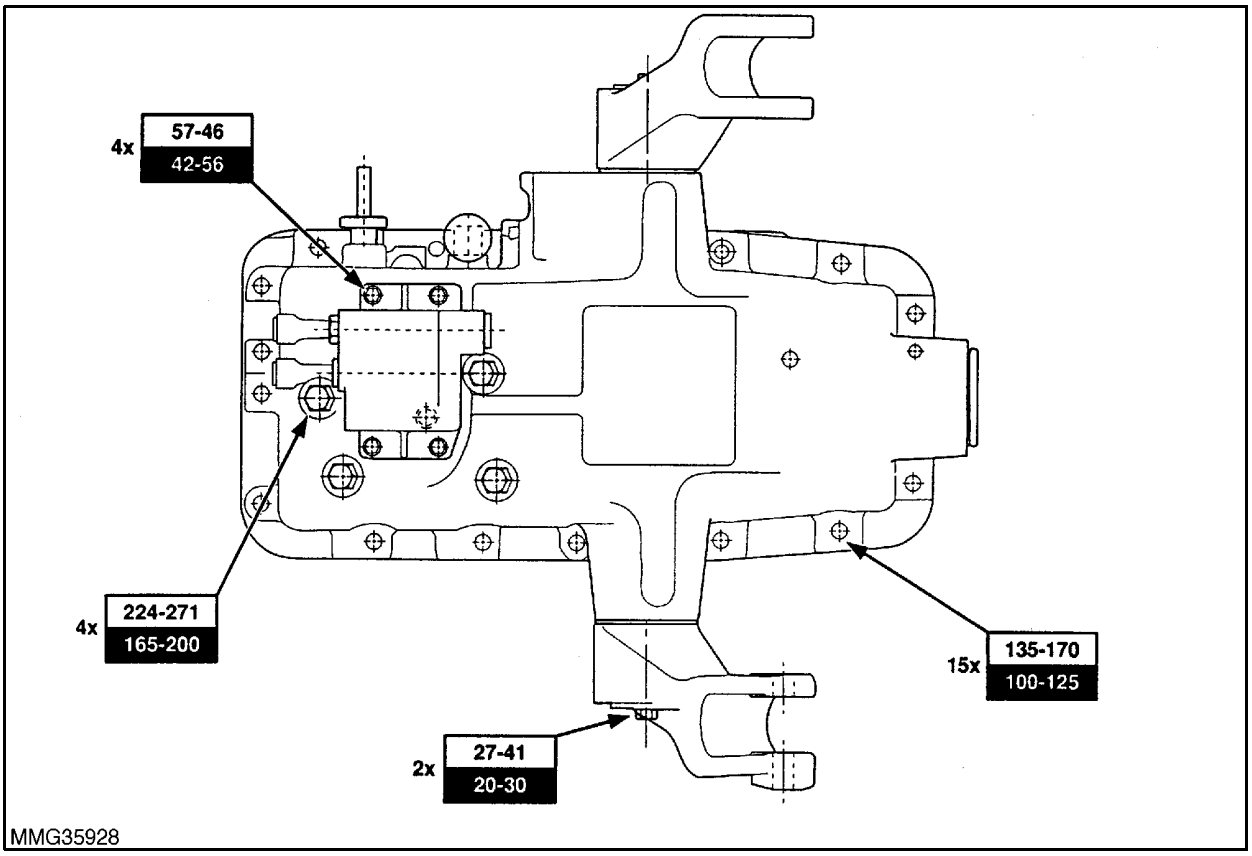
ASC CONTROL VALVE SIZES

Colour	Inches	mm
Green	.6247–.6244	15.8674–15.8598
Yellow	.6244–.6241	15.8598–15.8521
Blue	.6241–.6238	15.8521–15.8445
White	.6238–.6235	15.8445–15.8369
Blue/White	.6235–.6232	15.8369–15.8293

TORQUES

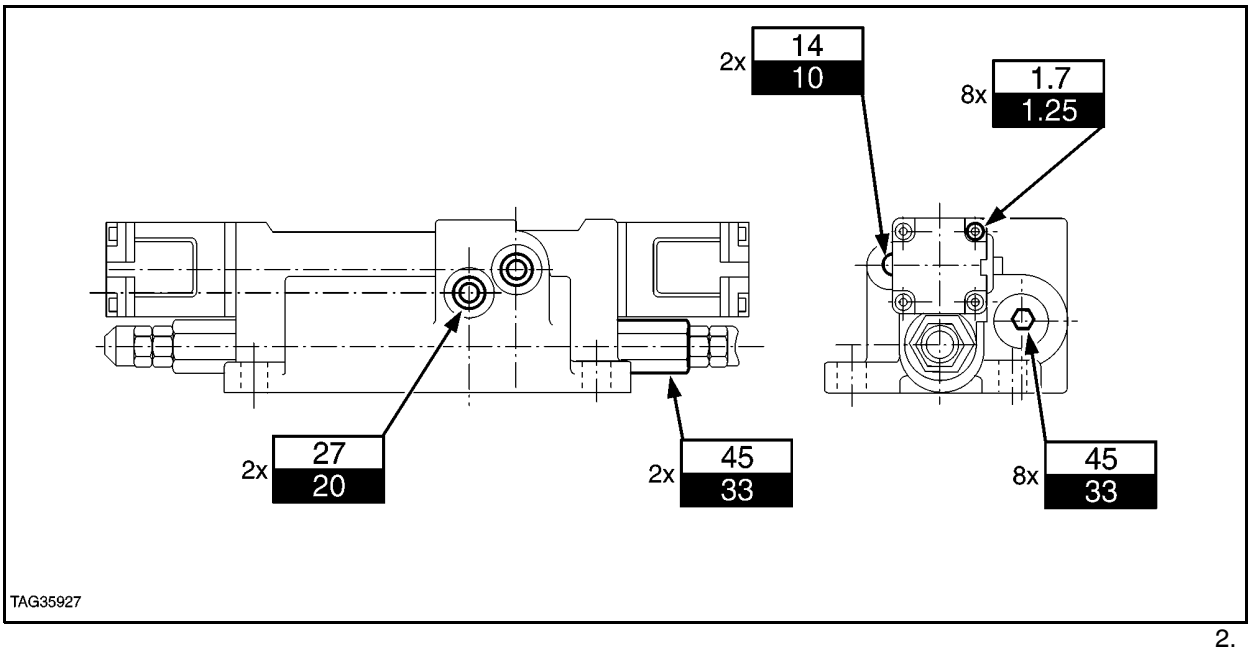
= **Nm**

= **lbf ft**



1.

Lift Cylinder Relief Valve Torque 75-90 lbf ft (102-122Nm)



2.

BRAKING SYSTEM SPECIFICATIONS

Service Brake

Component \ Tractor Model	8×2 Models	12×12 and 16×16 models
Brake Type	Wet Brakes	Wet Brakes
Brake Operation	Mechanical + Ball ramp	Hydraulic + Ball ramp
Brake Discs (Per Side)	3	3/4*
Brake Disc Total Friction Area	2452.8 cm^2	2452.8 cm^2/ 3270.4 cm^2

* 3 per side on 30 kph models with single speed or 2 speed changeable PTO shaft.

Standard Secondary Brake – 12×12 and 16×16 Models

NOTE: *8×2 Models do not have a secondary brake system.*

Brake Type	Twin cable mechanically operated using actuator assemblies of service brake.

Optional Secondary Brake – 12×12 and 16×16 Models

Brake Type	Single cable, mechanically operated, dry disc, transmission handbrake
Friction Area	195.1 cm^2 (30.24 in^2)
Brake Shaft Bearing Pre-Load:	
Using gauge , Tool No. T4062	12-16 lb.in (1.4-1.7 Nm)
Using a spring balance	20-26 lb (9.1-11.8 Kg)
Bearing Retainer To Rear Axle Centre Housing Available Shims:	0.005 in (0.127 mm) & 0.020 in (0.508 mm)

Brake Hydraulics

Master Cylinder Push Rod to Plunger Clearance	0.6 mm (0.024 in) Minimum
Brake Fluid	Mineral brake oil

TIGHTENING TORQUES

Components	lbf. ft	Nm
Master Cylinder Retaining Bolts	17	23
Handbrake Adjuster Locknut	20	27
Handbrake Retaining Bolts	33	45
Transmission Handbrake Housing Retaining Bolts	49	66
Transmission Handbrake Cover Bolts	32	44
Transmission Handbrake Pinion Locknut	75	102
Brake Pedal and operating Lever Pinch Bolts	49	66

STEERING

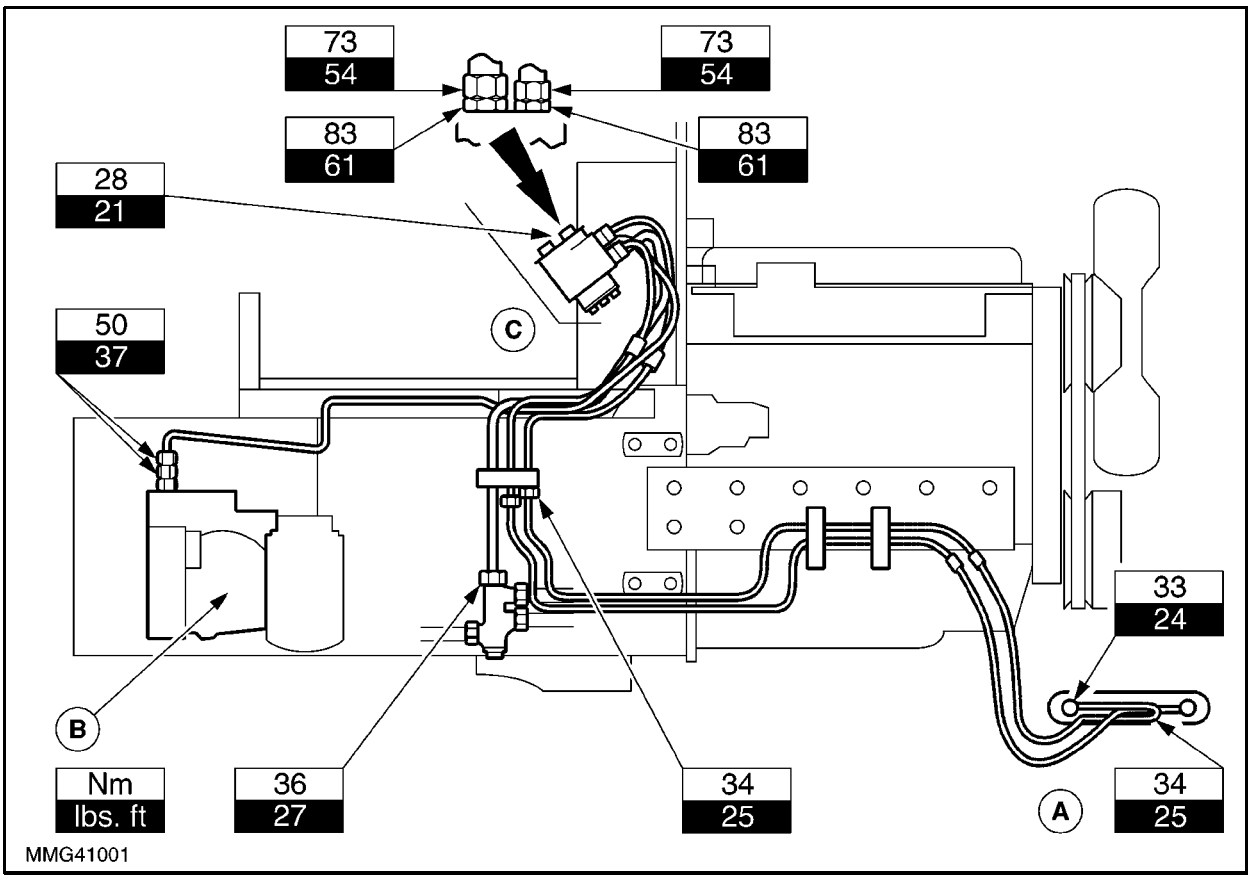
Hydrostatic Steering System

HYDROSTATIC SYSTEM	2WD	4WD
Pump specifications		
Minimum Pump Output		
Litres/min.	31.0	31.0
Imp.Galls/min	6.8	6.8
U.S. Galls/min.	8.2	8.2
Steering Motor Displacement	125cc/revolution	150cc/revolution
Relief Valve Maximum Differential Pressure Setting	145 Bar 2100 lbf.in^2	170 Bar 2465 lbf.in^2
Absolute Gauge Pressure	153-163 Bar 2220-2370 lbf.in^2	180-190 Bar 2620-2770 lbf.in^2

	TWO WHEEL DRIVE AXLE	
Maximum Steering angle	55°	
Steering Wheel Turns (Lock to Lock)	3.4	
Cylinder	Double Acting Balanced	
	Short Wheel Base	Long Wheel Base
Turning Radius with Brakes	3.27 m	3.53 m
Turning Radius less Brakes	3.66 m	3.88 m

Toe-out	0-13 mm	0-13 mm
	FOUR WHEEL DRIVE AXLE	
Maximum Steering angle	55°	
Steering Wheel Turns (Lock to Lock)	4.7	
Cylinder	2 off Double acting Unbalanced	
Turning Radius with Brakes (4WD disengaged)	3.45	
Turning Radius less Brakes (4WD disengaged)	4.04	
Toe-In	13mm	

TIGHTENING TORQUES



A. Steering Cylinder
B. Variable Displacement/Tandem Gear Pump
C. Steering Motor

3.

Steering General	Nm	Lbf.ft.
Steering Wheel Retaining Nut	23.0	17.0
Front Wheel Nut 2WD	133.0	98.0
Front Wheel Nut 4WD	475.0	350.0
Motor End Cover	23.0	17.0
Cylinder Ball-joint to Extension	43.0	32.0
Cylinder Ball-joint to Axle	176.0	130.0
Cylinder Ball-joint Clamps	43.0	32.0
Cylinder Ball-joint Nuts	176.0	130.0
Cylinder Extension Tube to Cylinder	271.0	200.0
Column to Frame Bolt	23.0	17.0
Cylinder, Tube End Pin Retaining Bolt (4WD)	23.0	17.0

CLUTCHES SPECIFICATIONS

SPECIFICATIONS

Components	
Disc Assembly Type	13in (330 mm) Single Disc Dry Plate
Material	Organic Non Asbestos
Pressure Plate Assembly Type	Belleville (diaphragm) Spring (Self Adjusting - No Maintenance)
Release Bearing Type	Mechanically Operated with 8x2 (16x4) Transmissions Hydraulically Operated with 12x12 Transmission
Clutch Pedal Free Play Adjustment - (Mechanically Operated Clutch Only)	1.1 - 1.6 in (28 - 41 mm)
Transmission Input Shaft Lubricant	Lithium and molybdenum disulphide grease GR75MD
Hydraulic Clutch oil	(NH 160 A)
Master Cylinder Push Rod to Plunger Clearance	0.6 mm (0.024 in) Minimum

TIGHTENING TORQUES

Components	**lbf.ft**	**Nm**
Clutch Cover to Flywheel Bolts	26	35
Clutch Pedal Operating Rod Turnbuckle Locknut	25	34
P.T.O. Drive Plate Bolts	95	129
Cross shaft Release Bearing fork Retaining Bolt	35	47
Hydraulic Slave Cylinder Retaining Bolts	18	25
Master Cylinder Retaining Bolts	17	23
Hydraulic Tube Connections	16	22

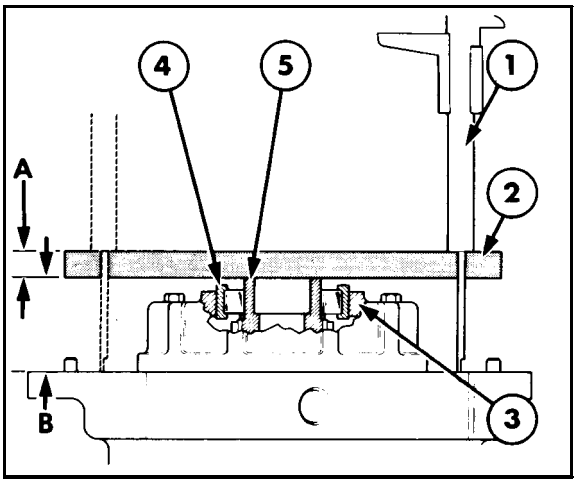
TRANSMISSION SYSTEMS

16 × 16 Electroshift Transmsission

Transmission Type	16 forward and 16 reverse speeds using straight cut gears, four multi-plate wet powershift clutches, one forward reverse friction plate synchroniser and one main range friction cone synchroniser
Control System	Electro-hydraulic with electronic management System
Clutch Hydraulic Operating Pressure	18-20 bar (260-290 lbf.in^2) supplied from the CCLS Hydraulic Piston Pump
Hydraulic Control Valve	
Type	Separate Casting, multi spool with internal cast-in galleries
Control	By electrically operated solenoid coils signalled by electronic management System
Hydraulic Accumulator	
Type	Diaphragm type, nitrogen charged with 0.7 litre hydraulic oil capacity
Charge Pressure	10 bar (145 lbf.in^2)
Multi-Plate Wet Clutches	
Type	Constant running, pressure lubricated, pressure applied, spring released
C1 and C2 clutches	
Number of Friction Plates	4 in each clutch
Number of Steel Plates	4 in each clutch
C3 and C4 clutches	
Number of Friction Plates	8 in each clutch
Number of Steel Plates	8 in each clutch
Number of Belleville Washers	4 pairs in each clutch
Belleville washer stack height	24 mm
Pressure Lubrication	Maximum 7 bar (100 lbf.in^2) supplied by the steering gear pump

Lubricant Capacity Transmission/Rear Axle	U.S. Gallons 16.0 Imp. Gallons 13.3 Litres 60.6	
Lubricant	134 D (NH 410 B)	
Lubricant operating temperature	65°C (150°F)	
Output Shaft Component End Float	0.004-0.012 in.	(0.10-0.30 mm)
Output Shaft 'D' Shaped Shim Washer Sizes	0.079-0.080 in. 0.085-0.086 in. 0.091-0.092 in. 0.097-0.098 in. 0.102-0.104 in.	(2.00-2.04 mm) (2.15-2.19 mm) (2.30-2.34 mm) (2.45-2.49 mm) (2.60-2.64 mm)

C3 Clutch Output Shaft to Transmission Rear Buckle Up Face:



Calculated Distance 'B' (mm)	Washer Thickness Required (mm)
58.82-59.15	6.20-6.25
59.16-59.40	5.95-6.00
59.41-59.65	5.70-5.75
59.66-59.90	5.45-5.50
59.91-60.17	5.20-5.25
60.18-60.52	4.85-4.90

Synchroniser Wear Check

Main Synchroniser

Minimum Gap Between Friction and Outer Cone	0.032 in	0.8 mm

High-Low Range Synchroniser

Minimum Gap Between	0.060 in	1.50 mm
Clutch 3 and 4 Piston Travel	0.10-0.12 in	2.50-3.05 mm
Clutch 3 and 4 Separator Plate Thickness	0.089-0.091 in 0.109-0.114 in	2.26-2.3 mm 2.76-2.8 mm

Forward/Reverse and Range Synchroniser

Support Shaft Running Clearance	0.016-0.024 in	0.40-0.60 mm

Forward/Reverse Synchroniser Support Front

Bearing Retainer Plate Shim Sizes:	F0NN-7Z478-AA	0.040 in.	1.00 mm
	F0NN-7Z478-BA	0.012 in.	0.30 mm
	F0NN-7Z478-CA	0.004 in.	0.10 mm
	F0NN-7Z478-DA	0.002 in.	0.05 mm

Gear Ratios
30 Km/hr Transmission

Gear	Forward Range	Transmission Ratio
1	Creeper	43.20
2	Creeper	35.36
3	Creeper	28.91
4	Creeper	23.66
5	Creeper	18.30
6	Creeper	14.98
7	Creeper	12.24
8	Creeper	10.02
1	L	8.51
2	L	6.97
3	L	5.69
4	L	4.66
5	L	3.30
6	L	2.95
7	L	2.41
8	L	1.97
1	H	2.74
2	H	2.25
3	H	1.84
4	H	1.50
5	H	1.16
6	H	0.95
7	H	0.78
8	H	0.64

	Reverse	
1	Creeper	43.60
2	Creeper	35.68
3	Creeper	29.17
4	Creeper	23.88
5	Creeper	18.46
6	Creeper	15.11
7	Creeper	12.36
8	Creeper	10.11
1	L	8.59
2	L	7.03
3	L	5.75
4	L	4.70
5	L	3.64
6	L	2.98
7	L	2.43
8	L	1.99
1	H	2.77
2	H	2.27
3	H	1.85
4	H	1.52
5	H	1.17
6	H	0.96
7	H	0.78
8	H	0.64

40 Km/hr Transmission

Gear	Forward Range	Transmission Ratio
1	Creeper	43.42
2	Creeper	35.36
3	Creeper	29.06
4	Creeper	23.66
5	Creeper	18.39
6	Creeper	14.98
7	Creeper	12.31
8	Creeper	10.02
1	L	8.55
2	L	6.97
3	L	5.72
4	L	4.66
5	L	3.62
6	L	2.95
7	L	2.42
8	L	1.97
1	H	2.08
2	H	1.69
3	H	1.39
4	H	1.13
5	H	0.88
6	H	0.72
7	H	0.59
8	H	0.48

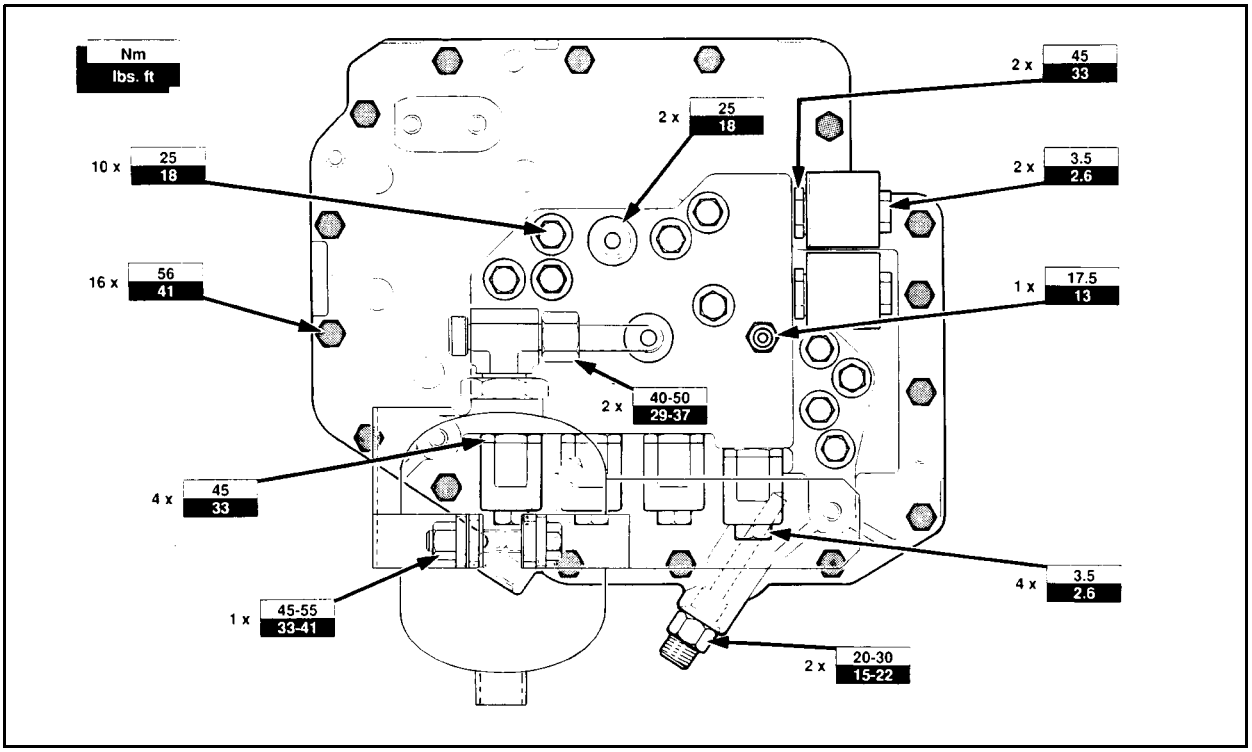
	Reverse	
1	Creeper	43.82
2	Creeper	35.68
3	Creeper	29.32
4	Creeper	23.88
5	Creeper	18.55
6	Creeper	15.11
7	Creeper	12.42
8	Creeper	10.11
1	L	8.63
2	L	7.03
3	L	5.78
4	L	4.70
5	L	3.66
6	L	2.98
7	L	2.45
8	L	1.99
1	H	2.10
2	H	1.71
3	H	1.40
4	H	1.14
5	H	0.89
6	H	0.72
7	H	0.59
8	H	0.48

Low Pressure Hydraulic Circuit Pressure Regulating Valve	18-20 bar (260-290 lbf/in^2)
Low Transmission Oil Pressure Switch	Closes @ 210-220 lbf/in^2 (14.5-15.2 bar) transmission oil pressure warning light comes 'On' Opens @ 240-250 lbf/in^2 (16.5-17.2 bar) transmission oil pressure warning light goes 'Off'
Maximum Operating Pressure	Low pressure circuit safety valve operates 400-415 lbf/in^2 (27.6-28.6 bars)

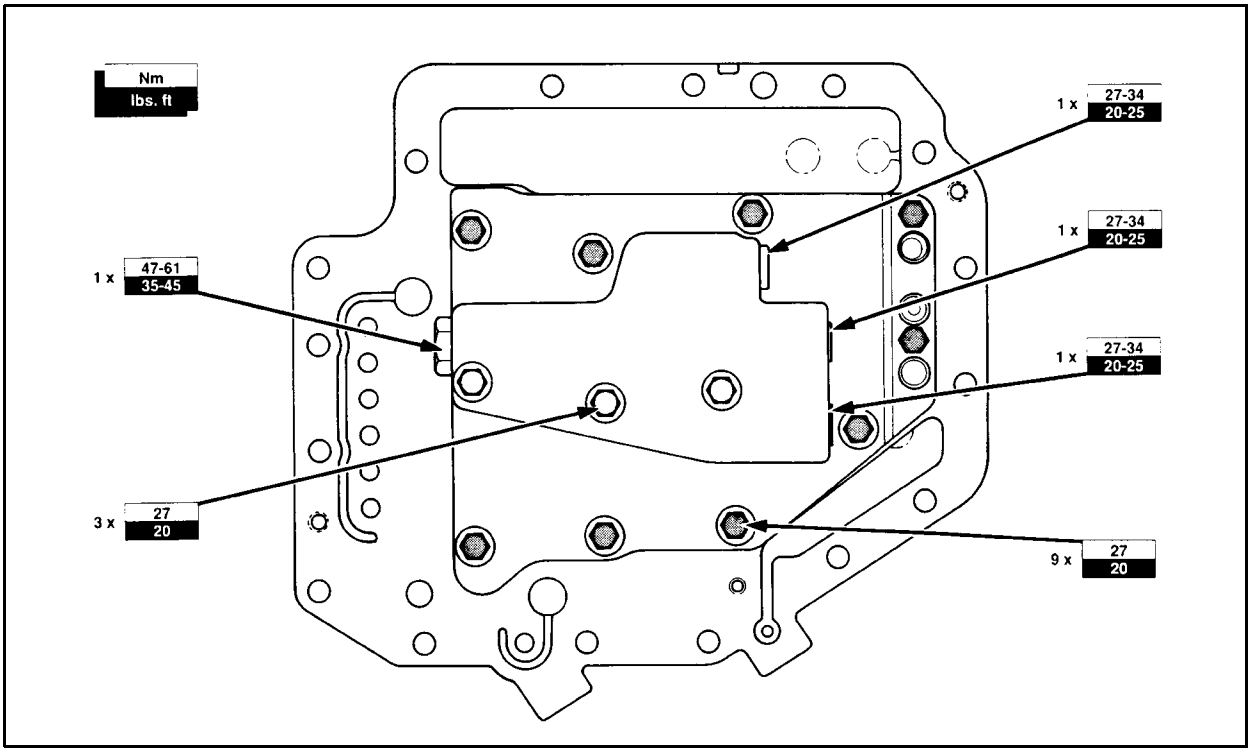
THREAD SEALANT

Thread Sealant	New Holland Thread Seal 82995768	
Gasket Sealant	New Holland Flexible Sealant	82995770 (50 ml) 82995771 (300 ml)

Tightening Torque Values



Side Cover (External View)



Side Cover (Internal View)