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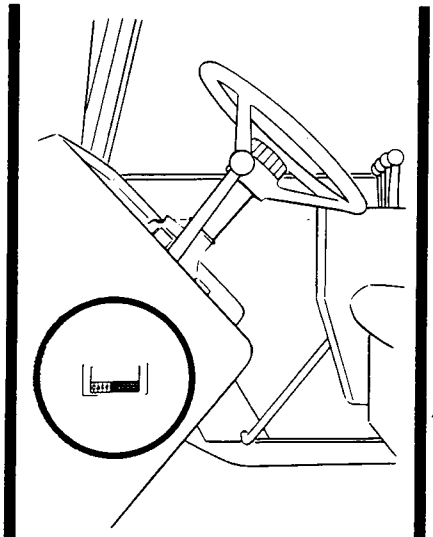
2470 TRACTORS

PRIOR TO SN 8762940

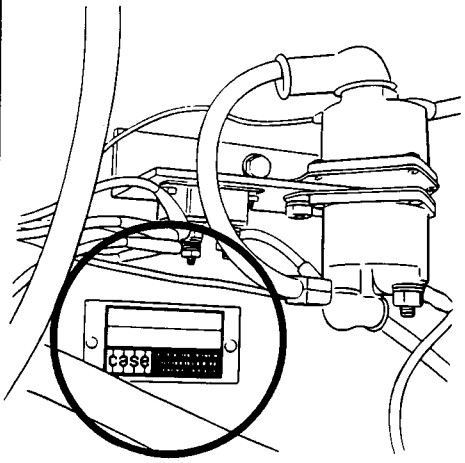
Section 1010

GENERAL SPECIFICATIONS

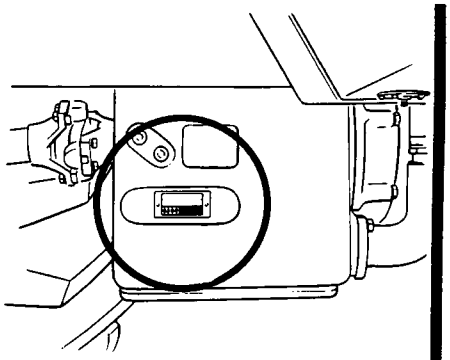
SERIAL NUMBERS



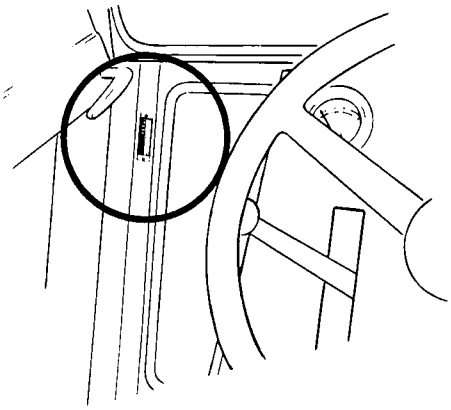
TRACTOR SERIAL NUMBER



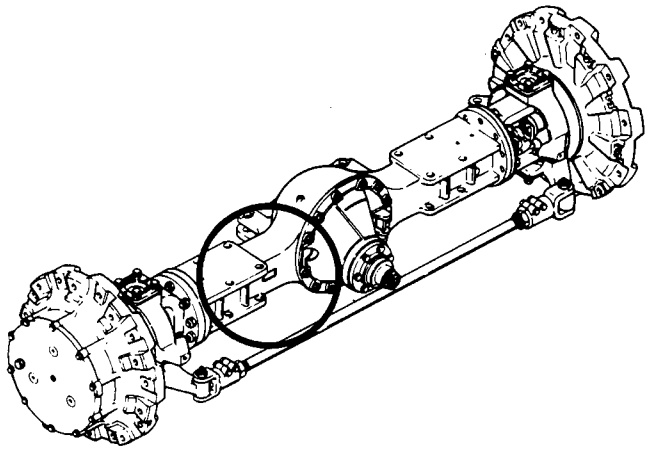
ENGINE SERIAL NUMBER



TRANSMISSION SERIAL NUMBER



CAB SERIAL NUMBER



AXLE SERIAL NUMBER

Rac. Form 9-75405

PRINTED IN U.S.A.

DIESEL ENGINE

General

Type	6 Cylinder, 4 Stroke Cycle, Valve-In-Head Turbocharged Diesel Engine
Firing Order	1-5-3-6-2-4
Bore	4-5/8 Inches (117.5mm)
Stroke	5 Inches (127mm)
Piston Displacement	504 Cubic Inches (8 257cm^3)
Compression Ratio	16.5 to 1
Cylinder Sleeves	Removable Wet Type
No Load Governed Speed	2340-2380 RPM
Rated Engine Speed	2200 RPM
Engine Idling Speed	775-825 RPM
*Valve Tappet Clearance (Exhaust)	(Hot) .020 Inch (0.508mm)
	(Cold) .025 Inch (0.635mm)
	(Intake) (Hot and Cold) .015 Inch (0.381mm)

*Hot Settings Are Made After The Engine Has Operated At Thermostat Controlled Temperature For At Least Fifteen Minutes.

Piston and Connecting Rod

Rings per Piston	3
Number of Compression Rings	2
Number of Oil Rings	1
Type Pins	Full Floating Type
Type Bearings	Replaceable Precision, Steel Back with Aluminum or Copper-Lead Alloy Liners.

Main Bearings

Number of Bearings	7
Type Bearings	Replaceable Precision, Steel Back with Aluminum or Copper-Lead Alloy Liners.

Engine Lubrication System

Oil Pressure	45 to 60 PSI (3.2 to 4.2 kg/cm^2) with Engine Warm and Operating at Rated Engine Speed.
Type System	Pressure and Spray Circulation
Oil Pump	Gear Type
Oil Filter (2)	Full Flow Spin on Type
Oil Capacity	With Filters, 23 U.S. Qts. (21.8 liters)
	Without Filters, 19 U.S. Qts. (17.9 liters)

DIESEL ENGINE

Fuel System

Fuel Injection Pump ..... Robert Bosch, Type PES (Multiple Plunger).
Pump Timing ..... 30 Degrees Before Top Dead Center (Port Closing).
Fuel Injectors ..... Pencil Type (Opening Pressure 3200 PSI). (225 kg/cm²)
Fuel Transfer Pump ..... Plunger Type, Integral Part of Injection Pump.
Governor ..... Variable Speed, Fly-Weight Centrifugal Type; Integral Parts of Injection Pump.
1st Stage fuel filter ..... Full Flow Spin on Type
2nd Stage fuel filter ..... Full Flow Spin on Type
Fuel Tank Water Trap and Drain (2) ..... Located in Base of Each Fuel Tank.
Fuel Tank Capacity ..... (55 U.S. Gallons - 208.2 liters - each tank).
Fuel Level Gauge ..... Electric, Located on Instrument Panel.
Hand Primer Pump ..... Located on Top of the Fuel Transfer Pump.
Preliminary Fuel Filter ..... Located At The Bottom Of The Fuel Transfer Pump.

Cooling System

Capacity of System ..... 44 U.S. Quarts (41.6 liters)
Type of System ..... Pressurized, Thermostat Controlled By-Pass Type: Forced Circulation, (Impeller Type Pump).
Radiator ..... Heavy Duty Fin and Tube Type
Thermostat (2) ..... Starts to Open at Approximately 175°F. (79°C), Fully Open at 202°F. (94°C.)
Pressure Cap Required ..... 7 PSI (0.492 kg/cm²)

Electrical System

Type of System ..... 12 Volt Negative Ground
Batteries ..... (2) 12 Volt Batteries Connected in parallel Group Size 30H, Rated in 1.255 to 1.265 Specific Gravity. Discharge Rate 300 Amps at 0°F. Voltage Drops to 9.2 after 10 seconds. Voltage drops 1.0 Volt per cell after 4 min.
Alternator ..... 12 Volt 55 Amp Output, Negative Ground
Voltage Regulator ..... 12 Volt, Solid Stage, Mounted on Alternator.
Starter Motor ..... 12 Volt with Solenoid Switch
Head Lights (2) ..... 12 Volt, 40/40 Watt Sealed High-Low Beam
Front Flood Lights (2) (optional) ..... 12 Volt, 35 Watt Sealed Beam
L.H. Rear Flood and Tail Light (1) ..... 12 Volt, 60 Watt Sealed Beam Combination Tail and Flood Lamp.
R.H. Rear Flood (optional) (1) ..... 12 Volt, 35 Watt Sealed Beam
Circuit Breaker System over Load Check ..... 12 Volt Twin 40 AMP Breakers connected in parallel, 80 AMP rating. 60 Amp. Min. Continuous capacity.

GENERAL SPECIFICATIONS

Electrical System (Cont'd)

Lights Circuit Breaker ..... 40 Amp., Located on Light Switch
Parking Brake Warning Light ..... 12 Volt, Red Flasher Type
Fuel Shut-Off Solenoid ..... 12 Volt, Rotary Type

Hydraulic Brakes

Type ..... Self-Adjusting Multiple Disc Wet Type Transmission Brakes.

Parking Brake

Type ..... Cable Actuated by over center Type Handle - Adjustable from Operator's Seat. Multiple Disc. Type.

Power Shift Transmission

Type ..... 3 Speed Compound Planetary With Hydraulically Actuated Clutches and a 4 Speed Gear Range Section.
Gear Selection ..... 12 Speeds Forward and 4 Speeds Reverse.
Shifting ..... Hydraulic Power Shifting Controlled By a Lever on Operator's Console. 4 Speed Range Controlled by a Mechanical Shifter From a Lever on Operator's Console.
Oil Type ..... Case TFD (Transmission-Final Drive)
Oil Capacity ..... 56 U.S. Quarts (52.9 liters)

Hydraulic Pump

Type ..... Direct Drive, Gear Type, Triple Hydraulic Pump
First Section ..... Charging Pump, Capacity at 2200 Engine RPM - 39 GPM (147.6 l/mn)
Intermediate Section ..... Supplies oil to the Transmission Hydraulic and PTO. Capactiy at 2200 Engine RPM - 17 GPM (64.4 l/mn)
Third Section ..... Supplies oil to the Steering System. Capacity at 2200 Engine RPM 17 GPM (64.4 l/mn)
Front Steering ..... 7 GPM (26.5 l/mn)
Rear Steering ..... 10 GPM (37.9 l/mn)

Hydrostatic Front Power Steering

Oil Supply ..... Triple Hydraulic Pump
HGA Hydrostatic Type ..... Integral and Bi-Directional Gerotor Metering Section, Actuated By the Steering Wheel.
Front Steering Cylinders ..... Two Double Acting Cylinders

Rear Power Steering

Oil Supply ..... Triple Hydraulic Pump
Control Valve Type ..... 4 Way, Three Position Spool Type.
Rear Steering Cylinders ..... Two Double Acting Cylinders
Controls ..... Hand Lever on Instrument Panel (Manual or Automatic)

Differential and Planetaries

Front and Rear ..... Spiral Bevel with Planetary Reduction in Hub.

3 Point Hitch System

Type Control ..... Hand Lever
Type Valve ..... 3 Positions - Raise - Hold - Lower with Speed Control
Type Draft Arms ..... Rigid Swinging, with Manual Float Adjustment
Type Hitch ..... 3 Point Category III

Single Dual Remote Hydraulic System

Triple Hydraulic Pump (17 gal. Section) ..... Direct Drive Gear Type
Type Remote Valve (R.H. Side) ..... Dual Valve-Individual Hand Lever Control
Portable Cylinder Couplings (L.H. Side) ..... Quick Detachable Break-away Type.
Oil Supply ..... Triple Hydraulic Pump
Relief Valve Pressure ..... 1900 to 2050 PSI (133.6 to 144.1 kg/cm^2)
Portable Cylinders ..... Case Cylinders Available

Twin Dual Remote Hydraulic System

Oil Supply ..... From Single Remote Valve (Connected in Series)
Type Remote Valve (R.H. Side, Forward of Single Valve) ..... Dual Valve- Individual Hand Lever Control.
Oil Supply ..... Triple Hydraulic Pump
Relief Valve Pressure ..... Dependent on Single Remote.
Portable Cylinder Couplings (R.H. Side) ..... Quick Detachable Break-away Type
Portable Cylinders ..... Case Cylinders Available

Power Take-Off

Type Clutch ..... Hydraulically Operated
Rotation ..... Clockwise
Spline Size ..... 21 Splines .....1-3/8 in. (34.9mm) Dia.
Engine Speed 2200 RPM ..... 1000 RPM Shaft Speed

Drawbar

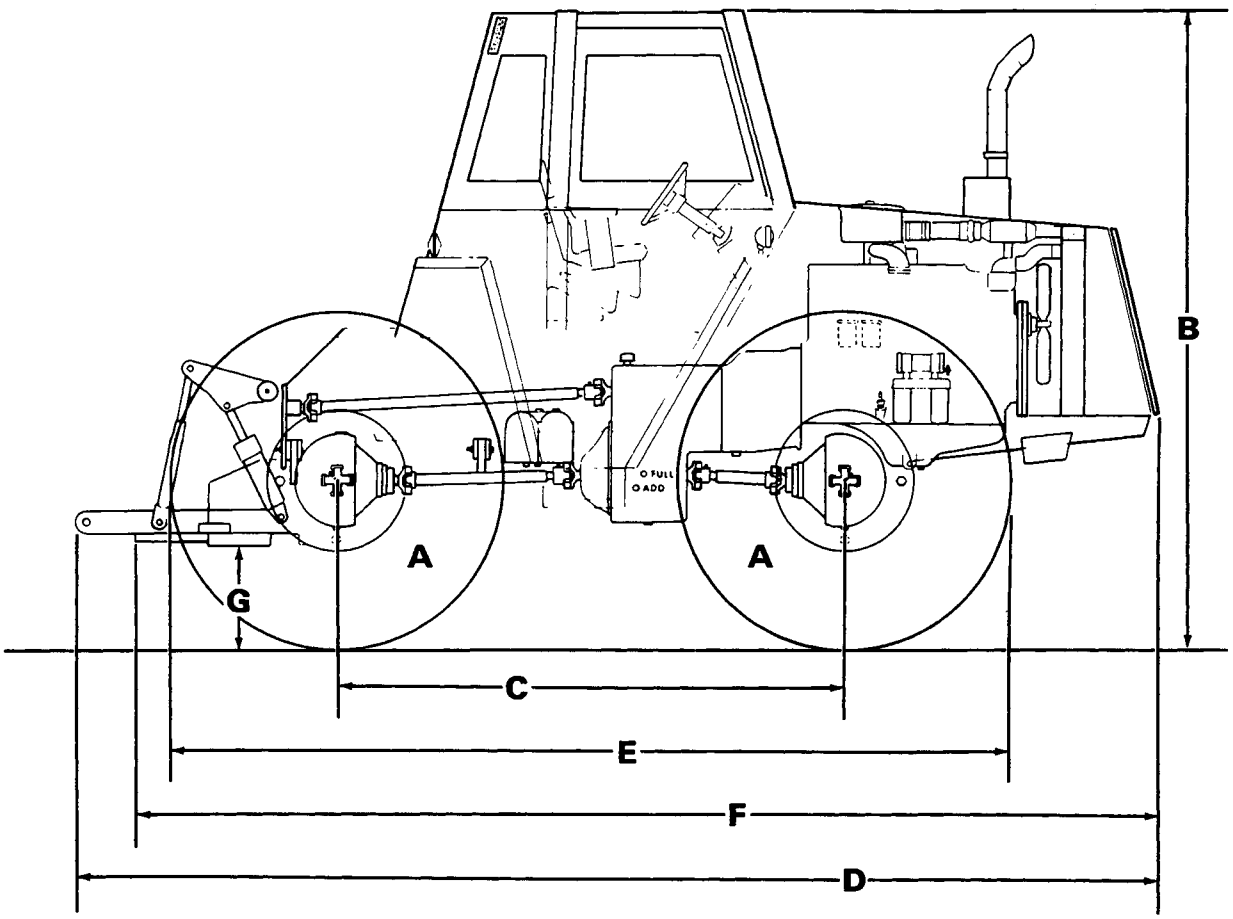
Standard or Yoke Type ..... Full Swinging Roller Mounted, Will Accommodate a 1-1/2 Inch (38.1mm) Dia. Pin.

APPROXIMATE TRAVEL SPEEDS IN MPH & KM/H AT 2200 RPM

12 Speed Power Shift Transmission

TRANSMISSION RANGE	POWER SHIFT			TIRE SIZE
	1	2	3 AND REVERSE	
1	1.9 mph (3.1 km/h)	2.5 mph (4.0 km/h)	3.1 mph (5.0 km/h)	18.4-30
2	2.8 mph (4.6 km/h)	3.8 mph (6.1 km/h)	4.8 mph (7.7 km/h)	
3	4.0 mph (6.4 km/h)	5.4 mph (8.7 km/h)	6.7 mph (10.5 km/h)	
4	7.4 mph (11.9 km/h)	9.8 mph (15.8 km/h)	12.3 mph (19.8 km/h)	
1	2.0 mph (3.2 km/h)	2.7 mph (4.4 km/h)	3.4 mph (5.5 km/h)	23.1-30
2	3.1 mph (5.0 km/h)	4.1 mph (6.6 km/h)	5.1 mph (8.2 km/h)	
3	4.3 mph (6.9 km/h)	5.8 mph (9.3 km/h)	7.2 mph (11.6 km/h)	
4	8.0 mph (12.9 km/h)	10.6 mph (17.1 km/h)	13.3 mph (21.4 km/h)	
1	2.0 mph (3.2 km/h)	2.7 mph (4.4 km/h)	3.3 mph (5.3 km/h)	18.4-34
2	3.0 mph (4.8 km/h)	4.1 mph (6.6 km/h)	5.1 mph (8.2 km/h)	
3	4.3 mph (6.9 km/h)	5.7 mph (9.2 km/h)	7.1 mph (11.4 km/h)	
4	7.9 mph (10.7 km/h)	10.5 mph (16.9 km/h)	13.1 mph (21.1 km/h)	
1	2.1 mph (3.4 km/h)	2.8 mph (4.5 km/h)	3.5 mph (5.6 km/h)	20.8-34
2	3.2 mph (5.2 km/h)	4.2 mph (6.8 km/h)	5.3 mph (8.5 km/h)	
3	4.4 mph (7.1 km/h)	5.9 mph (9.5 km/h)	7.4 mph (11.9 km/h)	
4	8.2 mph (13.2 km/h)	10.9 mph (17.5 km/h)	13.6 mph (21.9 km/h)	

APPROXIMATE OVERALL MEASUREMENTS



	TIRE	WHEEL RIM
A	23.1-30 R1	W20L-30

B	127 Inches (3 226mm)	D	216 Inches (5 486mm)	F	206 Inches (5 232mm)
C	102 Inches (2 591mm)	E	165 Inches (4 191mm)	G	15 Inches (381mm)

Overall Width ..... 108 Inches (2 743mm)
Turning Radius Minimum ..... 192 Inches (4 877mm)
Overall Length (w/Hitch Coupler) ..... 223 Inches (5 664mm)

APPROXIMATE SHIPPING WEIGHT

2 WHEEL STEER W/STD. EQUIPMENT ..... 14,800 Pounds (6 713 kg)

TIRE AND WHEEL EQUIPMENT

Front and Rear

TIRE SIZE	TIRE PLY	RIM SIZE	TREAD TYPE	TIRE PRESSURE
18.4-30	6	W16L-30	R1	16 PSI (1.1 kg/cm²)
18.4-34	6	W16L-34	R1 R2-O	16 PSI (1.1 kg/cm²)
20.8-34	8	W18L-34	R1	16 PSI (1.1 kg/cm²)
23.1-30	8	W20L-30	R1 R2-O	16 PSI (1.1 kg/cm²)

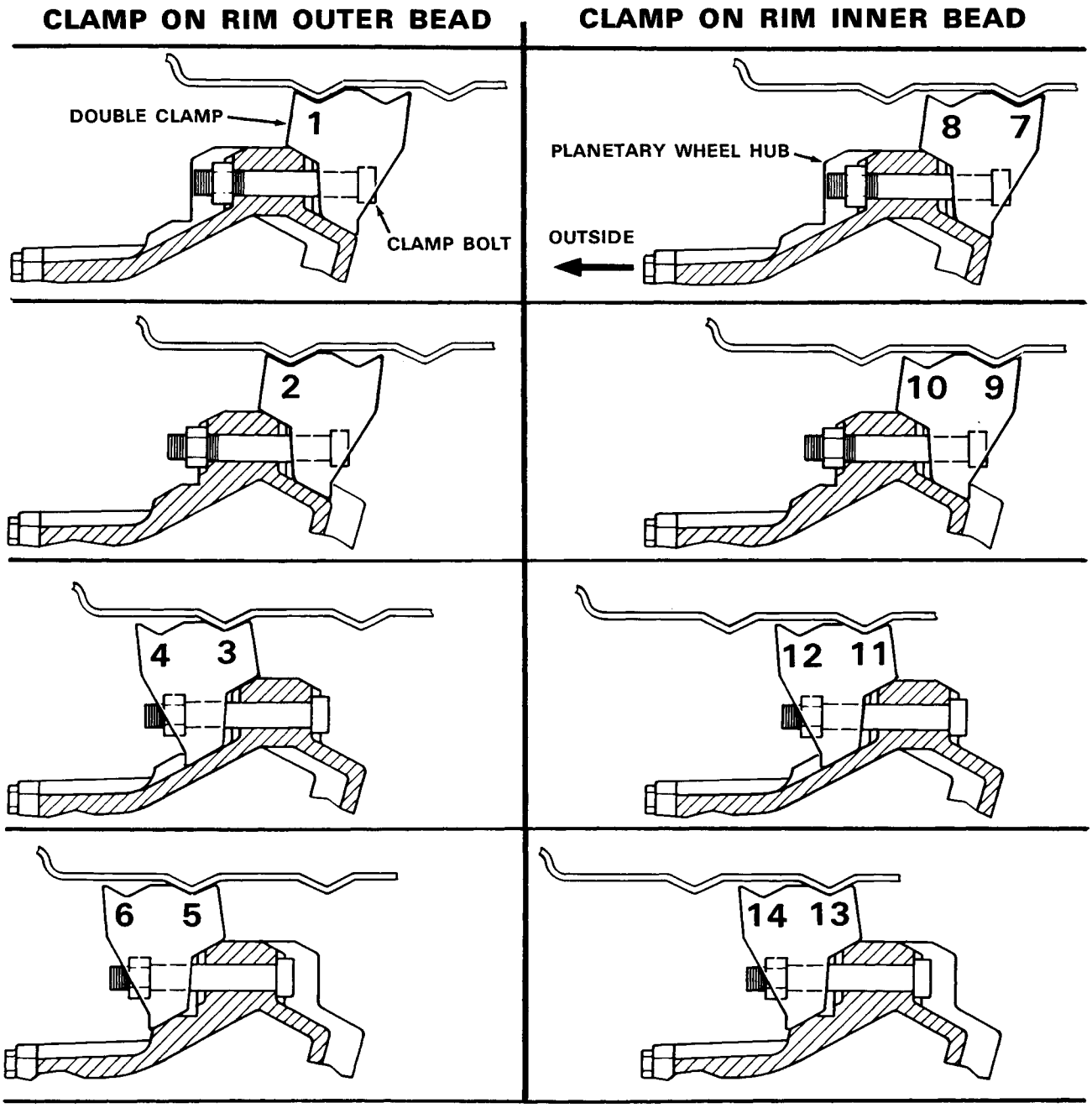
WHEEL TREAD SPACING WITH DOUBLE CLAMP

WHEEL TREAD SPACING	TIRE SIZE & CLAMP LOCATION	
	18.4 X 34 20.8 X 34	23.1 X 30
72 in. (1 828.8mm)	1	1*
74 in. (1 879.6mm)	2	2*
76 in. (1 930.4mm)	7	
78 in. (1 981.2mm)	3 & 9	3 & 7
80 in. (2 032mm)	5 & 8	5 & 9
82 in. (2 082.8mm)	4 & 10	4 & 8
84 in. (2 133.6mm)	6	6 & 10
86 in. (2 184.4mm)	11	
88 in. (2 235.2mm)	13	11
90 in. (2 286mm)	12	13
92 in. (2 336.8mm)	14	12
94 in. (2 387.6mm)		14

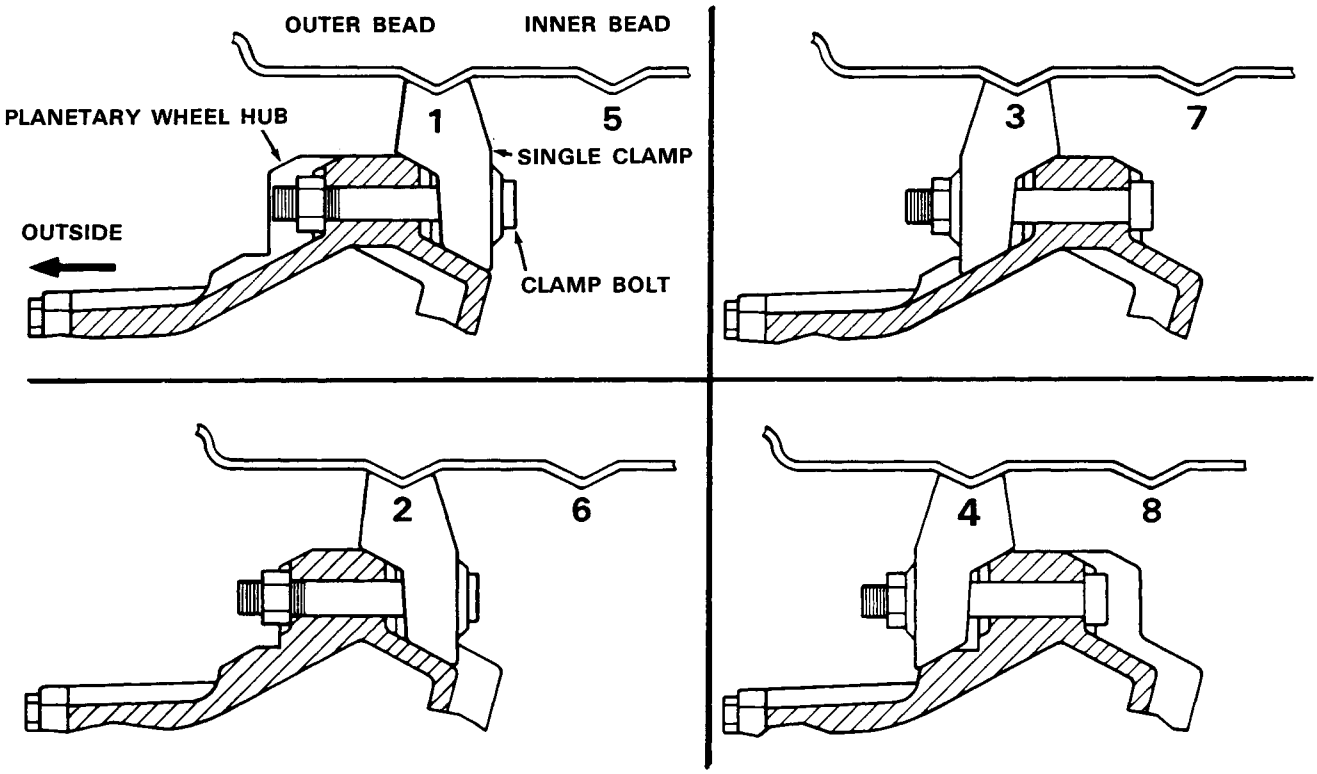
***CAUTION:** This location must not be used or the steering will be greatly reduced and damage to the tires could result.

DOUBLE CLAMP LOCATION

(Use With Page 8)

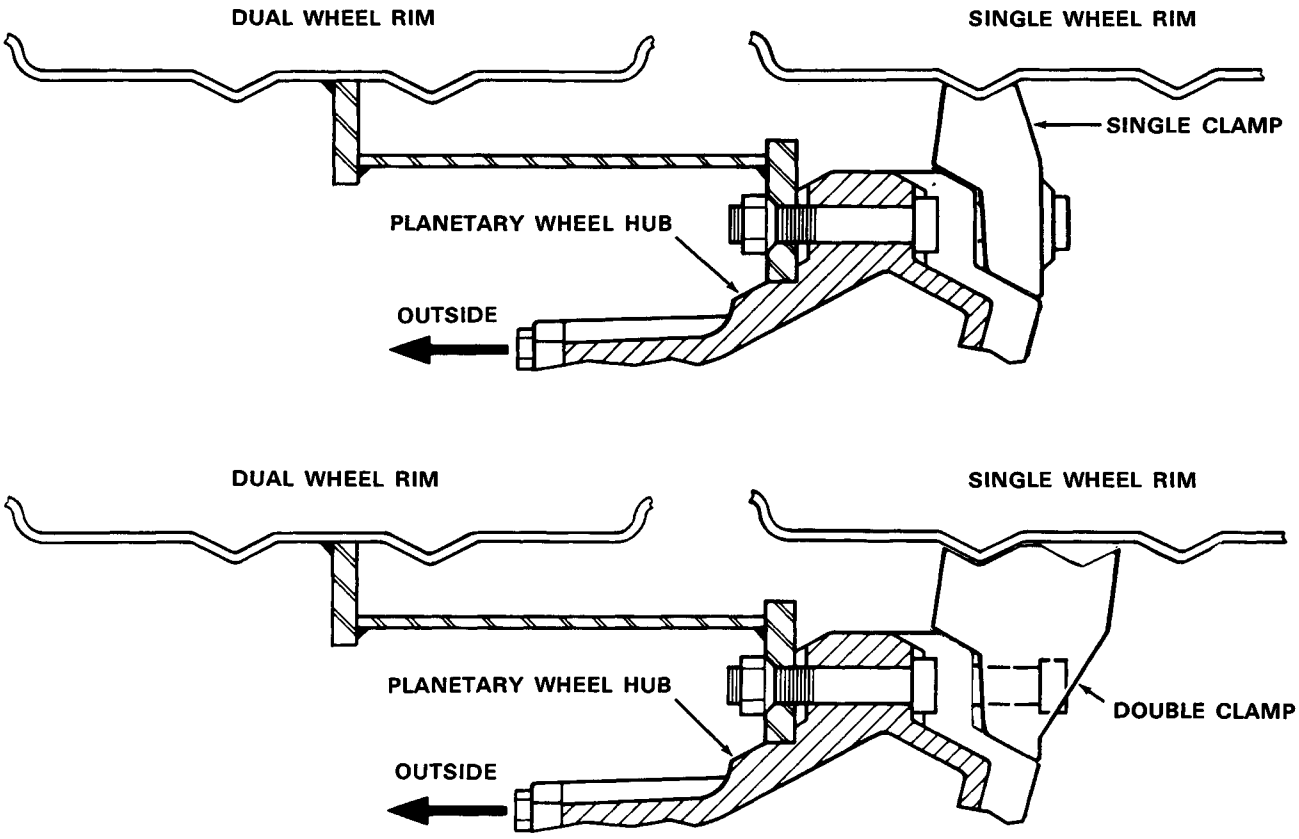


WHEEL TREAD SPACING
WITH SINGLE CLAMP



WHEEL TREAD SPACING	TIRE SIZE & CLAMP LOCATION 18.4 x 30
72 in. (1 828.8mm)	1
74 in. (1 879.6mm)	2
78 in. (1 981.2mm)	3
80 in. (2 032mm)	4 & 5
82 in. (2 082.8mm)	6
86 in. (2 184mm)	7
88 in. (2 235.2mm)	8

DUAL WHEELS



For the 18.4 x 30 or 18.4 x 34 dual wheel tread spacing, the inner wheels and tires must be set at the 72″ tread spacing. Then when the outer dual wheels and tires are installed, the proper running clearance between the tires will be reached.

OPERATOR'S CAB

THIS CASE 2470 OPERATOR'S CAB IS EQUIPPED WITH BUILT IN ROLLOVER PROTECTION AS SPECIFIED IN ASAE STANDARD S-336.

FUEL SPECIFICATIONS

Case Diesel engines are designed to operate most efficiently when using a Number 2 Diesel Fuel. Most well known refiners and distributors market a good grade of Diesel Fuel and there should be no difficulty in obtaining it.

Do not confuse Number 2 Diesel Fuel with Number 2 Furnace Oil, as this does not always meet the fuel specifications for diesel engines.

Specifications

For Suitable Number 2 Diesel Fuel

A.P.I. Gravity (Minimum) 30
Pour Point (Maximum) ..... 10^0 Fahrenheit (5^0C.) below ambient operating temperature.

DISTILLATION:
90% Point ..... 540^0 - 625^0 Fahrenheit (282^0 - 329^0C.)
End point ..... 675^0 Fahrenheit (357^0C.)
FLASH POINT (Minimum) ..... 125^0 Fahrenheit (52^0C.) or legal
Kinematic Viscosity
centistokes@ 100^0 Fahrenheit (38^0C.) ..... 2.0 - 4.3 Seconds*
Cetane No. (Minimum) ..... 40 (45-55 For Winter or high altitude use)
Water and Sediment Vol. (Maximum) ..... .05%
Ash, wt. (Maximum) ..... .01%
Sulphur wt. (Maximum) 5%
Carbon Residue on 10% (Maximum) 2%
Corrosion, Copper Strip,
3 hrs. @ Fahrenheit (100^0C.) ..... No. 3

(*32-40 Saybolt Universal Seconds)

NOTE: The use of Number 1 Diesel Fuel, which is a lighter fuel, may result in a loss of engine power and also increased fuel consumption because it has less heat content and a lower viscosity than Number 2 Diesel Fuel.

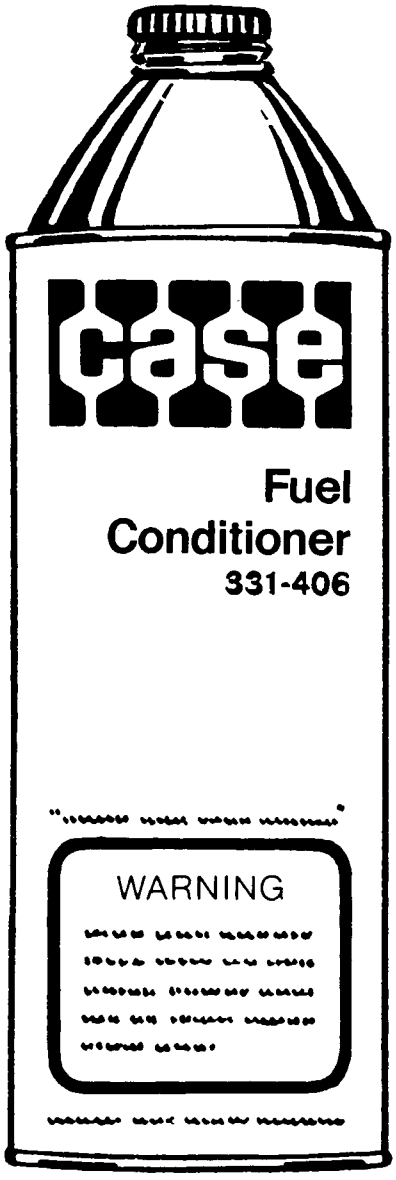
In extremely cold weather, temporary use of No. 1 Diesel Fuel (or a mixture of No. 1 and No. 2 Diesel Fuel) may be necessary. This will keep wax crystals from forming (wax crystals plug fuel filters and prevent fuel flow to the injection pump).

FUEL CONDITIONER

The following fuel conditioner is available from your Authorized Case Dealer to help insure continued fine performance that was designed into your Case Engine.

Case Diesel Fuel Conditioner is recommended for use in all Case Diesel engine fuel systems.

The fuel conditioner should be used as directed on the container.



Prevents gummy deposits from forming in the fuel system.

Eliminates fouling of the injector nozzles and valves.

Helps keep condensation suspended in the fuel, allowing it to be burned with the fuel.

Maintains a higher degree of fuel combustion and higher engine performance from the fuel the engine burns.

Section 1011

DETAILED SPECIFICATIONS

2470 TRACTORS

NOTE: All measurements and specifications are listed in U.S. and Metric System.

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Rac. Form 9-75335

PRINTED IN U.S.A.

Engine

CYLINDER SLEEVES

- Sleeve out of round (installed in block) ..... .001 in. (0.025mm)
- Sleeve out of round maximum limit including wear ..... .004 in. (0.102mm)
- I.D. of sleeve ..... 4.6250 to 4.6260 in. (117.475 to 117.5076mm)
- Sleeve I.D. maximum including wear ..... .007 in. (0.178mm)
- Clearance to bottom of piston skirt, 90° to piston pin ..... .0052 to .0075 in. (0.1321 to 0.1907mm)
- Piston skirt clearance maximum limit including wear ..... .010 in. (0.254mm)
- Taper (Installed in block) ..... .001 in. (0.025mm)
- Taper maximum limit including wear ..... .007 in. (0.178mm)

PISTON

- Type ..... Cam ground
- Material ..... Aluminum alloy
- O.D. at bottom of skirt 90° to piston pin ..... 4.6198 to 4.6188 in. (117.3433 to 117.3173mm)
- O.D. of skirt maximum limit including wear ..... .001 in. (9.025mm)
- I.D. of piston pin bore ..... 1.8001 to 1.8005 in. (45.7225 to 45.7327mm)
- I.D. piston pin bore maximum limit including wear ..... .001 in. (0.025mm)
- Width of 1st ring groove (Keystone groove) ..... None
- Width of 2nd ring groove (Keystone groove) ..... None
- Width of 3rd ring groove ..... .188 to .189 in. (4.775 to 4.801mm)
- 3rd ring groove width max. limit incl. wear ..... .002 in. (0.051mm)

PISTON RINGS

- No. 1 compression ..... Chrome Keystone type
- Width ..... None
- End gap in 4.625 in (117.475mm) ..... .015 to .025 in (0.381 to 0.635mm)
- End gap maximum limit including wear ..... .035 in. (0.889mm)
- Side clearance ..... None
- No. 2 compression ..... Chrome Keystone Type
- Width ..... None
- End gap in 4.625 in. (117.475mm) ..... 015 to .025 in. (0.381 to 0.635mm)
- End gap maximum limit including wear ..... .035 in. (0.889mm)
- Side clearance ..... None
- Oil Ring ..... Solid with latch wire insert
- Width ..... .186 to .187 in. (4.724 to 4.75mm)
- End gap in 4.625 in. (117.475mm) ..... .010 to .025 in. (0.254 to 0.635mm)
- End gap maximum limit including wear ..... .035 in. (0.889mm)
- Side clearance ..... .001 to .003 in. (0.025 to 0.076mm)
- Side clearance maximum limit including wear ..... .005 in. (0.127mm)

PISTON PIN

Type ..... Full Floating
O.D. of pin ..... 1.7994 to 1.7996 in. (45.7052 to 45.7102mm)
Fit in piston ..... .0004 to .0008 in. (0.0102 to 0.0203mm)
Fit in rod bushing ..... .0008 to .0014 in. (0.2030 to 0.0352mm)

CONNECTING ROD

Bushing (bronze) ..... Replaceable
Bushing I.D. installed (ream to size) ..... 1.8004 to 1.8008 in. (45.7302 to 45.7403mm)
Bushing I.D. maximum limit including wear ..... .001 in. (0.025mm)
Bushing out-of-roundness maximum limit including wear ..... .0015 in. (0.0377mm)
Bearing liners ..... Replaceable
Bearing liner width ..... 1.586 to 1.596 in. (40.284 to 40.538mm)
Rod width at crank end ..... 1.9865 to 1.9905 in. (50.4567 to 50.5587mm)
Journal I.D. without bearing liners ..... 3.1503 to 3.1513 in. (80.0176 to 80.0426mm)
Bearing oil clearance ..... .0013 to .0038 in. (0.0326 to 0.0963mm)
Bearing oil clearance maximum limit including wear ..... .005 in. (0.127mm)
Undersize bearings for service ..... .002,.010,.020,.030 in. (0.051, 0.254, 0.508,0.762mm)
Side clearance ..... .007 to .016 in. (0.178 to 0.406mm)
Cap bolts ..... 12 point flange head

CRANKSHAFT

Type ..... Balanced
Main bearing liners ..... Replaceable
End play, No. 5 main bearing cap ..... .003 to .013 in. (0.076 to 0.330mm)
No. 5 main end play maximum limit including wear ..... .020 in. (0.508mm)
Thrust bearings std. thickness ..... .155 to .157 in (3.937 to 3.988mm)
Thrust bearing maximum limit including wear ..... .008 in. (0.203mm)
Thrust bearings oversize thickness for service ..... .161 to .163 in. (4.089 to 4.140mm)
Oversize thrust bearing maximum limit including wear ..... .008 in. (0.203mm)
Connecting rod, journal std. O.D. ..... 2.998 to 2.999 in. (76.149 to 76.175mm)
.010 in. (0.254mm) O.D.undersize, grind to ..... 2.988 to 2.989 in. (75.895 to 75.921mm)
.020 in. (0.508mm) O.D. undersize,grind to ..... 2.978 to 2.979 in. (75.641 to 75.667mm)
.030 in. (0.762mm) O.D. undersize,grind to ..... 2.968 to 2969 in. (75.387 to 75.413mm)
Journals out-of-round ..... .0005 in. (0.0127mm)
Main bearing liner width 1st, 3rd, 5th and 7th ..... 2.1515 to 2.1615 in. (54.6477 to 54.9017mm)
Main bearing liner width 2nd, 4th and 6th ..... 1.214 to 1.224 in. (30.836 to 31.090mm)
Undersize main bearing liners for service ..... .002,.010,.020,.030 in. (0.051,0.254,0.508,0.762mm)
Main bearing oil clearance ..... .0016 to .0046 in. (0.0402 to 0.1172mm)
Main bearing clearance maximum limit including wear ..... .006 in. (0.152mm)

CRANKSHAFT (Continued)

Connecting rod journal maximum taper	.0005 in. (0.0127mm)
Rod journal taper maximum limit including wear	.0015 in. (0.0377mm)
Main bearing journal std. O.D.	3.498 to 3.499 in. (88.849 to 88.875mm)
.010 in. (0.254mm) O.D. undersize, grind to	3.488 to 3.489 in. (88.595 to 88.621mm)
.020 in. (0.508mm) O.D. undersize, grind to	3.478 to 3.479 in. (88.341 to 88.367mm)
.030 in. (0.762mm) O.D. undersize, grind to	3.468 to 3.469 in. (88.087 to 88.113mm)
Main journal bore I.D. without liners	3.691 to 3.692 in. (93.751 to 93.777mm)
Main journal width between cheeks:	
2nd, 4th and 6th	1.618 to 1.633 in. (41.097 to 41.478mm)
3rd.	2.555 to 2.570 in. (64.897 to 65.278mm)
5th	2.561 to 2.565 in. (65.049 to 65.151mm)
7th	2.5855 to 2.6005 in. (65.6717 to 66.0527mm)
Connecting rod journal between cheeks	1.9975 to 2.0025 in. (50.2287 to 50.8637mm)

CAMSHAFT

Type	Parabolic
Bushings	5, Replaceable
Bushing lubrication	Pressurized
Oil clearance	.0014 to .0054 in. (0.0352 to 0.1372mm)
Oil clearance maximum limit including wear	.0007 in. (0.178mm)
I.D. of bushing installed	2.2484 to 2.2514 in. (57.1092 to 57.1852mm)
Bushing width:	
1st (front)	1.646 to 1.666 in. (41.808 to 42.316mm)
2nd, 3rd and 4th	1.4275 to 1.4475 in. (36.2587 to 36.7667mm)
5th (rear)	1.1462 to 1.1662 in. (29.1131 to 29.6211mm)
O.D. of each bearing surface	2.246 to 2.247 in. (57.048 to 57.074mm)
Bearing O.D. maximum limit including wear	.004 in. (0.102mm)
Thrust washer thickness	.1225 to .1275 in. (3.1117 to 3.2387mm)
Thrust washer maximum limit including wear	.012 in. (0.305mm)
Thrust plunger spring:	
Free length	3.625 in. (92.075mm)
O.D. of spring	.3912 to .4062 in. (9.9361 to 10.3171mm)
Compressed to 2.750 in. (69.85mm)	45 to 55 lbs. (20.37 kg. to 24.97 kg)

VALVE PUSH ROD LIFTERS

Type ..... Mushroom
O.D. of lifter stem, std. ..... .8097 to .8102 in. (20.5668 to 20.5791mm)
O.D. of lifter stem, oversize for service ..... .8190 to .8195 in. (20.803 to 20.8157mm)
I.D. of block bore, std. ..... .8115 to .8130 in. (20.6117 to 20.65mm)
Block bore I.D. maximum limit including wear ..... .0015 in. (0.0377mm)
I.D. of block bore, oversize for service ..... .8215 to .8225 in. (20.8657 to 20.8917mm)

GEAR TRAIN

Backlash:
Crankshaft gear to camshaft gear ..... .004 to .011 in. (0.102 to 0.279mm)
Idler drive gear to idler gear ..... .003 to .010 in. (0.076 to 0.254mm)
Idler gear to fuel pump gear ..... .004 to .012 in. (0.102 to 0.305mm)
Crankshaft gear to oil pump gear ..... .006 to .011 in. (0.152 to 0.279mm)
Crankshaft gear to fuel pump gear ..... Maximum .027 in. (Maximum 0.686mm)
O.D. of idler gear shaft ..... 1.7325 to 1.7330 in. (44.0057 to 44.018mm)
Shaft O.D. maximum limit including wear ..... .0005 in. (0.0127mm)
I.D. of idler gear with bushing ..... 1.734 to 1.735 (44.0567 to 44.0817mm)
Idler gear to shaft running clearance ..... .0015 to .003 in. (0.0377 to 0.076mm)
Running clearance maximum limit including wear ..... .005 in. (0.127mm)
Idler gear thrust washer thickness ..... .061 to .063 in. (1.549 to 1.6mm)
Thrust washer maximum limit including wear ..... .057mm in. (1.448mm)
Idler gear end play ..... .010 in. 0.254mm)
Pump idler gear thickness ..... .742 to .744 in. (18.847 to 18.898mm)
Gears to body radial clearance ..... Maximum .006 in. (Maximum 0.152mm)
Radial clearance maximum clearance including wear ..... .009 in. (0.229mm)
Gears to pump cover clearance ..... Maximum .005 in. (Maximum 0.127mm)
Cover clearance maximum limit including wear ..... .008 in. (0.203mm)
Relief valve spring:
Number of coils 11.2
Wire thickness ..... .106 in (2.692mm)
Minimum I.D. ..... .625 in. (15.875mm)
Free length ..... 2.874 in. (73.0mm)
Compressed to 1.89 in. (48.01mm) ..... 44.96 to 49.70 lbs. (20.65 to 22.56 kg)
Oil pressure ..... 45 to 60 PSI (3.2 to 4.2 kg/cm^2)

OIL PUMP

Positive displacement ..... Gear Type
Backlash, pump gear to crankshaft gear ..... .006 to .011 in. (0.152 to 0.279mm)
Backlash, pump idler gear to pump drive gear ..... .003 to .008 in. (0.076 to 0.203mm)
Drive gear to pump body clearance ..... .005 to .010 in. (0.127 to 0.254mm)
Drive gear thickness ..... .700 in. (17.780mm)

Safety valve inner spring:

No. coils 16.5
Wire thickness ..... .086 in. (2.184mm)
I.D. ..... .490 in. (12.446mm)
Free length ..... 3.106 in. (78.892mm)
Compressed 1.680 in. (42.672mm) ..... 33.6 to 37.2 lbs. (15.25 to 16.89 kg.)

Safety valve outer spring:

No. coils 9.25
Wire thickness ..... .082 in. (2.083mm)
Minimum I.D. ..... .686 in. (17.424mm)
Free length ..... 2.442 in. (62.027mm)
Compressed 1.2″ (30.48mm) ..... 23.5 to 25.9 lbs. (10.67 to 11.76 kg)

Cylinder Head

CYLINDER HEAD

Warpage ..... (Max. Limit Incl. Wear) .005 in. (0.127mm)
Normal Compression pressure (Cranking speed approximately at 200 RPM) ..... 400 PSI (28.123 kg/cm^2)
Normal Compression pressure (Runing speed at 800 RPM) ..... 480 PSI (33.748 kg/cm^2)
Allowable variation between cylinders (Cranking speed approximately at 200 RPM) .... 25 PSI (1.758 kg/cm^2)
Allowable variation between cylinders (Running speed at 800 RPM) ..... 20 PSI (1.406 kg/cm^2)

ROCKER ARM ASSEMBLY

O.D. of shaft ..... .872 to .873 in. (22.149 to 22.174mm)
I.D. of arm bore ..... .8745 to .8755 in. (22.2127 to 22.2377mm)
Shaft assembly end play (both ends) ..... .010 to .030 in. (0.254 to 0.762mm)
Shaft spring:
Total coils (working coils) 4
Wire diameter ..... .080 in. (0.36mm)
Compressed to 1-9/16 in. (39.68mm) ..... 8.5 to 10 lbs. (3.86 to 4.54 kg.)
Lubrication ..... Engine oil, camshaft metering
Shaft oil holes ..... Toward valve side of engine. Shaft cannot be rotated.

INTAKE VALVE

Tappet clearance (Cold and Hot) ..... .015 in. (0.381mm)
Face angle ..... 44°
Face run-out maximum limit including wear ..... .002 in. (0.051 mm)
O.D. of head ..... 1.995 to 2.005 in. (50.673 to 50.927mm)
O.D. of stem ..... .402 to .403 in. (10.211 to 10.236mm)
O.D. of stem maximum limit including wear ..... .002 in . (0.051mm)
Length ..... 6.4195 to 6.4405 in. (163.0557 to 163.5887mm)
Insert seat angle ..... 45°
Seat contact width ..... .0775 to .0975 in. (1.9687 to 2.4767mm)
Seat run-out maximum limit including wear ..... .002 in. (0.051mm)
Insert height ..... .2775 to .2825 in. (7.0487 to 7.1757mm)
O.D. of insert ..... 2.0990 to 2.1000 in. (53.315 to 53.340mm)
I.D. of insert ..... 1.805 to 1.815 in. (45.847 to 46.101mm)

VALVE SPRING

Free length ..... 2.28 in. (57.912mm)
Total coils 7.75
Wire diameter ..... .171 in. (4.343mm)
Compressed to 1-31/64 in. (37.70mm) (valve open) ..... 135 to 145 lbs. (61.24 to 65.78 kg.)
Compressed to 1-15/16 in. (49.21mm) (valve closed) ..... 40 to 50 lbs. (18.14 to 22.68 kg.)

EXHAUST VALVE

Tappet clearance (COLD) ..... .025 in. (0.636mm)
(HOT) ..... .020 in. (0.508mm)
Face angle ..... 44°
Face run-out maximum limit including wear ..... .002 in. (0.051mm)
O.D. of head ..... 1.745 to 1.755 in. (44.323 to 44.577mm)
O.D. of stem end ..... .402 to .403 in. (10.211 to 10.236mm)
O.D. of stem end maximum limit including wear ..... .002 in. (0.051mm)
O.D. of taper 4.2675 (108.3947mm) from stem end ..... .401 to .402 in. (10.185 to 10.211mm)
O.D. of taper from stem end maximum limit including wear ..... .002 in. (0.051mm)
Length ..... 6.4195 to 6.4405 in. (163.0557 to 163.5887mm)
Insert seat angle ..... 45°
Seat contact width ..... .0800 to .1000 in. (2.032 to 2.540mm)
Seat run-out maximum limit including wear ..... .002 in. (0.051mm)
Insert height ..... .313 to .316 in. (7.95 to 8.026mm)
O.D. of insert ..... 1.9455 to 1.9465 in. (49.4157 to 49.4407mm)
I.D. of insert ..... 1.571 to 1.577 in. (39.903 to 40.056mm)

Cooling System

Type ..... Pressurize thermostat controlled by-pass forced circulation
Pump type ..... Valve type impeller
Fan ..... Suction type
Fan belt adjustment .... 60 Lb. (27.2 kg.) tension w/tension gauge or 1/2 in. (12.7mm) deflection
Cooling system capacity ..... 44 U.S. Quarts (41.6 liters)
Radiator cap ..... 7 PSI (0.492 kg/cm^2)
Thermostat (2) ..... Starts to open at approximately 175^{0}F. (79^{0}C.)
Fully open at 202^{0}F. (94^{0}C.)
Cold weather coolant ..... Reputable top brand "High Boiling Point" Anti-Freeze

Engine Oil Filter

Engine capacity w/filters ..... 23 U.S. Quarts (21.8 liters)
Engine capacity w/o filters ..... 19 U.S. Quarts (17.9 liters)
Type (2) ..... Full flow spin on type
Filter capacity ..... 1 U.S. Quart (0.946 liter) (Each)
Filter replacement ..... Every 200 hours
Filter head relief valve spring (Tapered):
Free length ..... 2.81 in. (71.317mm)
Number of coils 9
Wire diameter ..... .063 in. (1.600mm)
Compressed to 1.400 in. (35.560mm) ..... 5.3 to 5.8 lbs. (2.4 to 2.6 kg.)
O.D. tapered end ..... .796 to .826 in. (20.218 to 20.980mm)
O.D. base end ..... 1.185 to 1.205 in. (30.099 to 30.607mm)

Self Cleaning Air Induction System

Dry Type 2 final safety element ..... Replaceable elements
Primary element change interval ..... Every four washings or more often if required.
Primary element service interval ..... When the red signal appears in the clear plastic window of the restriction indicator.
Safety element change interval ..... Once a year or 1000 hours of operation, whichever comes first.

ASPIRATED STATA TUBE
Service Interval ..... Once a year or 1000 hours of operation, whichever comes first.
Aspirated safety valve replacement ..... Whenever flapper valve is damaged or restricted of free movement.

AIR RESTRICTION INDICATOR
Replacement ..... When the red signal does not disappear after several resets or does not meet the specifications given below.

CASE NO.	DONALDSON NO.	INCHES OF WATER	INCHES OF MERCURY
A59568	RBX00-2254	27.7 to 32.3 in. (703.6 to 820.4mm)	2.04 to 2.37 in. (51.82 to 60.20mm)

Fuel System

FUEL FILTERS

Preliminary fuel filter ..... Located at the bottom of the fuel transfer pump.

First stage filter ..... Full flow spin on type

Second stage filter ..... Full flow spin on type

Filter replacement ..... Every 500 hours or when loss of engine horsepower is indicated.

Preliminary fuel filter service interval ..... Whenever 1st and 2nd stage filters are serviced.

Fuel system relief valve operating pressure ..... 20 to 25 PSI (1.4 to 1.8 kg/cm^2)

FUEL TANK

Two ..... One each side of tractor

Capacity (55 U.S. Gallons (208.2 liters , each tank) ..... 110 U.S. Gallons (416.4 liters)

Water trap (2)(One at bottom of each tank) ..... Drain daily.

FUEL INJECTION PUMP

Type ..... Robert Bosch, PES multiple plunger

Rotation ..... Counter-clockwise

Mounting ..... Left hand side of engine

Drive ..... Gear driven at 1/2 engine speed

Lubrication ..... Pressurized engine oil

Governor ..... Centrifugal type, variable speed, flyweight, integral part of pump

Backlash between pump gear and idler gear ..... .012 in. (0.305mm)

TIMING

Timing marks ..... Located on crankshaft pulley (0^0 to 35^0 BTDC and 0^0 to 15^0 ATDC). Timing pointer located on timing gear cover.

At 2200 RPM Rated Engine Speed ..... 30^0 BTDC

FUEL INJECTOR

Type ..... Roosa Master

Opening Pressure (New) ..... 3350 to 3450 PSI (235.5 to 242.6 kg/cm^2)

(Serviced) ..... 3150 to 3250 PSI (221.5 to 228.5 kg/cm^2)

Maximum opening pressure difference between cylinders ..... 100 PSI (7 kg/cm^2)

Valve lift ..... 3/4 turn off valve seat of .0135 in. (0.355mm)

Spray orifice size ..... .014 in. (0.356mm)

Sac hole size ..... .042 to .051 in. (1.067 to 1.295 mm)

Number of orifices 4

Orifice length (through sacwall) ..... .095 in. (2.413mm)

Orifice spray angle ..... 150^0

Leakoff rate ..... 3 to 10 drops in 30 seconds at 1500 PSI (105.5 kg/cm^2) after first drop appears (serviced injector).

FUEL INJECTOR (Continued)

Opening pressure control spring:

Free length ..... .513 in. (13.030mm)
Number of coils 6-1/2
Wire diameter ..... .064 in. (1.626mm)
O.D. of spring ..... .289 in. (7.341mm)
Compressed load at .444 to .459 in. (11.3 to 11.7mm) ..... 31 lbs. (14.1 kg.)

Hydraulics

FILTERS

Filter housing capacity ..... 10 U.S. Quarts (9.5 liters)
Type (2) ..... 10-12 Micron Filtration
Filter element change interval ..... After the first 20 hours of operation and when the pointer or the hydraulic filter gauge enters the red zone thereafter.

SINGLE AND TWIN DUAL REMOTE VALVES

Pilot operated relief valve setting ..... Located in single dual valve only.
Cracking PSI ..... 1700 to 1900 PSI (119.522 to 133.583 kg/cm²)
Main Relief PSI ..... 1900 to 2100 PSI (133.583 to 147.644 kg/cm²)

	FREE LENGTH	NO. OF COILS	SPRING O.D.	COMPRESSED HEIGHT	LBS. PRESSURE
Outlet ball check spring	1.625 in.★ (41.275mm)	6	.548 in. (13.919mm)	.938 in.★ (23.825mm)	35 to 47 lbs. (15.9 to 21.3 kg.)
Return ball check spring	2.25 in.★★ (57.15mm)	10	Work bore .625 in. (15.875mm)	1.625 in.★★ (41.275mm)	30 to 35 lbs. (13.6 to 15.9 kg.)
Thermal relief valve spring	1.11 in. (28.194mm)	12	.330 in. (8.382mm)	.97 in. (24.64mm)	13 to 15 lbs. (5.9 to 6.8 kg.)
Spool plunger spring	Optional	Optional	.572 in. (14.529mm)	1.188 in. (30.175mm)	17 to 19 lbs. (7.7 to 8.6 kg.)
Relief valve piston spring	1.00 in. (25.40mm)	10	Work bore .470 in. (11.938mm)	.88 in. (22.35mm)	4.5 to 6.5 lbs. (2.1 to 2.9 kg.)
Pilot piston relief valve spring	.717 in. (18.212mm)	4	Work bore .771 in. (19.583mm)	.605 in. (15.367mm)	110 to 120 lbs. (49.9 to 54.4 kg.)

★Spring check made while measuring over 5/8 in. (15.9mm) dia. ball on top of spring.

★★Spring check made while measuring over 1/2 in. (12.7mm) dia. ball on top of small end of spring.

Remote lever centering spring
Free length ..... 7.8 in. (198.1mm)
Total coils 39
Spring wire diameter ..... .092 in. (2.337mm)
Load, compressed to 6.3 in. (160mm) ..... 7 lbs. (3.2 kg.)

SINGLE AND TWIN DUAL REMOTE VALVES (Continued)

Coupling bracket spring
- Free length ..... 1.250 in. (31.750mm)
- Total coils 7
- Spring wire diameter ..... .1055 in. (2.6797mm)

THREE POINT HITCH

- Valve control rod, pre-adjusted to ..... 9.25 in. (234.9mm)
- Hitch cylinder maximum stroke ..... 9.5 in. (241.3mm)
- Draft arm minimum lift range ..... 28 in. (711.2mm)
- Draft arm free travel ..... 1-1/2 to 2 in. (38.1 to 50.8mm)
- 3 point hitch hand lever adjustment ..... 15 to 18 lbs. (6.8 to 8.2 kg.) pull at handle
- Control valve spool travel ..... .085 in. to 110 in. (2.159 to 2.794mm)

	FREE LENGTH	SPRING O.D.	NO. OF COILS	SPRING RATE	COMPRESSED HEIGHT
Lowering poppet spring	2.188 in. (55.575mm)	Work bore .391 in. (9.931mm)	20	36 to 44 lbs. (16.3 to 19.9 kg.)	1.875 in. (47.625mm)
Flow Control Spring	1.391 in. (35.331mm)	.563 in. (14.300mm)	8	7.2 to 8.8 lbs. (3.3 to 4 kg.)	.875 in. (22.225mm)
Trigger valve spring	1.625 in. (41.275mm)	Optional	6	2.8 to 3.4 lbs. (1.3 to 1.5 kg.)	.438 in. (11.125mm)
Load check spring (2)	1.250 in. (31.750mm)	.623 in. (15.824mm)	7	7.7 to 9.4 lbs. (3.5 to 4.3 kg.)	.750 in. (19.050mm)

- Cylinder tube bore ..... 4 in. (101.6mm)
- Piston rod diameter ..... 1-1/2 in. (38.1mm)

HYDRAULIC TRIPLE PUMP

Needle bearing installation depth below bore face ..... .005 in. (0.127mm)

	FREE LENGTH	NO. OF COILS	SPRING RATE	COMPRESSED HEIGHT
Piston flow spring	3.80 in. (96.52mm)	24	21.3 to 20.3 lbs. (4.7 to 92 kg.)	2.50 in. (63.50mm)
Relief valve spring	2.02 in. (51.31mm)	13	92 to 112 lbs. (41.7 to 50.8 kg.)	1.62 in. (41.15mm)

If any wear or damage exists to the body sections, the pump must be replaced as a complete assembly.

If the thrust plates or seals should wear, a complete seal kit including these parts can be installed as the pump is reassembled.

PORTABLE HYDRAULIC CYLINDERS W/HYD. LIMIT STOP:

	FREE LENGTH	NO. OF COILS	SPRING RATE	COMPRESSED HEIGHT
Valve Plunger Spring	1.750 in. (44.450mm)	18-20	1 to 1.2 lbs. (0.5 to 0.6 kg.)	.796 in. to .828 in. (20.218 to 21.031mm)
Push Rod Spring	2.312 in. (58.725mm)	14	3.5 to 4.5 lbs. (1.6 to 2 kg.)	1.75 in. (44.45mm)

PORTABLE HYDRAULIC CYLINDERS W/COLLAR LOCKING LIMIT STOP:

	FREE LENGTH	NO. OF COILS COILS	SPRING RATE	COMPRESSED HEIGHT
Plunger Return Spring	1.2 in. (30.5mm)	10	.9 to 1.1 lbs. (0.4 to 0.5 kg.)	.945 in. (24.003mm)
Rod Return Spring	2.31 in. (58.67mm)	14	3.5 to 4.5 lbs. (1.6 to 2 kg.)	1.75 in. (38.10mm)

BREAK-AWAY COUPLINGS

COUPLING SOCKET	FREE LENGTH	NO. OF COILS	SPRING RATE	COMPRESSED HEIGHT
Sleeve tension spring	Optional	2-3/4	14 to 17 lbs. (6.4 to 7.7 kg.)	.406 in. (10.312mm)
Piston pressure spring	Optional	9.5	21 to 25 lbs. (9.5 to 11.3 kg.)	.859 in. (21.819mm)
COUPLING PLUG				
Piston spring	Optional	Optional	6.5 to 7 lbs. (2.9 to 3.2 kg.)	.656 in. (11.662mm)

SEPARATOR VALVE

	FREE LENGTH	NO. OF COILS	SPRING RATE	COMPRESSED HEIGHT
Relief poppet spring	2.47 in. (62.74mm)	Optional	3 to 4 lbs. (1.4 to 1.8 kg.)	1.469 in. (37.313mm)

PTO CONTROL VALVE

Relief check ball diameter ..... .281 in. (7.137mm)

	FREE LENGTH	NO. OF COILS	SPRING RATE	COMPRESSED HEIGHT
Relief spring	2.12 in. (53.85mm)	20	2.9 to 3.5 lbs. (1.3 to 1.6 kg.)	1.62 in. (41.15mm)

REAR STEERING CONTROL VALVE

Load check ball diameter ..... .375 in. (9.525mm)

	FREE LENGTH	NO. OF COILS	SPRING RATE	COMPRESSED HEIGHT
Load check ball spring	1.27 in. (32.26mm)	18-1/4	3.6 to 4.4 lbs. (1.6 to 2 kg.)	1 in. (25.4mm)

Steering

FRONT AND REAR AXLE AND PLANETARY

Gap between king pin flange and spindle housing ..... .010 to .016 in. (0.254 to 0.406mm)
Planetary bearing rolling torque ..... 4 to 7 ft. lbs. (0.6 to 1m-kg.)
Planetary carrier relief valve setting ..... 5 PSI (0.352kg/cm^2)
Front tie rod length limit from rear tie rod ..... .060 in. (1.524mm)
Front turning angle ..... 28^0
Front steering cylinder rod exposure ..... 12.25 in. (311.15mm)

REAR STEERING AXLE

Tie rod length from front tie rod ..... .060 in. (1.524mm)
Rear turning angle (w/manual steer quadrant) ..... 20^0 to 21^0
Rear turning angle (w/automatic steer quadrant) ..... 17-1/2^0 to 18-1/2^0
Steering cylinder rod exposure ..... 11.42 in. (290.07mm)

STEERING COLUMN

Upper seal installation below surface ..... .31 in. (7.87mm)
Steering wheel tilt from windshield ..... 2 in. (50.8mm)

	FREE LENGTH	NO. OF COILS	SPRING RATE	EXTENDED LENGTH
Tilt latch return spring	1.80 in. (45.72mm)	9	55.8 lbs. (25.3 kg.)	2.90 in. (73.66mm)
Column tilt return spring	3.16 in. (80.26mm)	19.5	55.8 lbs. (25.3 kg.)	5.60 in. (142.24mm)

FRONT STEERING PUMP VALVE

Commutator to commutator ring thickness difference ..... .0015 in. (0.0377mm) Max.
Rotor to stator clearance ..... .006 in. (0.152mm) Max.
Rotor to stator thickness difference ..... .002 in. (0.051mm) Max.
Slot pin out-of-roundness ..... .001 in. (0.025mm)
Upper cover needle bearing installation depth dimension ..... 1.28 to 1.30 in. (32.51 to 33.02mm)
Spool end to body end play ..... .0025 in. (0.0637mm)

FRONT AND REAR STEERING LINKAGE

Cable adjustment from bulkhead to cable seal ..... 4.60 in. (116.84mm)
Cable thread end to jam nut in ball joints ..... .66 in. (16.76mm)
Rear steer cable end to jam nut in clevis ..... .92 in. (23.37mm)

FRONT AND REAR STEERING LINKAGE (Continued)

	FREE LENGTH	NO. OF COILS	SPRING RATE	COMPRESSED HEIGHT
Steer cable tension springs	6.65 in. (169.91mm)	21	80 lbs. (36.3 kg.)	5.65 in. (143.51mm)
Rear steer conttrol arm detent spring	1.197 in. (30.404mm)	8	13.7 to 14.7 lbs. (6.2 to 6.7 kg.)	.938 in. (23.825mm)
Rear steer lever tension spring	1 in. (25.4mm)	3	-	-
Rear valve lever	4.16 in. (105.66mm)	19	112 lbs. (50.8 kg.)	3.16 in. (80.26mm)
Rear valve lever outer spring	4.75 in. (120.65mm)	15	175 lbs. (79.4 kg.)	3.75 in. (95.25mm)

Power Train

AXLE DIFFERENTIAL

Differential pinion bearing rolling torque (w/spring scale) ..... 7 to 16 lbs. (3.2 to 7.3 kg.)

Differential ..... Pre-loaded

Pinion bearing rolling torque (w/torque wrench) ..... 15 to 35 in. lbs. (172.8 to 403.2mm-kg.)

Differential end play ..... No end play

Differential gear to countershaft pinion backlash ..... .006 to .016 in. (0.152 to 0.406mm)

Differential ring gear run-out ..... Maximum .008 in. (0.203mm)

TORQUE LIMITER

Type ..... 12 in. (304.8mm) Dual torque limiter system

Belleville spring .... (Yellow) .454 to .466 in. (11.532 to 11.836mm) free height on a flat surface

POWER SHIFT TRANSMISSION

C-1 Clutch ..... (3) 8.25 in. (209.55mm) dia. sintered clutch plates

C-2 Clutch ..... (5) 8.25 in. (209.55mm) dia. sintered clutch plates

C-3 Clutch ..... (5) 8.25 in. (209.55mm) dia. sintered clutch plates

C-4 Clutch ..... (2) 12.25 in. (311.15mm) dia. sintered clutch plates

Planetary ..... Three speed, compound type

Mainshaft brake ..... 5.375 in. (136.525mm) Friction plates hydraulically released when C-2 or C-3 clutch is engaged.

Driven shaft ..... 1st, 2nd, 3rd and 4th drive gears with two (2) shifting collars.

Output shaft ..... 1st, 2nd, 3rd and 4th driven gears.

Belleville springs ..... .167 in. (4.242mm) free height on a flat surface

PTO shaft bushing ..... 1.375 to 1.376 in. (34.925 to 34.950mm) I.D.

Piston seal alignment tolerance ..... .062 in. (1.588mm)

POWER SHIFT TRANSMISSION (Continued)

	Free Length	Spring O.D.	No. of Coils	Spring Rate	Compressed Height
C-4 Pilot valve spring	1.69 in. (42.93mm)	.50 in. (12.70mm)	13	16.2 to 19.8 lbs. (7.4 to 9 kg.)	1.11 in. (28.19mm)
C-1,C-2,C-3 Pilot valve springs	1.17 to 1.77 in. (29.72 to 44.96m)	.500 in. (12.700mm)	10.5	5.4 to 6.4 lbs. (2.5 to 2.9 kg.)	1.03 in. (26.16mm)
Retard check spring	.93 in. (23.62mm)	.277 in. to .312 in. (7.036 to 7.925mm)	9	10 to 14 oz. (283.5 to 397 Gr.)	.68 in. (17.27mm)
Reverse lockout spring	1.758 to 1.852 in. (44.653 to 47.041mm)	.625 in. (15.875mm)	9.5	17.1 to 20.9 lbs. (8 to 9.5 kg.)	.625 in. (15.875mm)
Pressure regulator spring	1.37 in. (34.80mm)	.531 in. (13.487mm)	11	13.5 to 16.5 lbs. (6.1 to 7.5 kg.)	1.00 in. (25.40mm)
Modulator primary spring	1.61 in. (40.89mm)	.312 in. (7.925mm)	14.5	8.6 to 10.4 lbs. (3.0 to 4.7 kg.)	1.20 in. (30.48mm)
Modulator secondary spring	.76 in. (19.30mm)	.265 in. (6.731mm)	8	1.2 to 1.4 lbs. (0.5 to 0.6 kg.)	.43 in. (10.92mm)
Detent spring	1.07 in. (27.18mm)	.430 in. (10.922mm)	9.5	30 lbs. (13.6 kg.)	.67 in. (17.02mm)
Lube oil spring	1.69 in. (42.93mm)	.312 in. (7.925mm)	16	9 to 10.7 lbs. (4.1 to 4.9 kg.)	.97 in. (24.64mm)
Clutch inner small return spring	.75 in. (19.05mm)	.365 in. (9.271mm)	7.5	54 lbs. (24.5 kg.)	.50 in. (12.70mm)
Clutch outer large return spring	.75 in. (19.05mm)	.534 in. (13.564mm)	6	62 lbs. (28.1 kg.)	.50 in. (12.70mm)

POWER SHIFT RANGE LINKAGE

Range lever cable upper end into ball joints ..... .625 in. (15.875mm)

Range lever cable lower end into ball joints ..... .438 in. (11.112mm)

Power shift cable upper end in ball joint ..... .625 in. (15.875mm)

Power shift cable lower end & clutch cable upper end in ball joint ..... .438 in. (11.112mm)

Clutch cable lower end in clevis ..... .031 in. (0.794mm)

INCHING PEDAL

Pedal stop to firewall ..... 1.50 in. (38.10mm)

Clutch spool travel ..... 1.031 to 1.094 in. (26.194 to 47.781mm)

POWER BRAKES, MASTER CYLINDER AND PARKING BRAKE

Reaction in pin protrusion ..... .077 in. (1.955mm)

Type fluid ..... Case TFD

Pedal stop distance from firewall ..... 9.875 in. (540.893mm)

Parking cable rod distance below housing ..... 5.25 in. (123.35mm)

Roll pin protrusion from torque pin ..... .375 in. (9.525mm)

HYDRAULIC PTO

P.T.O. hand lever adjustment ..... 6 to 10 lbs. (2.7 to 4.5 kg.) pull at lever

Hand lever bushing reaming (After installation) ..... .626 to .628 in. (15.900 to 15.951mm)

Clutch housing dowel pin protrusion ..... .312 in. (7.925mm)

Sintered clutch plated ..... 12 each

PTO output shaft rolling torque ..... Minimum 70 ft. lbs. (9.68m-kg.)

Steel clutch plates ..... 11 each

	FREE LENGTH	NO. OF COILS	SPRING RATE	COMPRESSED HEIGHT
Clutch piston return spring	1.75 in. (44.45mm)	4	156 lbs. (70.8 kg.)	.75 in. (19.05mm)
PTO brake piston return spring	2.375 in. (60.325mm)	8-1/4	53 to 59 lbs. (24 to 26.8 kg.)	1.875 in. (47.625mm)
PTO lever tension spring	1 in. (25.4mm)	3	-	-

Control cable end adjustment ..... .40 in. (10.160mm)

Cable adjustment, bulkhead to cable seal, at hand lever ..... 3.875 in. (98.425mm)

Cable adjustment, bulkhead to cable seal, at control valve ..... 4 in. (101.6mm)

Hydraulic Steering and Hydraulic System Specifications

TRIPLE HYDRAULIC PUMP OUTPUT @ 2000 RPM ..... 39 GPM (147.6 l/mn)

Transmission and Hydraulics - 17 GPM (64.4 l/mn) PUMP SECTION

Pump flow - no load - 2000 RPM ..... 17 GPM (64.4 l/mn)

Pump flow - 1000 PSI (70 kg/cm²) load @ 2000 RPM ..... 16.5 GPM (62.5 l/mn)

Pump flow - 2000 PSI (141 kg/cm²) load @ 2000 RPM ..... 15.5 GPM (58.7 l/mn)

Clutch regulator valve - no load 750 RPM ..... 180 to 200 PSI (12.7 to 14.1 kg/cm²)

Clutch regulator valve no load @ 1800 RPM ..... 180 to 200 PSI (12.7 to 14.1 kg/cm²)

Front and Rear Steering - 17 GPM (64.4 l/mn) REGULATOR SECTION

Front Steering - 7 GPM (26.5 l/mn) REGULATED SECTION

Regulated flow - no load @ 2000 RPM ..... 7 GPM (26.5 l/mn)

Regulated flow - 2000 PSI (141 kg/cm²) @ 2000 RPM ..... 5 GPM (19 l/mn)

Front strg. relief valve - Cracking PSI @ 2000 RPM ... 1750 to 1850 PSI (123 to 130 kg/cm²)

Fully Open @ 2000 RPM ..... 1900 to 2000 RPM (133 to 141 kg/cm²)

Rear Steering - 10 GPM (37.9 l/mn) REGULATED SECTION

Regulated flow - no load @ 1000 RPM ..... 0 GPM (0 l/mn)

Regulated flow - no load @ 2000 RPM ..... 10.5 GPM (39.7 l/mn)

Rear strg. relief valve:

Fully open PSI @ 2000 RPM w/3" Cyl. ..... 1450 to 1550 PSI (102 to 109 kg/cm²)

Fully open PSI @ 2000 RPM w/2-1/2" Cyl. ..... 1950 to 2050 PSI (137 to 144 kg/cm²)

Special Torques

ENGINE

Cylinder head bolts	200 to 210 ft. lbs. (27.660 to 29.043m-kg.)
Intake and exhaust manifold stud nut	25 to 30 ft. lbs. (3.4 to 4.2m-kg.)
Rocker arm bracket stud nut and bolt	40 to 45 ft. lbs. (5.5 to 6.2m-kg.)
Cylinder head cover stud nut	60 to 70 in. lbs. (691.3 to 806.5mm-kg.)
Camshaft nut	95 to 105 ft. lbs. (13.134 to 14.517m-kg.)
Connecting rod bolts	95 to 105 ft. lbs. (13.134 to 14.517m-kg.)
Crankshaft pulley bolt	100 to 110 ft. lbs. (13.825 to 15.208m-kg.)
Flywheel to crankshaft bolts	180 to 190 ft. lbs. (24.886 to 26.268m-kg.)
Main bearing cap bolts	145 to 155 ft. lbs. (20.047 to 21.430m-kg.)
Oil pump suction tube nut	95 to 105 ft. lbs. (13.134 to 14.517m-kg.)
Oil pan capscrews	13 to 17 ft. lbs. (1.797 to 2.350m-kg.)
Oil pan drain plug	18 to 20 ft. lbs. (2.5 to 2.9m-kg.)
Engine oil filter	Install until gasket contacts the filter head, then hand tighten 1/2 turn. Loosen filter approximately 1 full turn and retighten until gasket contact is made, then hand tighten 1/2 to 3/4 turn.

FUEL SYSTEM

Fuel filters (2)	Install until gasket contacts the filter head, then hand tighten 1/2 to 3/4 turn.
Fuel pump drive hub nut (14mm thread)	94 to 108.5 ft. lbs. (13 to 15 m-kg.)
Fuel pump timing pointer screws	60 to 72 in. lbs. (691.3 to 829.5mm-kg.)
Fuel injector pressure adjusting screw locknut	70 to 75 in. lbs. (806.5 to 864.1mm-kg.)
Fuel injector clamp capscrews	20 ft. lbs. (2.8m-kg.)

HYDRAULICS

Hitch cylinder and portable cylinder gland	100 to 200 ft. lbs. (13.8 to 27.7m-kg.)
Triple hydraulic pump bolts	27 to 32 ft. lbs. (4.9 to 4.4m-kg.)
Portable cylinder piston bolt	200 to 220 ft. lbs. (27.7 to 30.4m-kg.)
Dual remote valve cover bolts	35-40 ft. lbs. (4.9 to 5.5m-kg.)
Dual remote lever rod eye bolts	17 to 20 ft. lbs. (2.4 to 2.8m-kg.)
3 point hitch cross shaft support bolts	270 to 324 ft. lbs. (37.3 to 44.8m-kg.)

STEERING

Steering column mounting studs	25-30 in. lbs. (288 to 345.6mm-kg.)
Steering column mounting jam nuts	30-35 in. lbs. (345.6 to 403.2mm-kg.)
Steering wheel retaining nut	30-35 ft. lbs. (4.2 to 4.8m-kg.)
Steering wheel lock knob nut	20-25 ft. lbs. (2.8 to 3.5m-kg.)
Steering control valve end cap bolts	14-17 ft. lbs. (1.9 to 2.4m-kg.)
Front and rear steering cylinder piston rod bolt	90 to 110 ft. lbs. (12.5 to 15.2m-kg.)
Tie rod yoke pivot bolts	Minimum 6 ft. lbs. (0.83m-kg.)
Steering pump valve upper cover screws	18 to 22 ft. lbs. (2.5 to 3m-kg.)

Special Torques (Continued)

HYDRAULIC PTO

Housing special retaining bolt ..... 80 to 96 ft. lbs. (11.1 to 13.3m-kg.)
PTO drive shaft U-Joint bolt ..... 50 to 55 ft. lbs. (6.9 to 7.6m-kg.)
PTO drive shaft yoke bolt ..... 80 to 96 ft. lbs. (11.1 to 13.3m-kg.)

POWER TRAIN

King Pin mounting bolts ..... 270 to 325 ft. lbs. (37.3 to 45m-kg.)
Differential cage bolts ..... 115 to 125 ft. lbs. (15.9 to 17.3m-kg.)
Drive shaft U-Joint bolts ..... 50 to 55 ft. lbs. (6.9 to 7.6m-kg.)
Differential bearing carrier bolts ..... 210 to 250 ft. lbs. (29 to 34.6m-kg.)
Differential cage retainer bolts ..... 85 to 105 ft. lbs. (11.8 to 14.5m-kg.)
Parking brake adjusting screw ..... Until torque pins bottom, then back-off 1-1/2 turns.
Brake yoke bolts ..... 220 to 300 ft. lbs. (30.3 to 41.5m-kg.)
Pinion shaft end nut ..... 320 to 450 ft. lbs. (44.3 to 62.2m-kg.)
Steerable axle trunnion to axle housing bolts ..... 380 to 455 ft. lbs. (52.6 to 62.9m-kg.)
Transmission tube fitting lock nuts ..... 4 to 6 ft. lbs. (0.6 to 0.9m-kg.)
C-1 & C-4 carrier bolts ..... 42 ft. lbs. (5.8m-kg.)
C-1 & C-4 oil supply tube bolts ..... 150 in. lbs. (1 728.2mm-kg.) more than thread torque.
Main shaft brake reaction plate bolts ..... 35 to 42 ft. lbs. (4.8 to 5.8m-kg.)
C-2 clutch hub bolts ..... 45 to 50 ft. lbs. (6.2 to 6.9m-kg.)
Planetary retaining screws ..... 50 to 65 in. lbs. (576.1 to 748.9mm-kg.)
C-4 clutch carrier bolts ..... 45 to 54 ft. lbs. (6.2 to 7.5m-kg.)
C-1 clutch reaction plate bolts ..... 45 to 54 ft. lbs. (6.2 to 7.5m-kg.)
Clutch housing to transmission bolts ..... 400 to 480 ft. lbs. (55.3 to 66.4m-kg.)
Clutch housing to engine 3/4 in. (19.050mm) bolts ..... 270 to 324 ft. lbs. (37.3 to 44.8m-kg.)
Clutch housing to engine .50 in. (12.70mm) ..... 80 to 96 ft. lbs. (11.1 to 13.3m-kg.)
Drive shaft locknut ..... 60 to 75 ft. lbs. (8.3 to 10.4m-kg.)
Output shaft yoke nuts ..... 220 to 300 ft. lbs. (30.4 to 41.5m-kg.)
Valve cover detent plug ..... 25 to 30 ft. lbs. (3.5 to 4.2m-kg.)
Valve cover test plugs ..... 7 to 10 ft. lbs. (1 to 1.4m-kg.)
Valve mounting bolts ..... 25 to 30 ft. lbs. (3.5 to 4.2m-kg.)
Pilot valves and pressure regulator plugs ..... 13 to 15 ft. lbs. (1.8 to 2.1m-kg.)
Shuttle valve sleeve and plug ..... 17 to 20 ft. lbs. (2.4 to 2.8m-kg.)
Inching spool plug ..... 17 to 20 ft. lbs. (2.4 to 2.8m-kg.)
Selector spool cover bolts ..... 7 to 9 ft. lbs. (1 to 1.2m-kg.)
Reverse lockout plug ..... 22 to 25 ft. lbs. (3 to 3.5m-kg.)
Orifice needle hex. nut ..... 5 to 7 ft. lbs. (0.7 to 1m-kg.)
Torque limiter bolts ..... 80 to 90 ft. lbs. (11.1 to 12.5m-kg.)

GENERAL TORQUE SPECIFICATION TABLE (Revised 7-72)

USE THE FOLLOWING TORQUES WHEN SPECIAL TORQUES ARE NOT GIVEN

NOTE: These values apply to fasteners as received from supplier, dry, or when lubricated with normal engine oil. They do not apply if special graphited or moly-disulphide greases or other extreme pressure lubricants are used. This applies to both UNF and UNC threads.

SAE Grade No.		5				8 ★			
Bolt head identification marks as per grade NOTE: Manufacturing Marks Will Vary									
Bolt Size		Torque Foot Pounds		Torque Meter Kilograms		Torque Foot Pounds		Torque Meter Kilograms	
Inches	Millimeters	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1/4	6.35	9	11	1.2	1.5	12	15	1.7	2.1
5/16	7.94	17	20.5	2.4	2.8	24	29	2.3	4.0
3/8	9.53	35	42	4.8	5.8	45	54	6.2	7.5
7/16	11.11	54	64	7.5	8.9	70	84	9.7	11.6
1/2	12.70	80	96	11.1	13.3	110	132	15.2	18.3
9/16	14.29	110	132	15.2	18.3	160	192	22.1	26.6
5/8	15.88	150	180	20.7	24.9	220	264	30.4	36.5
3/4	19.05	270	324	37.3	44.8	380	456	52.6	63.1
7/8	22.23	400	480	55.3	66.4	600	720	83.0	99.6
1	25.40	580	696	80.2	96.3	900	1080	124.5	149.4
1-1/8	25.58	800	880	110.6	121.7	1280	1440	177.0	199.2
1-1/4	31.75	1120	1240	154.9	171.5	1820	2000	251.7	276.6
1-3/8	34.93	1460	1680	201.9	232.3	2380	2720	329.2	376.2
1-1/2	38.10	1940	2200	268.3	304.3	3160	3560	437.0	492.3

★ Thick nuts must be used with Grade 8 bolts

Section 1012

LUBRICATION

2470 TRACTORS

Rac. Form 9-75345

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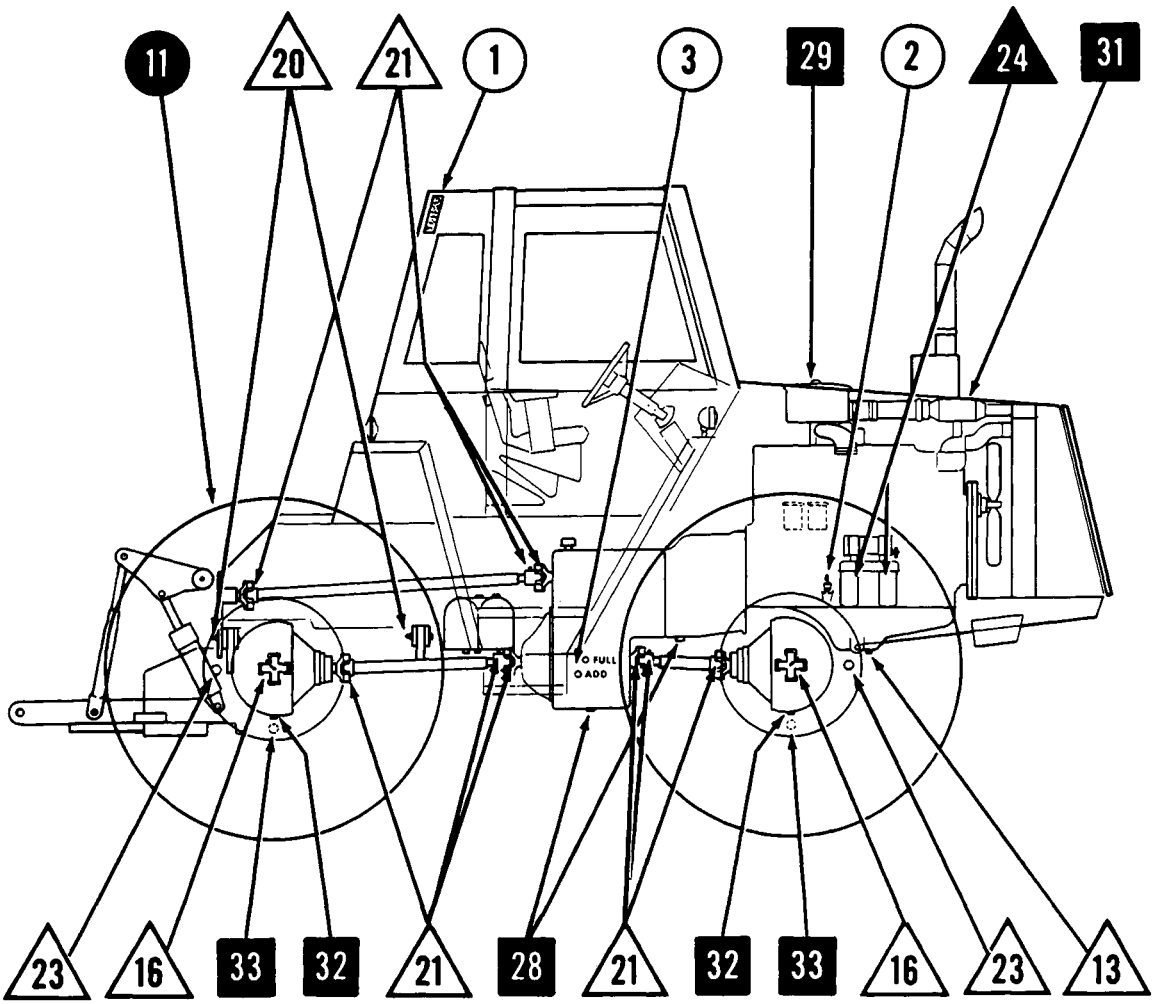
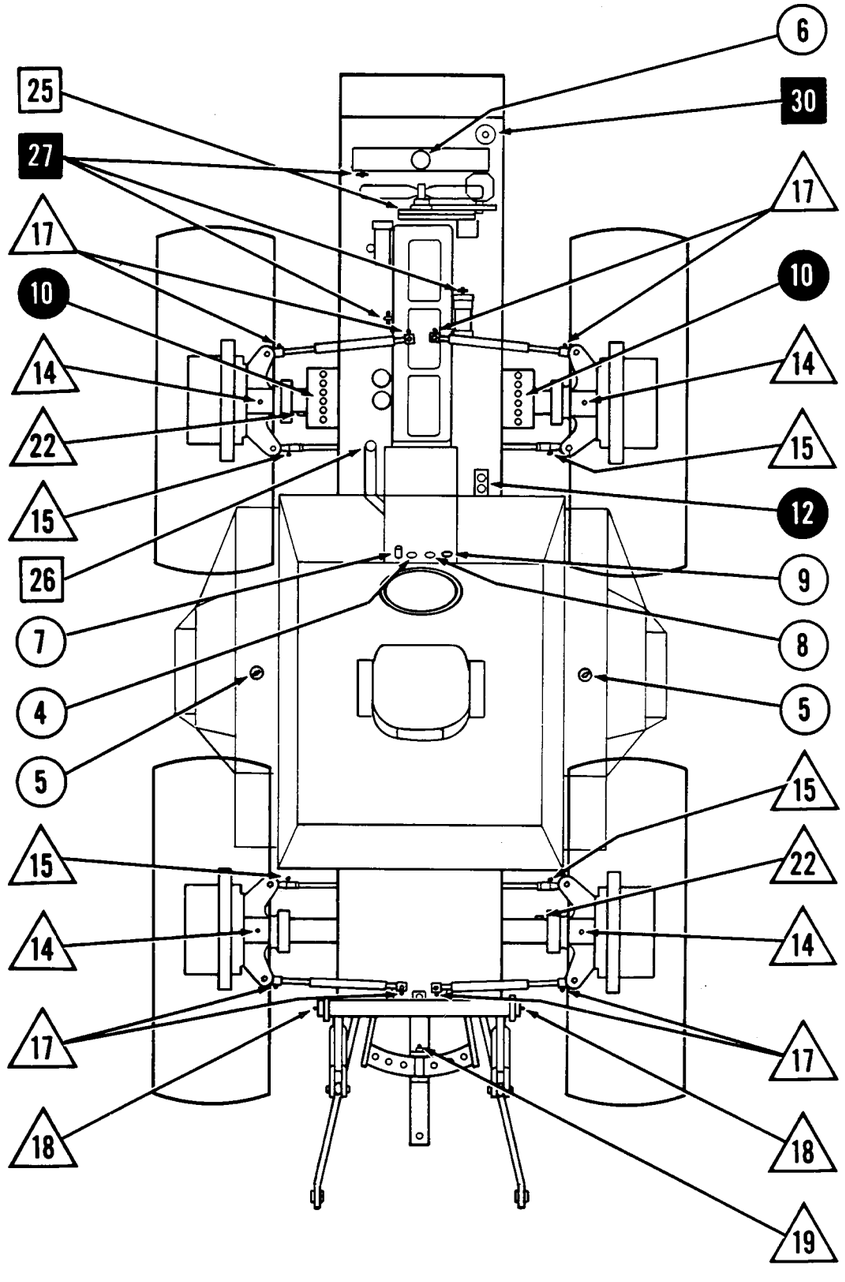


RECOMMENDED LUBRICANTS AND APPROXIMATE CAPACITIES GIVEN IN U.S. AND METRIC MEASURE

LUBRICATION POINTS	APPROXIMATE CAPACITIES	PREVAILING AIR TEMPERATURE RANGE		
Engine Crankcase w/o Filter	19 Quarts (18 liters)	DIESEL ENGINE		
		32°F. (0°C.) and Above	10°F. (-12°C.) to 50°F. (10°C.)	Use Only Below 40°F. (4°C.)
Engine Crankcase w/Filter	21 Quarts (19.8 liters)	SAE 30	SAE 20W	SAE 10W
Transmission-Hydraulic System	56 Quarts (52.9 liters)	USE CASE TFD FLUID		
All Pressure Fittings	As Many Strokes As Required	Use a Good No. 2 Gun Grease (Lithium Base)		
Fuel Tank	55 Gallons (Each Tank) (208.2 liters)	Use a Good Grade Number 2 Diesel Fuel		
Cooling System	44 Quarts (41.6 liters)	Use a Top Brand "High Boiling Point" Type Anti-Freeze in Cold Weather		
Hydraulic Brake Master Cylinder	1/2 in. (12.7mm) Below Opening	Warning! Use Only Case TFD Fluid		
		AIR TEMPERATURE RANGE		
		Above 90°F (32.2°C)	90°F (32.2°C.) to 0°F. (-17.8°C.)	Below 0°F. (-17.8°C)
Differential Housing (Front and Rear)	19 Quarts (18 liters) Each	SAE 140 EP	SAE 90 EP	SAE 80 EP
Planetary Housings (Front and Rear)	13 Quarts (12.3 liters) Each			



REF. NO.	SERVICE POINTS	NO. OF POINTS	GREASE	DRAIN	CHECK	CLEAN	CHANGE OIL (Few Drops)	FREQUENCY
1	Cab Air Filter	1			■			○ 10 HOURS
2	Engine Oil Crankcase Oil Level	1			■			
3	Transmission-Hyd. Fluid Level	1			■			
4	Fuel Tank Level	1			■			
5	Fuel Tank Water Trap	2	■					
6	Radiator Coolant Level	1			■			
7	Air Induction Restriction Indicator	1			■			
8	Transmission-Hyd. Filter Press.	1			■			
9	Fuel Filter Pressure	1			■			
10	Battery Water Level	2			■			● 50 HOURS
11	Tire Pressure	4			■			
12	Brake Master Cylinder Level	1			■			
13	Engine Crankcase Oil	1	■			■		
14	King Pins (Front and Rear)	8	■					
15	Tie Rod Ends (Front and Rear)	4	■					
16	Planetary Drive Universal Joints	4	■					
17	Steering Cylinder Pivot (Front & Rear)	8	■					
18	Hitch Lift Arm Cross Shaft Pivot	2	■					△ 100 HOURS
19	Drawbar Roller	1	■					
20	Rear Axle Pivot	2	■					
21	PTO and Axle Drive Shafts	9	■					
22	Differential Oil Level (Front and Rear)	2			■			
23	Planetary Oil Level (Front and Rear)	4			■			
24	Engine Oil Filters	2		■			■	▲ 200 HOURS
25	Fan and Compressor Belts	3			■			□ 250 HOURS
26	Transmission-Hydraulic Breather	1				■		
27	Cooling System	3		■		■		
28	Transmission-Hydraulic Fluid	2		■			■	
29	Final Safety Elements	2				■	■	
30	Air Con. Refrigerant Level	1			■			■ 1000 HOURS
31	Air Aspirated Strata Tube	1			■	■		
32	Differential Oil (Front & Rear Axle)	2		■			■	
33	Planetary Oil (Front and Rear)	4		■			■	