SERVICE MANUAL
Uni-Loader
1818
8-66102

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

SERVICE MANUAL
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1818 Uni-Loader Service Manual 8-66102
Table of Contents

CASE CORPORATION
700 State Street
Racine, WI 53404 U.S.A.

CASE CANADA CORPORATION
450 Sherman Avenue
Hamilton, ON L8N 4C4 CANADA

May, 1991 (Revised January, 2001)

1818 Uni-Loader Service Manual
8-66102
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SAFETY RULES
SERVICE MANUAL INTRODUCTION AND TORQUE SPECIFICATIONS

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CASE CORPORATION

Bur 8-68110

Printed in U.S.A.
Issued July 1987

SAFETY RULES

Most accidents involving machine operation and maintenance can be avoided by following basic safety rules and precautions. Read and understand all the safety messages in this manual, the safety manual, and the safety signs on the machine before you operate or service the machine.

Read the operators manual and make sure you understand the operation of the machine.

Operators Manual Storage 876245

The safety information given in this manual does not replace safety codes, insurance needs, federal, state, and local laws.

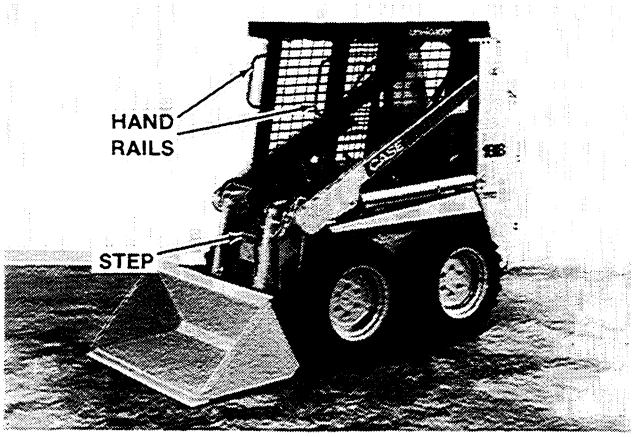
IMPORTANT: *Safety messages in this section point out situations which can be encountered during the normal operation and maintenance of your machine. These safety messages also give possible ways of dealing with these conditions.*

Additional safety messages are used in the text of the manual to show specific safety hazards.

BEFORE OPERATION

Do not wear loose clothing or jewelry that can catch on controls, etc. Safety shoes, heavy gloves, ear protection, etc., can also be required for your protection.

Foreign material or grease on the steps and hand rails can cause an accident. Keep the steps and hand rails clean.



Remove all loose objects from the operators area and from the machine. Loose objects can jam controls and cause accidents.

Engine exhaust fumes can cause death. If you operate this machine in an enclosed area, use good ventilation to replace the exhaust fumes with fresh air.

Make sure all persons are away from the machine before you start the engine.

Before you start the engine, always fasten the seat belt and pull down the operators protection bars.

Use hand rails and step provided. Do not rush.

MACHINE OPERATION

Check all controls in a clear area and make sure the machine is operating correctly.

Do not allow another person to ride on the machine. This other person can fall or can cause an accident.

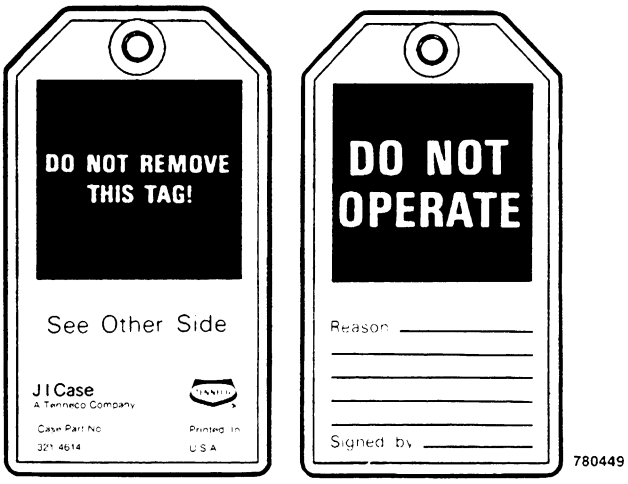
Be alert, always know the location of all workers in your area. Keep all other persons completely away from your machine. Injury or death can result if you do not follow these instructions.

PARKING THE MACHINE

When you park the machine and before you leave the operators area, lower the loader bucket to the ground or support the loader lift arms with the support strut and stop the engine.

MAINTENANCE

When you service the machine, put a Do Not Operate tag on the instrument panel. A Do Not Operate tag (Case part number 321-4614) is included with each new machine. Extra tags are available from your Case dealer.



Improper service or repair can cause injury or death. If you do not understand a service or adjustment procedure, see the correct section in this manual.

Unauthorized modifications to this machine can cause injury or death. Do not make unauthorized modifications to this machine.

If you must service this machine with the engine running, have another person help you. Follow the instructions in this manual. Do not leave the operators seat with the engine running.

Metal chips or debris can cause eye injury. Always wear eye or face protection when you use a hammer on this machine. Use a hammer with a soft face, such as brass, to drive hardened pins.

When adding air to a tire, always stand behind the tread of the tire and use a self-adjusting chuck. Explosive separation of the tire can result if you overinflate. When tire service is necessary, have a qualified tire mechanic service the tire.

Hydraulic fluid or grease injected into your skin can cause severe injury or death. Keep your hands and body away from any pressurized leak. If fluid is injected into your skin, see a doctor immediately and have the fluid removed.

FIRE OR EXPLOSION PREVENTION

Engine fuel can cause an explosion or fire. Do not fill the fuel tank with the engine running, if you are near an open fire, or if you are welding, smoking, etc.

Use nonflammable cleaning solvent to clean parts.

Sparks or flame can cause the hydrogen gas in a battery to explode. To prevent an explosion, do the following:

1. When disconnecting the battery cables, disconnect the negative (-) cable first; when connecting the battery cables, connect the negative (-) cable last.

2. When connecting jumper cables to start the engine, use the procedure shown in this manual.

3. Do not short circuit the battery posts with metal items.

4. Do not weld, grind, or smoke near a battery.

Sparks from the electrical system or engine exhaust can cause a fire or an explosion. Before you operate this machine in an area with flammable dust or vapors, use good ventilation to remove all flammable dust or vapors.

A fire can cause injury or death. Always have a fire extinguisher near the machine. Make sure the fire extinguisher is serviced according to the manufacturers instructions.

Remove all trash or debris from the machine. Make sure that oily rags or other flammable materials are not stored on the machine.

Check for fuel, oil, and hydraulic fluid leaks. Replace worn or damaged hoses/lines. After repairs are made, clean the machine before you operate.

BURN PREVENTION

Battery acid causes severe burns. Batteries contain sulfuric acid. Avoid contact with skin, eyes, or clothing. Antidote - EXTERNAL: flush with water. INTERNAL: drink large quantities of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil. Call a doctor immediately. EYES: flush with water for 15 minutes and get prompt medical attention.

When the battery electrolyte is frozen, the battery can explode if, (1) you try to charge the battery, (2) you try to jump start and run the engine. To prevent the battery electrolyte from freezing, try to keep the battery at full charge. If you do not follow these instructions, you or others in the area can be injured.

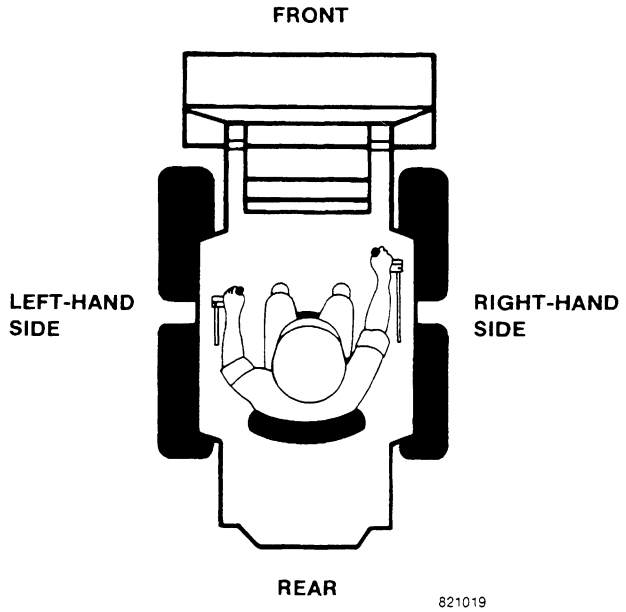
Hot coolant can spray out if the radiator cap is removed. To remove the radiator cap, let the cooling system cool, turn to the first notch, then wait until the pressure is released.

SERVICE MANUAL INTRODUCTION

This service manual has been prepared with the latest service information available. Troubleshooting, removal, disassembly, inspection and installation procedures, and complete specifications and tightening references can be found in most sections. Some sections have drawings but no written procedure because the job is so easily done. This service manual is one of the most important tools available to the service technician.

Right, Left, Front, and Rear

The terms right-hand and left-hand and front and rear as used in this manual indicate the right and left sides, and front and rear of the machine as seen from the operator's seat for correct operation of the machine or attachment.



Text

If the service manual is for more than one machine or different models of components (planetary axles, gear boxes, control valves, etc.) the procedures have the steps necessary to service each model.

Table of Contents

A Table of Contents is in the front of this manual. The Table of Contents shows the main divisions and the sections that are in each division. The individual sections, where necessary, have a Table of Contents on the cover or second page of that section.

Page Numbers

All page numbers are made of two numbers the separated by a dash, such as 4002-9. The number dash before the dash is the section number. The number following is the page number in that section. Page numbers will be found at the upper right or left of each page.

Illustrations

Illustrations are put as near as possible to the text and are to be used as part of the text.

Special Tools

Special tools are needed to remove and install, disassemble and assemble, check, and adjust some components parts of this machine. Some special tools can be easily made locally and the necessary information to make the tool is in this service manual. Other special tools are more difficult to make locally and are available from Service Tools in the U.S. and from Jobborn Manufacturing in Canada. Use these tools according to the instructions in this service manual for your personal safety and to do the job correctly.

Order special tools from either of the following companies:

Service Tools
P.O. Box 314
Owatonna, Minnesota 55060

Jobborn Manufacturing Co.
97 Frid Street
Hamilton, Ontario L8P 4M3
Canada

TORQUE SPECIFICATIONS - DECIMAL HARDWARE

Use the torques in this chart when special torques are not given. These torques apply to fasteners with both UNC and UNF threads as received from suppliers, dry, or when lubricated with engine oil. Not applicable if special graphites, molydisulfide greases, or other extreme pressure lubricants are used.

Grade 5 Bolts, Nuts, and Studs

Size	Pound-Feet	Newton metres
1/4 in	9-11	12-15
5/16 in	17-21	23-28
3/8 in	35-42	48-57
7/16 in	54-64	73-87
1/2 in	80-96	109-130
9/16 in	110-132	149-179
5/8 in	150-180	203-244
3/4 in	270-324	366-439
7/8 in	400-480	542-651
1.0 in	580-696	787-944
1-1/8 in	800-880	1085-1193
1-1/4 in	1120-1240	1519-1681
1-3/8 in	1460-1680	1980-2278
1-1/2 in	1940-2200	2631-2983

Grade 8 Bolts, Nuts, and Studs

Size	Pound-Feet	Newton metres
1/4 in	12-15	16-20
5/16 in	24-29	33-39
3/8 in	45-54	61-73
7/16 in	70-84	95-114
1/2 in	110-132	149-179
9/16 in	160-192	217-260
5/8 in	220-264	298-358
3/4 in	380-456	515-618
7/8 in	600-720	814-976
1.0 in	900-1080	1220-1465
1-1/8 in	1280-1440	1736-1953
1-1/4 in	1820-2000	2468-2712
1-3/8 in	2380-2720	3227-3688
1-1/2 in	3160-3560	4285-4827

NOTE: *Use thick nuts with Grade 8 bolts.*

TORQUE SPECIFICATIONS - METRIC HARDWARE

Use the following toques when special torques are not given

These values apply to fasteners with coarse threads as received from supplier, plated or unplated, or when lubricated with engine oil. These values do not apply if graphite or molydisulfide grease or oil if used.

Grade 8.8 Bolts, Nuts, and Studs

8.8

Size	Pound-Feet	Newton metres
M4	2-3	3-4
M5	5-6	6.5-8
M6	8-9	10.5-12
M8	19-23	26-31
M10	38-45	52-61
M12	66-79	90-107
M14	106-127	144-172
M16	160-200	217-271
M20	320-380	434-515
M24	500-600	675-815
M30	920-1100	1250-1500
M36	1600-1950	2175-2600

Grade 10.9 Bolts, Nuts, and Studs

10.9

Size	Pound-Feet	Newton metres
M4	3-4	4-5
M5	7-8	9.5-11
M6	11-13	15-17 5
M8	27-32	37-43
M10	54-64	73-87
M12	93-112	125-150
M14	149-179	200-245
M16	230-280	310-380
M20	450-540	610-730
M24	780-940	1050-1275
M30	1470-1770	2000-2400
M36	2580-3090	3500-4200

Grade 12.9 Bolts, Nuts, and Studs

12.9

Usually the torque values specified for grade 10.9 fasteners can be used satisfactorily on grade 12.9 fasteners.

811359A

TORQUE SPECIFICATIONS - STEEL HYDRAULIC FITTINGS

Tube OD Hose ID	Thread Size	Pound-Feet	Newton metres
37 Degree Flare Fittings			
1/4 in 6.4 mm	7/16-20	6-12	8-16
5/16 in 7.9 mm	1/2-20	8-16	11-21
3/8 in 9.5 mm	9/16-18	10-25	14-33
1/2 in 12.7 mm	3/4-16	15-42	20-56
5/8 in 15.9 mm	7/8-14	25-58	34-78
3/4 in 19.0 mm	1-1/16-12	40-80	54-108
7/8 in 22.2 mm	1-3/16-12	60-100	81-135
1.0 in 25.4 mm	1-5/16-12	75-117	102-158
1-1/4 in 31.8 mm	1-5/8-12	125-165	169-223
1-1/2 in 38.1 mm	1-7/8-12	210-250	285-338

Tube OD Hose ID	Thread Size	Pound-Feet	Newton metres
Straight Threads with O-ring			
1/4 in 6.4 mm	7/16-20	12-19	16-25
5/16 in 7.9 mm	1/2-20	16-25	22-23
3/8 in 9.5 mm	9/16-18	25-40	34-54
1/2 in 12.7 mm	3/4-16	42-67	57-90
5/8 in 15.9 mm	7/8-14	58-92	79-124
3/4 in 19.0 mm	1-1/16-12	80-128	108-174
7/8 in 22.2 mm	1-3/16-12	100-160	136-216
1.0 in 25.4 mm	1-5/16-12	117-187	159-253
1-1/4 in 31 8 mm	1-5/8-12	165-264	224-357
1-1/2 in 38.1 mm	1-7/8-12	250-400	339-542

Split Flange Mounting Bolts		
Size	Pound-Feet	Newton metres
5/16-18	15-20	20-27
3/8-16	20-25	26-33
7/16-14	35-45	47-61
1/2-13	55-65	74-88
5/8-11	140-150	190-203

Section

1002

FLUIDS AND LUBRICANTS

Bur 8-17800

Printed in U.S.A.
Issued May 1991

CASE CORPORATION

CAPACITIES AND LUBRICANTS

Fuel Tank
Capacity ..... 8. 5 U.S. gallons (32.2 litres)

Diesel Engine Crankcase
Capacity - with filter change ..... 4.9 U.S. quarts (4.6 litres)

Type of oil ..... See Engine Oil Recommendations on page 3

Gasoline Engine Crankcase
Capacity - with filter change ..... 2.3 U.S. quarts (2.2 litres)

Type of oil ..... See Engine Oil Recommendations on page 3

Hydraulic Reservoir
Capacity - with filter change ..... 5.75 U.S. gallons (21.8 litres)

Capacity - without filter change ..... 5.5 U.S. gallons (20.8 litres)

Capacity - total system ..... 7.5 U.S. gallons (28.4 litres)

Type of oil ..... SAE 10W30 engine oil with additive, see below

When you change the hydraulic oil, add one U.S. quart (0.95 litre) of Case HTO (Hydrostatic Transmission Oil Additive) Case part number B17508.

When you add oil to the hydraulic reservoir between oil changes, use a mixture of SAE 10W30 engine oil and HTO additive. Mix one U.S. quart (0.95 litre) of HTO additive with five U.S. gallons (19 litres) of 10W30 engine oil. (20 to 1 ratio).

Drive Chain Compartments
Capacity - each side ..... 3 U.S. quarts (2.8 litres)

Type of oil ..... SAE 10W30 engine oil

Engine Cooling System (Diesel)
Capacity ..... 7 U.S. quarts (6.6 litres)

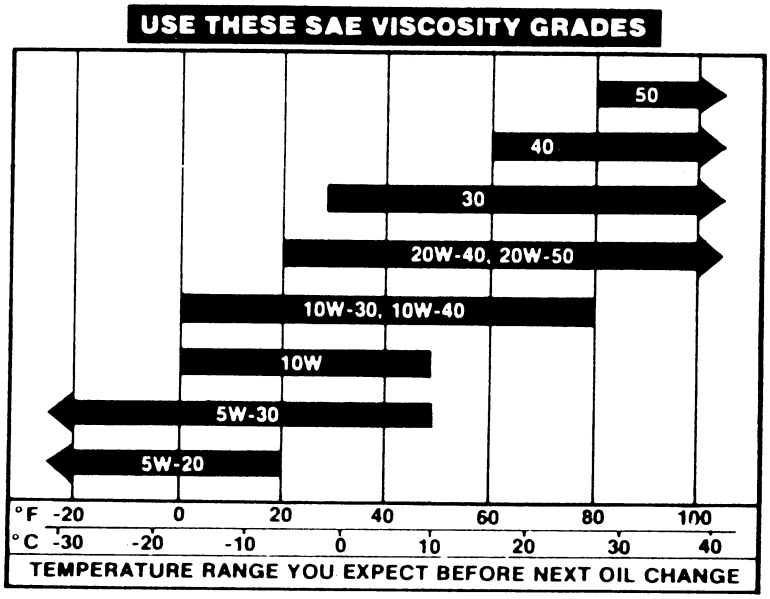
Type of coolant ..... Ethylene glycol type antifreeze and water that is mixed for lowest ambient temperature at least 50/50 mix

Grease Fittings
Type of lubricant ..... Case IH molydisulfide grease

Hydrostatic Motor Shaft Spline
Type of lubricant ..... Molykote, Type G grease

GASOLINE ENGINE OIL RECOMMENDATIONS

Use Case IH Engine Oil of the correct viscosity. See the chart for the temperatures and the recommended viscosity.



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DIESEL ENGINE OIL RECOMMENDATIONS

Use Case IH Engine Oil of the correct viscosity. See the chart for the temperatures and the recommended viscosity.

Above 77°F (25°C) ..... SAE 30

32 to 77°F (0 to 25°C) ..... SAE 10W30

Below 32°F (0°C) ..... SAE 10W or SAE 10W30

FUEL

Gasoline Engines

Use clean, unleaded regular grade gasoline. Do not use leaded gasoline in the engine.

Diesel Engines

Use the diesel fuel recommended for the temperatures in your area. If the ambient temperature lowers to the "cloud point" of the fuel, wax particles will form in the fuel. The wax particles can cause a restriction in the fuel filters decreasing engine power. See your fuel dealer.

Section
1010

ENGINE SPECIFICATIONS

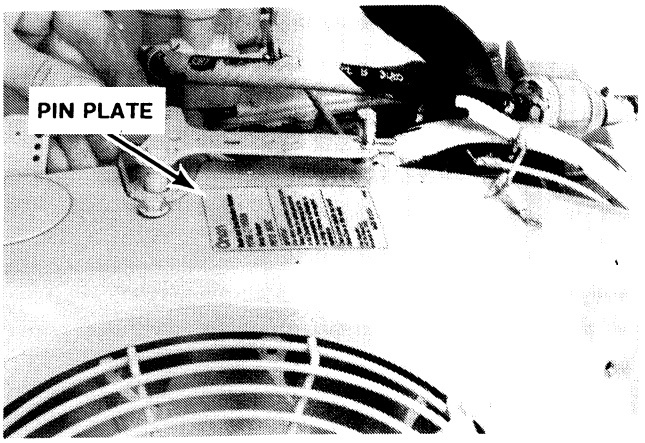
For Onan P218
2 Cylinder Gasoline Engine

Don 8-58750

Printed in U.S.A.
July, 1987

CASE CORPORATION

ENGINE IDENTIFICATION



How to interpret MODEL and SPEC NO.

P 2 18 G - I / 10550 A
1 2 3 4 5 6 7

1. Factory code for general identification of basic engine series
2. Number of cylinders
3. BHP rating
4. Fuel required (G = gasoline)
5. Engine duty cycle
6. Factory code for designated optional equipment, if any.
7. Specification (spec letter) which advances with factory production modifications.

A PIN (Product Identification Number) plate is fastened to the top of the flywheel guard. The bottom number on the plate is the serial number for the engine. Always use both numbers when ordering service parts or when making service enquiries.

GENERAL SPECIFICATIONS

Engine

Type	Horizontal Air Cooled 4-Cycle Gasoline Engine	
Number of Cylinders	2	
Stroke	2.875 inch	73 mm
Total Displacement	47.7 cubic inch	782 cm^3
Compression Ratio	7:1	
Cylinder Compression	75 to 115 PSI	517 to 793 kPa
Lubrication	Pressure Lubrication By Rotor Type Pump	
Ignition Order	Both Together	
Direction Of Rotation	Clockwise Looking From Flywheel End	
Governor	Mechanical On End Of Camshaft	

DETAILED SPECIFICATIONS

Valve Clearance (Cold)		
Intake	0.005 inch	0.13 mm
Exhaust	0.013 inch	0.33 mm
Intake Valve		
Stem Diameter	0.2795 to 0.2800 inch	7.099 to 7.112 mm
Clearance (Stem to Guide)	0.0010 to 0.0025 inch	0.025 to 0.064 mm
Valve Face Angle	44°	
Intake Valve Seat		
Seat Diameter	1.4395 to 1.4405 inch	36.56 to 36.59 mm
Seat Outside Diameter	1.470 to 1.471 inch	37.34 to 37.36 mm
Valve Seat Width	0.031 to 0.047 inch	0.787 to 1.194 mm
Valve Seat Angle	45°	
Exhaust Valve		
Stem Diameter	0.2780 to 0.2785 inch	7.061 to 7.074 mm
Clearance (Stem to Guide)	0.0020 to 0.0035 inch	0.051 to 0.089 mm
Valve Face Angle	44°	
Exhaust Valve Seat		
Seat Diameter	1.189 to 1.190 inch	30.20 to 30.23 mm
Seat Outside Diameter	1.192 to 1.193 inch	30.28 to 30.30 mm
Valve Seat Width	0.031 to 0.047 inch	0.787 to 1.194 mm
Valve Seat Angle	45°	
Valve Guide		
Intake Inside Diameter	0.281 to 0.282 inch	7.137 to 7.163 mm
Exhaust Inside Diameter	0.2805 to 0.2815 inch	7.124 to 7.150 mm
Valve Springs Intake And Exhaust		
Valve Spring Free Length (Approx.)	1.60 inch	40.64 mm
Valve Spring Length		
Valve Open	1.055 inch	26.80 mm
Valve Closed	1.346 inch	34.19 mm
Spring Load At 1.35 inch (Valve Closed)	25 lb	11.3 kg
Spring Load At 1.05 inch (Valve Open)	55 lb	24.9 kg
Camshaft		
Journal Diameter	1.3740 to 1.3745 inch	34.90 to 34.91 mm
Bearing Clearance	0.0015 to 0.0030 inch	0.038 to 0.076 mm
End Play	0.0110 to 0.0480 inch	0.280 to 1.22 mm
Cam Lobe Lift		
Intake	0.275 inch	6.98 mm
Exhaust	0.295 inch	7.49 mm
Camshaft Gear		
Backlash	0.001 to 0.005 inch	0.025 to 0.127 mm
Gear Backlash		
Timing Gear	0.001 to 0.005 inch	0.025 to 0.127 mm
Tappet		
Body Diameter	0.7475 to 0.7480 inch	18.99 to 19.00 mm
Bore Diameter	0.7500 to 0.7515 inch	19.05 to 19.09 mm
Clearance In Bore	0.002 to 0.004 inch	0.051 to 0.102 mm

DETAILED SPECIFICATIONS

Cylinder Liners		
Standard Bore	3.2490 to 3.2500 inch	82.53 to 82.55 mm
Oversize Bore	+ 0.005 inch	+ 0.127 mm
	+ 0.010 inch	+ 0.254 mm
	+ 0.020 inch	+ 0.508 mm
	+ 0.030 inch	+ 0.762 mm
	+ 0.040 inch	+ 1.016 mm
Maximum Out Of Round	0.003 inch	0.08 mm
Maximum Taper	0.005 inch	0.13 mm
Cross Hatch Pattern	23 degrees to horizontal	
Surface Finish	20 to 40 RMS	
Piston Rings		
Ring Gap In Liner:		
Top Compression	0.010 to 0.020 inch	0.250 to 0.510 mm
Bottom Compression	0.010 to 0.020 inch	0.250 to 0.510 mm
Oil Control	0.010 to 0.020 inch	0.250 to 0.510 mm
Side Clearance In Top Groove	0.003 to 0.008 inch	0.076 to 0.203 mm
Oversize Rings	See Oversize Pistons	
Pistons		
Clearance In Liner	0.0033 to 0.0053 inch	0.084 to 0.135 mm
Piston Pin Bore	0.687 to 0.688 inch	17.47 to 17.48 mm
Ring Groove Width:		
Top Compression Ring	0.080 to 0.081 inch	2.032 to 2.057 mm
Bottom Compression Ring	0.080 to 0.081 inch	2.032 to 2.057 mm
Oil Control Ring	0.188 to 0.189 inch	4.775 to 4.801 mm
Available Oversizes	+ 0.005 inch	+ 0.127 mm
	+ 0.010 inch	+ 0.254 mm
	+ 0.020 inch	+ 0.508 mm
	+ 0.030 inch	+ 0.762 mm
	+ 0.040 inch	+ 1.016 mm
Piston Pins		
Diameter	0.6875 to 0.6877 inch	17.463 to 17.468 mm
Clearance In Piston	0.00004 to 0.00064 inch	0.001 to 0.0162 mm
Clearance In Connecting Rod	0.0002 to 0.0007 inch	0.005 to 0.018 mm
Connecting Rods		
Big End Bore (Bolts Torqued)	1.6280 to 1.6285 inch	41.35 to 41.36 mm
Side Clearance On Crankshaft	0.002 to 0.016 inch	0.051 to 0.406 mm
Piston Pin Bore	0.6879 to 0.6882 inch	17.47 to 17.48 mm
Big End To Crankshaft Clearance	0.0020 to 0.0033 inch	0.051 to 0.084 mm
Available Oversizes	+ 0.010 inch	+ 0.254 mm
	+ 0.020 inch	+ 0.508 mm
	+ 0.030 inch	+ 0.762 mm

DETAILED SPECIFICATIONS

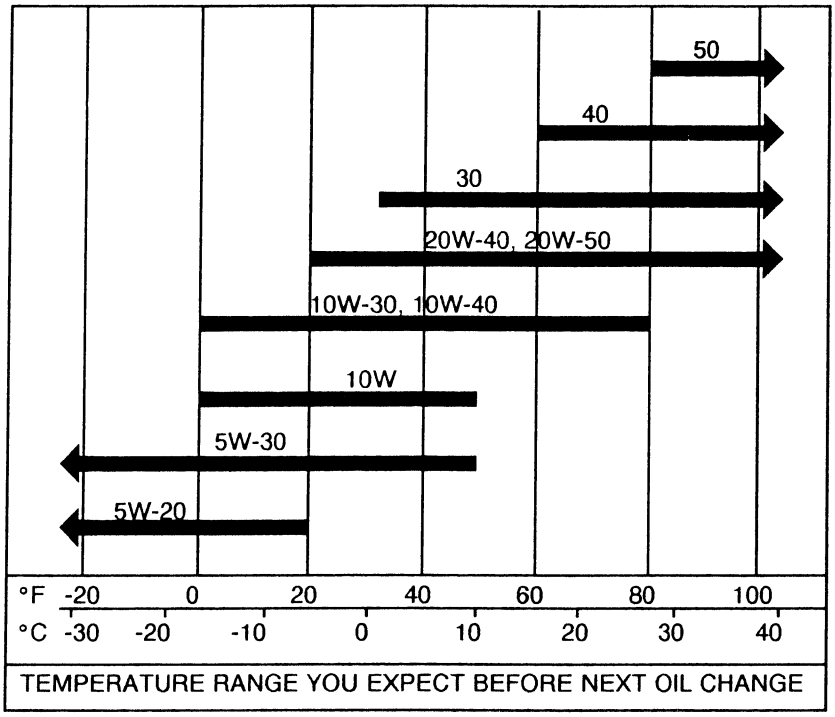
Crankshaft

Main Bearing Journal Diameter	1.9992 to 2.0000 inch	50.78 to 50.80 mm
Main Bearing Clearance	0.0024 to 0.0042 inch	0.061 to 0.107 mm
Connecting Rod Journal Diameter	1.6252 to 1.6260 inch	41.28 to 41.30 mm
Connecting Rod Bearing Clearance	0.0020 to 0.0033 inch	0.051 to 0.084 mm
Main Bearing Journal Taper (Max)	0.001 inch	0.03 mm
Connecting Rod Bearing Journal Taper (Max)	0.001 inch	0.03 mm
Crankshaft Gear Installation Temperature	350°F	177°C
Starter Ring Gear Installation Temperature	400°F	204°C
Crankshaft End Play	0.006 to 0.012 inch	0.15 to 0.30 mm

Lubricant

Capacity	1.5 Quarts	1.4 Litre
Change Period	Every 25 Hours	
Grade	See Table Below	

USE THESE SAE VISCOSITY GRADES



Oil Strainer

Location	In Oil Pan
Cleaning Period	Every 100 Hours

Oil Relief Valves

Location	One In Engine Block One In Oil Filter Adaptor	
Open At (Both)	20 PSI	138 kPa
Valve Diameter (Both)	0.3105 to 3.125 inch	7.89 to 7.94 mm
Valve Spring (Both)		
Free Length	1.00 inch	25.4 mm
Compress To	0.50 inch	12.7 mm
With A Load Of	2.4 to 2.8 lb	10.7 to 12.5 N

DETAILED SPECIFICATIONS

Low Oil Pressure Switch

Location	On Oil Filter Adaptor Block	
Operation	Stops Voltage Flow To Ignition When Oil Pressure Is Below 8 PSI	55 kPa

Engine Block Breather

Location	Above Left Hand Valve Cover	
Cleaning Period	Every 200 Hours	

Oil Pump

Location	At Front Of Engine Inside Timing Cover	
Drive	Gear In Mesh With Crankshaft Gear	
Gear Backlash	0.001 to 0.008 inch	0.025 to 0.203 mm
Minimum Pressure at 1500 RPM	8 PSI	55 kPa
Shim Gasket Thickness	0.005 inch	0.127 mm
	0.007 inch	0.178 mm
	0.009 inch	0.229 mm

Ignition System

Type	Electronic Battery Ignition System Using An Ignition Module And Trigger Ring	
Location	Behind Flywheel On Engine Crankshaft And Timing Gear Cover	

Ignition Coil

Primary Coil Resistance	2.90 to 3.60 Ohms At 70°F	
Secondary Coil Resistance	14.5 to 19.8k Ohms At (21°C)	

Ignition Timing

Degress Before Top Center	20	

Spark Plug

Type	RS14YC	
Electrode Gap	0.025 inch	1.64 mm

Carburetor

Type	Fixed Power Jet With Adjustable Low Idle Needle	

Governor

Type	Throwout Balls In Cup On End Of Camshaft. Actuates On Throttle Control Lever	

Fuel Pump

Type	Diaphragm Operated By Vacuum In Engine Block	
Inlet Vacuum (Min)		
Low Idle Speed	2.6 in Hg at 32°F	0.767 kPa at 0°C
Maximum Speed	2.6 in Hg at 32°F	0.767 kPa at 0°C
Outlet Pressure (Min)		
Low Idle Speed	1.7 PSI	11.72 kPa
Maximum Speed	1.7 PSI	11.72 kPa

DETAILED SPECIFICATIONS

Fuel Filter

Type	In Line Between Fuel Pump And Carburetor	

Starter Motor

Armature Shaft Thrust Gap	0.002 to 0.02 inch	0.05 to 0.5 mm
Pinion Clearance	0.020 to 0.080 inch	0.5 to 2.0 mm
Brushes (Minimum Length)	0.4528 inch	11.5 mm

Alternator

Type	Rotating Permanent Magnet Flywheel And Fixed Stator Coils
Output At:	
1800 RPM (Min)	19V AC
3600 RPM (Max)	45V AC
Stator Internal Resistance	0.05 to 0.15 Ohms

Rectifier/Regulator Unit

Type	Solid State
Output To Battery	13.6 to 14.7V DC 20 Ampere

SPECIAL TORQUES

Cylinder Head Bolts (Tighten In Three Stages):		
Graphoil Gasket	14 to 16 lb ft	19 to 22 Nm
Asbestos Gasket	16 to 18 lb ft	22 to 24 Nm
Connecting Rod Bolts	12 to 14 lb ft	16 to 19 Nm
Oil Pan Setscrews	18 to 23 lb ft	24 to 31 Nm
Drain Plug	18 to 23 lb ft	24 to 31 Nm
Engine Block Breather Setscrew	1 to 2 lb ft	1 to 3 Nm
Oil Pump Retaining Setscrews	7 to 9 lb ft	10 to 12 Nm
Timing Gear Cover Setscrews and Nut	8 to 10 lb ft	11 to 14 Nm
Inlet Manifold To Cylinder Heads	6 to 10 lb ft	8 to 14 Nm
Exhaust Manifold To Cylinder Heads	9 to 11 lb ft	12 to 15 Nm
Spark Plugs	15 to 20 lb ft	20 to 27 Nm
Starter Motor Mounting Bolts	19 to 21 lb ft	25 to 28 Nm
Solenoid Screw	54 lb in	6 Nm
Brush Retaining Screws	33 lb in	4 Nm
Through Bolts	51 lb in	5.7 Nm
Flywheel Retaining Bolt	50 to 55 lb ft	67 to 75 Nm

STANDARD TORQUES

Where no special torque data is specified, the following torque figures must be applied. Threads must be clean and lubricated with clean engine oil. Always tighten in two stages, 50% of figure then full tightness.

1/4 Inch Diameter Engine Block		
Studs and Nuts	7 to 9 lb ft	10 to 12 Nm
5/6 Inch Diameter Engine Block		
Studs and Nuts	8 to 10 lb ft	11 to 14 Nm

Section
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ENGINE SPECIFICATIONS

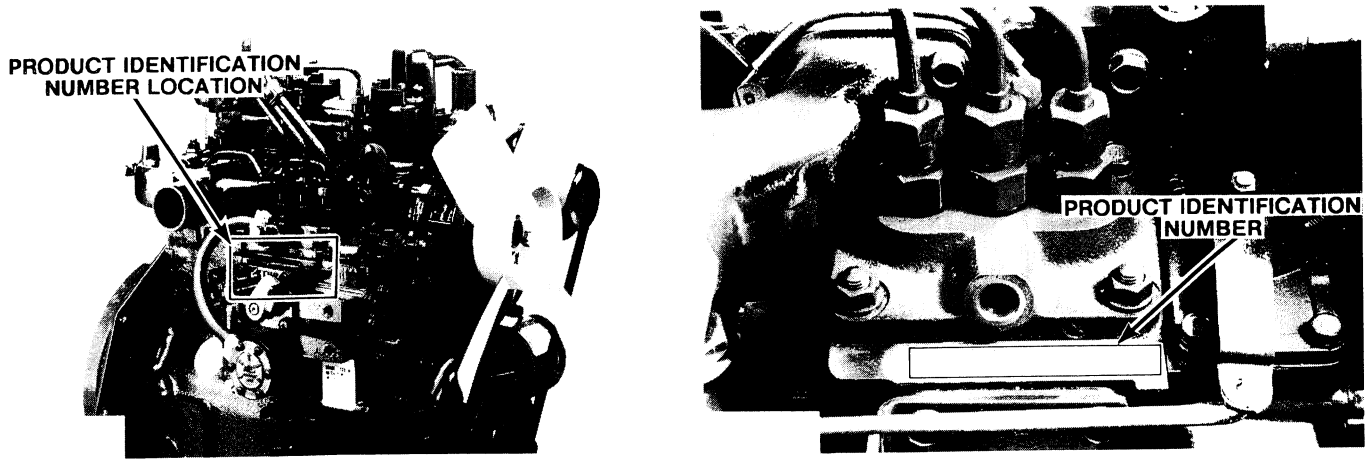
For Kubota D850
3 Cylinder Diesel Engine

Don 8-58740

Printed in U.S.A.
July, 1987

CASE CORPORATION

ENGINE IDENTIFICATION



A PIN (Product Identification Number) number is stamped on the engine block in front of the injection pump. Always use this number when ordering service parts or when making service enquiries.

IMPORTANT: *This engine was made using the metric measurement system. All measurements and checks must be made with metric tools to make sure of an accurate reading when inspecting parts.*

GENERAL SPECIFICATIONS

Engine

Type	Vertical, Water Cooled 4-Cycle Diesel Engine	
Number of Cylinders	3	
Total Displacement	52.2 cubic inch	855 cm^3
Maximum Torque at 1800 RPM	37.3 lb ft	50.6 Nm
Combustion Chamber	Spherical	
Compression Ratio	22 : 1	
Lubrication	Pressure Lubrication By Rotor Type Pump	
Injection Order	1-2-3	
Direction Of Rotation	Clockwise Looking From Flywheel End	
Dry Weight	182 lb	82.6 kg

DETAILED SPECIFICATIONS

Cylinder Head		
Warpage Per 4 inch (100 mm) Length	.0.002 inch	0.05 mm
Thickness Of Gasket When Tightened	0.041 to 0.045 inch	1.05 to 1.15 mm
Thickness of Gasket Shims	0.008 inch	0.20 mm
Cylinder Head To Piston Clearance	0.024 to 0.032 inch	0.6 to 0.8 mm
Compression Ratio	22 : 1	
Valves And Valve Guides		
Valve Seat Width	0.083 inch	2.1 mm
Valve Seat Angle	45 degress	
Valve Stem Diameter (Inlet and Exhaust)	0.2740 to 0.2746 inch	6.960 to 6.975 mm
Valve Guide Bore (Inlet and Exhaust)	0.2759 to 0.2765 inch	7.010 to 7.025 mm
Clearance Between Valve And Guide	0.0014 to 0.004 inch	0.035 to 0.1 mm
Depth Of Valve Below Cylinder Head Face	0.035 to 0.05 inch	0.9 to 1.3 mm
Valve Clearance (Inlet and Exhaust)	0.006 to 0.007 inch	0.145 to 0.185 mm
Valve Springs		
Free Length	1.370 to 1.402 inch	34.8 to 35.6 mm
Fitted Length	.1.22 inch	31 mm
Load Required To Compress To Fitted Length	14.1 to 16.5 lb	63 to 74 N
Squareness	0.051 inch	1.3 mm
Rockers And Rocker Shaft		
Rocker Shaft Diameter	0.4320 to 0.4324 inch	10.973 to 10.984 mm
Rocker Bush Bore	.0.4330 to 0.4346 inch	10.997 to 11.038 mm
Clearance Between Shaft And Bush	0.0005 to 0.0026 inch	0.013 to 0.065 mm
Engine Camshaft		
Camshaft Bearing Surface Diameter	1.2966 to 1.2972 inch	32.934 to 32.950 mm
Engine Block Bearing Surface Diameter	1.2992 to 1.3002 inch	33.000 to 33.025 mm
Clearance Between Bearing Surfaces	0.0020 to 0.0059 inch	0.050 to 0.15 mm
Camshaft Axial Alignment	0.0020 inch	0.05 mm
Cam Height (Inlet and Exhaust)	1.0563 to 1.0583 inch	26.83 to 26.88 mm
Gear Backlash	0.0017 to 0.0079 inch	0.042 to 0.2 mm
Idler Gear		
Shaft Diameter	0.9436 to 0.9441 inch	23.967 to 23.980 mm
Gear Bushes Inside Diameter	0.9449 to 0.9457 inch	24.000 to 24.021 mm
Clearance Between Shaft And Bushes	0.0008 to 0.002 inch	0.020 to 0.054 mm
(Max)	0.0039 inch	0.1 mm
Gear Backlash	0.0017 to 0.0079 inch	0.042 to 0.2 mm
Fuel Camshaft		
Cam Height (Injection Pump)	1.378 inch	35 mm
Gear Backlash	0.0017 to 0.0079 inch	0.042 to 0.2 mm

DETAILED SPECIFICATIONS

Cylinder Liners		
Standard Bore	2.8346 to 2.8353 inch	72.00 to 72.019 mm
Max Wear	2.8412 inch	72.169 mm
Oversize Bore	2.8543 to 2.8550 inch	72.500 to 72.519 mm
Max Wear	2.8609 inch	72.699 mm
Cross Hatch Pattern	40 to 60 degrees	
Surface Finish (Max)	1.2 to 2 μm	
Protrusion In Engine Block	± 0.001 inch	± 0.025 mm
Piston And Rings		
Ring Gap In Liner:		
Top Compression	0.0098 to 0.0492 inch	0.25 to 1.25 mm
Bottom Compression	0.0098 to 0.0492 inch	0.25 to 1.25 mm
Oil Control	0.0078 to 0.0492 inch	0.20 to 1.25 mm
Ring Side Clearance In Piston:		
Bottom Compression	0.0033 to 0.0044 inch	0.085 to 0.112 mm
Oil Control	0.0008 to 0.0020 inch	0.020 to 0.052 mm
Piston Pin Hole Diameter	0.7874 to 0.7885 inch	20.00 to 20.03 mm
Oversize Pistons	+ 0.0197 inch	+ 0.5 mm
Connecting Rods		
Small End Bush Diameter	0.7884 to 0.7890 inch	20.025 to 20.040 mm
Piston Pin Diameter	0.7875 to 0.7878 inch	20.002 to 20.011 mm
Clearance Between Pin And Bush	0.0008 to 0.0020 inch	0.02 to 0.05 mm
Alignment And Twist	0.002 inch	0.05 mm
Clearance Between Big End Bearing Inserts And Crankshaft	0.0011 to 0.0079 inch	0.029 to 0.20 mm
Crankshaft		
Main Bearing Diameters No. 1, 2, 3 & 4	1.7297 to 1.7303 inch	43.934 to 43.950 mm
Clearance Between Bearing Inserts And No. 1, 2 & 3 Diameters	0.0013 to 0.0079 inch	0.034 to 0.20 mm
Inside Diameter Of No. 4 Main Bearing (In Engine Block)	1.7317 to 1.7339 inch	43.984 to 44.040 mm
Clearance Between No. 4 Bearing And Crankshaft	0.0013 to 0.0079 inch	0.034 to 0.20 mm
Connecting Rod Bearing Diameters	1.4551 to 1.4557 inch	36.959 to 36.975 mm
Clearance Between Connecting Rod Inserts And Crankshaft Diameters	0.0011 to 0.0079 inch	0.029 to 0.20 mm
End Play	0.0059 to 0.0197 inch	0.015 to 0.5 mm
Axial Alignment (Max)	0.003 inch	0.08 mm
Flywheel		
Flatness Error (Max)	0.006 inch	0.152 mm

DETAILED SPECIFICATIONS

Lubricant		
Capacity	4.9 Quarts	4.6 Litre
Grade;		
Above 77°F (25°C)	SAE 30	
32° to 77°F (0 to 25°C)	SAE 20	
Below 32°F (0°C)	SAE 10W or SAE 10W-30	
Change Period	Every 100 Hours	

IMPORTANT: *The engine oil must be MIL-L-2104B/MIL-L-2140C or have properties of API classification CC/CD grades.*

Suction Filter		
Location	In Oil Pan	
Cleaning	At Oil Change	
Relief Valve		
Location	In Engine Block Below Oil Filter Cartridge	
Opens At	28 to 64 PSI	196 to 441 kPa
Oil Filter Cartridge		
Location	On Engine Block Below Dynamo	
Type	Full Flow With Paper Element and By-Pass Valve	
Change Period	Every 150 Hours	
Oil Pump		
Location	At Front Of Engine Inside Timing Cover	
Drive	Gear In Mesh With Crankshaft Gear	
Pressure At;		
Max Engine Speed	28 to 64 PSI	196 to 441 kPa
Low Idle	10 PSI	69 kPa
Stator To Body Clearance (Max)	0.010 inch	0.25 mm
Rotor To Stator Lobe Clearance (Max)	0.008 inch	0.20 mm
Rotor To End Plate Clearance (Max)	0.008 inch	0.20 mm
Low Oil Pressure Warning Switch		
Operates At A Pressure Below	7 PSI	49 kPa

DETAILED SPECIFICATIONS

Coolant

Type	Solution of Water and Ethylene Glycol Anti-Freeze	
40% Ethylene Glycol Solution Gives Protection To	-12°F	-24°C
50% Ethylene Glycol Solution Gives Protection To	-34°F	-36°C
Change Period	500 Hours or Once A Year Minimum	

IMPORTANT: *Do not install more than 50 percent Ethylene Glycol in the cooling system unless the ambient air temperature will be less than -34°F (-36°C). More than 50 percent Ethylene Glycol decreases heat transfer and will cause the engine surface temperature to be more than normal. Use an Ethylene Glycol that meets SAE J1034 and SAE J814c standards.*

Thermostat

Starts To Open At	176.9 to 182.3°F	80.5 to 83.5°C
Fully Open At	203°F	95°C
Opening Travel	0.315 inch	8 mm

Water Pump

Type	Impeller	
Flow	9.2 U.S. GPM	35 Litre/min
Drive	Fan Pulley	
Impellor Blade To Body Clearance	0.020 to 0.030 inch	0.51 to 0.76 mm

Fan Belt

Deflection With 13.2 to 15.4 lb (58.8 to 68.6 N) Load	0.276 to 0.354 inch	7 to 9 mm

DETAILED SPECIFICATIONS

Fuel Pump

Type . . . . . Diaphragm
Drive . . . . . Follower On Fuel Camshaft And Hand Lever
Mounting . . . . . On Engine Block Below Injection Pump
Lubrication . . . . . Engine Oil

Injection Pump

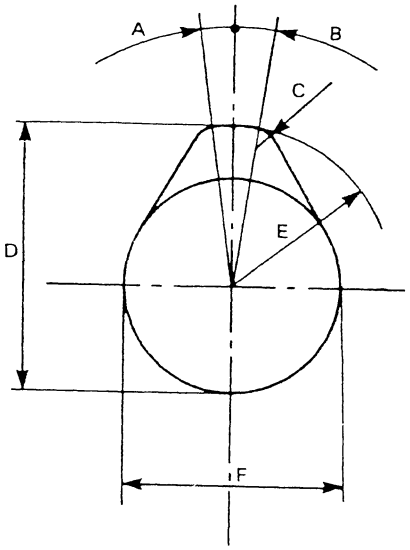
Type . . . . . Bosch K Mini Pump NP-PFR3KD50/24P4
Case 1959448 C1
Drive . . . . . Follower On Fuel Camshaft At 1/2 Engine Speed
Mounting . . . . . On Exhaust Side Of Engine Block
Lubrication . . . . . Fuel Oil Under Pressure
Pump Element Leakage . . . . . 5689 to 4978 PSI (39.23 to 34.32 MPa)
In Not Less Than 30 Seconds
Delivery Valve Leakage . . . . . 3129 to 2987 PSI (21.57 to 20.59 MPa)
In Not Less than 5 seconds
Injection Timing . . . . . 23 to 25 Degrees Before Top Center
Injection Order 1-2-3

Test Details

Test Conditions

Driving Stand	DIESEL KIKI CO. LTD: Code No. 10578-4150
Nozzle	DN12SD12T
Opening Pressure	1707 PSI (11.77 MPa)
Injection Pipe	0.24 in. Dia. x 0.08 in. Dia. x 23.62 in Long (6 mm Dia. x 2 mm Dia. x 600 mm Long)
Fuel Feed Pressure	7 PSI (49 kPa)
Test Fuel	Diesel Fuel No. 2-D
Pre-Stroke	0.0846 to 0.0886 (2.15 to 2.25 mm)
Cam Profile	PFK-T-00 (See Figure)

Cam Profile Data



A	7°
B	7°
C	0.118 in (3 mm)
D	1.378 in (35 mm)
E	0.827 in (21 mm)
F	1.102 in (28 mm)

Adjustment Reference Data

Control Rack Position (mm)	Speed (RPM)	Amount of fuel (CC/100st)
a + 2	1400	2.21 to 2.55
a	1400	1.52 to 1.58
a - 1	1400	0.95 to 1.35
a - 1	400	0.45 to 0.77