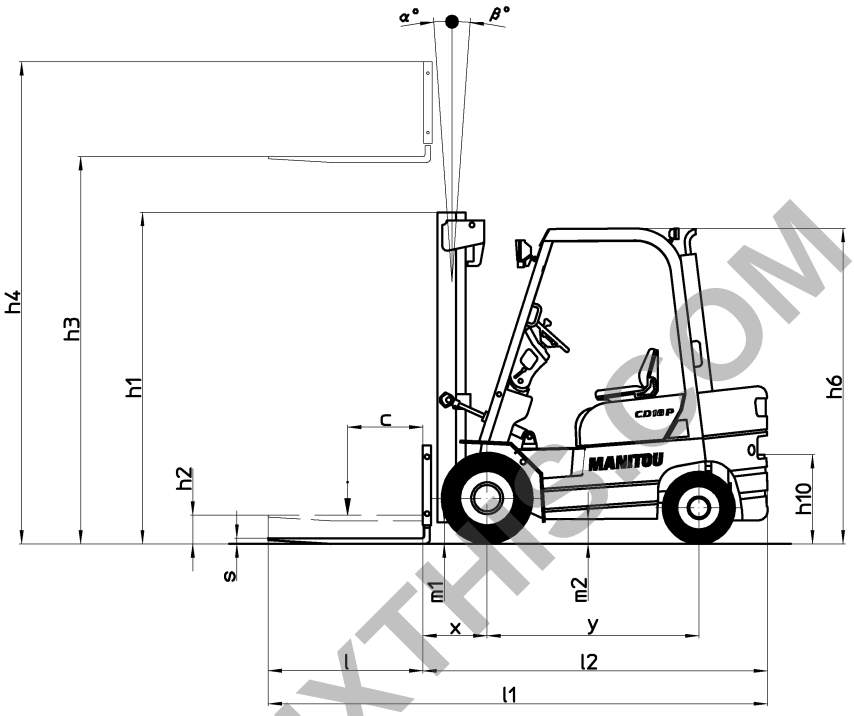
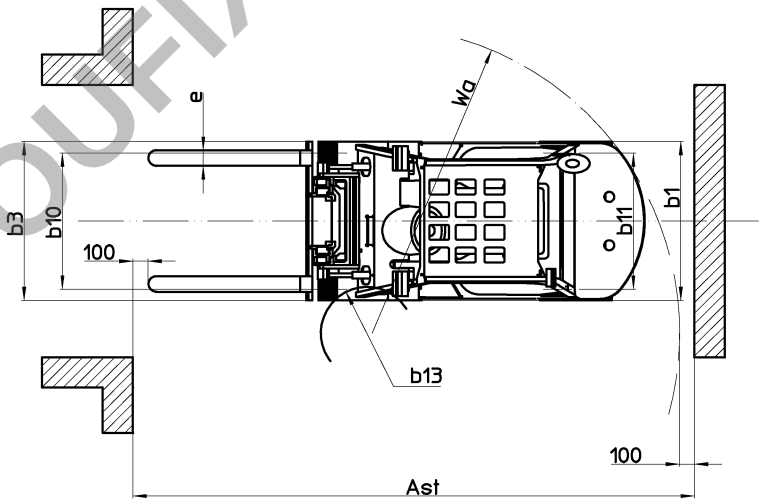
DIMENSIONS AND LOAD CHART

CD 15 P (WITH STANDARD MAST)

Ast	3500 mm
b1	1050 mm
b3	1050 mm
b10	880 mm
b11	900 mm
b13	280 mm
c	500 mm
e	100 mm
h1	2170 mm
h2	195 mm
h3	3355 mm
h4	4265 mm
h6	2060 mm
h10	280 mm
l	1220 mm
l1	3460 mm
l2	2240 mm
m1	115 mm
m2	120 mm
Q	1500 kg
s	35 mm
Wa	1880 mm
x	420 mm
y	1400 mm
α	6 °
β	12 °





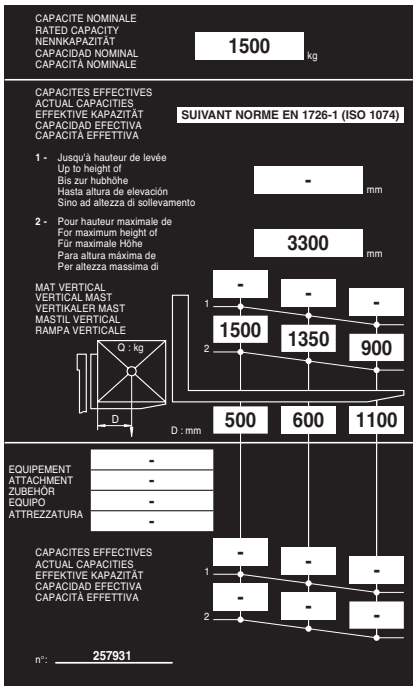
RATED CAPACITY

ACTUAL CAPACITIES
(according to standard EN 1726-1)

1 - Up to height of

2 - For maximum height of

VERTICAL MAST



ATTACHMENT

ACTUAL CAPACITIES

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GENERAL REPAIR INSTRUCTIONS

1. Before performing any service operation with the engine mounted, disconnect the grounding cable from the battery.

   This will reduce the chance of cable damage and burning due to short circuiting.
2. Always use the proper tool or tools for the job at hand.

   Where specified, use the specially designed tool or tools.
3. Use genuine ISUZU parts referring ISUZU PARTS CATALOG for the engines.
4. Never reuse cotter pins, gaskets, O-rings, lock washers, and self locking nuts. Discard them as you remove them. Replace them with new ones.
5. Always keep disassembled parts neatly in groups. This will ensure a smooth reassembly operation.

   It is especially important to keep fastening parts separate. These parts vary in hardness and design, depending on their installation position.
6. All parts should be carefully cleaned before inspection or reassembly.

   Oil ports and other openings should be cleaned with compressed air to make sure that they are completely free of obstructions.
7. Rotating and sliding part surfaces should be lubricated with oil or grease before reassembly.
8. If necessary, use a sealer on gaskets to prevent leakage.
9. Nut and bolt torque specifications should be carefully followed.
10. Always release the air pressure from any machine-mounted air tank(s) before dismounting the engine or disconnecting pipes and hoses.
11. Always check and recheck your work. No service operation is complete until you have done this.
12. Information contained in the “Main Data and Specifications” of the Workshop Manual and the Instruction Book may differ. In this case, the information contained in the Instruction Book should be considered applicable.

NOTES ON THE FORMAT OF THIS MANUAL

This Workshop Manual is applicable to the 3LA1, 3LB1, 3LD1 family of industrial diesel engines. Unless otherwise specified, these engines have common parts and components as well as data and specifications.

Illustrations used in this Workshop Manual are based on the 3LB1 and 3LD1 engines.

1. Find the applicable section by referring to the Table of Contents at the beginning of the Manual.
2. Common technical data such as general maintenance items, service specifications, and tightening torques are included in the “General Information” section.
3. Each section is divided into sub-sections dealing with disassembly, inspection and repair, and reassembly.
4. When the same servicing operation is applicable to several different units, the manual will direct you to the appropriate page.
5. For the sake of brevity, self-explanatory removal and installation procedures are omitted.

   More complex procedures are covered in detail.

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TIGHTENING TORQUE SPECIFICATIONS

The tightening torque values given in the table below are applicable to the bolts unless otherwise specified.

STANDARD BOLT

kg·m (lb.ft/N·m)

Strength Class / Bolt Identification / Bolt Diameter × pitch (mm)	4.8 (4T)	(7T)	8.8 Refined	8.8 Non-Refined	9.8 (9T)
					
	 No mark	——			
M 6 ×1.0	0.4～0.8 (2.9～5.8/3.9～7.8)	0.5～1.0 (3.6～7.2/4.9～9.8)			——
M 8 ×1.25	0.8～1.8 (5.8～13.0/7.8～17.7)	1.2～2.3 (8.7～16.6/11.8～22.6)			1.7～3.1 (12.3～22.4/16.7～30.4)
M10 ×1.25	2.1～3.5 (15.2～25.3/20.6～34.3)	2.8～4.7 (20.3～34.0/27.5～46.1)			3.8～6.4 (27.5～46.3/37.3～62.8)
M12 ×1.25	5.0～7.5 (36.2～54.2/49.0～73.6)	6.2～9.3 (44.8～67.3/60.8～91.2)			7.7～11.6 (55.7～83.9/75.5～113.8)
M14 ×1.5	7.8～11.7 (56.4～84.6/78.5～114.7)	9.5～14.2 (68.7～102.7/93.2～139.3)			11.6～17.4 (83.9～125.6/113.8～170.6)
M16 ×1.5	10.6～16.0 (76.7～115.7/103.0～156.9)	13.8～20.8 (99.8～150.4/135.3～204.0)			16.3～24.5 (118.9～177.2/159.9～240.3)
M18 ×1.5	15.4～23.0 (111.1～166.4/151.0～225.6)	19.9～29.9 (143.9～216.3/195.2～391.3)			23.4～35.2 (169.3～254.6/229.5～345.2)
M20 ×1.5	21.0～31.6 (151.9～228.6/205.9～307.9)	27.5～41.3 (198.9～298.7/269.7～405.0)			32.3～48.5 (233.6～350.8/316.8～475.6)
M22 ×1.5	25.6～42.2 (185.2～305.2/251.1～413.8)	37.0～55.5 (267.6～401.4/362.9～544.3)			43.3～64.9 (313.2～469.4/424.6～636.5)
M24 ×2.0	36.6～55.0 (264.7～397.8/358.9～539.4)	43.9～72.5 (317.5～523.9/430.5～711.0)			56.5～84.7 (408.7～612.6/554.1～830.6)
*M10 ×1.5	2.0～3.4 (14.5～24.6/19.6～32.4)	2.8～4.6 (20.3～33.3/27.5～45.1)			3.7～6.1 (26.8～44.1/36.3～59.8)
*M12 ×1.5	4.6～7.0 (33.3～50.6/45.1～68.7)	5.8～8.6 (42.0～62.2/56.9～84.3)			7.3～10.9 (52.8～78.8/71.6～106.9)
*M14 ×2.0	7.3～10.9 (52.8～78.8/71.6～106.9)	9.0～13.4 (65.1～96.9/88.3～131.4)			10.9～16.3 (78.8～118.9/106.9～159.9)
*M16 ×2.0	10.2～15.2 (73.8～110.0/100.0～149.1)	13.2～19.8 (95.5～143.2/129.5～194.2)			15.6～23.4 (112.8～169.3/162.8～229.5)

An asterisk (*) indicates that the bolts are used for female threaded parts that are made of soft materials such as casting. Those shown in parentheses in the strength class indicate the classification by the old standard.

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7. ROCKER ARM SHAFT AND ROCKER ARM

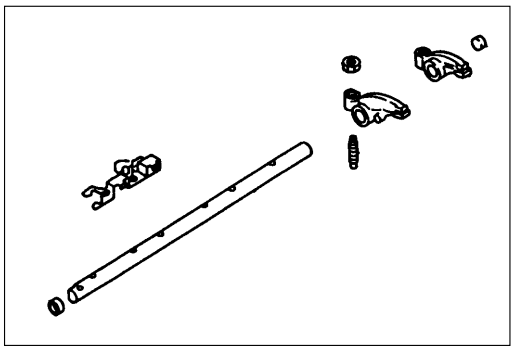


Fig. 94

Inspect all disassembled parts for wear, damage and any abnormalities.

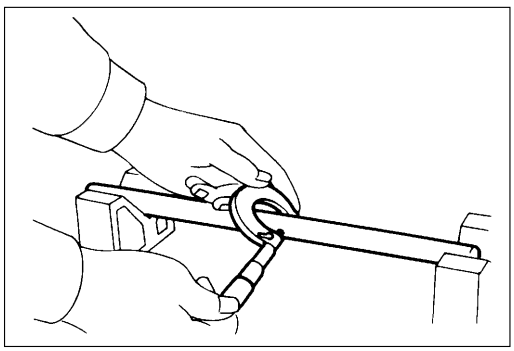


Fig. 95

Rocker Arm Shaft Outside Diameter

Use a micrometer to measure the rocker arm outside diameter.

If the measured value is less than the specified limit, the shaft must be replaced.

mm (in.)

	Standard
Rocker Arm Shaft Diameter	11.935 – 11.955 (0.4699 – 0.4707)

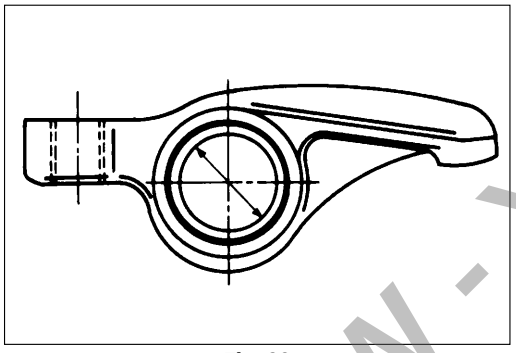


Fig. 96

Rocker Arm Shaft and Rocker Arm Clearance

1. Use a vernier caliper to measure the rocker arm bushing inside diameter.

mm (in.)

	Standard
Rocker Arm Bushing Inside Diameter	11.960 – 11.980 (0.4709 – 0.4717)

2. Measure the rocker arm shaft outside diameter.

   Replace either the rocker arm or the rocker arm shaft if the clearance exceeds the specified limit.

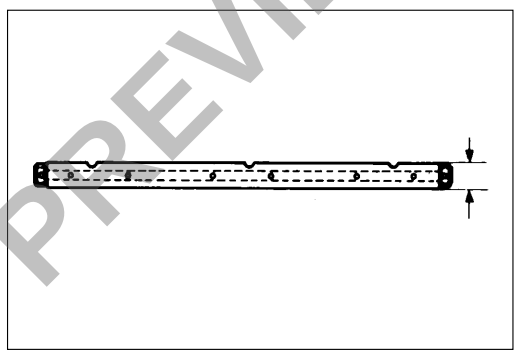


Fig. 97

mm (in.)

	Standard	Limit
Rocker Arm Bushing and Rocker Arm Shaft Clearance	0.005 – 0.045 (0.0002 – 0.0018)	0.2 (0.0079)

3. Check that the rocker arm oil port is free of obstructions.

   If necessary, use compressed air to clean the rocker arm oil port.

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2. CYLINDER HEAD

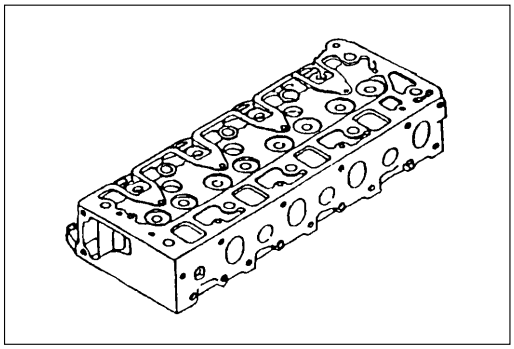


Fig. 64

Cylinder head inspection

Remove carbon deposit on the bottom surface of the head with care not to damage the valve seat.

Leakage: Water pressure test 5kg/cm^2 (for 3 minutes)

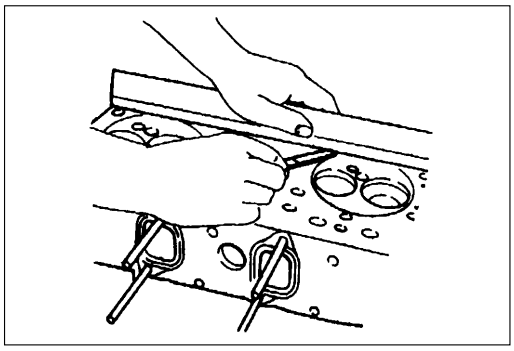


Fig. 65

Cylinder Head Lower Face Warpage

1. Use a straight edge and a feeler gauge to measure the four sides and the two diagonals of the cylinder head lower face.
2. Regrind the cylinder head lower face if the measured values are greater than the specified limit but less than the maximum grinding allowance.

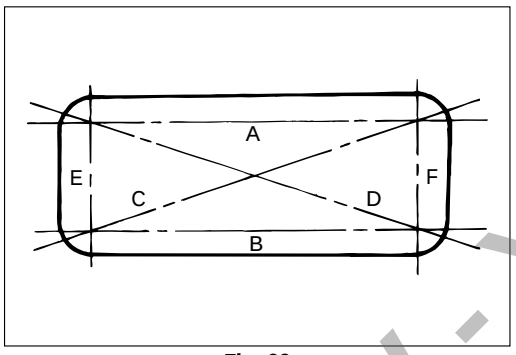


Fig. 66

If the measured values exceed the maximum grinding allowance, the cylinder head must be replaced.

Cylinder Head Lower Face Warpage mm (in.)

Standard	Limit	Maximum Grinding Allwance
0.075 (0.0029)	0.15 (0.0059)	0.3 (0.0118)

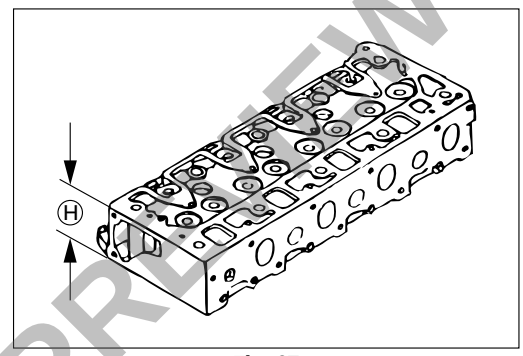


Fig. 67

Cylinder Head Height Ⓗ (Reference) mm (in.)

Engine	Standard
4LB1 4LC1 4LE1	63.90 – 64.10 (2.515 – 2.523)

Note:

If the cylinder head lower face is reground, valve depression must be checked.

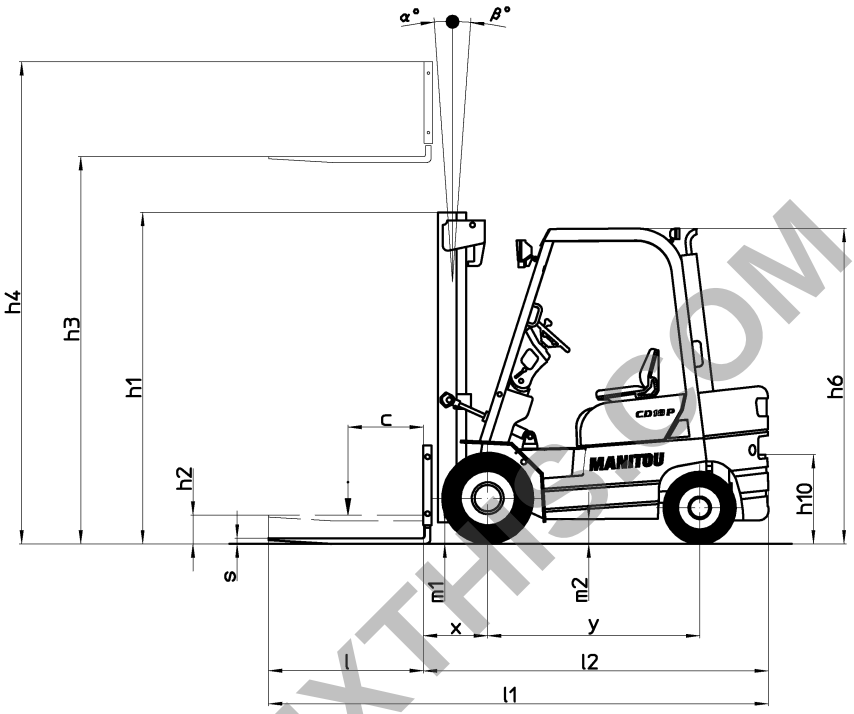
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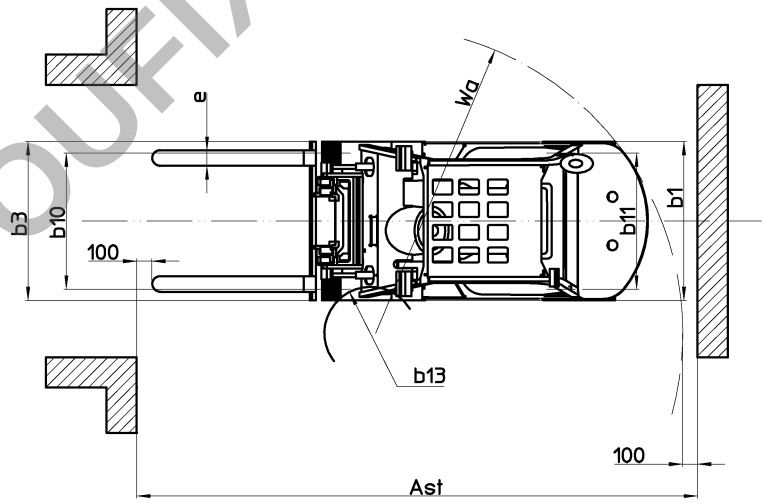
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DIMENSIONS AND LOAD CHART

CD 18 P (WITH STANDARD MAST)

Ast	3535 mm
b1	1050 mm
b3	1050 mm
b10	880 mm
b11	900 mm
b13	280 mm
c	500 mm
e	100 mm
h1	2170 mm
h2	195 mm
h3	3355 mm
h4	4265 mm
h6	2060 mm
h10	280 mm
l	1220 mm
l1	3495 mm
l2	2275 mm
m1	115 mm
m2	120 mm
Q	1800 kg
s	35 mm
Wa	1915 mm
x	420 mm
y	1400 mm
α	6 °
β	12 °





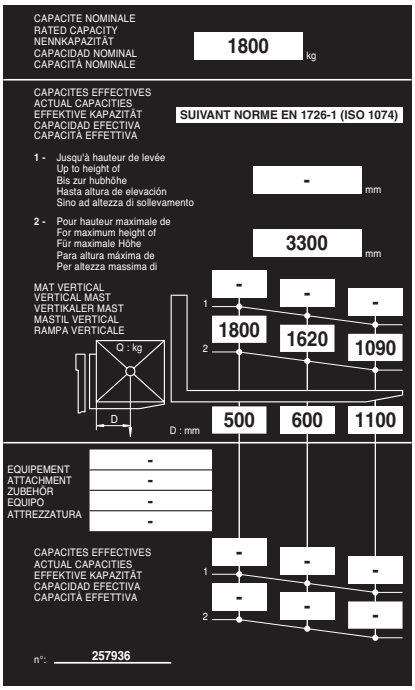
RATED CAPACITY

ACTUAL CAPACITIES
(according to standard EN 1726-1)

1 - Up to height of

2 - For maximum height of

VERTICAL MAST



ATTACHMENT

ACTUAL CAPACITIES

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6. Each service operation section in this Workshop Manual begins with an exploded view of the applicable area.

(Example)

Major components

Figures in parentheses "( )" show the order of disassembling or reassembling.

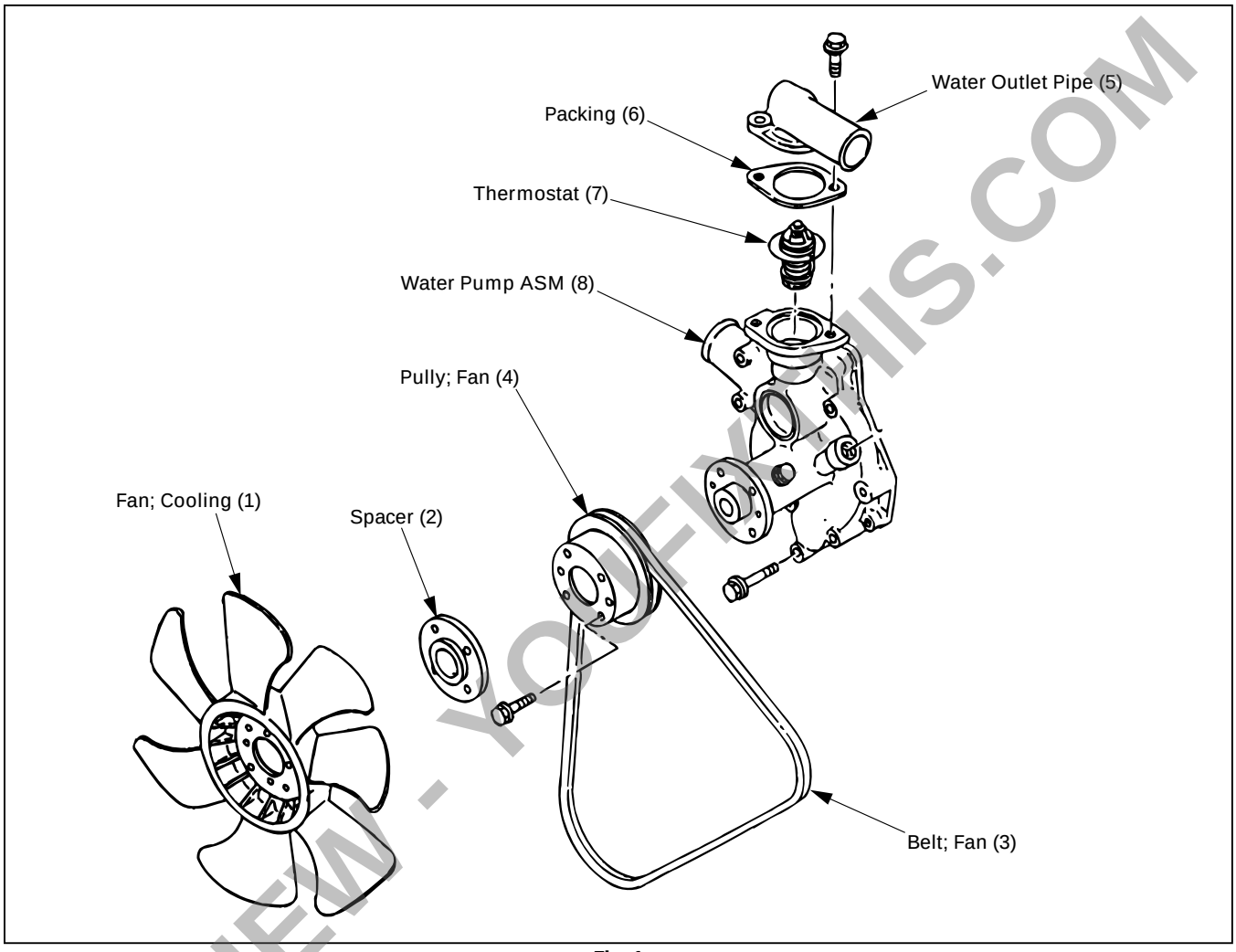


Fig. 1

7. Measurement criteria are defined by the terms "standard" and "limit".

   A measurement falling within the "standard" range indicates that the applicable part or parts are serviceable.

   "Limit" should be thought of as an absolute value.

   A measurement which is outside the "limit" indicates that the applicable part or parts must be either repaired or replaced.

8. Components and parts are listed in the singular form throughout the Manual.

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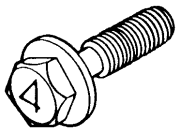
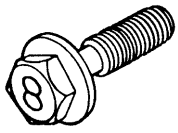
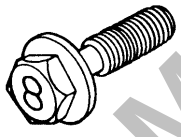
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TIGHTENING TORQUE SPECIFICATIONS

The tightening torque values given in the table below are applicable to the bolts unless otherwise specified.

FLANGED HEAD BOLT

kg·m (lb.ft/N·m)

Bolt head marking / Nominal size (dia. x pitch)			
M 6 × 1	0.5～0.9 (3.61～6.50/4.6～8.5)	0.6～1.2 (4.33～8.67/5.88～11.76)	——
M 8 × 1.25	1.1～2.0 (7.95～14.46/10.78～19.61)	1.4～2.9 (4.33～8.67/5.88～11.76)	1.9～3.4 (13.74～24.59/18.63～33.34)
M10 × 1.25	2.3～3.9 (17.35～28.20/23.53～38.24)	3.6～6.4 (26.03～44.12/35.30～59.82)	4.3～7.2 (31.10～52.07/42.16～70.60)
***M10 × 1.5**	2.3～3.8 (16.63～27.48/22.55～37.26)	3.5～5.8 (25.31～41.95/34.32～56.87)	4.1～6.8 (29.65～49.18/40.20～66.68)
M12 × 1.25	5.6～8.4 (40.50～60.75/54.91～82.37)	7.9～11.9 (57.14～86.07/77.47～116.69)	8.7～13.0 (62.92～94.02/85.31～127.48)
***M12 × 1.75**	3.5～9.5 (37.61～56.41/50.99～76.49)	7.3～10.9 (52.80～78.83/71.58～106.89)	8.1～12.2 (58.58～88.24/79.43～119.64)
M14 × 1.5	8.5～12.7 (61.48～91.85/83.35～124.54)	11.7～17.6 (84.62～127.30/114.73～172.59)	12.6～18.9 (91.13～136.70/123.56～185.34)
***M14 × 2**	7.6～11.5 (57.14～85.34/77.47～115.71)	11.1～16.6 (80.28～120.06/108.85～162.79)	11.8～17.7 (85.34～128.02/115.71～173.57)
M16 × 1.5	11.8～17.7 (85.34～128.02/115.71～173.57)	17.1～26.5 (125.85～189.50/170.63～256.93)	18.0～27.1 (130.19～196.01/176.52～265.76)
***M16 × 2**	11.2～16.7 (81.00～120.79/109.83～163.77)	16.6～24.9 (120.06～180.10/162.79～244.18)	17.2～25.7 (124.40～186.61/168.67～253.01)

A bolt with an asterisk (*) is used for female screws of soft material such as cast iron.

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9. CONNECTING ROD AND CONNECTING ROD BEARING

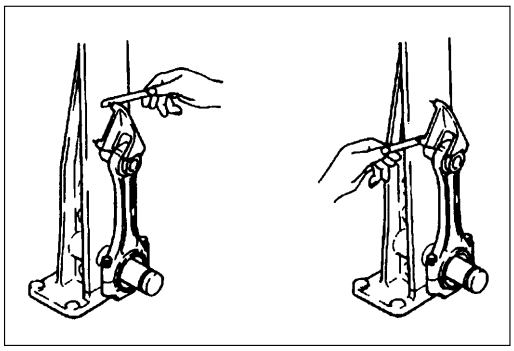


Fig. 103

Torsion and parallelism of connecting rod

If worn beyond the limit-repair or replace.

mm (in.)

Per 100 mm (3.94)	Standard	Limit
Torsion	0.05 (0.002)	0.2 (0.0079)
Parallelism	0.05 (0.002)	0.15 (0.0059)

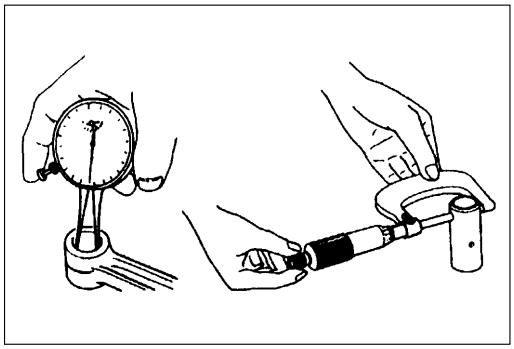


Fig. 104

Clearance between small end pin hole of connecting rod and piston pin, inside diameter of bushing

mm (in.)

		Standard	Limit
Clearance		0.008 – 0.020 (0.0003 – 0.0008)	0.05 (0.0020)
Inside diameter	4LB1	21 (0.8268)	—
	4LB1T 4LC1 4LE1	25 (0.9843)	—

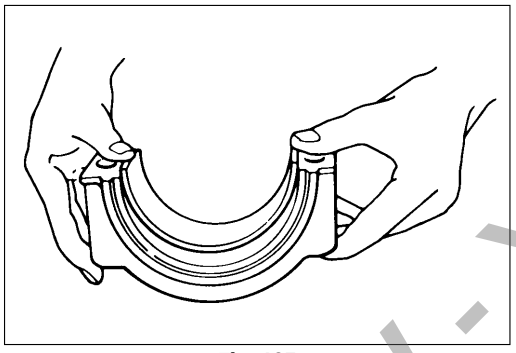


Fig. 105

Connecting Rod Bearing Inspection

1. Fit the connecting rod bearing lower half into the connecting rod bearing cap.
2. Check the connecting rod bearing lower half tension.
   If the tension is insufficient, the bearing must be replaced.
3. Tighten the connecting rod and the bearing cap to the specified torque.

kg·m (ft. lbs.)

Tightening torque	4LB1, 4LB1T	3.8 – 4.2 (27 – 30)
	4LC1	2.3 – 2.7 (17 – 20) ↓ 100 – 115 deg.
	4LE1	7.5 – 8.5 (54 – 61)

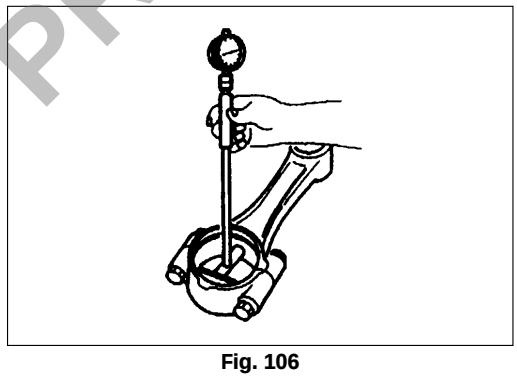


Fig. 106

Clearance between bearing and crank pin, inside diameter with bearing installed and without.

mm (in.)

	Standard	Limit
Clearance	0.035 – 0.073 (0.0014 – 0.0029)	0.10 (0.0039)

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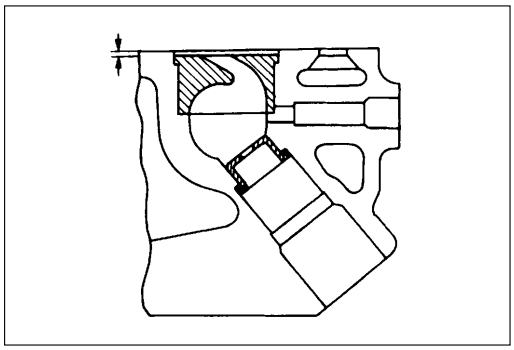


Fig. 68

HOT PLUG

Hot Plug Depression

1. Clean the cylinder head lower face, taking care not to damage the hot plug surfaces.
2. Use a straight edge and a feeler gauge to measure the hot plug depression in a straight line from the No. 1 hot plug to the No. 3 hot plug.

   If the measured value exceeds the specified limit, the hot plugs must be replaced.

Hot Plug Depression mm (in.)

Limit
0.05 (0.002)

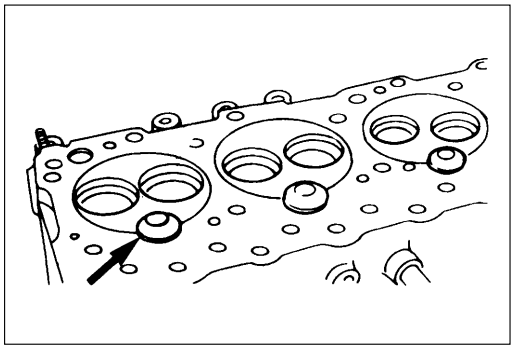


Fig. 69

Combustion Chamber Inspection

1. Remove the carbon adhering to the inside of the combustion chamber. Take care not to damage the hot plug fitting positions.
2. Inspect the combustion chamber, the hot plug hole, and the hot plug machined faces for cracking and other damage.

   If cracking or damage is present, the cylinder head must be replaced.

Note:

Be absolutely certain that there are no scratches or protuberances on the combustion chamber surfaces which will be in contact with the hot plug after it is installed. These flaws will prevent the hot plug from seating correctly.

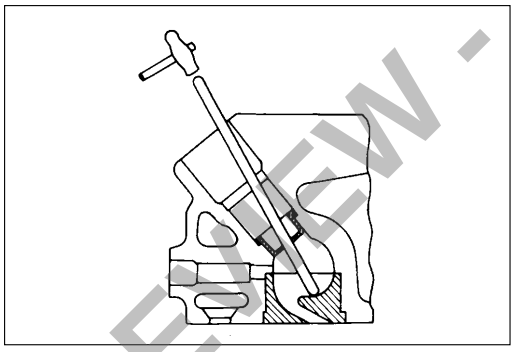


Fig. 70

Hot Plug Replacement

Hot Plug Removal

1. Insert a 3.0 – 5.0 mm (0.12 – 0.20 in) diameter brass bar into the nozzle holder fitting hole until it makes contact with the hot plug.
2. Lightly tap the bar with a hammer to drive the hot plug free.

Hot Plug Inspection

Inspect the hot plugs for excessive wear and other damage. Replace the hot plugs if either of these conditions are discovered.

Refer to “Hot Plug Installation”.

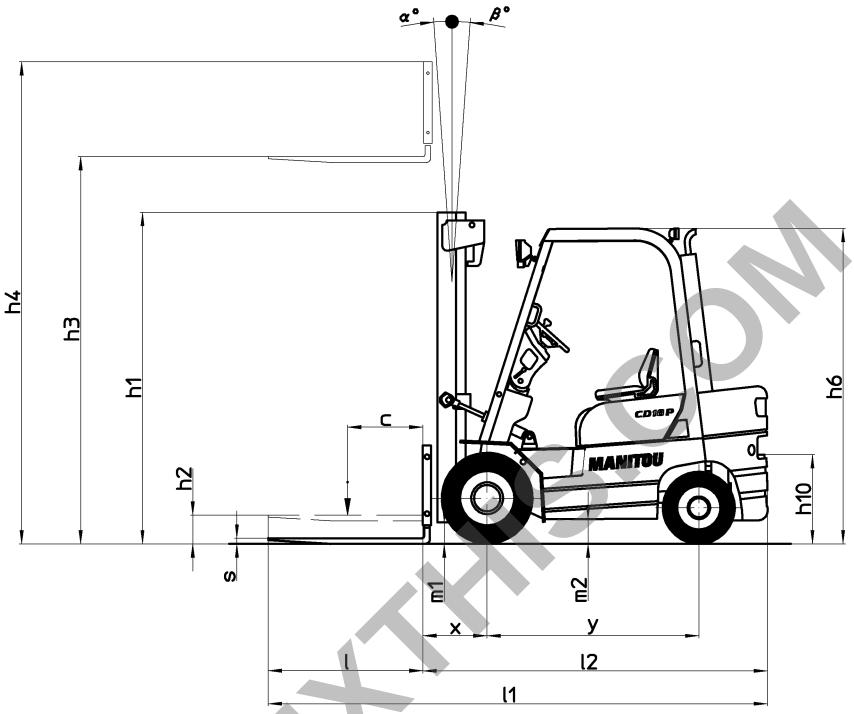
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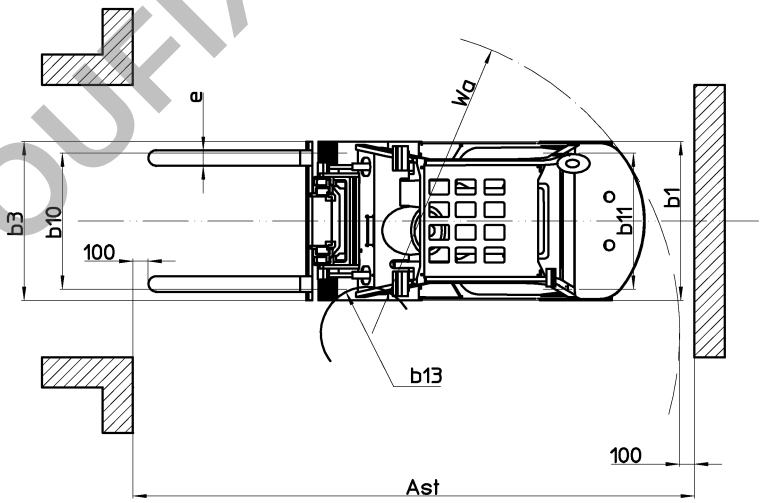
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DIMENSIONS AND LOAD CHART

CD 20 P (WITH STANDARD MAST)

Ast	3755 mm
b1	1150 mm
b3	1150 mm
b10	960 mm
b11	970 mm
b13	320 mm
c	500 mm
e	120 mm
h1	2170 mm
h2	200 mm
h3	3360 mm
h4	4270 mm
h6	2120 mm
h10	300 mm
l	1220 mm
l1	3675 mm
l2	2455 mm
m1	120 mm
m2	140 mm
Q	2000 kg
s	40 mm
Wa	2100 mm
x	455 mm
y	1600 mm
α	6 °
β	12 °





RATED CAPACITY

ACTUAL CAPACITIES
(according to standard EN 1726-1)

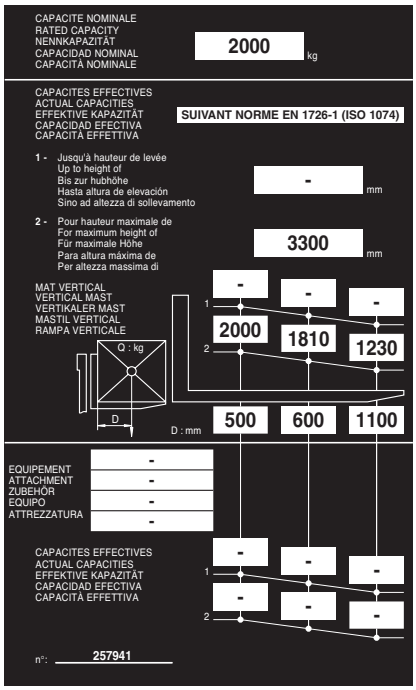
1 - Up to height of

2 - For maximum height of

VERTICAL MAST

ATTACHMENT

ACTUAL CAPACITIES



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9. The following symbols appear throughout this Worshop Manual. They tell you the type of service operation or step to perform.

 . . . Remove

 . . . Adjustment

 . . . Installation

 . . . Cleaning

 . . . Disassembly

 . . . Important Operation Requiring Extra Care

 . . . Reassembly

 . . . Specified Torque (Tighten)

 . . . Alignment (Marks)

 . . . Special Tool Use Required for Recommended (Isuzu Tool or Tools)

 . . . Directional Indication

 . . . Commercially Available Tool Use Required or Recommended

 . . . Inspection

 . . . Lubrication (Oil)

 . . . Measurement

 . . . Lubrication (Grease)

 . . . Liquid Gasket Application

10. Direction used in this Manual are as follows:

Front

The cooling fan side of the engine viewed from the flywheel.

Right

The injection pump side of the engine.

Left

The exhaust manifold side of the engine.

Rear

The flywheel side of the engine.

Cylinder numbers are counted from the front of the engine.

The front most cylinder is No. 1 and rear most cylinder is No.

The engine's direction of rotation is counterclockwise viewed from the flywheel.

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TIGHTENING TORQUE ON MAJOR COMPONENTS

1. COOLING FAN AND WATER PUMP

kg·m (ft. lbs.)

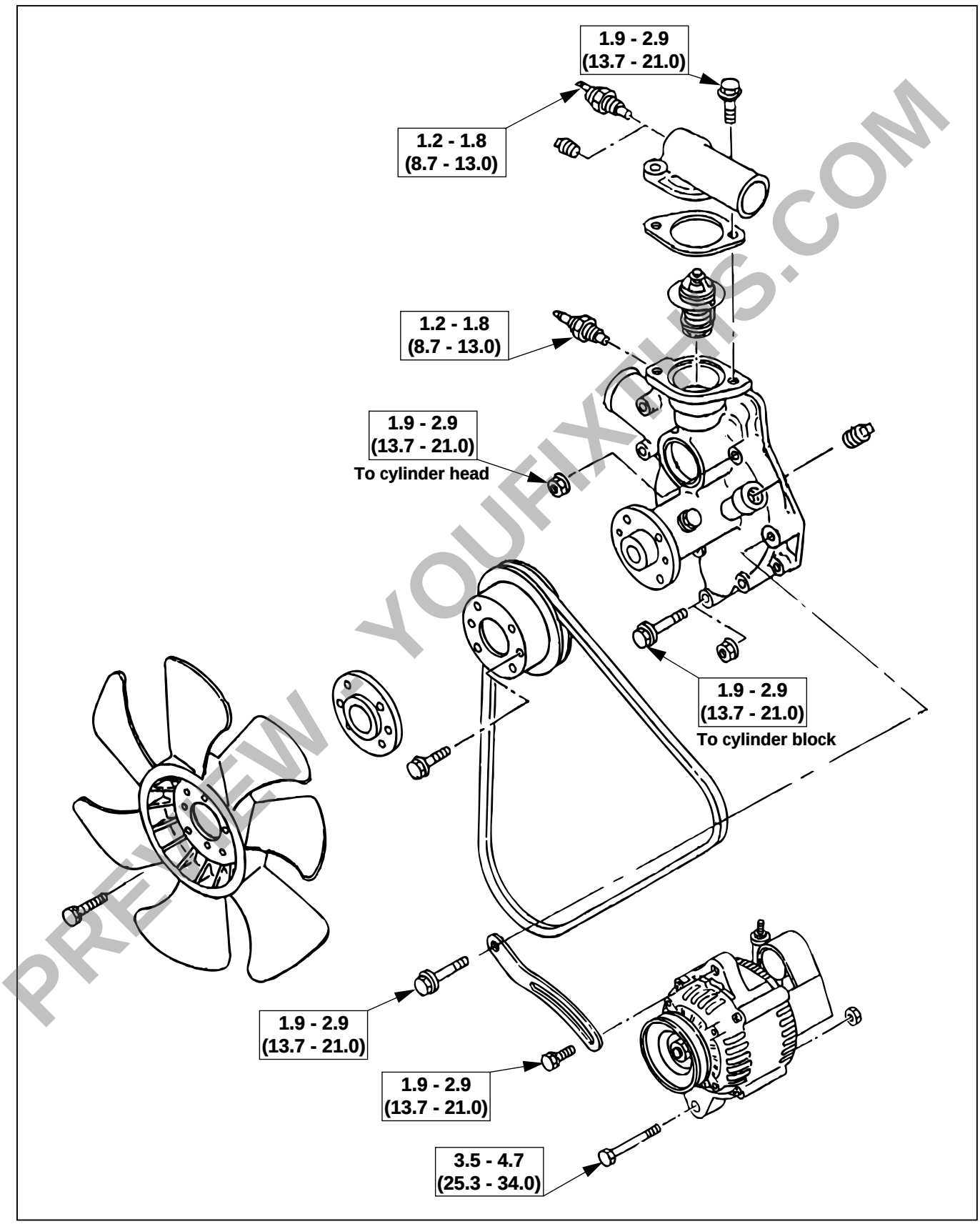


Fig. 13

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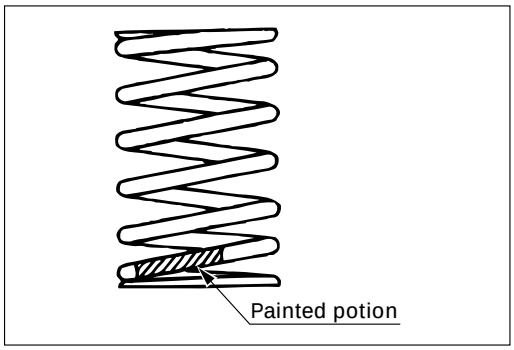


Fig. 119

Intake and Exhaust Valve Springs

Install the valve springs with their painted end (the close pitched end) facing down.

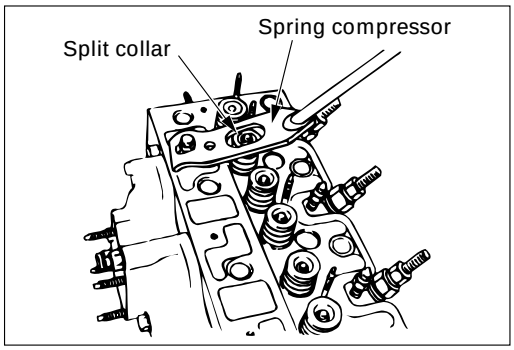


Fig. 120

Spring Seat Split Collar

1. Use a spring compressor to push the valve spring into position.
2. Install the spring seat split collar.
3. Set the spring seat split collar by tapping lightly around the head of the collar with a rubber hammer.

   Spring Compressor: 5-8840-9030-0

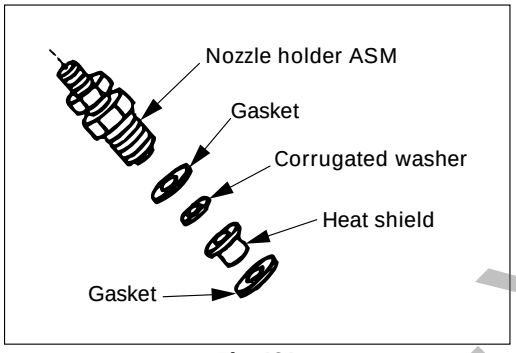


Fig. 121

Nozzle holder assembly

Before assembling the nozzle holder assembly, check to see if the spray condition and the spray pressure of the injection nozzle are appropriate, (Refer to "INSPECTION AND SERVICE.")

Assemble to the cylinder head the gasket (heat shield), heat shield, corrugated washer and gasket (nozzle holder) in this order.

Install the nozzle holder assembly, and then tighten it to the specified torque.

kg·m (ft. lbs.)

Tightening torque	4.0 – 5.0 (29.0 – 36.0)

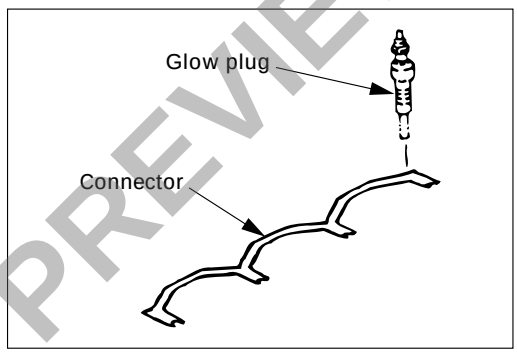


Fig. 122

Glow plug and connector

Assemble the glow plug to the cylinder head, and then tighten it to the specified torque.

Install the connector to the glow plug, and then tighten until snug.

kg·m (ft. lbs.)

Parts	Tightening torque
Glow plug	1.5 – 2.0 (11.0 – 14.0)

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CONTENTS

GROUPS	CHAPTERS	CD 15 P	CD 18 P	CD 20 P	CD 25 P	CD 30 P	CD 35 P		CG 15 P	CG 18 P	CG 20 P	CG 25 P	CG 30 P	CG 35 P		
- 0 -	**- GENERAL POINTS -**															
0-1-M128 EN	LIFT TRUCK CHARACTERISTICS	•	•	•	•	•	•		•	•	•	•	•	•		
- 10 -	**- ENGINE -**															
10-3-70 EN	ENGINE DISASSEMBLY	•	•													
10-3-71 EN	ENGINE DISASSEMBLY			•	•	•	•									
10-3-75 EN	ENGINE DISASSEMBLY								•	•	•	•	•	•		
- 12 -	**- CARBURATION -**															
12-3-2 EN	VACUUM FUELOCK FILTER REPAIR METHOD VFF30								•	•	•	•	•	•		
12-3-3 EN	CARBURETTOR REPAIR METHOD CA55								•	•	•	•	•	•		
12-8-1 EN	COBRA PRESSURE RELIEF VALVE OPERATION								•	•	•	•	•	•		
12-8-20 EN	GPL CARBURATION OPERATING								•	•	•	•	•	•		
- 20 -	**- GEAR BOX -**															
20-3-18 EN	GEAR BOX DISASSEMBLY	•	•						•	•						
20-3-19 EN	GEAR BOX DISASSEMBLY			•	•	•	•				•	•	•	•		
- 70 -	**- HYDRAULIC -**															
70-6-M128 EN	HYDRAULIC DIAGRAM	•	•	•	•	•	•		•	•	•	•	•	•		
- 80 -	**- ELECTRIC -**															
80-6-M128 EN	ELECTRIC DIAGRAM	•	•	•	•	•	•		•	•	•	•	•	•		

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CHARACTERISTICS

I.C. ENGINE

CD 15 P CD 18 P — **ISUZU 4LE1**
CD 20 P CD 25 P CD 30 P CD 35 P — **ISUZU 4JG2**

	ISUZU 4LE1	**ISUZU 4JG2**
- Type		
- Number of cylinders	4 in line	4 in line
- Number of strokes	4	4
- Suction	Natural	Natural
- Ignition sequence	1.3.4.2.	1.3.4.2.
- Clearance of rocker valve (cold)		
. Inlet	0,40 mm	0,40 mm
. Exhaust	0,40 mm	0,40 mm
- Capacity	2179 cm3	3059 cm3
- Bore	85 mm	95,4 mm
- Stroke	92 mm	107 mm
- Compression ratio	21,5:1	20:1
- Nominal rating loaded	2400 rpm	2400 rpm
- Rating slow unladen	850 ± 25 rpm	700 ± 25 rpm
- Max. rating unladen	2640 ± 25 rpm	2690 ± 50 rpm
- Power ISO 3046-INF	32,7 kW	44,9 kW
- Maximum torque ISO 3046-INF	136 Nm at 1600 rpm	186,3 Nm at 1800 rpm
- Air cleaner	Dry cartridge	Dry cartridge

COOLING CIRCUIT

	ISUZU 4LE1	**ISUZU 4JG2**
- Type	With water	With water
- Fan	Blowing	Blowing
. Number of blades	6	6
. Diameter	432 mm	432 mm
- Thermostat		
. Start opening	74,5°C - 78,5°C	82°C
. Full opening	90°C	90°C

TRANSMISSION

- Type

CD 15 P CD 18 P — **GRAZIANO TRASMISSIONI GROUP TXL 25**
CD 20 P CD 25 P CD 30 P CD 35 P — **GRAZIANO TRASMISSIONI GROUP TXL 30/ST**

BRAKE

- Service brake	Foot pedal. Hydraulic brake, applied on the front wheels.
. Type	Drum.
- Parking brake	Mechanical hand lever applied on the front wheels.
. Type	Drum.

ELECTRIC CIRCUIT

- Earth	Negative
- Battery	
CD 15 P CD 18 P	12 V - 70 Ah - 600 A
CD 20 P CD 25 P CD 30 P CD 35 P	12 V - 90 Ah - 800 A
- Alternator	12 V
. Type	Denso
. Tension regulator	Incorporated into the alternator
- Starter	12 V
. Type	Denso

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6. FUEL SYSTEM

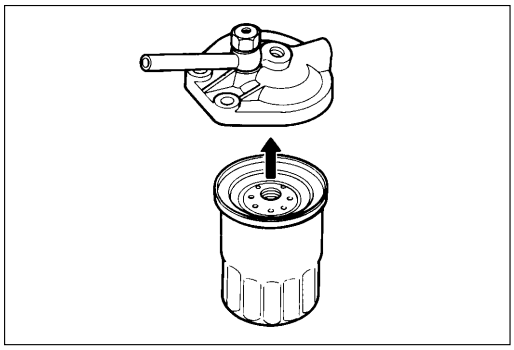


Fig. 33

Fuel Filter Replacement

Cartridge (Spin-On) Type

Removal

1. Loosen the fuel filter by turning it counterclockwise with the filter wrench or your hand. Discard the used filter.

   Filter Wrench

2. Wipe the fuel filter fitting face clean with a rag.

   This will allow the new fuel filter to seat properly.

Installation

1. Apply a light coat of engine oil to the O-ring.
2. Supply fuel to the new filter.

   This will facilitate air bleeding.
3. Turn in the new fuel filter until the filter O-ring is fitted against the sealing face.
4. Use the filter wrench to turn in the fuel filter an additional 2/3 of a turn.

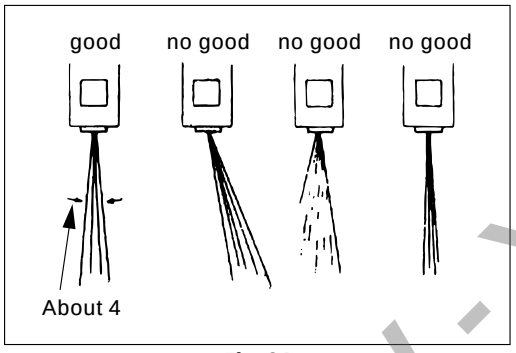


Fig. 34

Injection nozzle

Check to see if the spray condition and the injection pressure are normal. Adjust them to the specified value respectively when they don't meet the standard valve.

kg/cm^2 (psi)

Injection pressure	4LB1	135 (1920)
	4LC1	
	4LE1	

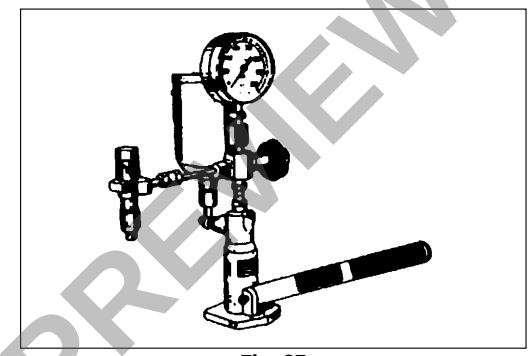


Fig. 35

Using a nozzle tester, adjust the injection pressure with a shim.

Special tool: Nozzle tester

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GENERAL REPAIR INSTRUCTIONS

1. Before performing any service operation with the engine mounted, disconnect the grounding cable from the battery.

   This will reduce the chance of cable damage and burning due to short circuiting.
2. Always use the proper tool or tools for the job at hand.

   Where specified, use the specially designed tool or tools.
3. Use genuine ISUZU parts.
4. Never reuse cotter pins, gaskets, O-rings, lock washers, and self locking nuts. Discard them as you remove them. Replace them with new ones.
5. Always keep disassembled parts neatly in groups. This will ensure a smooth reassembly operation.

   It is especially important to keep fastening parts separate. These parts vary in hardness and design, depending on their installation position.
6. All parts should be carefully cleaned before inspection or reassembly.

   Oil ports and other openings should be cleaned with compressed air to make sure that they are completely free of obstructions.
7. Rotating and sliding part surfaces should be lubricated with oil or grease before reassembly.
8. If necessary, use a sealer on gaskets to prevent leakage.
9. Nut and bolt torque specifications should be carefully followed.
10. Always release the air pressure from any machine-mounted air tank(s) before dismounting the engine or disconnecting pipes and hoses. To not do so is extremely dangerous.
11. Always check and recheck your work. No service operation is complete until you have done this.

NOTES ON THE FORMAT OF THIS MANUAL

This Workshop Manual is applicable to ISUZU industrial engine or engines which is or are stated in the title.

When more than two engine models are dealt in the manual, such engines have common parts and components as well as data and specifications, unless otherwise specified.

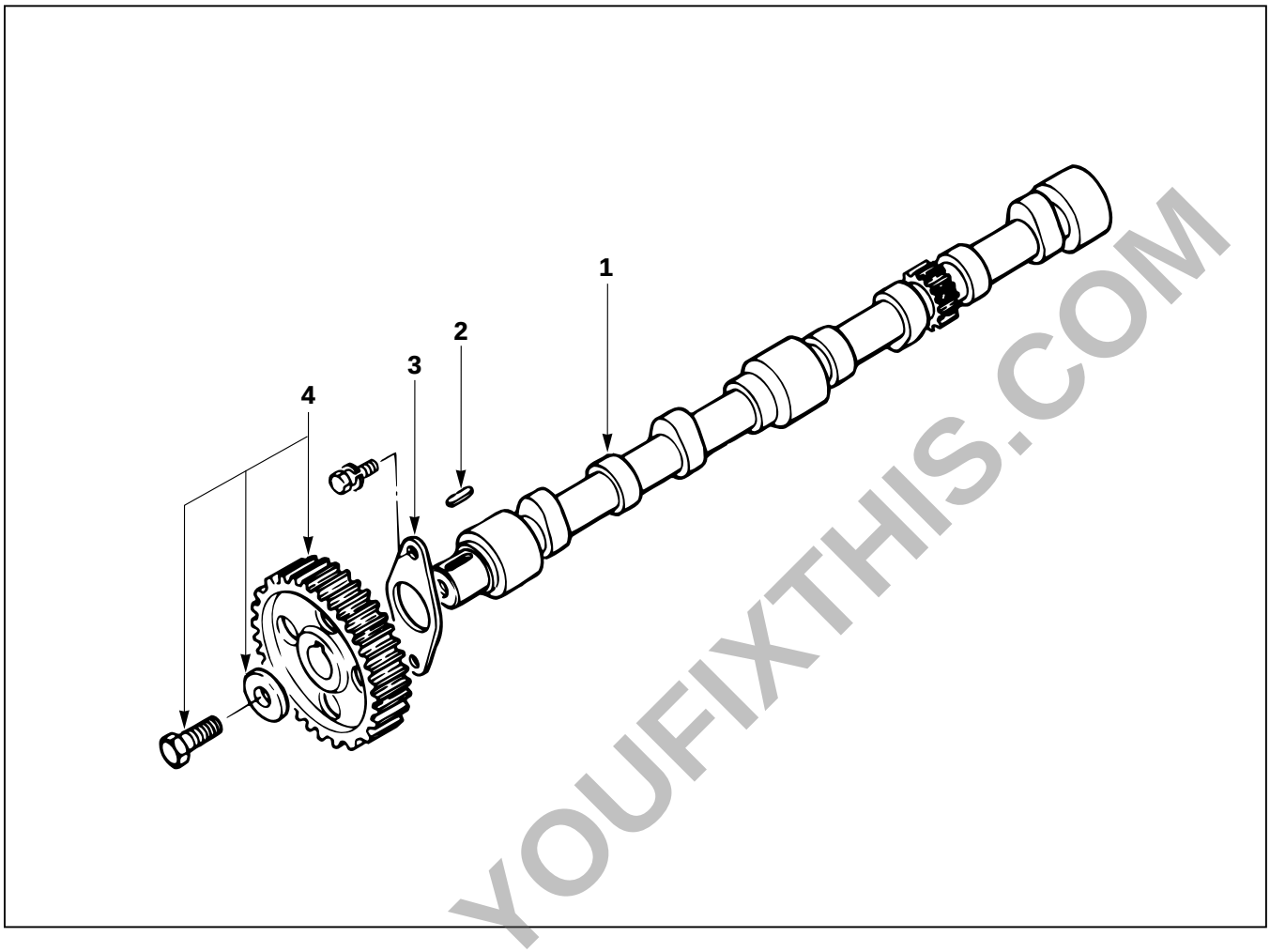
1. Find the applicable section by referring to the Table of Contents at the beginning of the Manual.
2. Common technical data such as general maintenance items, service specifications, and tightening torques are included in the "General Information" section.

   The section ENGINE ASSEMBLY is an exception. This parts are divided in three sections to facilitates indexing.
3. Each section is divided into sub-sections dealing with disassembly, inspection and repair, and reassembly.

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CAMSHAFT, CAMSHAFT TIMING GEAR, AND THRUST PLATE



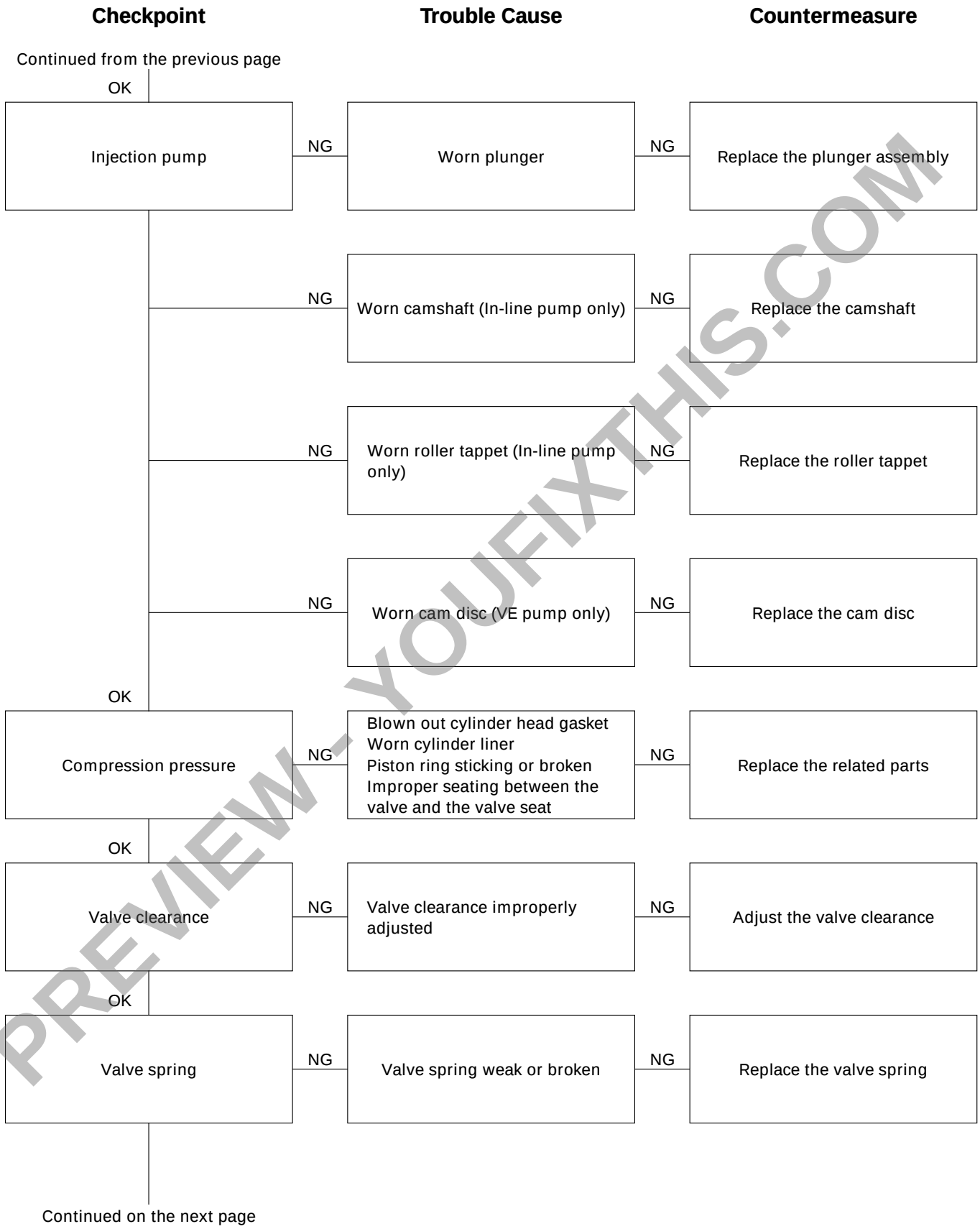
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Reassembly Steps

1. Camshaft
2. Feather key
3. Thrust plate
▲ 4. Camshaft timing gear

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3. INSUFFICIENT POWER

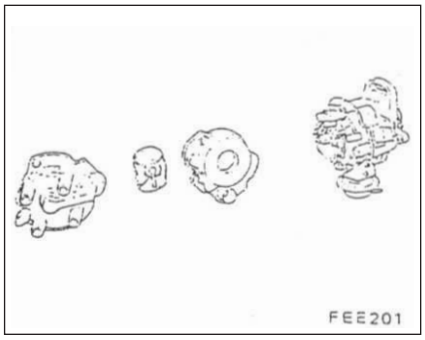


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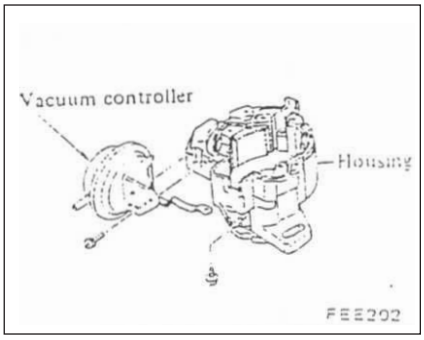
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DISASSEMBLY

1. Remove cap and rotor head.

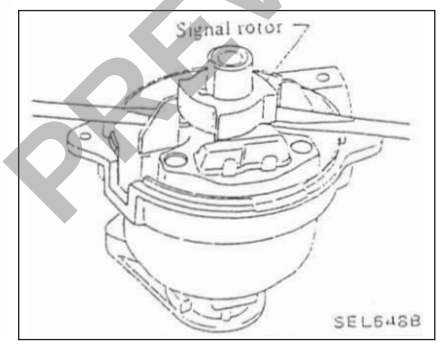


2. Remove vacuum controller.



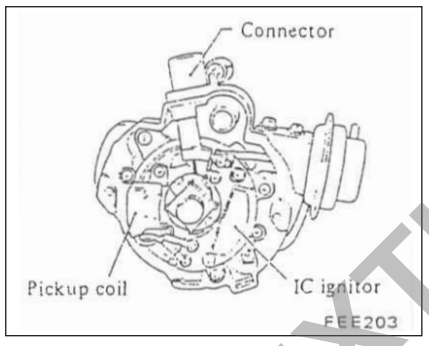
3. Insert a flat-bladed screwdriver under lower side of signal rotor, and pry signal rotor from shaft. Remove roll pin from signal rotor.

CAUTION:
When removing signal rotor, be careful not to distort or damage the teeth.

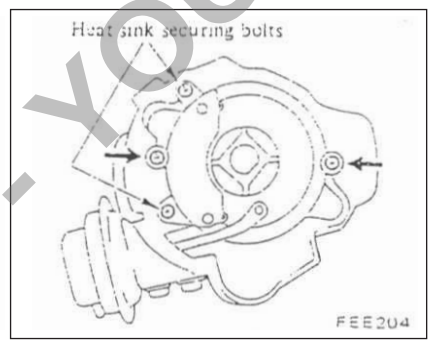


4. Remove four screws securing pick-up coil and connector terminal to IC ignitor.
5. Remove four screws securing IC ignitor and pickup coil.
6. Slide connector out of housing.

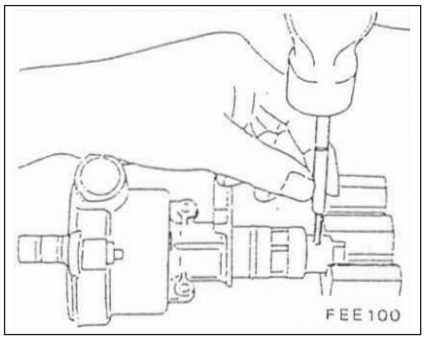
CAUTION:
Do not place pickup coil in an area where there are iron fillings.



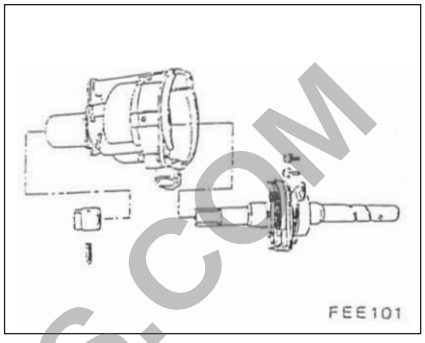
7. Remove heat sink and breaker plate securing bolts (shown by arrows), then remove heat sink.



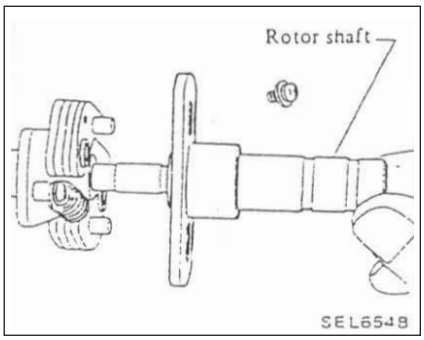
8. Knock roll pin out and remove collar.



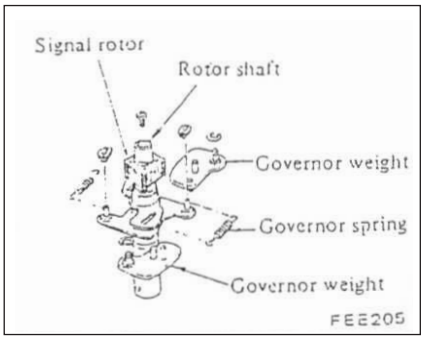
9. Remove two screws.
10. Draw out shaft assembly from housing.



11. Unscrew rotor shaft setscrew. Remove rotor shaft.



12. Remove governor weight and governor spring from the shaft assembly.



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⚠ ATTENZIONE A QUESTO SIMBOLO ⚠

Questo simbolo di avvertimento segnala messaggi importanti che interessano la vostra sicurezza.
Leggete attentamente le norme di sicurezza riportate ed attenetevi alle precauzioni consigliate al fine di evitare pericoli potenziali e salvaguardare la vostra salute ed incolumità personale.

EVITARE GLI INCIDENTI

La maggior parte degli incidenti ed infortuni che si verificano nelle officine sono causati dalla mancata osservanza di qualche semplice e fondamentale regola di prudenza e sicurezza. Per questa ragione nella maggior parte dei casi essi possono essere evitati: basta prevederne le possibili cause ed agire di conseguenza con la necessaria cautela e prudenza.
Con qualsiasi tipo di macchina, per quanto ben progettata e costruita, non è possibile escludere in assoluto ogni eventualità di incidente.
Un meccanico attento e prudente è la migliore garanzia contro gli incidenti.
L'osservanza scrupolosa di una sola ed elementare norma di sicurezza sarebbe già sufficiente ad evitare molti infortuni gravi.

PERICOLO! Non eseguire mai alcun intervento di pulizia, lubrificazione o manutenzione con il motore in moto.

NORME DI SICUREZZA
GENERALITÀ

⚠ Seguire attentamente le procedure di manutenzione e di riparazione prescritte.

⚠ Non indossare anelli, orologi da polso, gioielli, capi di vestiario slacciati o penzolanti quali ad esempio: cravatte, indumenti strappati, sciarpe, giacche sbottonate o bluse con chiusura a lampo aperte che possono impigliarsi nelle parti in movimento. Si consiglia invece di usare capi appropriati ai fini antinfortunistici, ad esempio: scarpe antiscivolo, guanti, occhiali di sicurezza, elmetti, ecc.

⚠ Non eseguire alcun intervento assistenziale sulla macchina con persone sul sedile conduttore, salvo che siano operatori abilitati e coadiuvino all'operazione da svolgere.

⚠ Non far funzionare la macchina od usare i relativi attrezzi da altra posizione che non sia quella a sedere del posto di guida.

⚠ Non eseguire mai alcun intervento sulla macchina quando il motore è in moto, salvo che ciò risulti prescritto.

⚠ Arrestare il motore ed accertarsi che non vi sia più pressione prima di staccare tubazioni, cappellotti, coperchi, valvole, etc.

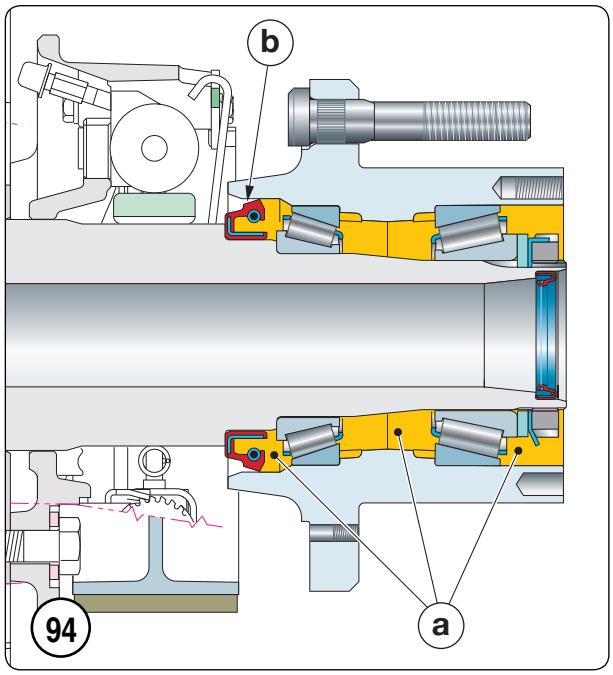
⚠ Tutti gli interventi assistenziali devono essere eseguiti con la massima cura ed attenzione.

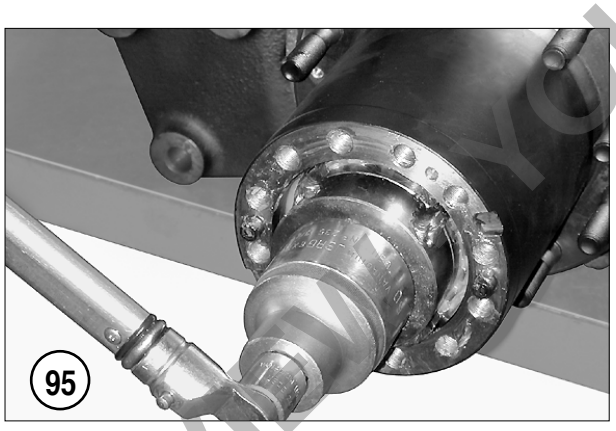
⚠ Scollegare le batterie ed etichettare tutti i comandi per segnalare che un intervento è in corso.
Bloccare la macchina e ogni attrezzatura che deve essere sollevata.

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Rimontaggio mozzi ruote
Wheel hubs reassembling







(I) **Norme registrazione cuscinetti**

1) Lavare i cuscinetti con petrolio caldo ed asciugarli con aria compressa e lubrificarli immergendoli in grasso fuso.

2) Montare i cuscinetti con relativo mozzo dopo averne riempito di grasso (del tipo FIAT MR2 o similari) ogni cavità interna (**a**).

⚠ **Attenzione**! L'eccesso di grasso può causare il rovesciamento del labbro della guarnizione (**b**).

Montare la rondella dentata e quindi avvitare la ghiera.

3) Ruotare e martellare il mozzo per favorire l'assestamento dei rulli conici sulle piste e, nel frattempo, serrare la ghiera progressivamente fino alla coppia di serraggio di 14,7 daNm.

4) Allentare la ghiera e quindi riavvitarla successivamente incrementando progressivamente la coppia di serraggio fino al valore di 1 daNm.

5) Riallentare la ghiera in modo da assicurare un gioco max. sui cuscinetti di 0,05 mm, corrispondente a circa 1/32 di giro della ghiera. Fermare quindi la ghiera come indicato al punto **6**.

6) A registrazione avvenuta assicurare la ghiera ripiegando uno dei lobi della rosetta di sicurezza in uno degli intagli della ghiera (vedere foto 96). Se ciò non fosse possibilile continuare ad avvitare la ghiera fino a raggiungere la posizione di montaggio.

(GB) ***Bearings adjustment specifications***

1) *Wash the bearings with hot petroleum and dry them by immersion in melted grease.*

2) *Assemble the bearings with the related hub, after filling with grease (FIAT MR2 or similar) each internal cavity (a).*

⚠ ***Attention!*** *Too much grease can cause the overturning of the lip of the seal (**b**). Assemble the toothed washer and the screw the ring nut.*

3) *Rotated and hammer the hub to make easier the bedding of the conical rollers on the tracks, and at the same time screw gradually the ring nut to the driving torque of 14.7 daNm.*

4) *Loosen the ring nut and then screw it increasing gradually the driving torque to 1 daNm.*

5) *Loosen again the ring nut in a way to assure a max. play on the bearings of 0.05 mm, correspondent to about 1/32 of turn of the ring nut. Lock then the ring nut in the way explained in step 6.*

6) *If no tab mates the slot, tighten slightly the nut to match the nearest tab (see photo 96).*

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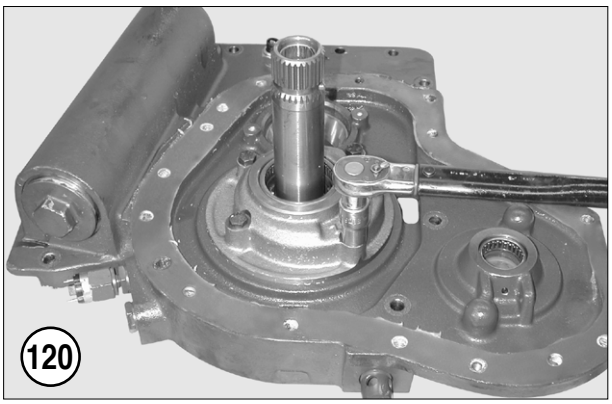
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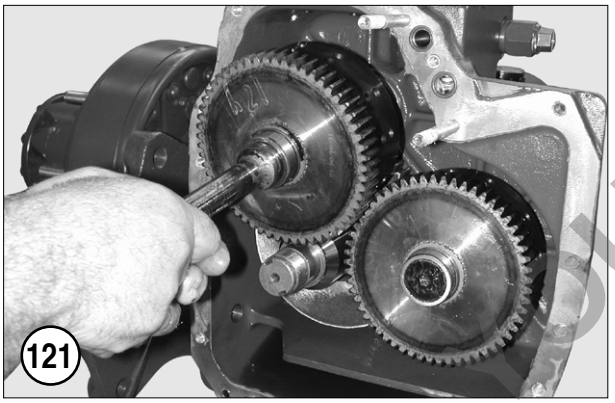


Ⓘ Rimontare la pompa su coperchio trasmissione, applicare il frenafiletti medio sulle viti e bloccare con una coppia di serraggio di 2,3 ÷ 2,5 daNm.

ⒼⒷ *Reinstall pump on transmission cover, smear medium locking compound on screws. Tighten with a torque of 2.3 to 2.5 daNm.*

Ⓓ *Leitradträger und Pumpe komplett montieren. Befestigungsschrauben mit Loctite Medium einsetzen und mit einem Drehmoment von 2,3 ÷ 2,5 daNm anziehen.*

Ⓕ *Remonter la pompe sur le couvercle de la transmission, appliquer le frein à filets moyen sur les vis et bloquer à un couple de serrage de 2,3 ÷ 2,5 daNm.*

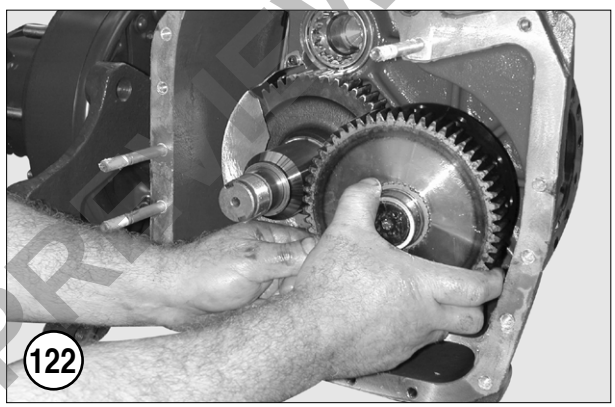


Ⓘ **Smontaggio trasmissione**
Sfilare il gruppo frizione superiore completo.

ⒼⒷ ***Transmission disassembly***
Pull out the upper clutch unit complete.

Ⓓ ***Getriebedemontage***
Die obere Kupplungsgruppe komplett herausnehmen.

Ⓕ ***Démontage de la transmission***
enlever le groupe embrayage supérieur complet.



Ⓘ Sfilare il gruppo frizione inferiore completo.

ⒼⒷ *Pull out the lower clutch unit complete.*

Ⓓ *Die untere Kupplungsgruppe komplett heraus-nehmen.*

Ⓕ *Enlever le groupe embrayage inférieur complet.*

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