

ISUZU

*Bellett*

# INTRODUCTION

ENGINE SERIES

PART 1

# INTRODUCTION



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**ISUZU MOTORS LIMITED**

TOKYO, JAPAN

## PART 1 INTRODUCTION

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## PART 1 INTRODUCTION

### 1-1 BELLETT ENGINE (GASOLINE)

The BELLETT engines model G150 with the cubic capacity of 1,471 c.c. and model G130 with the cubic capacity of 1,325 c.c. have prolonged service life and highest rate of operating economy. These are the high performance engines skillfully engineered to secure a stabilized torque and operating flexibility at any travel speed.

Both engines model G150 and G130 comprises major component parts which are in common and have similar appearances except the carburetors.

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Gasoline engine model G130

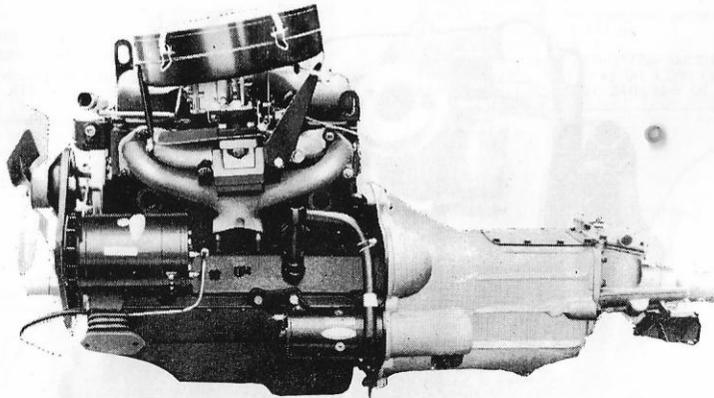


Fig. 1-1

Gasoline engines model G150 and G150C

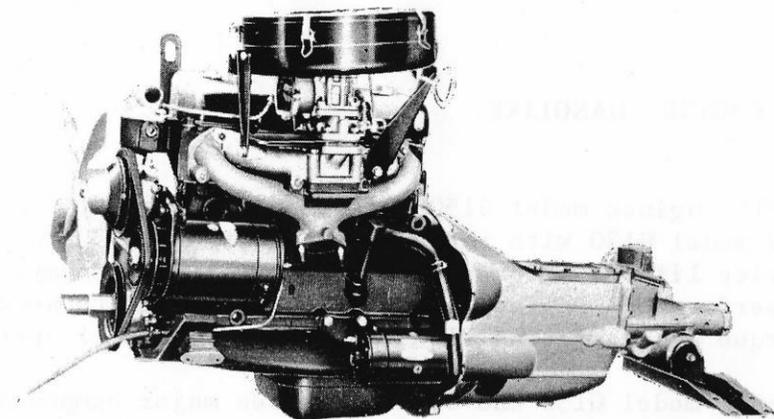


Fig. 1-2

The engines model G150 and G150C have the same appearances except the compression ratios are different

Gasoline engine model G150D

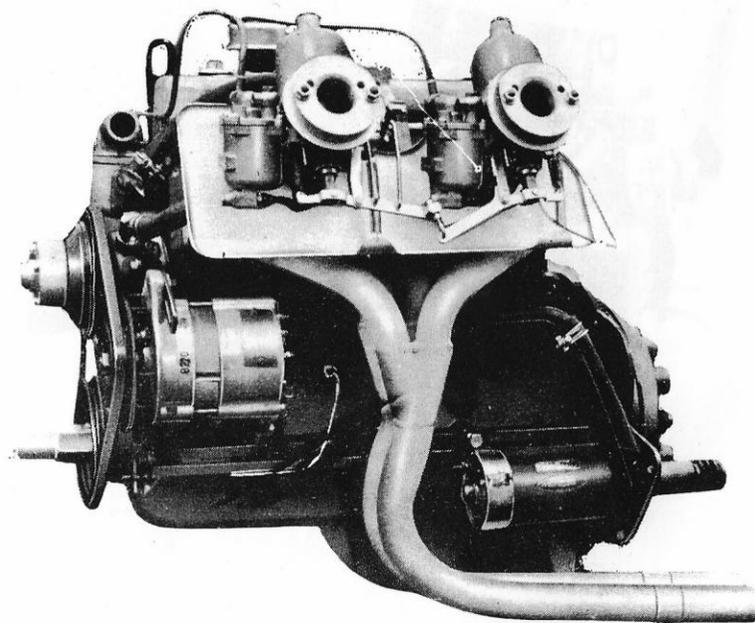
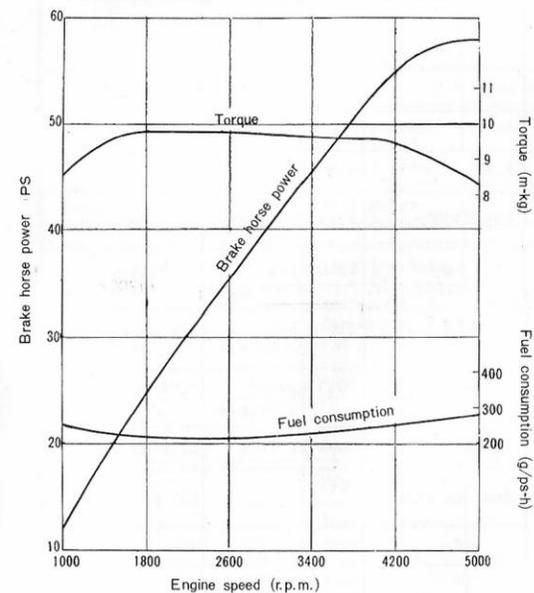


Fig. 1-3

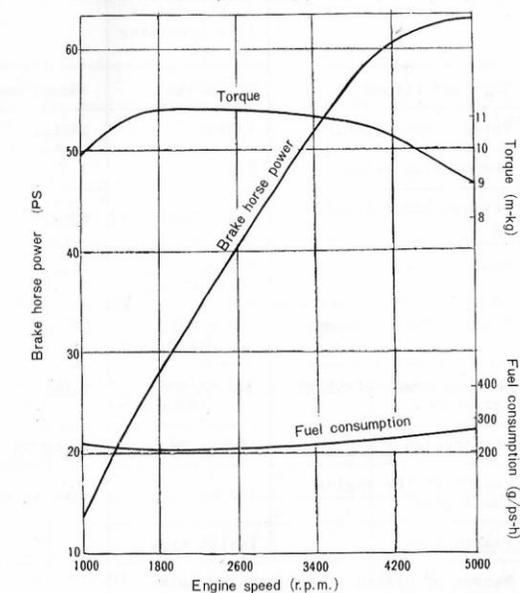
Engine performance curve for model G130 (gasoline engine)

Number of cylinder: 4  
Bore of the cylinder and crankshaft stroke: 75mm × 75mm  
Total cubic capacity: 1,325 ltr.  
Compression ratio: 7.5 : 1  
Maximum brake horse power: 58ps (at 5,000 r.p.m.)  
Maximum torque: 9.8 m·kg (at 1,800 r.p.m.)  
Minimum fuel consumption: 215g/ps-h (at 2,200 r.p.m.)



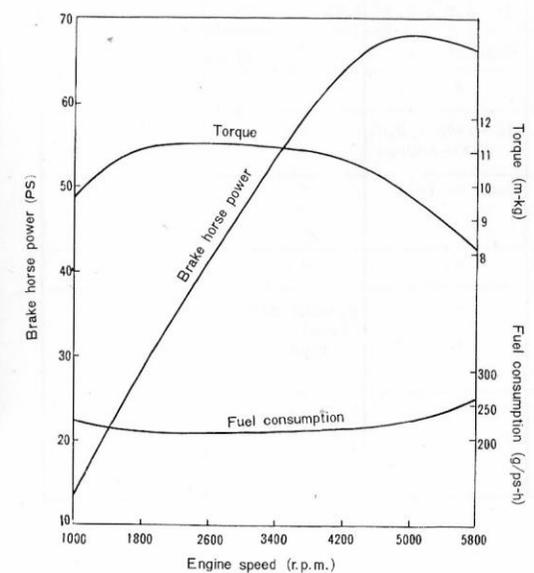
Engine performance curve for model G150 (gasoline engine)

Number of cylinder: 4  
Bore of the cylinder and crankshaft stroke: 79mm × 75mm  
Total cubic capacity: 1,471 ltr.  
Compression ratio: 7.5 : 1  
Maximum brake horse power: 63ps (at 5,000 r.p.m.)  
Maximum torque: 11.2 m·kg (at 1,800 r.p.m.)  
Minimum fuel consumption: 210g/ps-h (at 2,200 r.p.m.)



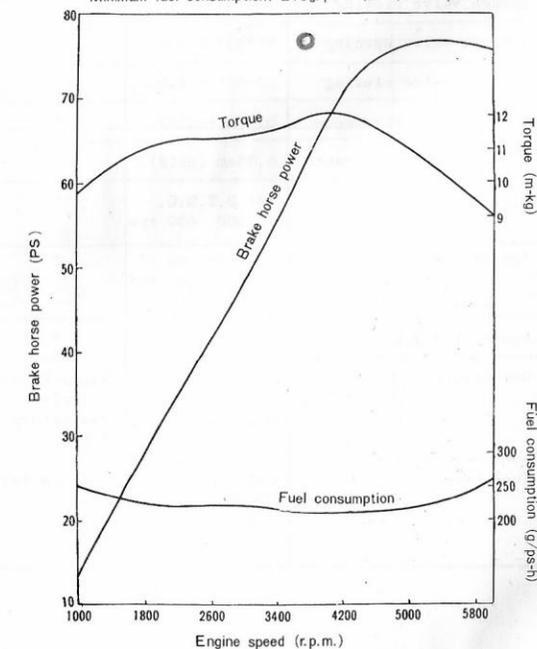
Engine performance curve for model G150C (gasoline engine)

Bore of the cylinder and crankshaft stroke: 79mm × 75mm  
Total cubic capacity: 1,471 ltr.  
Compression ratio: 8.5 : 1  
Maximum brake horse power: 68ps (at 5,000 r.p.m.)  
Maximum torque: 11.3 m·kg (at 2,200 r.p.m.)  
Minimum fuel consumption: 210g/ps-h (at 2,200 r.p.m.)



Engine performance curve for model G150D (gasoline engine)

Number of cylinder: 4  
Bore of the cylinder and crankshaft stroke: 79mm × 75mm  
Total cubic capacity: 1,471 ltr.  
Compression ratio: 8.5 : 1  
Maximum brake horse power: 77ps (at 5,400 r.p.m.)  
Maximum torque: 12.0 m·kg (at 4,200 r.p.m.)  
Minimum fuel consumption: 210g/ps-h (at 3,800 r.p.m.)



## 1-2 SPECIFICATIONS OF BELLETT ENGINE (GASOLINE)

Engine model	G130	G150	G150C	G150D	G160
Type	Water cooled 4-cylinder in line (gasoline engine)	Same as left	Same as left	Same as left	Same as left
Bore and stroke	75mmx75mm	79mmx75mm	"	"	83mmx73mm
Total cubic capacity	1325cc	1471cc	"	"	1579cc
Compression ratio	7.5	7.5	8.5	8.5	9.3
Maximum brake horse power	58ps/5000r.p.m.	63ps/5000r.p.m.	68ps/5000r.p.m.	77ps/5400r.p.m.	88ps/5400r.p.m.
Maximum torque	9.8 kg-m /1800r.p.m.	11.2 kg-m /1800r.p.m.	11.3 kg-m /2200r.p.m.	12.0 kg-m /4200r.p.m.	12.5 kg-m /4200r.p.m.
Minimum fuel consumption	215 g/psh /2200r.p.m.	210 g/psh /2200r.p.m.	Same as left	210 g/psh /3800r.p.m.	210 g/psh /3800r.p.m.
Maximum mean effective pressure	9.3 kg/cm <sup>2</sup> /1800r.p.m.	9.6kg/cm <sup>2</sup> /1800r.p.m.	9.7 kg/cm <sup>2</sup> /2200r.p.m.	10.3 kg/cm <sup>2</sup> /4200r.p.m.	9.95 kg/cm <sup>2</sup> /4200r.p.m.
Compression	11 kg/cm <sup>2</sup>	11 kg/cm <sup>2</sup>	12 kg/cm <sup>2</sup>	Same as left	13.5 kg/cm <sup>2</sup>
Weight of the engine unit (dry)	130 kg	Same as left	Same as left	"	139 kg
Piston type	T-slot type	"	"	"	Same as left
Number of piston ring	Compression ring 2 and oil control ring 1	"	"	"	"
Firing order	1-3-4-2	"	"	"	"
Intake valve opening	40° B.T.D.C.	"	38° B.T.D.C.	"	"
Intake valve closing	74° A.B.D.C.	"	82° A.B.D.C.	"	"
Exhaust valve opening	70°30' A.B.D.C.	"	73° A.B.D.C.	"	"
Exhaust valve closing	23°30' A.T.D.C.	"	35° A.T.D.C.	"	"
Intake valve clearance	0.3mm (cold)	"	Same as left	"	"
Exhaust valve clearance	0.35mm (cold)	"	"	"	"
Ignition timing	14° B.T.D.C. /600 650 rpm	"	12~14°B.T.D.C. /600~650rpm	"	12° /600~650rpm
Ignition timing governor	Combination of centrifugal and vacuum type	"	Same as left	"	Same as left
Spark plug gap	0.7 0.8mm	"	"	"	"
Carburetor	Hitachi DAB 308-5 (single) Solex type	Nihon Kikaki (single) Strongburgh type	"	Hitachi HJD38W (twin) SU type	"
Fuel pump	Nihon Kikaki PD-56Q (diaphragm type)	Same as left ( " )	" ( " )	Same as left ( " )	" ( " )

Engine model	G130	G150	G150C	G150D	G160
Fuel tank capacity	40 ltr	Same as left	Same as left	Same as left	Same as left
Oil feed pump	Forced circulation (Trochoid type)	"	"	"	"
Oil pan capacity	2.6 ltr	3.2 ltr	"	"	"
Cooling method	Pressurized and forced circulation	Same as left	"	"	"
Type of radiator	Flat water tube in 2-row	"	"	"	"
Water pump	Impeller type	"	"	"	"
Type of thermostat	Bellows type for model '64 and Wax pellet type for model '65	Bellows type	Wax pellet type	Same as left	Same as left
Capacity of the cooling system	6 ltr	"	"	"	"
Air cleaner	Paper element	"	"	"	"
Oil filter	Paper filter type	"	"	"	"
Battery	N-40 (12V-40AH)	"	NS-40 (12V-40AH)	"	NS-40 (12V-40AH)
Ground electrode	(-) Negative electrode connected to ground	"	Same as left	"	Same as left
Generator	Hitachi GT123-08 (12V-300W)	"	Hitachi LT123-16 (AC 12V-300W)	"	"
Starter	Hitachi S114-54 (12V-1KW)	"	Same as left	"	"

**1-3 PERIODICAL INSPECTION AND LUBRICATION  
(FOR GASOLINE ENGINE AND ITS ASSOCIATED PARTS)**

To maintain the automobile always in top operating condition, routine service, periodical inspection and lubrication should be carried out according to the following table.

REFERENCE TABLE FOR DAILY CHECK-UPS

Check spot	C h e c k u p
Engine	1. Cooling water level and leakage 2. Engine oil level and leakage 3. Fuel level and leakage 4. Check oil level in the fuel injection pump 5. Tension and wear of the fan belt 6. Easiness of starting and operating noise 7. Unreasonable exhaust smoke
Steering wheel	1. Check for excessive play and loosened parts 2. Free from undue vibration, swerving or restricted operation
Brake	1. Check for reasonable travel stroke of the foot brake pedal and response of the brakes 2. Check for effective travel stroke of the lever and its response to assure safety of driving
Tires	1. Check for proper tire pressure, abnormal wear and scores or serious damage detrimental to operation
Chassis spring	1. Chassis spring for breakage
Battery	1. Battery electrolyte level and leakage
Horn, flasher and windshield wiper for normal operation	1. Check these parts for operating failure
Meters	1. Check flasher for operating failure, fouling and damage
Rear view mirror	1. Check for proper function
Reflector and license plate	1. Check for fouling and damage
Any trouble or operating failure detected during automobile is in operation	1. Check pertinent parts for operating failure

REFERENCE TABLE FOR PERIODICAL INSPECTION AND LUBRICATION  
(BELLETT GASOLINE ENGINE)

● Marking denotes "Replacement"

Equip- ment	Inspection period and interval	When initial 1,000 km covered		After every 3,000 km of travel or 2-month intervals		After every 9,000 km of travel or 6-month intervals		After every 18,000 km of travel or 6-month intervals		After every 36,000 km of travel or 6-month intervals	
		Per- sonal	Busi- ness	Per- sonal	Busi- ness	Per- sonal	Busi- ness	Per- sonal	Busi- ness	Per- sonal	Busi- ness
	Personal and business use (classification)										
	Check-up										
E n g i n e	Tension and wear of fan belt	○	○	○	○						
	Easiness of starting and operating noise			○	○						
	Draining the engine lubricant through the oil filter's drain plug	○	○	○	○						
	Check all the parts for oil leakage	○	○	○	○						
	Check for fuel leakage through the entire fuel system	○	○	○	○						
	Check for water leakage through the entire cooling system	○	○	○	○						
	Check for leakage in the air intake system	○	○	○	○						
	Tightness of cylinder head and manifolds mounting	○	○			○	○				
	Valve clearances	○	○			○	○				
	Muffler and exhaust pipes for loosened mounting or wear	○	○	○	○						
	Engine mountings for tightness	○	○			○	○				
	Air cleaner element for clogging or wear			○	○	●					
	Engine performance at low speed and accelerated speed			○	○						
	Cleaning of air breather system			○	○						
	Check exhaust smoke for normal condition			○	○						
	Check insulated electrode of the spark plug for fouling and wear			○	○						
	Check contact breaker points of distributor for wear and fouling			○	○						
	Ignition timing adjustment			○	○						
	Automatic ignition timing control for normal operation			○	○						
	Cleaning the internal part of oil pan and oil pump strainer										○
Measuring the cylinder compression										○	
Cleaning the internal part of the fuel tank										○	

Equip- ment	Inspection period and mileage interval	When initial 1,000 km covered		After every 3,000 km of travel or 2-month intervals		After every 9,000 km of travel or 6-month intervals		After every 18,000 km of travel or 12-month intervals		After every 36,000 km of travel or 6- month inter- vals
		Per- sonal	Busi- ness	Per- sonal	Busi- ness	Per- sonal	Busi- ness	Per- sonal	Busi- ness	Busi- ness
	Personal and business use (classification)									
	Check-up									
E n g i n e	Draining and refilling with recommended oil	●	●	●	●					
	Replacing the cooling water							●		●
	Draining and refilling with recommended oil			●	●					
	Replacing the oil filter element					●	●			
	Replacing the fuel filter element							●	●	
	Replacing the air cleaner element							●	●	
	Lubricating the diaphragm in the fuel injection pump					○	○			
E l e c t r i c a l s y s t e m	Lubricating the engine control linkage			○	○					
	Check all the wiring for loosened connection and damage			○	○					
	Check meters and pilot lamps for operating failure			○	○					
	Check battery hold down bolts and terminals for loosening	○	○	○	○					
	Check generator for charging operation failure			○	○					
	Check battery electrolyte level			○	○					
	Measuring the specific gravity of the battery electrolyte					○	○			
	Check carbon brush in the starter and commutator surface for wear or fouling							○		○
	Check generator and voltage regulator for operating failure							○	○	
	Check contacting point of the change- over switch for wear or fouling							○	○	
	Check starter pinion for proper engagement							○	○	
	Check starter mounting for loosening							○	○	
	Lubricating the center and rear bearings of the starter					○	○			
Lubricating the front bearing of the starter									○	
Grease the generator bearing as recommended									●	

1-4 BELLETT ENGINE (DIESEL)

The BELLETT diesel engine model C180 with the cubic capacity of 1,764 c.c. has been skillfully designed to assure prolonged service life and highest rate of operating economy. The engine is compactly built and fitted in the position under the flat engine hood.

Careful design considerations given to the engine facilitate the cleaning work and eliminate the time and labor required for overhauling and thus, the engine ensures the highest of maintenance economy.

Diesel engine model C180

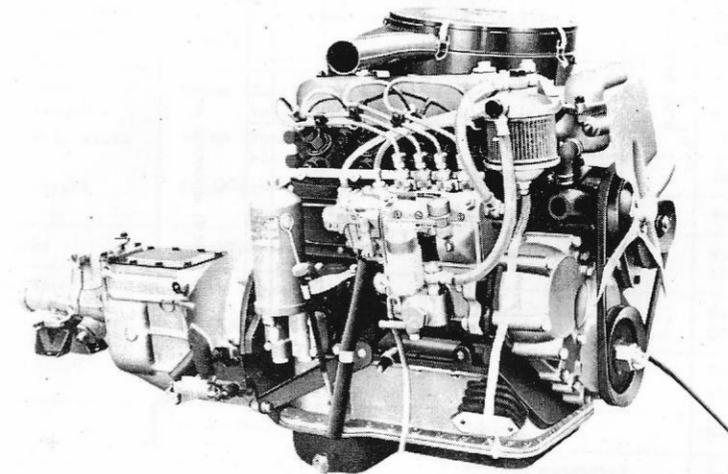
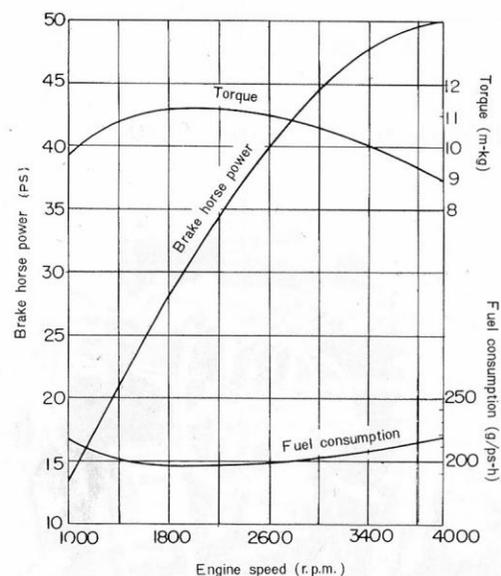


Fig. 1-4

Engine performance curve for model C180  
(diesel engine)

Number of cylinder: 4  
Bore of the cylinder and crankshaft stroke: 79mm x 90mm  
Total cubic capacity: 1764 ltr.  
Compression ratio: 22 : 1  
Maximum brake horse power: 50ps (at 4,000 r.p.m.)  
Maximum torque: 11.2 m·kg (at 2,000 r.p.m.) p.p.  
Minimum fuel consumption: 195g/ps·h (at 2,200 r.p.m.)



1-5 SPECIFICATIONS OF BELLETT ENGINE (DIESEL)

Engine model	C180	Fuel injection pump	Bosch type NP-PES4A55B312	
Type	Water-cooled 4-cylinder in line	Governor	Pneumatic type NP-EP/MZ 60A	
Bore and stroke	79mm x 90mm	Automatic injection timing control	Centrifugal type NP-EP/SCD	
Total cubic capacity	1764cc	Fuel injection nozzle	Throttle type NP-DNOSD212	
Compression ratio	22	Fuel injection pressure	120kg/cm <sup>2</sup>	
Maximum brake horse power	50PS/4000rpm	Fuel feed pump	NP-EP/KS22	
Maximum torque	11.2m·kg/2000rpm	Fuel filter	Paper filter type	
Minimum fuel consumption	195g/PS·h/2000rpm	Air cleaner	Paper filter type	
Maximum mean effective pressure	8.0kg/cm <sup>2</sup>	Lubrication method	Forced circulation type	
Compression pressure	28kg/240rpm	Oil feed pump	Trochoid type	
Weight of the engine unit (dry)	1.68kg	Oil filter	Full-flow paper filter type	
Dimensions:	Over-all length	663mm (Cooling fan- to-starter)	Capacity of oil pan	4 ltr
	Full width	611mm (Fuel pump-to- air cleaner)	Cooling method	Pressurized forced circulation type
	Height	676mm (Air cleaner- to-oil pan)	Water pump	Impeller type
Cylinder liner	Integral casting method	Thermostat	Wax pellet type	
Type and material of the piston	Trunk type (Lo-ex alloy)	Generator	Nikko denki 12AGY-12V-400W	
Number of piston ring	Compression ring x 3 and oil control ring x 2	Starter	Nikko denki 24MW-A-24V-1.5KW	
Firing order	1-3-4-2	glow plug	Jidosha kiki AKE/GS10/3·10.5V-10A	
Intake valve opening	10° B.T.D.C.	Battery	N-30Z (12V-30AH x 2)	
Intake valve closing	54° A.B.D.C.	Electrode connected to ground	(-) Negative electrode connected to ground	
Exhaust valve opening	52° B.B.D.C.			
Exhaust valve closing	12° A.T.D.C.			
Intake valve clearance	0.4mm			
Exhaust valve clearance	0.4mm			
Static injection timing	27° B.T.D.C.			

**1-6 PERIODICAL INSPECTION AND LUBRICATION  
(FOR DIESEL ENGINE AND ITS ASSOCIATED PARTS)**

To maintain the automobile always in top operating condition, routine service, periodical inspection and lubrication should be carried out according to the following table.

REFERENCE TABLE FOR DAILY CHECK-UPS

Check spot	Check up
Engine	1. Cooling water level and leakage 2. Engine oil level and leakage 3. Fuel level and leakage 4. Tension and wear of fan belt 5. Easiness of starting and operating noise 6. Unreasonable exhaust smoke
Steering wheel	1. Check for excessive play and loosened parts 2. Free from undue vibration, swerving or restricted operation
Brake	1. Check for reasonable travel stroke of the foot brake pedal and response of the brakes 2. Check for effective travel stroke of the lever and its response to assure safety of driving
Tires	1. Check for proper tire pressure, abnormal wear and scores or serious damage detrimental to operation
Chassis spring	1. Chassis spring breakage
Battery	1. Battery electrolyte level and leakage
Horn, flasher and windshield wiper for normal operation	1. Check for operating failure
Meters	1. Check flasher for operating failure, fouling and damage
Rear view mirror	1. Check for proper function
Reflector and license plate	1. Check for fouling and damage
Any trouble or operating failure detected during automobile is in operation	1. Check pertinent parts for operating failure

**REFERENCE TABLE FOR PERIODICAL INSPECTION AND LUBRICATION  
(BELLETT DIESEL ENGINE)**

● Marking denotes "Replacement"

Equip-ment	Inspection period and mileage intervals	When initial 1,000 km covered		After every 3,000 km of travel or 2-month intervals		After every 9,000 km of travel or 6-month intervals		After every 18,000 km of travel or 12-month intervals		After every 36,000 km of travel or 6-month intervals	
		Per-sonal	Busi-ness	Per-sonal	Busi-ness	Per-sonal	Busi-ness	Per-sonal	Busi-ness	Busi-ness	
E n g i n e	Check-up	Personal and business use (classification)									
	Tension and wear of fan belt	○	○	○	○						
	Easiness of starting and operating noise			○	○						
	Draining the engine lubricant through the oil filter's drain plug	○	○	○	○						
	Check all the parts for oil leakage	○	○	○	○						
	Check for fuel leakage through the entire fuel system	○	○	○	○						
	Check for water leakage through the entire cooling system	○	○	○	○						
	Check for leakage in the air intake system	○	○	○	○						
	Tightness of cylinder head and manifolds mounting	○	○			○	○				
	Valve clearances	○	○			○	○				
	Muffler and exhaust pipes for loosened mounting or wear	○	○	○	○						
	Engine mountings for tightness	○	○			○	○				
	Air cleaner element for clogging or wear			○	○						
	Engine performance at low speed and accelerated speed			○	○						
	Cleaning of air breather system			○	○						
	Check exhaust smoke for normal condition			○	○						
	Check pre-heating system for operating failure			○	○						
	Check fuel filter for clogging and clean as necessary			○	○						
	Check fuel injecting pressure and spraying condition of the fuel injection nozzle							○	○		
	Check and clean the engine oil pan and interior of oil strainer										
Measuring the cylinder compression											
Clean the interior of fuel tank											
Check fuel feed pump for operating failure											

Equip-ment	Inspection period and interval	When initial 1,000 km covered		After every 3,000 km of travel or 2-month intervals		After every 9,000 km of travel or 6-month intervals		After every 18,000 km of travel or 6-month intervals		After every 36,000 km of travel or 6-month intervals
		Personal and business use (classification)	Per-sonal	Busi-ness	Per-sonal	Busi-ness	Per-sonal	Busi-ness	Per-sonal	Busi-ness
	Check-up									
E n g i n e	Fuel pump for operating failure									○
	Replacing the engine oil	●	●	●	●					
	Replacing the cooling water							●		●
	Carburetor cleaning and overhauling if necessary							○		○
	Replacing the oil filter element					●	●			
	Replacing the fuel filter element							●	●	
	Replacing the air cleaner element							●	●	
	Cleaning the fuel pump strainer				○	○				
	Lubricating the distributor cam				○	○				
	Lubricating the engine control linkage				○	○				
E l e c t r i c a l s y s t e m	Lubricating the distributor rotor and arm shaft				○	○				
	Check meters and pilot lamps for proper operation				○	○				
	Check battery holding down bolts and terminals for loosening	○	○	○	○					
	Check generator for proper charging operation				○	○				
	Check battery electrolyte level						○	○		
	Check carbon brush in the starter and commutator surface for wear or fouling								○	○
	Check generator and voltage regulator for proper operation							○	○	
	Check starter pinion for proper engagement							○	○	
	Check starter mounting for loosening							○	○	
	Lubricating the center and rear bearings of the starter						○	○		
Lubricating the front bearing in the starter									○	
Grease the generator bearing as recommended									●	

1-7 LUBRICATION CHART

The automobile should be lubricated with recommended oil or grease according to the following chart when it has covered the specified travel distances.

Lubricant	Parts to be lubricated	Type and brand name	Specified oil	Capacity
Engine Oil	Crankcase	Hi-belpa or White wave engine oil (Showa Sekiyu) and (Nihon Sekiyu)	March through September (SAE 30) and October through February (SAE 20)	G150 3.2 l G130 2.6 l C180 4.0 l
	Transmission	Same as above	SAE 20	2.0 l
Gear oil	Differential	Belpa gear oil 90H (Showa Sekiyu)	Summer season SAE 140 Winter season SAE 90	0.7 l
Grease	Front hub bearing	Sun line grease (Showa Sekiyu)		60 gr
	Rear hub bearing	Same as above		54 gr
	Drive shaft	One-luber with molybdenum disulfide MO-No <sub>2</sub> grease		
	Steering housing and hand brake cable	Belpa special grease or M-1 Grease (Showa Sekiyu) and (Nihon koyu)		
	Joint balls on the front suspension	One-luber with molybdenum disulfide MO-No <sub>2</sub> Grease (Kyodo yushi)		
	Joint balls on the steering track rod	Same as above		
Brake fluid		HIGH GRADE brake fluid		