

# **GS200**

## **Introduction to the IC Genesis Series**



# **CLARK<sup>®</sup>**

## ***TECHNICAL TRAINING***

Copyrighted Material  
Intended for CLARK dealers only  
Do not sell or distribute

# Contents

About this class .....	2
About Safety .....	2
Genesis Introduction .....	3
Section 1. Planned Maintenance .....	4
Section 2. Engine .....	9
Section 3. Cooling System .....	14
Section 4. Fuel .....	17
Section 5. Air Induction System .....	34
Section 6. Transaxle .....	36
Section 7. Electrical System .....	52
Section 8. Brake System .....	59
Section 9. Steering System .....	67
Section 10. Hydraulic System .....	73
Section 11. Uprights .....	90
Section 12. Counterweight .....	101
Section 13. Overhead Guard .....	102
Section 14. Specifications .....	103

©Copyright CLARK Material Handling Company 1995.  
Revised 1999

## Section 2. Engines

### Engine Tune-Up (4G64 Gas/LPG/CNG Engine)

#### Tune-Up Specifications

Spark Plug Type: Gas Engine: NGK BP4ES  
Champion NY 16

LPG Engine: NGK BP5ES  
Champion NY 12

Spark Plug Gap: 0.7-0.8 mm (0.028-0.031 in)

Spark Plug Tightening Torque: 25 N-m (18.4 ft.-lbs.)

Ignitor Air Gap: 0.8 mm (.031 in)

Ignition Timing: Gasoline 4° BTDC @ 500 rpm  
LPG 9° BTDC @ 500 rpm

Centrifugal Advance: Beginning: 0° at 1000 rpm (engine).  
End: 10° at 5000 rpm (engine)

Vacuum Advance: Beginning: 0° at 80 mm Hg (3.14 in. Hg.)  
End: 11.5° at 280 mm Hg (11.0 in. Hg.)

Engine Speed:

Idle: 650-700 rpms

Maximum No-Load

Governed: 2500-2650 rpms

Converter Stall: LPG: 1790-1890 rpms  
Gas: 1850-1950 rpms

Engine Vacuum:

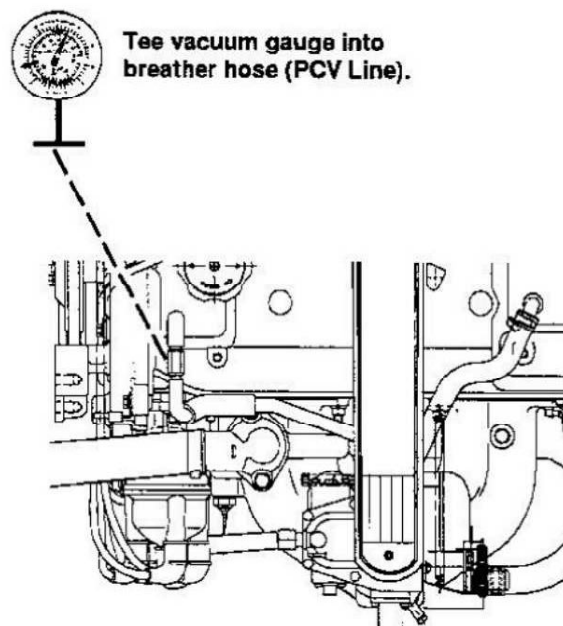
Idle: 406-457 mm Hg (16-18 in. Hg)

Max. No-Load: 330-381 mm Hg (13-15 in. Hg)

Converter Stall: 38-64 mm Hg (1.5-2.5 in. Hg)

**Note** For diesel engine specifications refer to SM 598.

**Note** Allow the engine to warm up to operating temperature before putting it under any load conditions.



*Engine Top View*

### **Engine RPM and Vacuum at Idle**

1. Check the engine idle speed. If idle speed is not 650-700 rpm, adjust the carburetor idle screw setting as explained in SM 598, Section 02, "Fuel System."

2. Check the engine intake manifold vacuum with the engine idling at the 650-700 rpm, then increase engine speed.

The typical intake manifold vacuum reading at idle should be 406-457 mm Hg (16-18 in. Hg) at 650-700 rpm. Refer to the chart below to analyze the reading you obtain.

#### **Vacuum Gauge Readings**

High and Steady

Low and Steady

Very Low

Needle Pulses Steadily  
as Speed Increases

#### **Engine Condition**

Good

Loss of power in all cylinders caused by late ignition, late valve timing, or loss of compression due to leakage around piston rings.

Manifold, carburetor or cylinder head gasket leak.

A partial or complete loss of power in one or more cylinders caused by leaking intake valve, cylinder head or intake manifold gasket leak, fault in the ignition system, or weak valve springs.



Gradual Drop at Engine Idle  
Intermittent Fluctuation

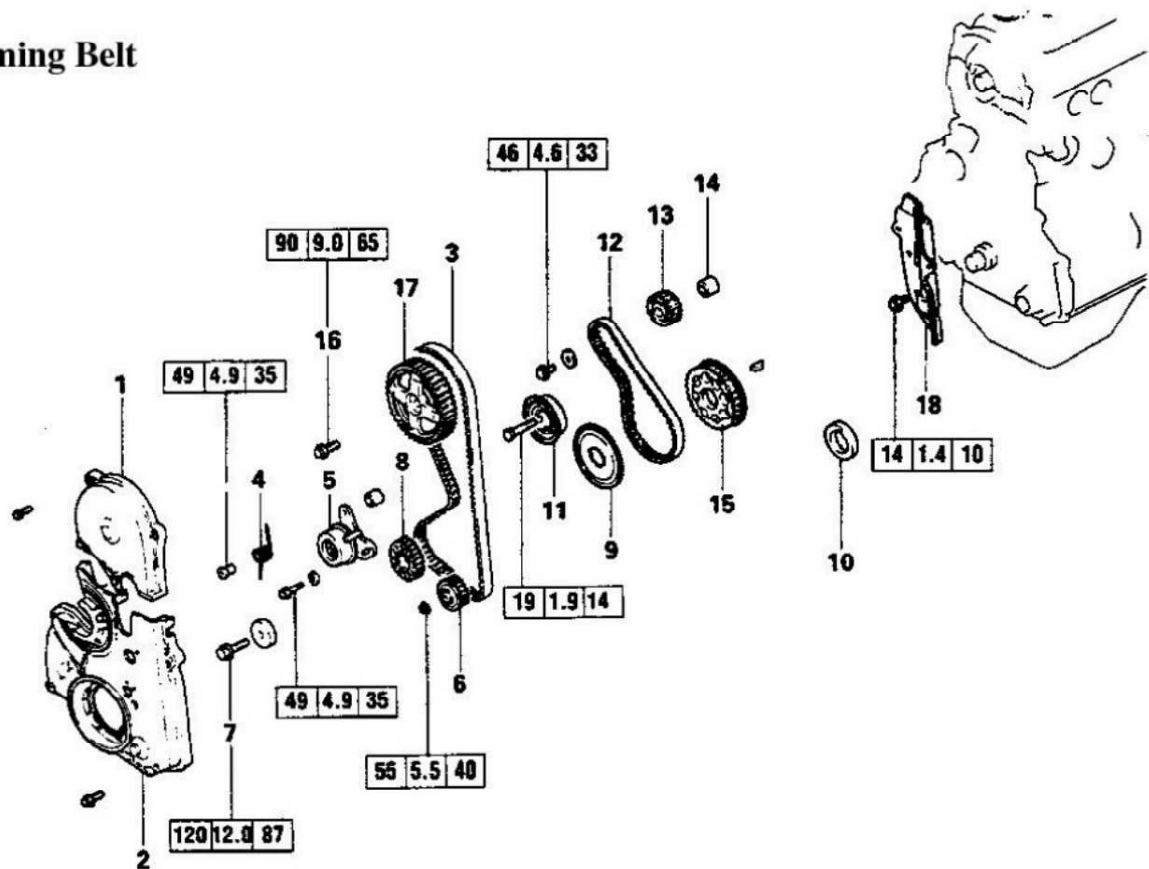
Excessive back pressure in the  
exhaust system. An occasional loss of power possibly  
caused by a defect in the ignition system or a sticking  
valve.

Slow Fluctuation or Drift  
of the Needle

Improper idle mixture adjustment, or  
carburetor, spacer, or intake manifold gasket leak.

If vacuum is OK, check the no-load governed speed.

## Timing Belt



### Removal and Installation steps

- |     |                               |     |                         |
|-----|-------------------------------|-----|-------------------------|
| 1.  | Timing belt front upper cover | 11. | Tensioner "B"           |
| 2.  | Timing belt front lower cover | 12. | Timing belt "B"         |
| 3.  | Timing belt                   | 13. | Silent shaft sprocket   |
| 4.  | Tensioner spring              | 14. | Spacer                  |
| 5.  | Tensioner pulley              | 15. | Crankshaft sprocket "B" |
| 6.  | Oil pump sprocket             | 16. | Camshaft sprocket bolt  |
| 7.  | Crankshaft bolt               | 17. | Camshaft sprocket       |
| 8.  | Crankshaft sprocket           | 18. | Timing belt rear cover  |
| 9.  | Flange                        |     |                         |
| 10. | Spacer                        |     |                         |

# Hydraulic Valve Actuators

The 4G64 Engine uses hydraulic valve actuators that does not require adjustment.

## Adjuster Leak Down Test

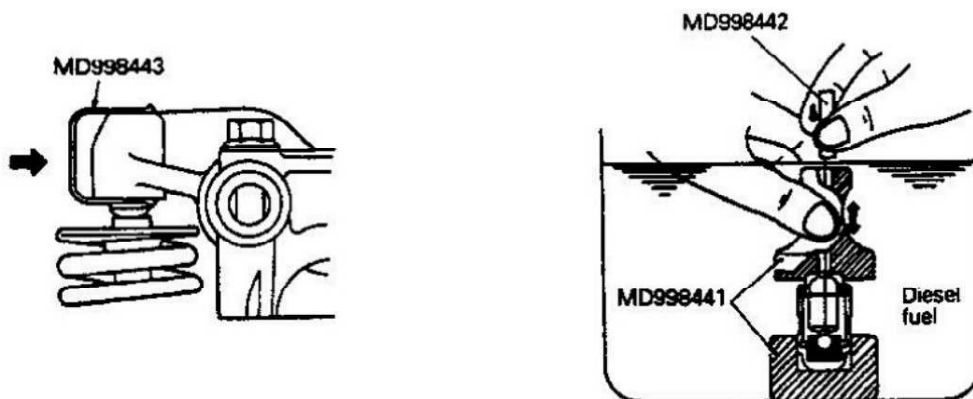
**Important** The lash adjuster is a precision part. Keep it free from dust and other foreign matter. Do not disassemble lash adjusters.

When cleaning lash adjusters, use clean diesel fuel only.

1. Immerse the lash adjuster in clean diesel fuel.
2. While lightly pushing down the inner steel ball using the special tool, Air Bleed Wire, move the plunger up and down four or five times to bleed air. Use of the retainer (special tool) helps facilitate the air bleeding of the rocker arm mounted type lash adjuster.
3. Remove the wire and press the plunger. If the plunger is hard to be pushed in, the lash adjuster is normal. If the plunger can be pushed in all the way readily, bleed the lash adjuster again and test again. If the plunger is still loose, replace the lash adjuster.

**Important** Upon completion of air bleeding, hold the lash adjuster upright to prevent inside diesel fuel from spilling and keep it free from dust and other foreign matter.

4. After air bleeding, set the lash adjuster on the on the special tool (Leak down tester MD998440).
5. After the plunger has gone down somewhat (0.2 - 0.5 mm), measure the time taken for it to go down 1 mm. Replace if the measured time is not 5-20 seconds/mm.



## Section 3. Cooling Systems

### Specifications

Radiator Type: Crossflow radiator with coolant recovery system.

System Pressure (Radiator cap): 89-103 kPa (13-15 psi).

Thermostat:

Gas, LPG, and CNG

Open (cracking) at  $82^{\circ}\text{C} \pm 1.5^{\circ}$  ( $180^{\circ}\text{F} \pm 2.7^{\circ}$ )  
Fully open at  $95^{\circ}\text{C}$  ( $203^{\circ}\text{F}$ ).

Diesel

Open (cracking) at  $76.5^{\circ}\text{C} \pm 1.5^{\circ}$  ( $170^{\circ}\text{F} \pm 2.7^{\circ}$ )  
Fully open at  $90^{\circ}\text{C}$  ( $194^{\circ}\text{F}$ ).

Coolant Mixture: 50% water and 50% low-silicate, ethylene glycol, permanent-type antifreeze with rust and corrosion inhibitors.

### Cooling System Coolant Capacity:

Cushion-tire truck with 3-row radiator capacity is 6.3 L (6.6 qt.)

Pneumatic-tire truck with 3-row radiator capacity is 7.5 L (7.9 qt.)

Diesel truck with 4-row radiator capacity is 10 L (10.5 qt.).

Fan Type: Pusher type

Fan Drive Belt: V-type belt

Water Pump Type: Centrifugal

Hose Clamp Sizes:

Gas/LPG: 47 mm (1.8 in) @ radiator end;  
44 mm (1.7 in) @ engine (water pump or thermostat) end

Diesel: 51mm (2 in).

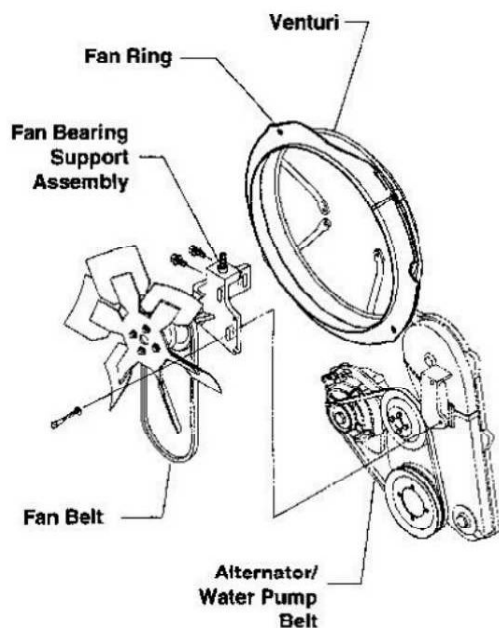
### Service Intervals

Coolant Level Check: Every 8- 10 hours or daily.

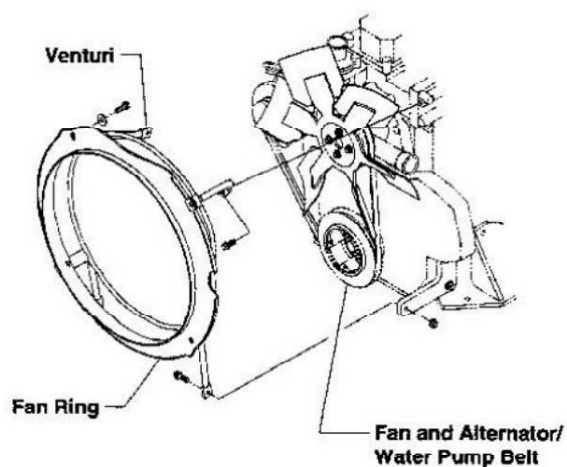
Coolant Change (drain and refill): Every year or 2000 hours of operation.

Coolant Hoses Inspection/Replacement: As needed and every 50-250 hours or each PM and every year or 2000 hours of operation.

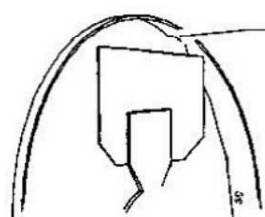




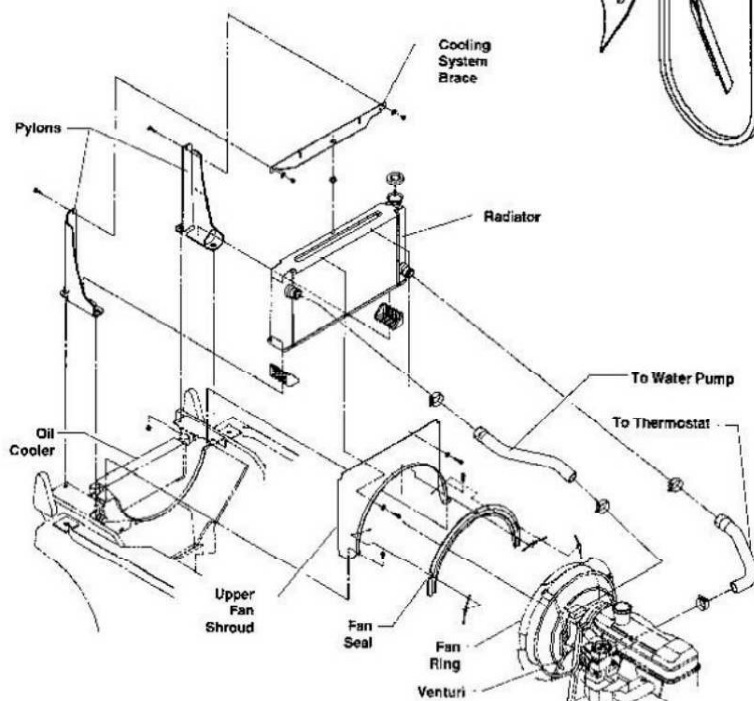
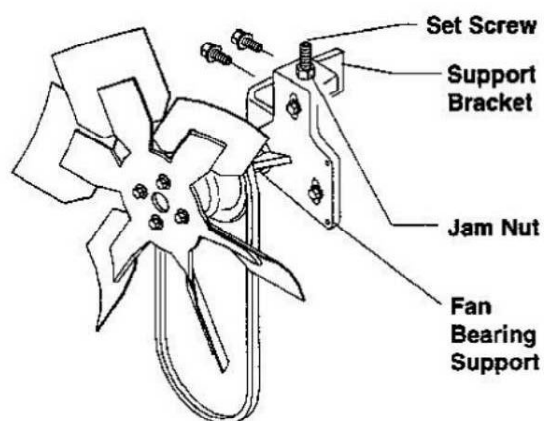
*Gas/LPG Engine Cooling System Belts*



*Diesel Engine Cooling System Belt*



Slip belt over fan blade at indentation in ring.



*Cooling System - Cushion-Tire Truck*



## **Section 4. Fuel Systems**

### **Specifications**

#### **LPG Tank**

Capacity: 9.1, 15.2, 19.7 kg (20, 33.5, or 43.5 lb.)

Working Pressure: 138-1654 kPa (20-240 psi.)

Safety Relief Valve: Opens when pressure exceeds 1896 kPa (275 psi).

Shut-off Valve: Manual with maximum withdrawal valve.

Maximum Withdrawal Valve: Closes when flow rate exceeds 5.7 Lpm (1.5 gpm).

Fuel Gauge- float level type.

Low Fuel Light: Instrument pod light comes on at 138 kPa (20 psi).

#### **Carburetor**

Type: Diaphragm-operated air-gas valve design with self contained air-fuel metering device

Idle air-fuel mixture: 0.30%-0.70% CO (carbon monoxide) @ 650 rpm.

Power Mixture: 0.6%-1.5 % CO at converter stall.

Idle Speed: 650-700 rpm.

Maximum No-Load Governed Speed: 2550-2650 rpm

#### **Vaporizer- Regulator**

Primary Chamber Pressure: tank pressure to 10.3 kPa (11.5 psi).

Secondary Chamber Pressure: 10.3 kPa (1.5 psi) to a negative pressure to vapor outlet pressure.

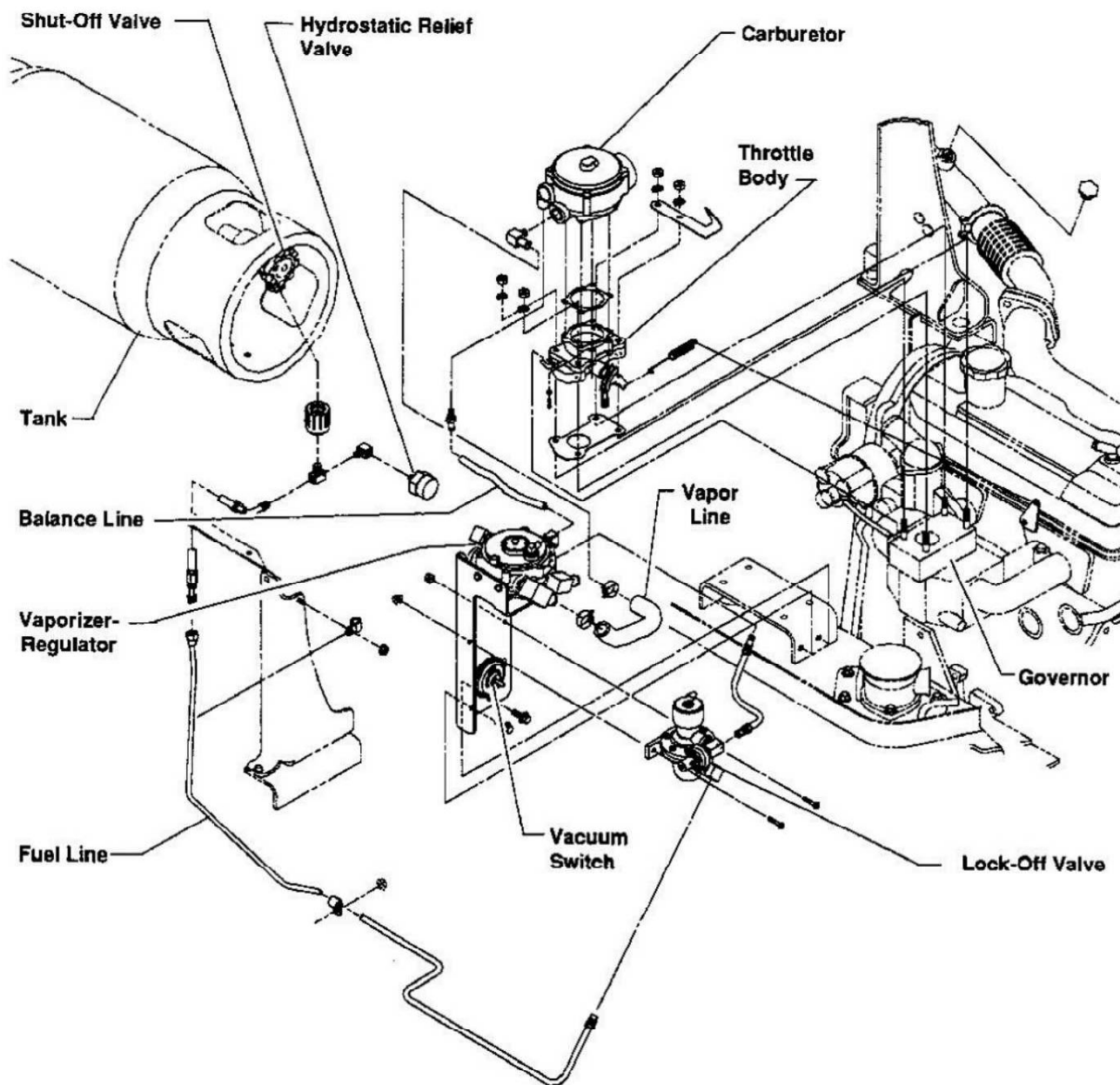
Vapor Outlet Pressure: -3 8.1 mm (- 1.5 in) water column.

#### **Lock-Off Valve**

Type: Solenoid-operated valve actuated by external vacuum switch.

Filter element: Replace every 2000 hours.

**Fuel Type:** HD-5 Propane



*LPG Fuel System*