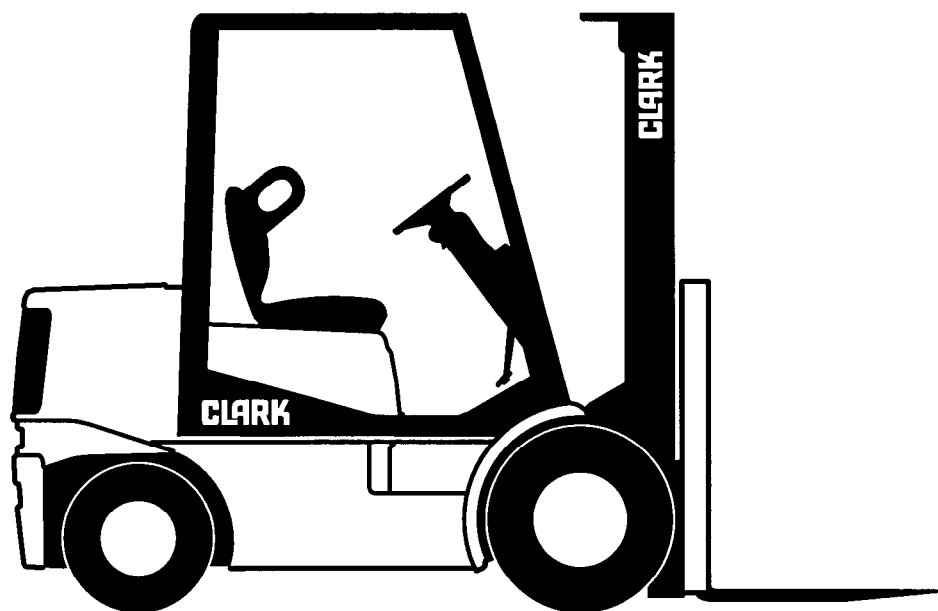


SM-520R GCS/GCS



CLARK

Technical
Publications
Lexington, KY
40508

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Foreword

This service publication provides information covering normal service, maintenance and repair of the Clark lift trucks noted on the cover. It has been specifically prepared to help owners and service personnel maintain these lift trucks in efficient and safe operating condition.

Regular, correct maintenance and care of lift trucks is not only important for long and efficient truck life; it is essential for safe operation. The importance of proper maintenance through planned service, inspection and qualified repairs cannot be emphasized too strongly.

To assist in keeping lift trucks in good operating condition, this manual includes preventive maintenance procedures to be performed at regular intervals. These are essential to the service life and safe operation of all fork lift trucks. Instructions for safety inspections, operational checks, cleaning, and lubrication are provided for reference in setting-up and conducting a recommended periodic Planned Maintenance (PM) program.

Refer to the Operator's Manual, located on the truck, for additional information on the operation, care and maintenance of your truck.

Genuine Clark replacement parts should be used for all service and repair requirements. Substitute parts from other sources may be different than original parts and may not meet OSHA or other safety requirements.

Any reference to brand names other than Clark in this manual is made simply as an example of the type of tools and materials recommended for use and, as such, should not be considered as an endorsement. Equivalents, if available, may be used.

For more information on maintenance and repair of these trucks, contact your authorized Clark dealer.

NOTICE - The descriptions and specifications included in this manual were in effect at the time of printing. Clark Equipment Company reserves the right to discontinue models at any time, or make improvements and changes in specifications or design without notice and without incurring obligation. Specifications, torques, pressures, measurements, adjustments, illustrations and other items may change at any time. Contact your authorized CLARK dealer for information on possible updates or revisions.

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About This Manual

This manual is intended for use by persons who are trained and authorized to do lift truck maintenance. It is designed to provide essential information about the correct and safe service maintenance and repair of the lift truck *by trained mechanics or service technicians*.

The information is organized into 14 major Parts of related components or topics as outlined by the Table of Contents at the front of the manual:

- **1** General information including precautions and safe maintenance practices.
- **2** Service specifications and reference information including lubricants, capacities, pressures, etc.
- **3** Planned Maintenance (PM) service procedures.
- **4-13** Adjustment, service and repair procedures for truck components.

In Parts 4-13, the detailed service and repair procedures are arranged in Sections for each procedure, component or subsystem. Some Sections include explanations that cover service procedures common to several components or subsystems.

In general, each Section is written to show and describe the general arrangement, adjustment, removal, disassembly, inspection, repair, and assembly steps that are normally required to service the component. Component specifications (as applicable), information notes and safety messages are included within those procedures. In most cases, specifications are shown in Section 2, Service Specifications, for convenience of reference.

Each Section includes Parts GROUP number(s) at the bottom of each page for cross reference. The Parts GROUP numbers are the same as the component group in the Master Parts Book and Service Parts Book. They are parts system reference numbers; use only the appropriate Parts Manual for ordering parts. **Do not order parts** from numbers shown in this manual.

The Table of Contents lists major headings of Parts of the manual. Additional content listings are placed at the beginning of each Section of the manual, subsection or component heading to simplify reference to multiple topics or procedures covering optional equipment, such as engines and transaxles.

If you cannot find a topic in the respective Table of Contents, check the Alphabetical Subject Index at the back of the manual.

This manual has been made easier to use by providing only specific steps and instructions necessary to explain the activity, component, assembly, or process being worked on. The technician is expected to include obvious additional steps of standard procedure for removal, disassembly, cleaning, inspection, reassembly, installation, etc., as needed.

To be better prepared to do the necessary service work, take time to completely read the entire procedure, including any special instructions, before doing any work.

The technician is cautioned and expected to always work in a safe manner by using the correct procedure. Do not take chances which may result in injuries.

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1.0 General Information

Safe Maintenance Practices

The following instructions have been prepared from current industry and government safety standards applicable to industrial truck operation and maintenance. These recommended procedures specify conditions, methods, and accepted practices that aid in the safe maintenance of industrial trucks. They are listed here for the reference and safety of all workers during maintenance operations. Carefully read and understand these instructions and the specific maintenance procedures before attempting to do any repair work. When in doubt of any maintenance procedure, please contact your local CLARK dealer.

1. Powered industrial trucks can become hazardous if maintenance is neglected. Therefore, suitable maintenance facilities, trained personnel, and procedures must be provided.
2. Maintenance and inspection of all powered industrial trucks shall be done in conformance with the manufacturer's recommendations.
3. A scheduled planned maintenance, lubrication, and inspection program shall be followed.
4. Only trained and authorized personnel should be permitted to maintain, repair, adjust, and inspect industrial trucks, and in accordance with the manufacturer's specifications.
5. Properly ventilate work area, vent exhaust fumes, and keep shop clean and floor dry.
6. Avoid fire hazards and have fire protection equipment present in the work area. Do not use an open flame to check for level, or leakage of fuel, electrolyte, or coolant. Do not use open pans of fuel or flammable cleaning fluids for cleaning parts.
7. Before Starting Work On Truck:
 - a) Raise drive wheels off of floor or disconnect power source and use blocks or other positive truck-positioning devices.
 - b) Put blocks under the upright rails and carriage, innermast(s), or chassis before working on them.
 - c) Disconnect battery before working on the electrical system.
8. Before working on engine fuel system of gasoline powered trucks with gravity-feed fuel systems, be sure fuel shutoff valve is closed.
9. Before working on engine fuel system of LP-gas powered trucks, close LP-gas cylinder valve and run engine until there is no more fuel in the system and engine stops running. If engine will not run, close LP-tank valve and vent fuel slowly in a safe area.
10. Operation of the truck to check performance must be conducted in an authorized, safe, clear area.
11. Before Starting To Drive Truck:
 - a) Be in operating position.
 - b) Disengage clutch on manual transmissions, or apply brake on trucks with powershift transmission and electric trucks.
 - c) Put directional control in neutral.
 - d) Start engine or turn on power.
 - e) Check functioning of lift and tilt systems, directional and speed controls, steering, brakes, warning devices, and any load handling attachments.
12. Before Leaving The Truck:
 - a) Stop truck.
 - b) Fully lower the load engaging means: upright, carriage, forks, or attachments.
 - c) Put directional control in neutral.
 - d) Apply the parking brake.
 - e) Stop the engine or turn off power.
 - f) Turn off the control or ignition circuit.
 - g) Put blocks at the wheels, if truck is on an incline.
 - h) Remove the ignition key (OSHA regulation)
13. Handle LP-gas cylinders with care. Damage such as dents, scrapes, or gouges may dangerously weaken the tank and make it unsafe for use.
14. Brakes, steering mechanisms, control mechanisms, warning devices, lights, governors, lift overload devices, guards and safety devices, lift and tilt mechanisms, articulating axle stops, and frame members must be carefully and regularly inspected and maintained in a safe operating condition.

15. Special trucks or devices designed and approved for hazardous-area operation must receive special attention to ensure that maintenance preserves the original, approved safe operating features.

16. Fuel systems must be checked for leaks and condition of parts. Extra special consideration must be given in the case of a leak in the fuel system. Action must be taken to prevent the use of the truck until the leak has been corrected.

17. All hydraulic systems must be regularly inspected and maintained in conformance with good practice. Tilt and lift cylinders, valves, and other similar parts must be checked to assure that "drift" or leakage has not developed to the extent that it would create a hazard.

18. When working on hydraulic system, be sure the engine is turned off or battery disconnected on electric trucks, upright is in its fully-lowered position, and hydraulic pressure relieved in hoses and tubing. **WARNING** - Always put blocks under the carriage and upright rails when necessary to work with upright in an elevated position.

19. Batteries, motors, controllers, limit switches, protective devices, electrical conductors and connections must be inspected and maintained in conformance with good practice. Special attention must be paid to the condition of electrical insulation.

20. To avoid injury to personnel or damage to the equipment, consult the manufacturer's procedures in replacing contacts on any battery connection.

21. Industrial trucks must be kept in a clean condition to minimize fire hazards and help to detect loose or defective parts.

22. The truck manufacturer's capacity, operation and maintenance instruction plates, tags, or decals must be maintained in legible condition.

23. Modifications and additions that affect capacity and safe truck operation must not be done without the manufacturer's prior written approval. Capacity, operation and maintenance instruction plates, tags or decals must be changed accordingly. **Note** - Using other than Clark parts may nullify the truck rating.

24. Care must be taken to assure that all replacement parts, including tires, are interchangeable with the original parts and of a quality at least equal to that provided in the original equipment. Parts, including tires, are to be installed per the manufacturer's procedures. Always use genuine CLARK or CLARK-approved parts.

25. When removing tires, follow industry safety practices. Most important, deflate pneumatic tires completely prior to removal. Following assembly of tires on multi-piece rims, use a safety cage or restraining device while inflating.

26. Use special care when removing heavy components from the truck, such as counterweight, upright, engine, transaxle, etc. **WARNING** - If not properly blocked, truck may become unstable. Be sure that lifting and handling equipment is of the correct capacity and in good condition.

27. Before any truck is returned to service it must be safety checked to insure safe operation.

NOTICE - Additional operating and maintenance safety instructions are contained in the following publications:

ANSI/ASME B56.1 - 1983: Safety Standard for Low Lift and High Lift Trucks (Safety Code For Powered Industrial Trucks). Published by: Society of Mechanical Engineers, United Engineering Center, 345 E. 47th Street, New York, N.Y. 10017.

NFPA 505-1982: Fire Safety Standard for Powered Industrial Trucks: Type Designations, Areas of Use, Maintenance and Operation. Available from: National Fire Protection Assoc., Inc., Batterymarch Park, Quincy, MA 02269.

General Industry Standards, OSHA 2206: OSHA Safety and Health Standards (29 CFR 1910), Subpart N-Materials Handling and Storage, Section 1910.178 Powered Industrial Trucks. For sale by: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C 20402.

Safety Signs and Messages

SAFETY SIGNS and MESSAGES are placed in conspicuous places throughout this manual and also on the lift truck to provide instructions and to call attention to specific areas where potential hazards exist and special precautions should be taken. Be sure to know and understand the meaning of these instructions, signs and messages. Each one is there for a specific purpose. Damage to the truck or death or serious injury to personnel may result if these messages are not followed.

NOTICE This message is used when special information, instructions or identification is required relating to procedures, equipment, tools, pressures, capacities and other special data.

IMPORTANT This message is used when special precautions should be taken to ensure a correct action or to avoid damage to or malfunction of the truck or a component.

CAUTION This message is used as a reminder of safety hazards which can result in personal injury if proper precautions are not taken.

WARNING This message is used when a hazard exists which can result in injury or death if proper precautions are not taken.

DANGER This message is used when an extreme hazard exists which will result in death or serious injury if proper precautions are not taken.

These labels identify hazards which may not otherwise be apparent to a trained mechanic. There are many potential hazards for an untrained mechanic and there is no way to label the truck or service manual against all such hazards. Clark Equipment Company cannot anticipate every possible circumstance that might involve a potential hazard. The safety signs and warning messages in this manual are therefore not all inclusive. If a procedure, tool, device or work method not specifically noted or recommended by Clark is used, you must satisfy yourself that it is safe for you and others. You should also ensure that the lift truck or its components will not be damaged or made unsafe by the procedures you choose.

IMPORTANT SAFETY NOTICE**Read and understand all safety precautions and warnings before performing repairs on lift trucks.**

Appropriate service methods and proper repair procedures are essential to the safe, reliable operation of industrial trucks as well as the personal safety of the individual doing the work. This Service Manual provides general directions for accomplishing service and repair work with tested, effective techniques. Following them will help assure successful repair and reliable truck operation.

There are numerous variations in procedures, techniques, tools, and parts for servicing industrial trucks, as well as in the skill of the individual doing the work. This manual cannot possibly anticipate all such variations and provide advice or precautions as to each. Accordingly, anyone departing from the instructions provided in this manual through procedures used or choice of tools, materials, and parts may jeopardize his or her personal safety and/or the safety of the vehicle user.

Improper or careless techniques cause accidents. Don't take chances with incorrect or damaged equipment. Read and understand the procedures for safe operation and maintenance outlined in this manual.

STAY ALERT! Follow safety rules, regulations and procedures. Accidents can be avoided by recognizing dangerous procedures or situations before they occur.

DRIVE AND WORK SAFELY and follow the safety signs and their messages displayed on the truck and in this manual.

General Precautions

The following list contains general precautions that should be followed when working on a lift truck:

- **Always wear safety glasses** for eye protection.
- **Remove rings, watches, loose jewelry and open clothing** before working on a vehicle, to avoid serious injury.
- **Do not smoke** while working on a vehicle.
- **Put ignition switch in the OFF position**, unless otherwise required by the procedure.
- **Set the parking brake.** Place wheel chocks or wood blocks of 4" x 4" size or larger to the front and rear surfaces of the tires to provide further restraint from inadvertent vehicle movement.
- **Use safety stands** whenever a procedure requires you to be under the vehicle.
- **Operate the engine only in a well-ventilated area** to avoid the danger of carbon monoxide.
- **Keep hands and other objects clear** of the fan belt and fan blades if it is necessary to work in the engine compartment.
- **Keep yourself and your clothing** away from all moving parts, especially the fan and belts, when the engine is running.
- **Avoid contact with hot metal parts** such as the radiator, exhaust manifold, exhaust pipe and muffler to prevent serious burns.

Product Identification

Model Nomenclature



Cushion Tire Models

GCX 20/22/25/27/30 -,C
 GCS 20/22/25/27/30 MB
 GCS 17/20/22/25/27/30 MC,WC,I
 DCS 17/20/22/25/27/30 I



Pneumatic Tire Models

GPX 20/22/25/27/30 -,C
 GPS 20/22/25/27/30 MB
 GPS 20/22/25/27/30 MC,WC,I
 DPS 20/22/25/27/30 I

Rated Load Capacity*

@ 24 inch [500 mm] Load Center

Model	17	20	22	25	27	30
Basic Capacity						
lbs	3500	4000	4500	5000	5500	6000
[kgs]	[1750]	[2000]	[2250]	[2500]	[2750]	[3000]

*This is the basic capacity of the truck chassis. The actual capacity of the truck may be less due to the use of high lift uprights and/or attachments.

Product Identification

Model Designation by Engine and Transaxle Application

Serial No. Prefix	Engine				Transaxle			
	Mitsubishi 4G54 Gas/LPG	Continental TM27 Gas/LPG	Continental TMD27 Diesel	Waukesha D176GA Gas/LPG	HR500 1-spd	HR600 1-spd	HR600 2-spd	TA18 1-spd
Cushion Models GX230C		•	•					•
GX230	•							•2
G138 MB	•				•1			
G138 MC	•					•		
G138 WC				•5		•		
G138 I		•3	•4			•		
Pneumatic Models GPX230C		•	•					•
GPX230	•							•7
GP138 MB	•				•6			
GP138 MC	•					•		
GP138 WC				•8			•	
GP138 I		•9	•10				•	

Notes: 1 - Lot 5521 thru 7157 6 - Lot 5536 thru 7169
 2 - Lot 7158 and above 7 - Lot 7170 and above
 3 - Lot 6200 and above 8 - Lot 5525 thru 6091
 4 - Lot 6200 and above 9 - Lot 6205 and above
 5 - Lot 5510 thru 6086 10 - Lot 6205 and above

- HR500 and TA18 transaxles incorporate full-floating straight drive axles with drum-and-shoe brakes.
- HR600 transaxles incorporate pre-reduction enclosed oil-cooled disc brakes & offset drive axles.

Model Serial Number Code

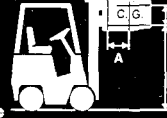
Cushion Tire Trucks				Plant of Manufacture
Model Designation	Sequence No.	Lot No.	Plant of Mfr	
GX 230	-XXXX	-XXXX	-XX	None.....Battle Creek, MI FA.....Georgetown, KY FB.....Lexington, KY KOF.....Republic of Korea
GX 230C	-XXXX	-XXXX	-XX	
G138 MB	-XXXX	-XXXX	-XX	
G138 MC	-XXXX	-XXXX	-XX	
G138 WC	-XXXX	-XXXX	-XX	
G138 I	-XXXX	-XXXX	-XX	
Pneumatic Tire Trucks				Plant of Manufacture
Model Designation	Sequence No.	Lot No.	Plant of Mfr	
GPX 230	-XXXX	-XXXX	-XX	See above
GPX 230C	-XXXX	-XXXX	-XX	
GP138 MB	-XXXX	-XXXX	-XX	
GP138 MC	-XXXX	-XXXX	-XX	
GP138 WC	-XXXX	-XXXX	-XX	
GP138 I	-XXXX	-XXXX	-XX	

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Product Identification

Truck Data & Capacity Plate (Nameplate)



CLARK Industrial Truck Division 	MODEL ①	TYPE ②	TRUCK WEIGHT
	SERIAL NO. ③		⑥ LBS kg
LOAD C.G. C A B	ATTACHMENTS ④		
CAPACITY WITH ATTACHMENT OR FORKS WITH UPRIGHT VERTICAL			
LBS. ⑤	A IN	B IN	C IN kg A mm B mm C mm
FROM FACTORY THIS TRUCK MEETS PART II, ANSI B56.1 1969/1975 BATTLE CREEK, MI, U.S.A.			
FOR OTHER CAPACITIES CONSULT MANUFACTURER. PT. NO. 2376306			

The truck nameplate should be referred to for:

1. Model number
2. UL Type Classification
3. Truck serial number
4. Attachment description
5. Capacity rating, load center, and lifting height data
6. Truck weight, less load

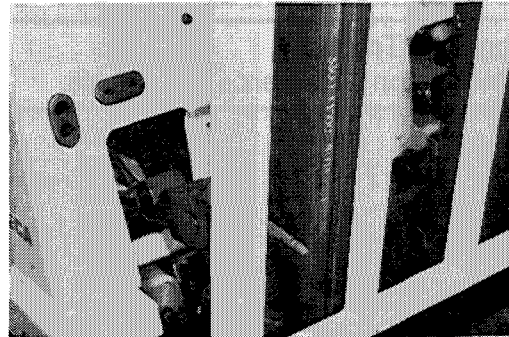
The truck Serial Number is required when requesting information and must always be given when ordering parts. Likewise, the upright Deck Number must be provided on requests for Upright Service or Parts Information.

Machine Serial Number



1. The machine serial number is also stamped in the left-hand side frame member.

Upright Deck Number



1. The Upright Deck Number is stamped on the outer rail assembly of Clark-manufactured uprights.

Product Identification

Truck Model Visual Identification

GCX and GCS MB Cushion-tire models and GPX and GPS MB Pneumatic-tire models incorporate full-floating drive axles. They are easily identified by their circular axle hub bolt pattern.

GCS and GPS MC, WC and I models incorporate offset drive axles. They are identified by a smooth hubcap at the center of the drive axle.



GCX, GCS MB as well as GPX and GPS MB models can be identified by the circular bolt pattern at the center of the drive axle hub.



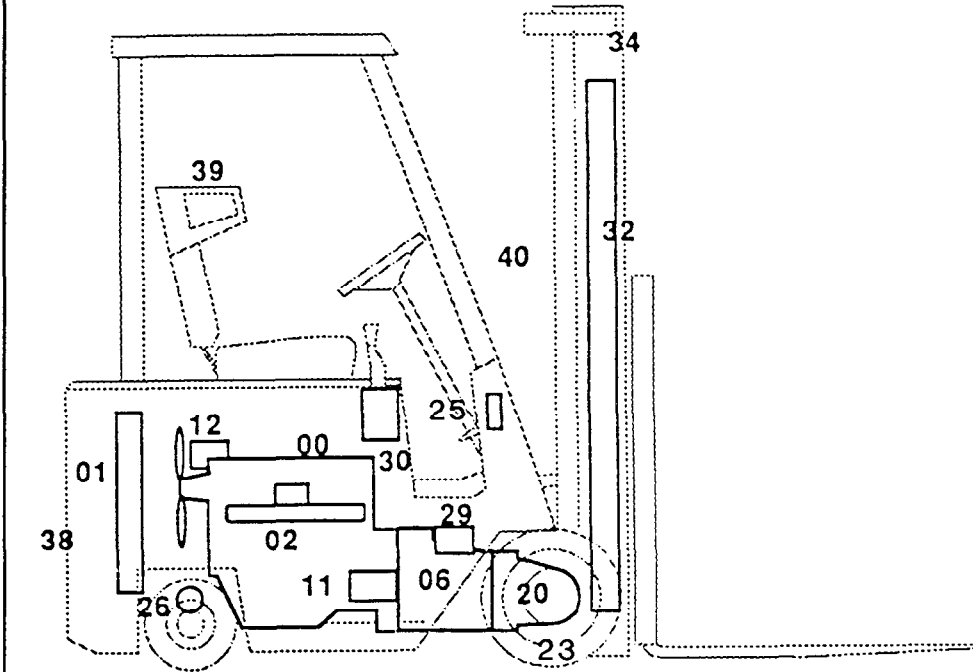
GPS MC, WC, and I models and GCS MC, WC, and I models are identified by the smooth hubcap at the center of the drive axle hub.

Component Identification

Truck Systems by *Parts GROUP Number*

Parts GROUP Numbers shown on the bottom of pages and on illustrations indicate part system reference information. They are helpful in identifying components. However, only the Parts Manual should be used for ordering parts.

TYPICAL FORK TRUCK BASIC GROUP NUMBERS



Typical Clark fork lift truck basic parts group numbers as used in this manual

- | | |
|--|-----------------------------------|
| 00 - Engine | 25 - Power Steering Control |
| 01 - Cooling System | 26 - Steer Axle |
| 02 - Fuel System, Carburetors, Exhaust | 29 - Hydraulic Pump and Sump |
| 06 - Transaxle (Transmission) | 30 - Hydraulic Control Valve |
| 11 - Distributor | 32 - Hydraulic Cylinders |
| 12 - Alternator, Starter | 34 - Upright and carriage |
| 20 - Drive Axle (See Transaxle) | 38 - Counterweight |
| 23 - Wheels and Tires | 39 - Frame and Chassis Components |
| 23 - Brake System | 40 - Nameplates and Decals |

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2 Specifications

Product Specification Changes

G(P)138 WC Models <ul style="list-style-type: none"> • Replaced by G(P)138 I Model 	Thru Lot 6086(6091)
G(P)138 MB Models <ul style="list-style-type: none"> • Replaced by GX, GPX 230 Models <i>Also see G(P)138 MB & MC Models below</i> 	Thru Lot 7157(7169) Effective Mid 1989
G(P)138 MB & MC Models <ul style="list-style-type: none"> * Per-Lux ignition conversion • 4G54 [2.6L] engine with electronic ignition (CEI non-contact distributor) • 4G54 [2.6L] engine with balancer and increased engine oil pressure • New PCV crankcase ventilation system 	Late 1986 Feb 1987 Early 1987
G(P)138 MC & I Models <ul style="list-style-type: none"> • Flow-thru brake master cylinder refill system (replaces flow-by system) 	
G(P)138 I Models <ul style="list-style-type: none"> • Replace G(P)138 WC Models • TM27/TMD27 [2.7L] Engines (Replace Waukesha D176GA) 	Begin Lot 6200 Begin Lot 6200
G(P)138 All models <ul style="list-style-type: none"> • Motorola 9DM 62-amp alternator replaces Delco Series 10SI 37-amp alternator • Steering control valve changed to improve steering response • Steer cylinder with internal stops (<i>Also see Steer Axle changes below</i>) • Type 2 steer axle with fabricated axle body, new steering cylinder 	Oct 1986 Late 1989
G(P)X230 - Models <ul style="list-style-type: none"> • TA18 Transaxle (Replaces HR500 transaxle) • Electric shift controls (with TA18 transaxle) • Dual brake and inching master cylinders with remote reservoir 	Begin Lot 7158(7170) Effective Mid 1989 Effective Mid 1989 Effective Mid 1989
G(P)X230C Models <ul style="list-style-type: none"> • Continental (Balanced) Engine in place of Mitsubishi • TA18 Transaxle 	Begin Lot 8530(8550)

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Product Specification Changes

<p>4G54 [2.6L] Engine</p> <ul style="list-style-type: none"> • Starter changed from straight drive to gear reduction starter • Per-Lux ignition conversion • Change to electronic ignition (CEI non-contact distributor) • No-lead gasoline changes • New PCV system (oil separator no longer used) • Engine balancer added 	<p>Feb 1987 Late 1986 Early 1987</p> <p>Effective Feb 1987</p>
<p>Steer Axle</p> <ul style="list-style-type: none"> • Steer cylinder gland change to add internal stops • Type 1A - Steer linkage changed to straight links (replaces forged rod ends) • Style 4 steer cylinder - Gland retained with snap-ring (non-threaded) <p>• Type 2 - Change to fabricated axle body, new steering cylinder</p>	<p>Feb 1987. Begin Lot No. GC(P)S-I 6810(6815) GC(P)S-MC 6820(6825) GC(P)S-MB 6830(6835) Late 1989</p>
<p>HR600 Transaxle</p> <ul style="list-style-type: none"> • Revised to add improved control of O-rings at brake housing interface • Oil capacity changed from 27 pints to 35 pints by relocation of oil level plug 	<p>Late 1986</p>

2.1 Service Specifications

Frame/Chassis

- Basic design is to metric standard dimensions
- Components and hardware dimensions are combination USA inch and metric
- Stamped and formed frame, welded construction, 10 mm, except cowl 6 mm
- Removable fuel and hydraulic tanks

Cooling System

- TYPE: Crossflow radiator, with transmission oil cooler in radiator side tank
 - 1) Variable-speed temperature-controlled viscous fan drive (MC, I models).
 - 2) Coolant recovery system is standard (all models).
- System Pressure (Radiator Cap): 14 psi nominal Limits 12-16 psi [83-110 kPa]
- Thermostat: Open (cracking) 175-182°F [65-68°C]
Fully open 202°F [79°C]

Recommended Coolant: 50% water and 50% *low-silicate* ethylene glycol permanent-type antifreeze containing rust and corrosion inhibitors. Antifreeze protection level -34°F [-37°C].

NOTICE - The use only of an antifreeze having a low silicate additive content is strongly recommended. Silicates are added to antifreeze to help protect aluminum cylinder heads in automotive engines. During use, the silicate additives may form gummy deposits that can block and seriously damage a cooling system. Low-silicate antifreeze is available for heavy-duty use. Also, some tap waters react adversely with coolant chemicals. If your local tap water is "hard", use distilled water.

Electrical System

		<i>Engine Model</i>
• System Voltage & Type:	12 volt, negative ground	
• Fuses:	AGC 15 amp (in-line in wiring harness)	
• Indicator Lamps:	No. 57	
• 1 Battery:	12 volt, BCI Group 73	4G54, D176GA
Cold Crank Current:	420 amps @ 0°F [17.8°C]	
• 2 Battery:	12 volt, BCI Group 72	TM27
Cold Crank Current:	320 amps @ 0°F [17.8°C]	
• 3 Battery:	12 volt, BCI Group 31	TMD27 Diesel
Cold Crank Current:	625 amps @ 0°F [17.8°C]	
Cranking Voltage:	9.4 volts, minimum	
No-load Voltage:	12 volts	
Charging Voltage:	13.5 volts, minimum	
• Alternator/Voltage Regulator:	Delco Series 10 SI, Type 100, 12 volt, 37 amp Motorola 9DM, 12 volt, 62 amps (After Oct 1986)	

Fuel System

Gasoline	
• Fuel Strainer, Gasoline:	In fuel tank
• Fuel Filter, Gasoline:	4G54 [2.6L] Engine: In-line, between tank and fuel pump TM27 [2.7L] Engine: In-line D176GA [2.9L] Engine: In-line, at inlet to carburetor
Recommended Fuel:	Regular grade non-leaded gasoline, 85 octane minimum/motor method
LPG	
• Fuel Filter, LPG:	In lock-off valve
Recommended Fuel:	HD5 Propane
Diesel	
• Fuel Strainer, Diesel:	In fuel tank
• Fuel Filter, Diesel:	In-line, between fuel supply (transfer) pump and injection pump
Recommended Fuel:	No. 1-D (light fuel) and preferably No. 2 (heavy fuel) Cetane Number: 50 desired, 45 minimum Total Sulphur: 0.5% maximum

Drive & Steer Tires

Model Series	Model	Drive Tire Size	Steer Tire Size
• MB, GX	GCS(X)20-25	20x8x16	17x5x12.12
	GCS(X)30	20x9x16	17x6x12.12
• MB, GPX	GPS(X)20-25	7.00x12 - 14 ply rating	6.50x10 - 10 ply rating
	GPS(X)30	28x9x15 - 14 ply rating	6.50x10 - 10 ply rating
• MC	GCS17-25	18x8x12.12	16x5x10.5
	GCS27-30	18x9x12.12	16x6x10.5
	GPS20-25	7.00x12 - 14 ply rating	6.50x10 - 10 ply rating
	GPS27-30	28x9x15 - 14 ply rating	6.50x10 - 10 ply rating
• WC, I	GCS17-25	18x8x12.12	16x5x10.5
	GCS27-30	18x9x12.12	16x6x10.5
	GPS20-25	7.00x12 - 14 ply rating	6.50x10 - 10 ply rating
	GPS27-30	28x9x15 - 14 ply rating	6.50x10 - 10 ply rating
Tire Inflation Pressures:	GPS(X) 20-30 (all models)	Drive Tires: Steer Tires:	140 psi [965 kPa] 115 psi [792 kPa]

Engines

Engine Applications

Truck Model	Type	Engine Model	Cyls	Displacement
• MB, MC • GX, GPX	Gas/LPG	Mitsubishi 4G54	4	[2.6 L]156 cu in
• WC	Gas/LPG	Waukesha D176GA	4	[2.9 L]176 cu in
• I, GX-C, GPX-C	Gas/LPG/*Diesel	Continental TM27/*TMD27	4	[2.7 L]164 cu in

Engine Specifications

MITSUBISHI 4G54 [2.6 L]

Basic Specifications	
TYPE:	4-Cyl. In-Line, 4-Cycle, Water Cooled
FUEL:	Gasoline/LPG
VALVE ARRANGEMENT:	OHV, OHC
DISPLACEMENT:	[2.555 L] 156 cu in
BORE x STROKE:	[91,1 x 98 mm] 3.587 x 3.858 in
FIRING ORDER:	1-3-4-2
ROTATION:	RH viewed @ fan end
COMPRESSION RATIO:	8.2:1
Compression Pressure:	[979 kPa] 142 psi @ 250 rpm
No. PISTON RINGS:	3 (2 Compression, 1 Oil control)
NOMINAL RATED SAE POWER (Gasoline):	49 hp @ 2200 rpm
TORQUE (Gasoline):	[168 Nm] 124 lbf.ft. @ 1500 rpm
DRY WEIGHT:	[170 kg] 375 lb
ENGINE BALANCER:	After early 1987
CRANKCASE VENTILATION:	Integral closed PCV
Cooling System	Capacity: [8.5L] 9.0 qts
WATER PUMP:	Centrifugal type
THERMOSTAT:	Wax type, Start open [82°C] 180°F. Fully open [95°C] 203°F
FAN DRIVE RATIO:	1.4:1
Lubricating System	Pressure feed
OIL PUMP:	Trochoid (gerotor) type
Oil Relief Pressure:	[503-586 kPa] 73-85 psi
Oil Pressure Switch:	Actuates below [27 kPa] 4 psi
OIL FILTER:	Spin-on full-flow cartridge, By-pass valve opens at 14 psi
ENGINE OIL CAPACITY, w/Filter:	[4.5L] 4.8 qts
Fuel System	
CARBURETOR:	Downdraft, Low emission
Gasoline & LPG	
CHOKE:	Manual butterfly valve
GOVERNOR:	Air velocity type
FUEL PUMP:	Mechanical diaphragm type
Fuel Pump Flow:	[0.8 L] 1.7 pints per minute, min. @ 2000 rpm (engine)
Fuel Pump Pressure:	[31-41 kPa] 4.5-6.0 psi
FUEL FILTER:	In-line
VALVE TIMING: INT (Open) 25° BTDC, (Close) 55° BBDC	
EXH (Open) 62° BBDC, (Close) 14° BTDC	
VALVE CLEARANCE, Warm:	INT [0,15 mm] .006 in EXH [0,25 mm] .010 in
IGNITION TIMING: Gasoline	6° BTDC @ 500 rpm
IGNITION TIMING: LPG	9° BTDC @ 500 rpm
SPARK PLUG GAP:	[0,7-0,8 mm] .027-.031 in
Spark Plug Torque:	[24-30 Nm] 18-22 lbf.ft.
Spark Plug Type:	14 mm Gasoline 909377 LPG 909378
Ignition System- 2 Types in field use	
Type 1. Conventional contact breaker type distributor.	
DISTRIBUTOR:	Contact point type, w/condenser
Distributor Point Gap:	[0,45-0,55 mm] .018-.022 in.
Spark Advance:	Centrifugal and vacuum advance
Centrifugal Advance:	0-10° @ 500-2500 rpm
Vacuum Advance:	0-8.5° @ 8.7-17.7 inHg
Dwell Angle:	52° Nominal (49-55°)
Condenser Capacity:	0.27µF
Type 2. Non-contact (CEI system) distributor.	
DISTRIBUTOR:	Non-contact ignitor type
Ignitor air gap:	[0,8 mm] .031 in.
Spark Advance:	Centrifugal and vacuum advance
Centrifugal Advance:	0-11° @ 500-2500 rpm
Vacuum Advance:	0-8.5° @ 3.5-17.7 inHg
Dwell Angle:	52° Nominal (49-55°)
Condenser Capacity:	0.27µF
Engine Speed Settings	
Idle Speed:	650 rpm (600-700 rpm)
No Load Governed Speed:	2600 rpm (2550-2650 rpm)
Reference Engine Speeds (Typical values)	
Converter Stall:	2050-2250 rpm (Gasoline) 2000-2200 rpm (LPG)
Tilt Bypass:	2450-2550 rpm
Engine Vacuum Readings (Typical values)	
Idle:	17-19 inHg
No Load Gov Speed:	13-15 inHg
Stall:	2.0-3.5 inHg
Locked Stator @ No Load Gov RPM	8-10 inHg
Tilt Bypass:	4-6 inHg