

Service Manual

EP16KT, EP18KT, EP20KT Chassis, Mast & Controller

EP16KT	ETB4A-00001-99999 (48 V)
EP18KT	ETB5A-00001-49999 (48 V)
EP20KT	ETB5A-50001-99999 (48 V)

AC

Product: Caterpillar EP16KT, EP18KT, EP20KT Chassis, Mast & Controller Forklifts Service Repair Workshop Manual(99719-68110)
Full Download: <https://www.arepairmanual.com/downloads/caterpillar-ep16kt-ep18kt-ep20kt-chassis-mast-controller-forklifts-service-repair-workshop-manual99719-68110/>

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FOREWORD

This service manual is a guide to servicing of Caterpillar Lift Trucks. The instructions are grouped by systems to serve the convenience of your ready reference.

Long productive life of your lift trucks depends to a great extent on correct servicing — the servicing consistent with what you will learn from this service manual. We hope you read the respective sections of this manual carefully and know all the components you will work on before attempting to start a test, repair or rebuild job.

The descriptions, illustrations and specifications contained in this manual were of the trucks of serial numbers in effect at the time it was approved for printing. Caterpillar reserves the right to change specifications or design without notice and without incurring obligation.

Safety Related Signs

The following safety related signs are used in this service manual to emphasize important and critical instructions:

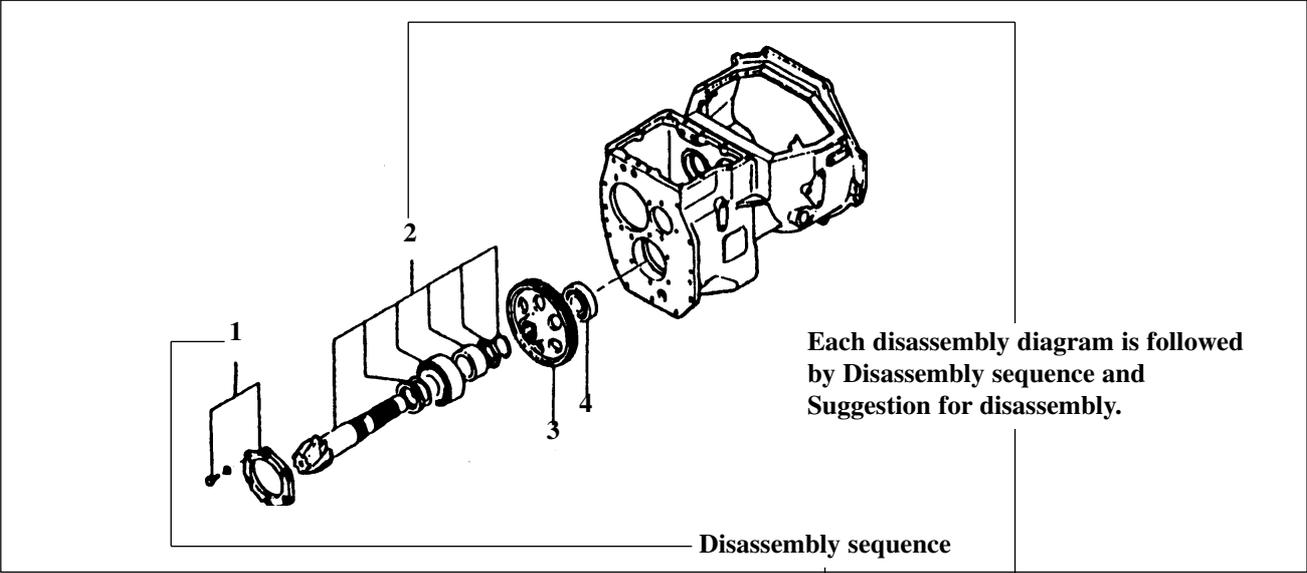
 **WARNING** Indicates a specific potential hazard resulting in serious bodily injury or death.

 **CAUTION** Indicates a specific potential hazard resulting in bodily injury, or damage to, or destruction of, the machine.

 **NOTE** Indicates a condition that can cause damage to, or shorten service life of, the machine.

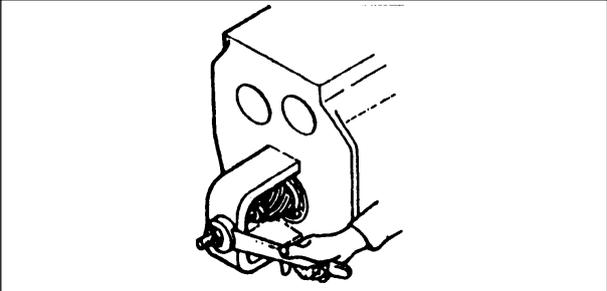
HOW TO READ THIS MANUAL

Disassembly diagram (example)



- 1 Cover, Bolt, Washer (part name)
- 2 Output shaft (part name)

Suggestion for disassembly
 (1) Output shaft removal



Unit: mm (in.)

Clearance between cylinder and piston	A	0.020 to 0.105 (0.00079 to 0.00413)
	B	0.15 (0.0059)

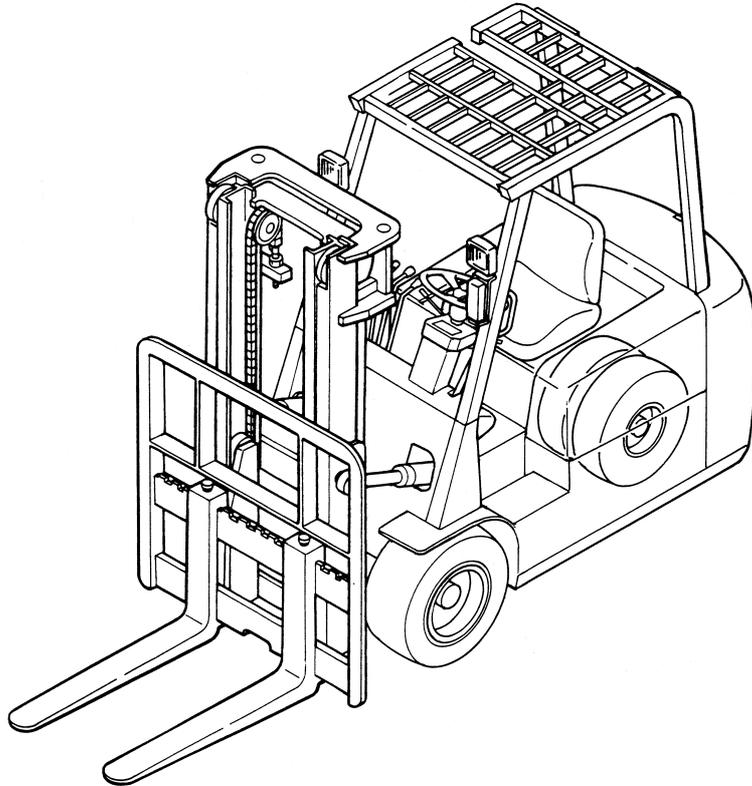
A: Assembly standard
 B: Repair or service limit

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Vehicle Exterior

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Models

This manual applies to EP16KT, EP18KT, and EP20KT.

Truck Model	Serial Number
EP16KT	EFB4A-00011-up (48 V)
EP18KT	EFB5A-00011-up (48 V)
EP20KT	EFB5A-50001-up (48 V)

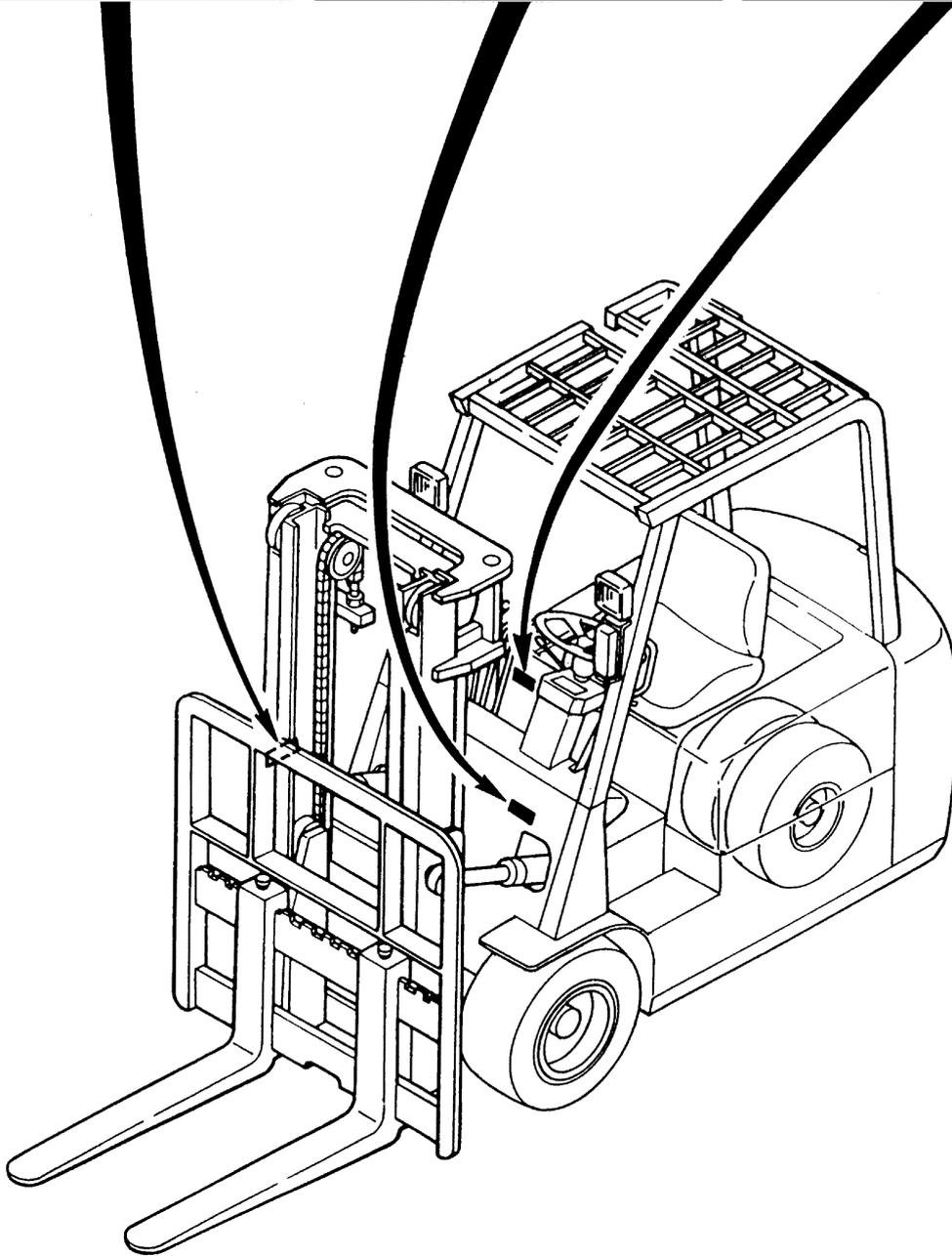
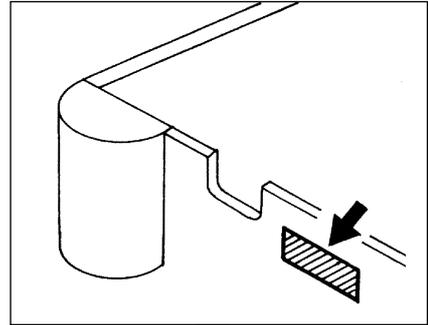
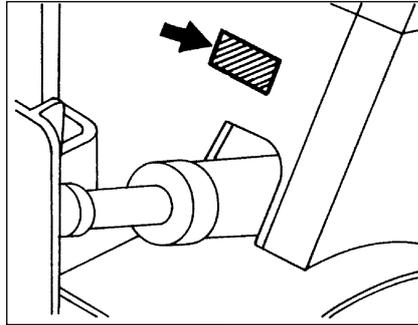
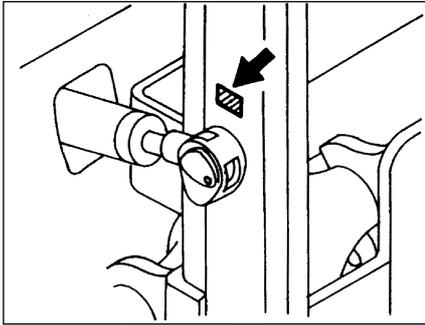
GENERAL INFORMATION

Vehicle Number Stamping Positions

Mast number

Nameplate

Chassis number

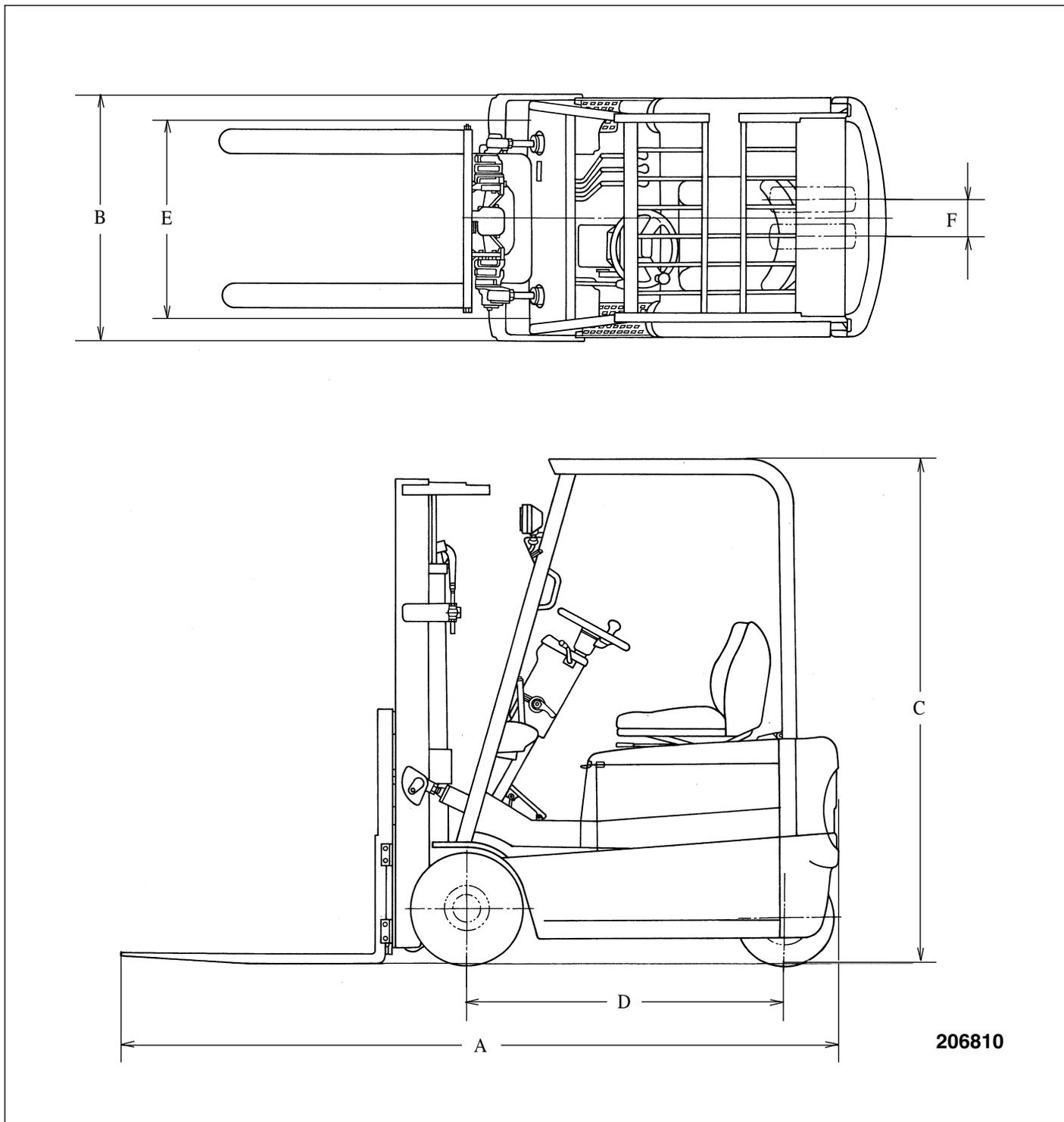


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MEMO

A large empty rectangular box with a thin black border, intended for writing a memo.

External Specifications



Technical Data

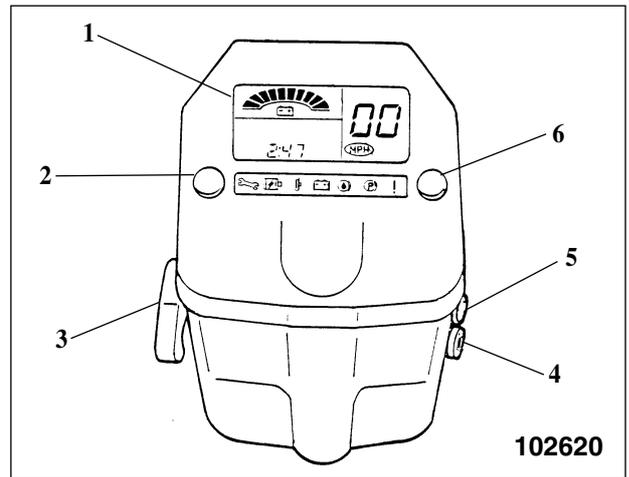
Truck Models		EP16KT	EP18KT	EP20KT
Class		1.6t	1.8t	2.0t
Load Capacity/Load Center	N (kgf)/mm [lbf/in.]	15680 (1600)/500 [3000/24]	17640 (1800)/500 [3500/24]	19600 (2000)/500 [4000/24]
Truck size Length to Fork Face	A mm (in.)	1897 (78.2)	1997 (78.6)	
Width for MCFE (w/SE tire)	B mm (in.)	1100 (43.3)	1100 (43.3)	1168 (46)
for MCFA (w/cushion tire)	mm (in.)	1080 (42.5)	1080 (42.5)	1080 (42.5)
Height of Overhead Guard	C mm (in.)	2040 (80.3)	2040 (80.3)	2040 (80.3)
Wheelbase	D mm (in.)	1310 (51.6)	1410 (55.5)	1410 (55.5)
Service Weight (W/O Battery)	kg (lb)	2164 (4769)	2324 (5122)	2344 (5166)
Tread Front/Rear	E/F mm (in.)	913/170 (35.9/6.7)	913/170 (35.9/6.7)	947/170 (37.3/6.7)
Tires Number Front/Rear		2/2	2/2	2/2
Tires Size Front		18 × 7.8	18 × 7.8	200/50-10
Rear		15 × 4.5-8	15 × 4.5-8	15 × 4.5-8
Turning Radius	mm (in.)	1530 (60.2)	1630 (64.2)	1665 (65.6)
Travel Speeds Unloaded/Loaded	km/h (mph)	16/14 (10/8.7)	16/14 (10/8.7)	16/14 (10/8.7)
Gradeability Loaded	%	19	17	15
Lift Speeds Loaded	m (in.)/sec	0.42 (16.5)	0.41 (16.1)	0.4 (15.7)
Battery Voltage	V	48	48	48
Battery Rated Capacity (5 hrs.) MAX	Ah	600	720	720
Battery Compartment Length × Width × Height	mm (in.)	531 × 1016 × 650 (20.9 × 40 × 25.6)	634 × 1016 × 650 (25 × 40 × 25.6)	634 × 1016 × 650 (25 × 40 × 25.6)
Traction Motor, 60 min rating	kW	2 × 4.5	2 × 4.5	2 × 4.5
Hydraulic Motor	kW	11.5	11.5	11.5
Traction Motor Control Method		IGBT/MOSFET	IGBT/MOSFET	IGBT/MOSFET
Hydraulic Motor Control Method		IGBT/MOSFET	IGBT/MOSFET	IGBT/MOSFET

VEHICLE ELECTRICAL COMPONENTS

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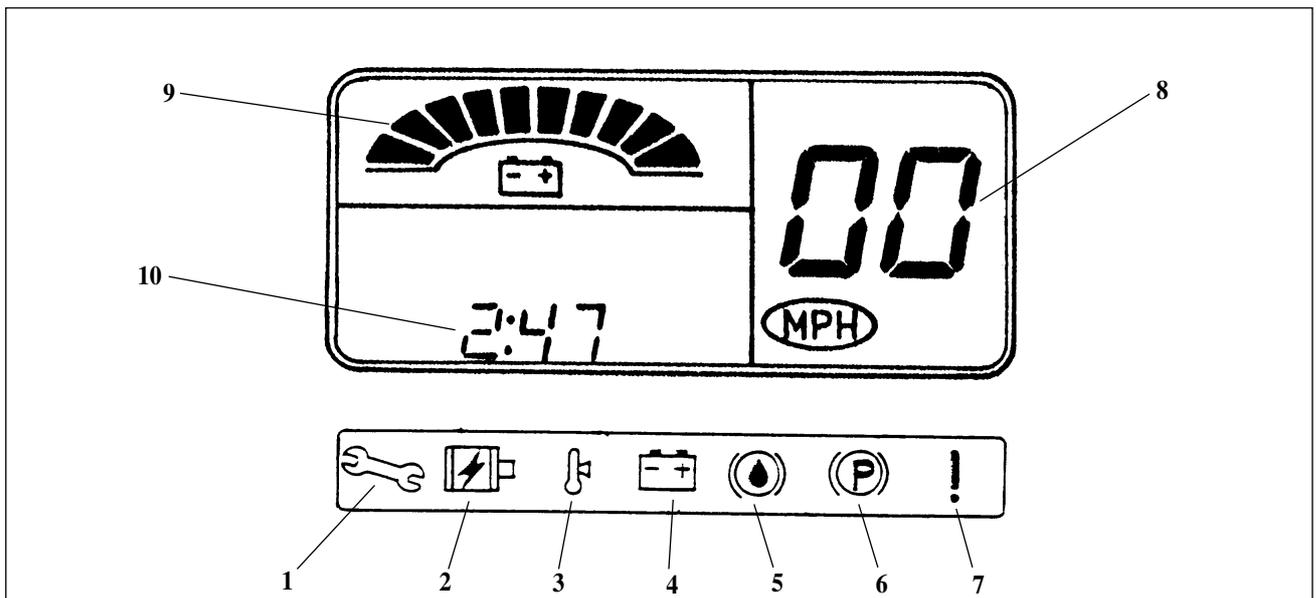
Console Box

- 1 Central vehicle monitor system (CVMS)
- 2 Mode selector button
- 3 Tilt steering lock lever
- 4 Key switch
- 5 Light switch
- 6 Mode check button



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Functions of Central Vehicle Monitor System (CVMS)



Operations

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No.	Monitor name	When OFF	When ON or flashing	Remarks
1	Service indicator	Starts flashing 20 hours before set time. Remains ON when set time is reached.		
2	Worn motor brush lamp	Drive motor and pump motor brushes in operable condition	Worn brushes	After brushes are replaced, lamp turns OFF.
3	Controller/motor overheat lamp	Controller, drive motors and pump motor in normal temperature	Overheat	Overheat causes significant output loss. When component temperature lowers to normal level, output power returns.
4	Remaining battery charge warning lamp	Normal battery condition	Flashing indicates battery need to be recharged soon. ON indicates battery needs to be recharged and lifting function inoperable.	
5	Brake fluid level lamp	Normal fluid level	Low fluid level	

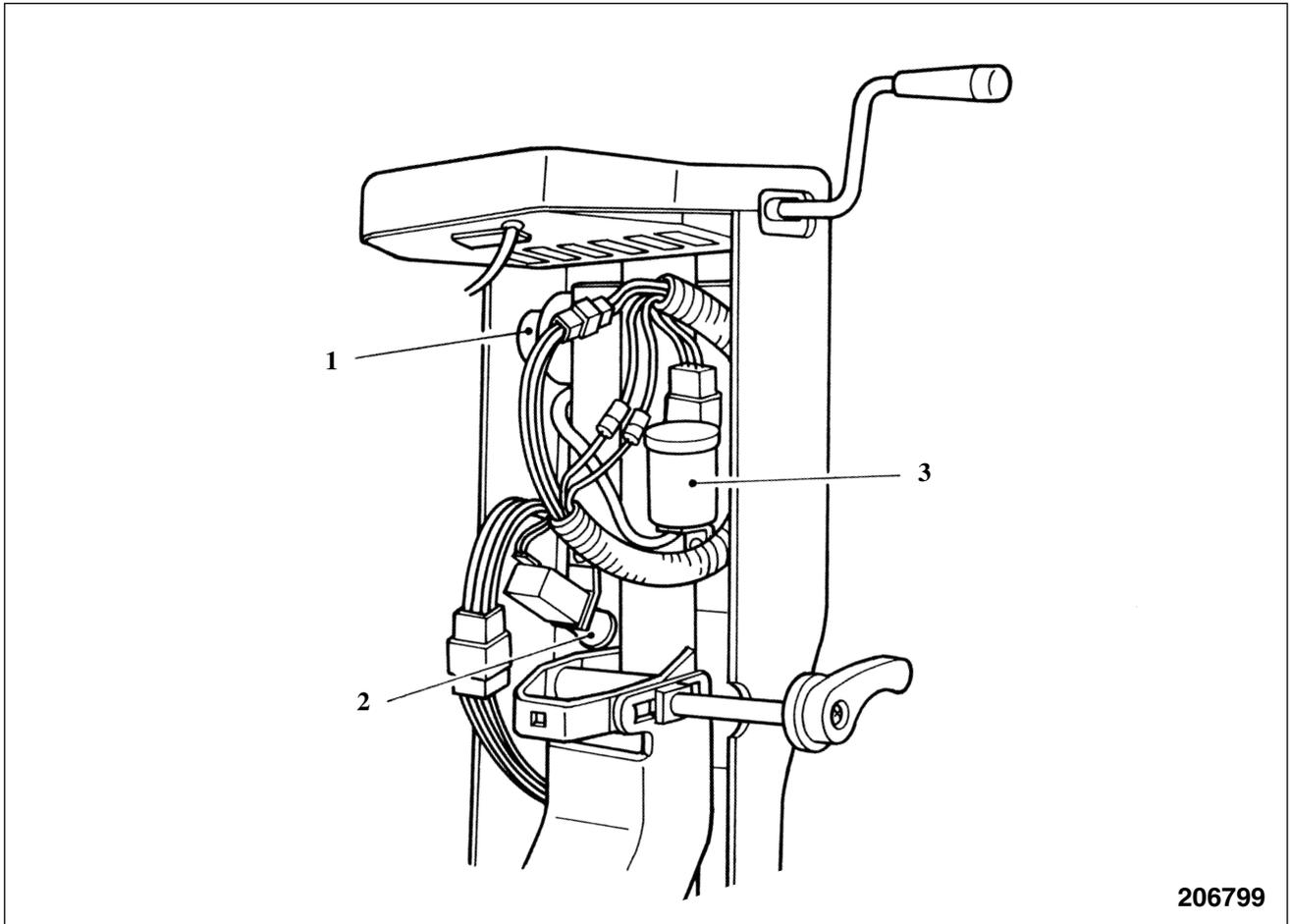
VEHICLE ELECTRICAL COMPONENTS

6	Parking lamp	Parking brake engaged	Parking brake disengaged	
7	Malfunction lamp	Normal	Vehicle malfunction	
8	Speedometer	KPH, MPH		
	Error indicator			
9	Battery discharge indicator			Indicates remaining battery power.
10	Hour meter	<p style="margin-left: 100px;"> 1 2 3 4 5 </p> <p style="margin-left: 100px;"> Advances every 0.1 hour (Number advances every 6 minutes.) Hour indication </p>		

Error indicator

Indication	Condition
E 	When key switch is set to [ON] with forward/reverse lever in [F] or [R] position. Turns OFF when the lever is set to [N].
E 0 ON	Right drive motor overheat
E 1 ON	Left drive motor overheat
E 2 ON	Pump motor overheat
E 3 ON	Controller overheat
E 4 ON	Worn right drive motor brush
E 5 ON	Worn left drive motor brush
E 6 ON	Worn pump motor brush
H 1 ON	Faulty setting of lift lever
H 2 ON	Faulty setting of tilt lever
H 3 ON	Faulty setting of attach-1 lever
H 4 ON	Faulty setting of attach-1 lever (Option)

Electric Components in Console Box

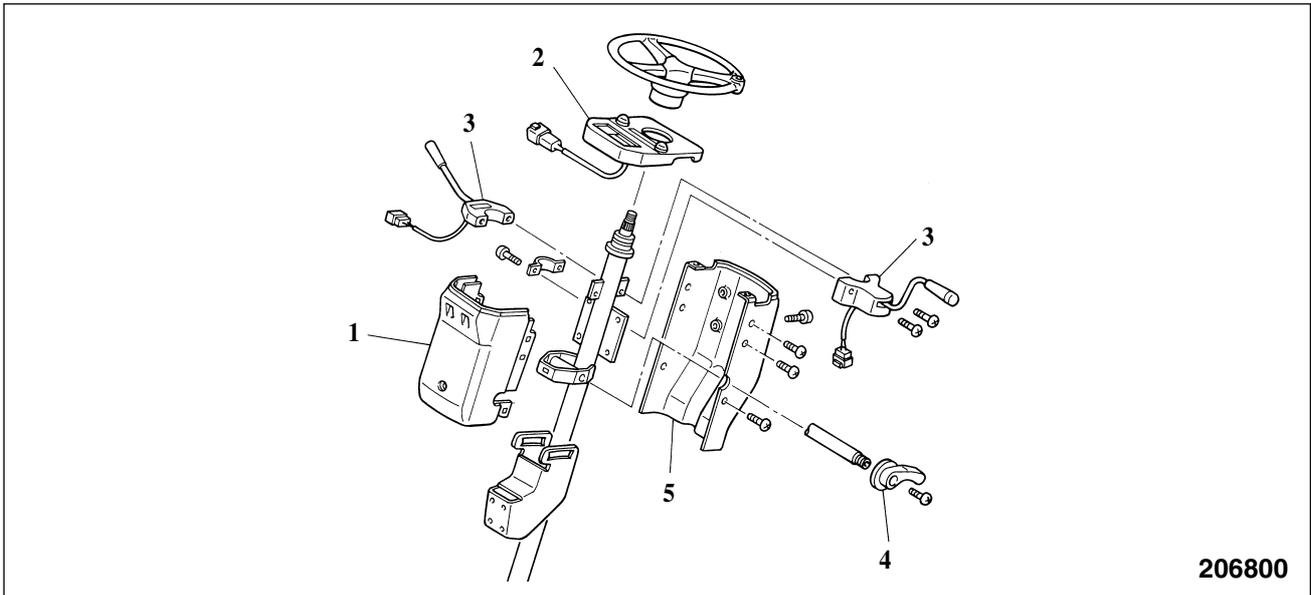


- 1 Key switch
- 2 Light switch

- 3 Flash relay

Disassembly and Assembly

Disassembly

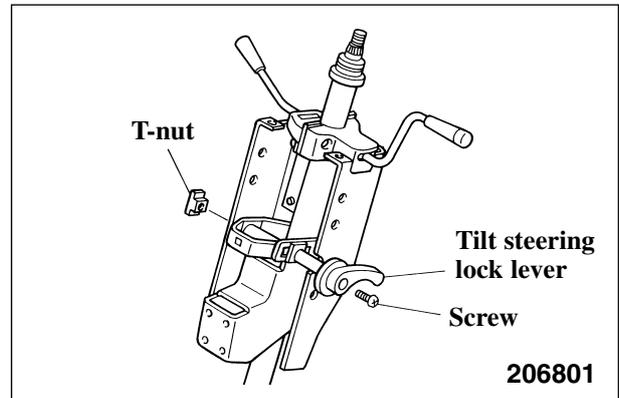


Sequence

- 1 Console box (front panel)
- 2 Central vehicle monitor panel
- 3 Turn signal switch, forward/reverse lever
- 4 Tilt steering lock lever
- 5 Console box (rear panel)

Disassembly procedure

- (1) Remove the front panel and monitor panel from the console box.
- (2) Disconnect the harness connectors of the horn, turn signal switch and forward/reverse lever.
- (3) Remove the screw from the tilt steering lock lever, and remove the lever from the rear panel of the console box.
- (4) Remove the rear panel.

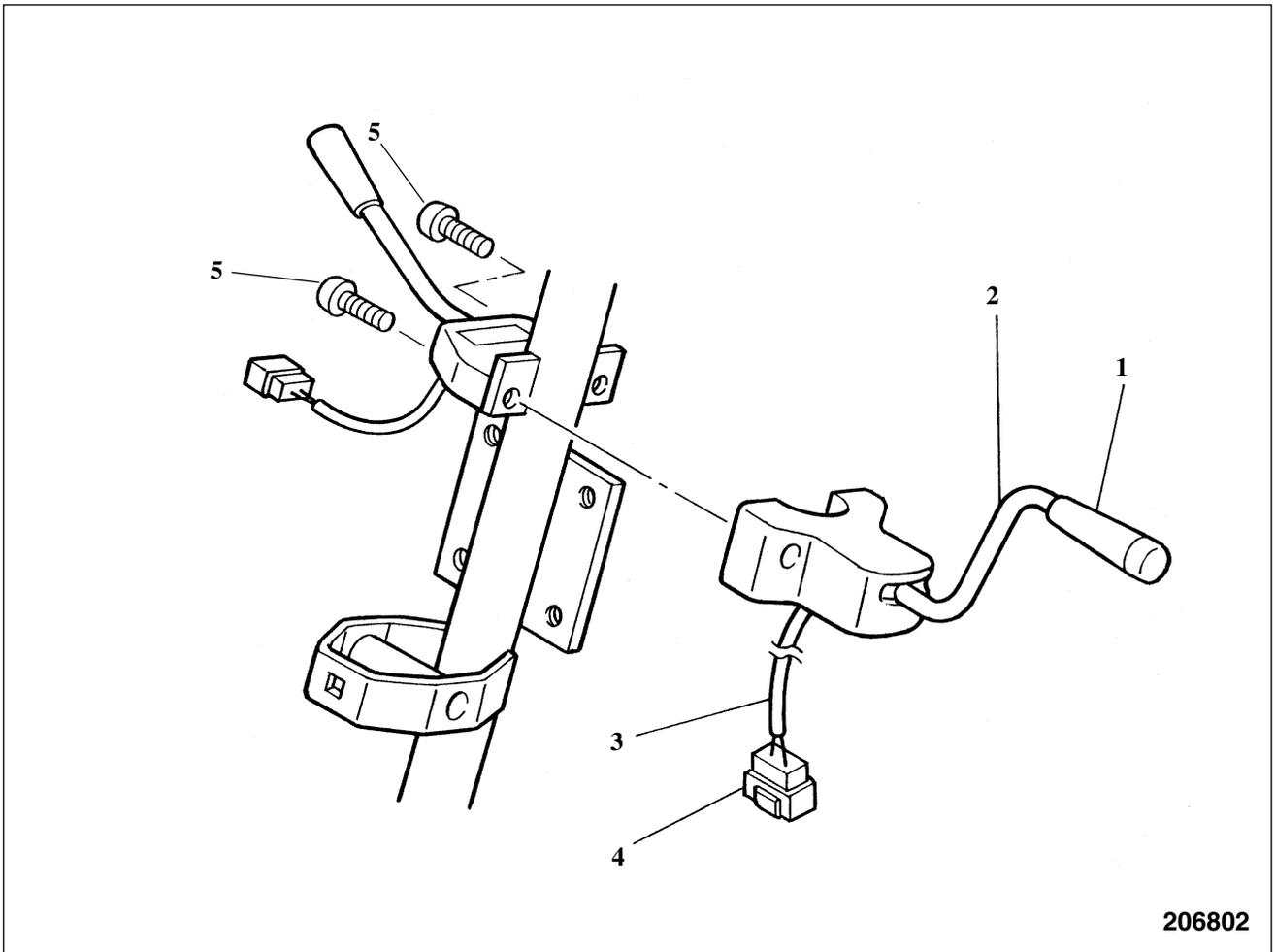


Assembly

Follow the disassembly procedure in reverse.

Forward/Reverse Lever

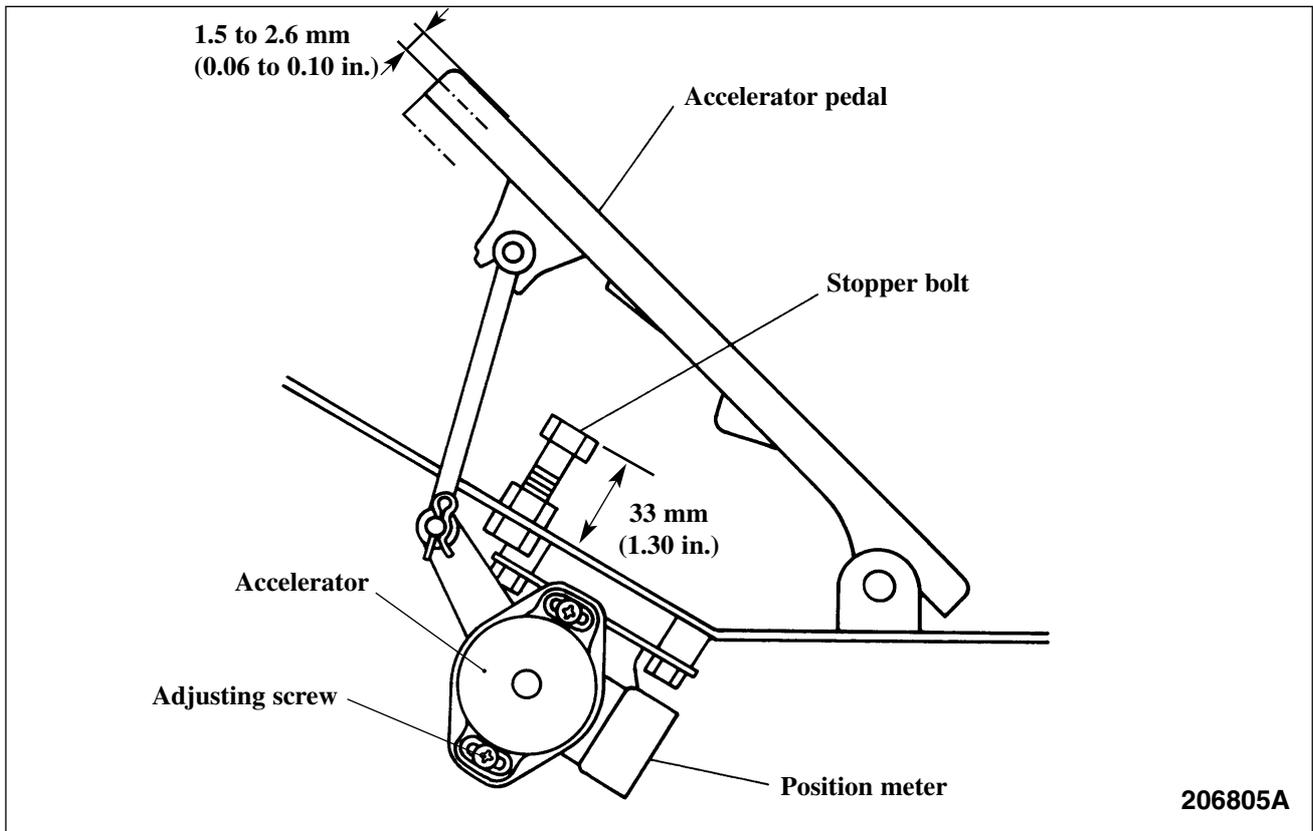
Structure



- 1 Knob
- 2 Lever
- 3 Harness

- 4 Connector
- 5 Screw

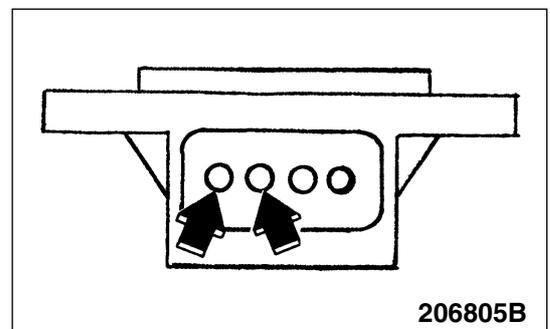
Accelerator Control



Adjustment procedure

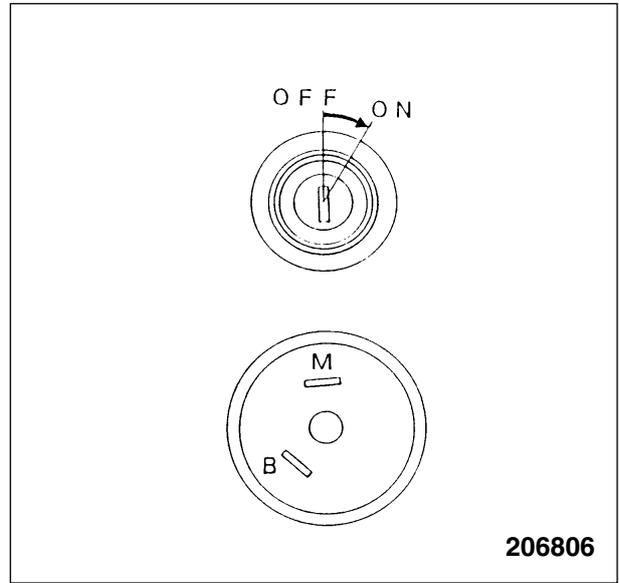
- (1) Disconnect the battery plug.
- (2) Fix the stopper bolt to 33 mm (1.30 in.) from the floor to the upper face of bolt.
- (3) Adjust the mounting angle of the position meter using the adjusting screw so the switch inside the position meter turns on when the accelerator pedal is depressed 1.5 to 2.6 mm (0.06 to 0.10 in.).

Make sure the inside switch ON by continuity between two arrow terminals using a tester.



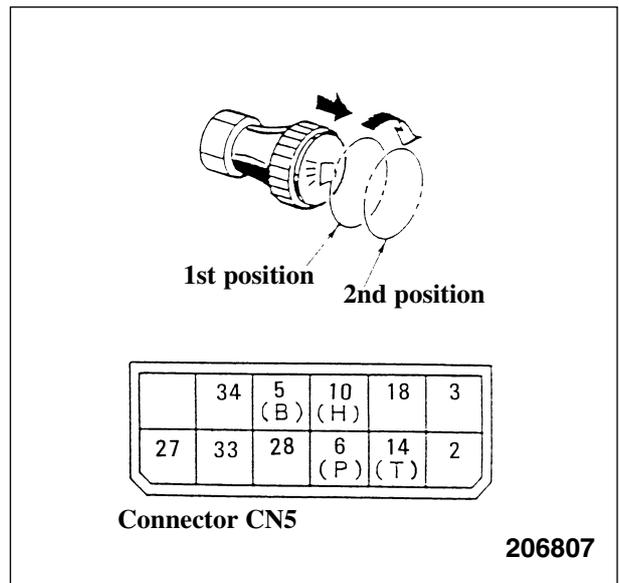
Key Switch

Terminal	B	M
Connection destination	Main fuse Battery	Logic card
OFF	○	
ON	○ —	○ —

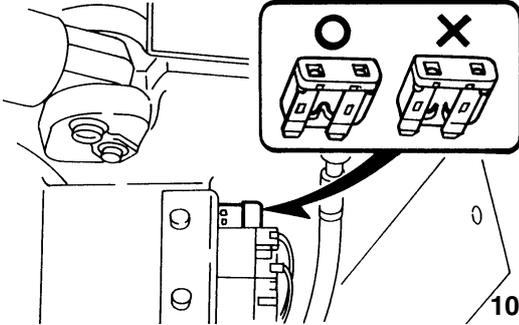


Light Switch

Terminal	B	T	P	H
Connection destination	Battery	Tail, stop and license lamps	Clearance lamps	Head lamps
1st position	○ —	○ —	○ —	
	Twist ○ —			○ —
2nd position	○ —	○ —	○ —	○ —
	Twist ○ —			○ —



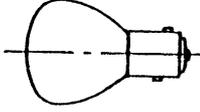
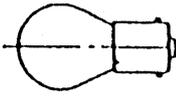
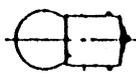
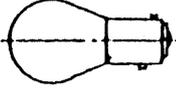
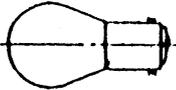
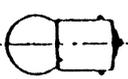
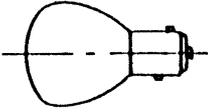
Fuses

Capacity (A)	Location	Main connecting device	
80	Main controller	Battery	Refer to main controller section
500			
325		Loading hydraulic motor	
15	Fuse holder	Electric parts	
10		Controller	

NOTE

Refer to Parts Manual for proper replacement fuses.

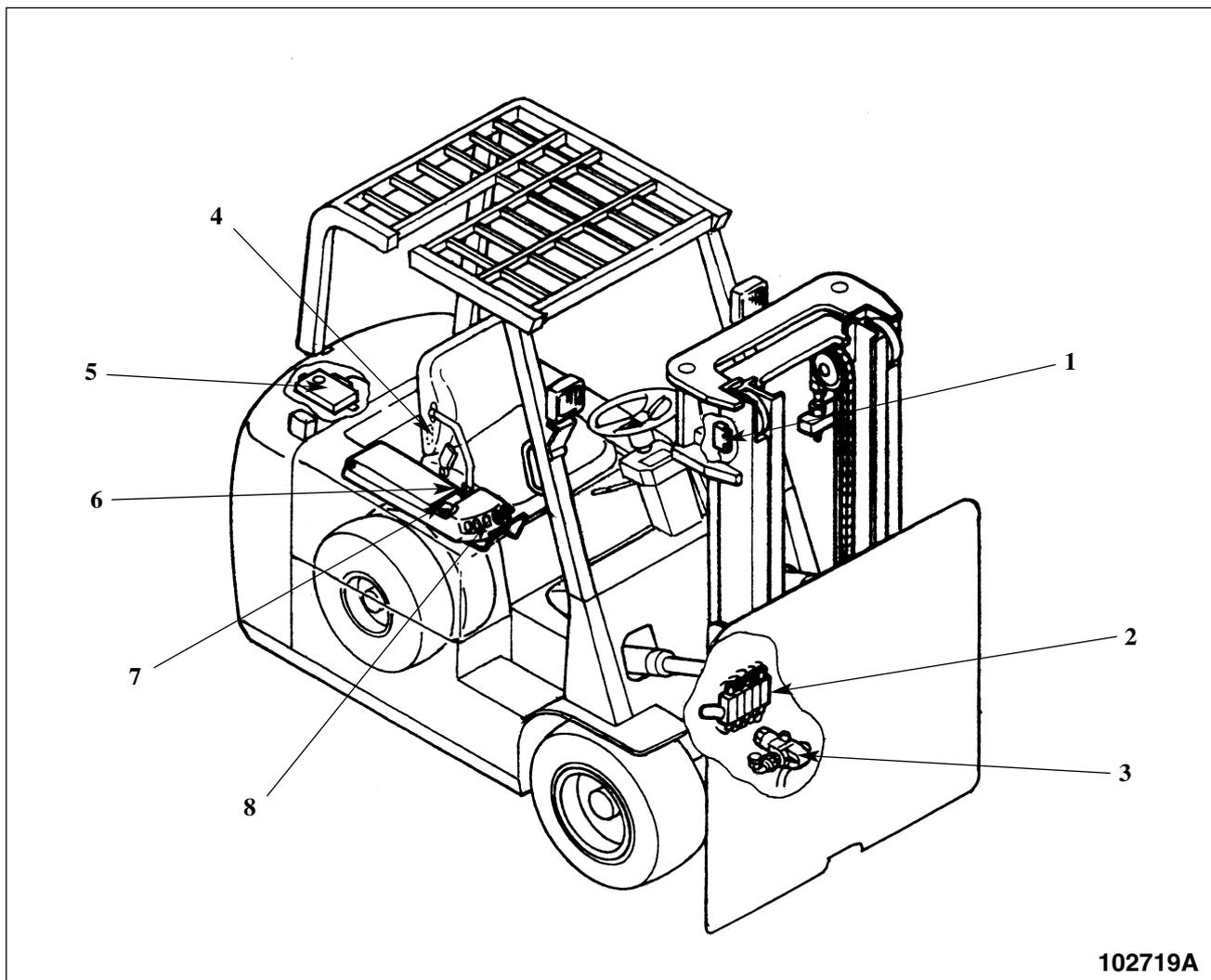
Lamp Specification Chart

Lamp \ Item		Quantity	Bulb color	Bulb		Remarks
				48 V	External diagram	
Head lamps		2	Clear	40 W		
Combination lamps (front)	Turn signal lamps	2	Orange	25 W		
	Clearance lamps	2	Clear	10 W		
Combination lamps (rear)	Stop lamps and tail lamps	2	Red	25 W/10 W		
	Turn signal lamps	2	Orange	25 W		
	Backup lamps	2	Clear	10 W		
Rear lamp		1	Clear	40 W		

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AC (Advanced Control System)

Nomenclature



- | | |
|---|---|
| 1 Full free switch (for full free mast) | 5 Controller |
| 2 Solenoid-actuated control valve | 6 Lowering speed selector switch |
| 3 Flow regulator valve | 7 Safety switch |
| 4 Seat switch | 8 Joystick levers (finger-control system) |

Maintenance Precautions

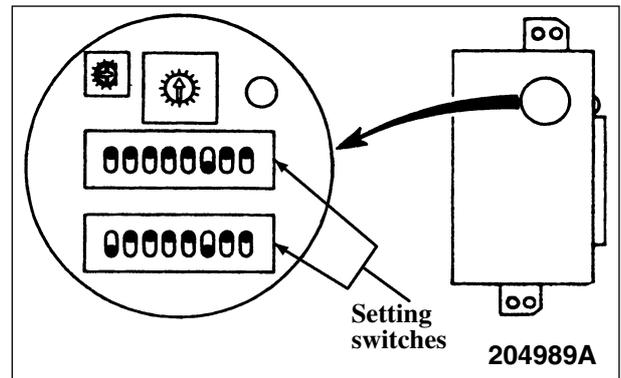
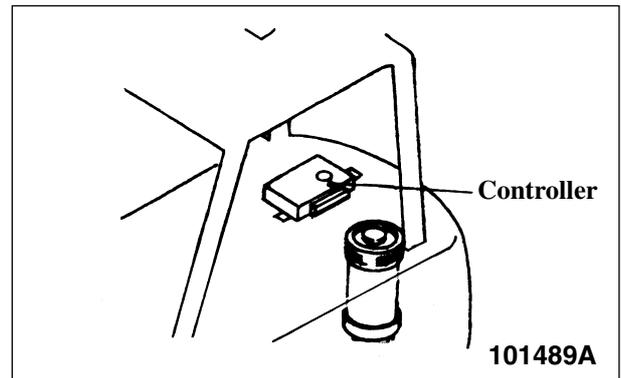
The AC model contains a microcomputer. Following are the precautions to be observed in performing any maintenance on the AC model.

- (1) When removing the controller cover, make proper provisions to keep out rain, washing water splashes and the like.
- (2) After using the controller setting switch, check to make sure the control system is in keeping with the truck specifications.

NOTE

Improper setting of the system will result in inability to lower the forks in an inching manner. (See "How to Set Controller.")

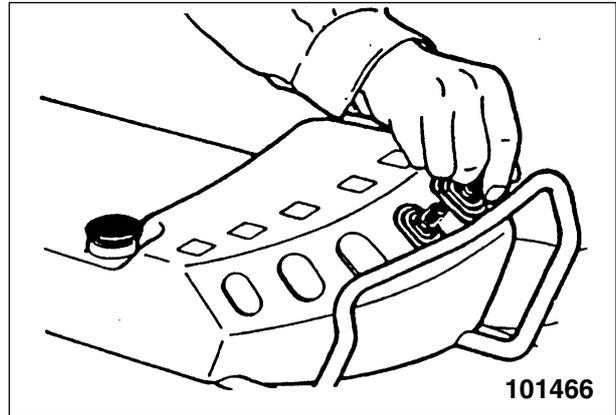
- (3) Before performing repairs which require welding, be sure to disconnect the battery plug and the controller from the system at its connectors.
- (4) When handling the controller by hand, never touch its electrical terminals, or your body charge will rupture some of the electronic elements in the internal controller circuits.



Description

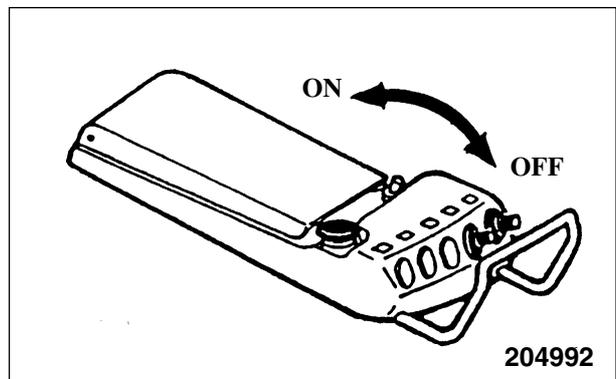
1. Finger-control system

This system, unlike the conventional mechanical control, is electronically actuated to reduce the effort required of the operator in moving the control levers for lift, tilt and attachment functions.



- (1) In the full free masts, more oil returns from the 1st lift cylinder than from the 2nd lift cylinders to allow the 1st lift cylinder to retract faster in order to add to productivity.
- (2) The lowering speed selector switch insures smooth fork and mast movement no matter how abruptly the operator may move the control levers. This switch is ideal for handling of fragile loads.

ON: 350 mm/s (69 fpm)
OFF: 500 mm/s (98 fpm)



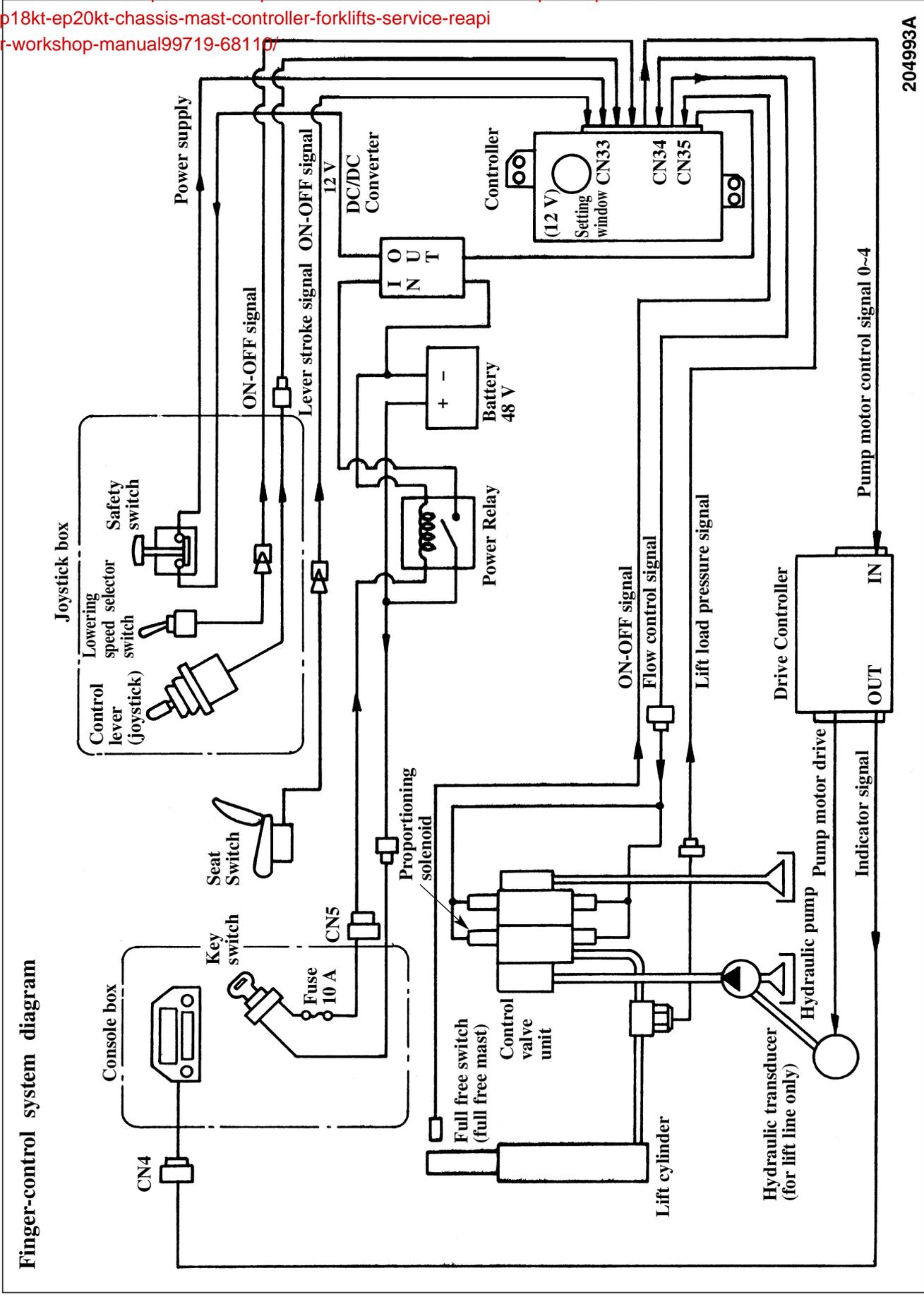
(3) This system provides the following safety functions:

- | | |
|--|---|
| <ul style="list-style-type: none"> (a) The lift, tilt and attachment functions are not performed even if the control levers are moved when the Pump Motor is not running. (b) The lift, tilt and attachment functions are not performed even if the control levers are moved when the safety switch is in ON (pushed) position. (c) The lift, tilt and attachment functions are | <ul style="list-style-type: none"> not performed even if the control levers are moved when the seat switch is not ON (the operator is not seated). (d) The system indicator light ! in the LED section alerts the operator to problems occurring in the electrical system and, at the same time, stops function. (If any problem occurs in the lift system, for example, the system becomes inoperative.) |
|--|---|

Operating Principles

1. Finger-control system

- (1) The system is activated by turning ON the safety switch (when the engine is running and the seat switch is ON (when the operator is seated).
- (2) As the control levers (joysticks) are moved to operate the equipment (mast and forks), the amount of lever movement will be translated into an electrical signal: this signal goes into the controller, in which it is converted to output signal. At this point the controller issues an ON signal to the unload solenoid, thereby turning ON this solenoid to introduce hydraulic pressure into the control valve. The system is now ready to actuate the equipment. The output signal applies to the proportioning solenoid selected by the direction of the joystick movement. Inside the control valve of that solenoid, its spool is forced to slide, altering the internal oil passage to direct the oil to the corresponding cylinders. The spool keeps on sliding until it comes to the position at which the pressure of its pilot chamber becomes equal to the force of its centering spring. In the meantime, the cylinder extends or retracts against its load. As the joy stick is moved back to its neutral position, the signal to the proportioning solenoid dies to lower the pilot chamber pressure and allow the centering spring to push the spool to its neutral position, whereby the line to the cylinder becomes shut off: the pressure in the line is now trapped, holding the cylinder there. At the same time, the ON signal to the unload solenoid goes OFF, so that the part of the system actuating the equipment goes into no-load state.
- (3) If the lowering speed selector switch is turned ON, the effect of a change in lever stroke signal upon the output signal is retarded. Thus, with this switch turned ON, the equipment will not move quickly even if the lever is moved quickly.
- (4) Power supply to the controller is initiated from the Power Relay through a 10-Amp fuse and safety switch. Pressing this switch into OFF position shuts down the controller without shutting down the Main Controller.
- (5) With the starter switch and safety switch turned ON, the proportioning solenoid are under control of the joysticks. With the Pump Motor shut down (and hence the hydraulic pump standing still), the spools in the control valves are inoperative because no pressure develops in their pilot chambers. Consequently, the equipment remains inoperative even when the starter switch and safety switch are turned ON.



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